

An Exploration of Unconscious Operations and Group Mentalities in Mathematics Lessons in a Secondary State School in England

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Abstract

This study employs an object relations psychoanalytic framework to examine occurrences of unpredictable and disruptive episodes in mathematics lessons involving a sample of pupils aged 12-16 with a broad range of mathematical attainment and sociocultural backgrounds.

Data were collected over a three-year period by participant observation. I engaged in ongoing psychoanalytically-informed reflection as I recorded field notes of my teaching and carried out pupil interviews. Data were analysed using a methodology derived from Klein's basic principles of object relations theory and the extensions to Klein's theory formulated by Bion in his observations of groups. The results relate to formal and informal classroom interactions at individual, subset and whole class levels and are presented in a format informed by autoethnography.

The findings generate new knowledge concerning the unconscious aspects of my beliefs and actions associated with teaching, the relationships I developed with pupils, and pupils' expressions of affect as they participated in my mathematics lessons. Teacher-pupil relationships incorporated many of the anxieties, defence mechanisms and emotions highlighted in Klein's conceptualisation of the mother-infant relationship. Pupil learning and attainment were shaped by individual expressions of defence mechanisms and the manifestation of subset and whole group mentalities that emerged as collective defensive responses to various anxiety determinants. The efficacy of the co-construction of mathematical knowledge seemed to be mediated by the unconscious operation of projective identification and dependent on the extent to which I was able to contain pupils' anxieties and gratify their needs for love and affection.

Declaration and Word Count

I hereby declare that, except where explicit attribution is made, the work presented in this thesis is entirely my own.

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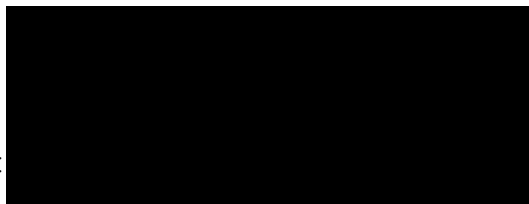


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Glossary of terms used in British schools

Academy: A school which receives its funding directly from the government and is therefore directly accountable to the Department of Education rather than a local authority.

Advanced Skills Teacher (AST): A teacher who has been deemed to have demonstrated excellent teaching practice against a range of criteria and is paid an additional stipend to support the teaching practices of colleagues.

Advanced level (A-level) examinations: Subject-based secondary school leaving qualifications taken by Year 13 students (typically when aged 18 years) in England, Wales, Northern Ireland, some Scottish schools and some other countries.

Assessing Pupils' Progress (APP) Tests: Assessments materials that were developed by the Department of Education between 1999 and 2009 for all key stages as a part of the National Strategies resource bank.

C1/C2/C3 disciplinary system: A system of behavior management in which pupils who repeatedly disrupt lessons are given sanctions of increasing severity. While the system is applied differently by individual schools, a pupil who incurs a C3 is typically removed from the classroom and obliged to participate in a series of detentions and restorative meetings with the classroom teacher, Head of Department and other members of staff.

Cognitive Abilities Tests (CATs): Assessments that are used by schools to assess pupils' overall intelligence.

Edexcel: A multinational education and examination body, owned by Pearson, which sets GCSEs, A-levels and other qualifications.

English Baccalaureate (EBacc): A performance measure based on Key Stage 4 pupils' performance in a subject grouping consisting of English, mathematics, geography or history, a science and a modern foreign language.

Fischer Family Trust (FFT): A registered charity that supports educational research and provides packages to schools and local authorities which analyse school performance.

General Certificate of Secondary Education (GCSE) examinations: A set of exams taken by Year 11 students in England, Wales, Northern Ireland, some Scottish schools and some other countries after two years of study.

Gifted and Talented (G & T): A designation for students who have shown evidence of high performance capability in academic, creative or leadership fields and are deemed to require services or activities not offered routinely in schools.

Head of Department: A teacher who is responsible for leading the development of a specific subject area and managing the teaching staff and financial resources allotted to that area.

Head of Year: A teacher who is responsible for overseeing the learning progress and behavior of all pupils within a single year group.

Higher Tier GCSE paper: An examination component that is targeted at grades A to C.

In-Service Training (INSET): A series of five days in an academic year, introduced along with the National Curriculum in 1988, on which schools are closed to pupils but teachers attend school to engage in training and complete administrative tasks.

Jesson band: A statistical analysis of pupil performance using value-added data that is carried out by schools for the purpose of self-evaluation.

Key Stage: Age-dependent phases of the state education system that were first defined in the 1988 Education Reform Act which implemented the National Curriculum. Primary education is divided into Key Stage 1 (Years 1 & 2) and Key Stage 2 (Years 3 – 6). Secondary education is divided in Key Stage 3 (Years 7 – 9) and Key Stage 4 (Years 10 & 11). Key Stages 0 and 5 have no legal definition but are used to denote pre-school and Years 12 & 13 (A-level and other post-16 courses).

Level: A measure of pupil learning attainment in English, mathematics and science concerning the subject knowledge and skills covered in Years 1 to 9 (Levels 1 – 8) that was introduced in 1988 with the implementation of the National Curriculum and abolished in 2016 when GCSE and A-level examinations were revised.

Matrix: A software program used by Senior Leadership Teams and educational consultants to monitor pupil learning progress and compare teacher performance across school departments.

Newly Qualified Teacher (NQT): A teacher who has gained Qualified Teacher Status but has not yet completed the statutory twelve-month programme known as ‘induction for newly qualified teachers’.

Notice to Improve: A judgement given as a result of an OFSTED inspection under Section 8 of the Education Act 2005, in which a school is deemed to be failing to provide an acceptable standard of education but to possess the capacity to improve.

Office for Standards in Education, Children's Services and Skills (OFSTED): A non-ministerial government department that inspects and regulates institutions in England which provide education to learners of all ages and care for children and young people.

Oxford, Cambridge and RSA (OCR) Examinations: An examination board that sets GCSEs, A-levels and other qualifications.

Partners in Excellence (PiXL): A not-for-profit partnership of over 1600 secondary schools, 500 sixth forms, 800 primary schools and 75 providers of alternative education which share best practice regarding teaching resources and assessment strategies.

Principal: The head teacher of a school.

RAISEonline data: An online tool commissioned jointly by OFSTED and the Department for Children, Schools and Families (now the Department for Education) to provide a common set of analyses for schools, inspection teams and others for self-evaluation.

School Action: A category of educational support available for children with special educational needs.

School Action Plus: A category of educational support available for children with special educational needs where there is evidence that a child will not make progress until a specific action is taken.

School Information Management System (SIMS): The computerised student information system used in 80% of British primary and secondary schools.

Schools Direct: A school-led, salaried teacher training programme that is offered in primary and secondary schools across England.

Senior Leadership Team: The group of individuals that is responsible for the overall leadership and management of a school. Each member of the team has a specific responsibility to manage a group of academic departments and other staff teams.

Special Measures: A status applied to schools which are deemed to fall short of acceptable standards. Schools in special measures are required to produce an action statement for improvement and are inspected several times over a two-year period.

Teach First: A social enterprise scheme which aims to address educational disadvantage in England and Wales by recruiting graduates of British universities to achieve Qualified Teacher Status by working for two years in schools while completing a Post Graduate Certificate of Education (PGCE) course.

1 Introduction

1.1 Impetus for research

In 1998, I began teaching science and mathematics in an inner city comprehensive that had recently been put into Special Measures and was summarily engulfed by the ‘panoptic performativity’ mind-set, in which a regime of frequent inspections and the sense of being under perpetual surveillance had driven my new colleagues, some of whom had decades of experience, to perform in ways dictated specifically by the discourse of inspection to escape the rigours of the regime (Perryman, 2006, p.148). I was given to understand by the fervent, newly assembled Senior Leadership Team that the teaching staff could be divided neatly into two groups: there were the “winners”, who had the physical and mental stamina to espouse the “transparency” of modern performance management methods and drive the school into a respectable position in the school league tables, and there were the “losers”, were those who were either “past it” or “burnt out” and would have to bail out of the profession. Any teacher who wished to “survive” would have to accept that she was going to be judged continually with respect to the Office for Standards in Education, Children’s Services and Skills (OFSTED) criteria which governed the delivery of lessons, pupil attainment and key characteristics of effective schools.

I ended up by staying at the school for seven years as its performance indicators improved and its ethos evolved incrementally into something like a corporate entity. But I could never bring myself to believe that the teachers who either left or were forced out during that time were ‘past it’: many were dedicated, highly knowledgeable professionals with solid track records of pupil attainment, who simply found it either too difficult or undesirable to transform the complex business of teaching and learning into a streamlined process that could be monitored and targeted in the way that was required. And I remained

unconvinced than any teacher, even an ‘outstanding’ one, could be always be a ‘winner’. My own classroom performance, along with my thoughts about teaching and my long-term viability in the profession, fluctuated dramatically according to what was happening in my classroom. If certain pupils in one of my lowest ability sets managed to complete a more difficult extension exercise, or if my Year 11 pupils did well in a mock exam, I might become exhilarated and perform effortlessly for the next two or three days; conversely, if a fight broke out and I was obliged to spend several hours after school clearing up the mess, writing reports and phoning parents, I would lose all confidence in my ‘classroom control’ and despair for several days. My emotional oscillations were amplified even further during inspections. Every few months or so I would tell myself that I had to retrain but it was precisely at the times I was feeling my lowest that I lacked the energy and the mental wherewithal to plan realistically what I would do next.

In the end, after leaving that school, I worked for another five years at a renowned independent school and then for three and a half years at an academy. However, I became increasingly distressed as each school embraced numerous features of panoptic performativity as everyday performance management tools, which compelled teachers to superimpose a veneer of predictability upon pupil ‘learning progress’ and ‘behaviour for learning’ and to suppress the humanistic side of classroom interaction. These performances led to substantial increases in overall stress levels for two reasons. First, notwithstanding the type of school, the process of teaching and learning, in both its minor and major aspects, is sustained by a far-reaching but fragile network of relationships that incessantly mediate the co-construction and assimilation of knowledge with infusions of pleasurable and painful emotions. Second, authentic ‘learning progress’ hardly ever manifests itself in discrete, observable steps: the episodes that an observer perceives to be ‘good’ or ‘inadequate’ may in fact involve a complex mix of mental and emotional

activities which hark back to earlier lessons, events that occurred in other parts of the school and in pupils' homes. In effect, ensuring that the delivery of a lesson followed the lesson plan was frequently an impossible task, if the lesson was actually to be a good one, in so far as a typical lesson possessed an indeterminate mixture of observable and barely visible layers of teacher-pupil interactions which was more like a pentimento in a painting than a clear 'snapshot' of teaching and learning that could be measured and analysed.

Of course, many people enter teaching precisely because it is a job in which no two days are exactly alike and which affords numerous opportunities to make on-the-spot decisions and use their creativity to afford a wide diversity of pupils the best chances of reaching their potential. As the growing use of computer software for performance management and all types of monitoring made this less and less possible and several colleagues began to retire early, become supply teachers or move to British schools abroad, I began to think about ways of examining the underlying emotional causes of unpredictability in teaching and learning so that I and others would understand its nature and become able to lessen its effects in our attempts to remain 'winners' in the classroom. My resolve to carry out PhD research on the topic became much firmer after I joined the academy and witnessed a history supply teacher breaking down in fits of tears during a continuing professional development (CPD) session after we were directed to 'think outside our comfort zone' and devise "entertaining" ways to quickly and conclusively demonstrate learning progress. After she had fled the room, there had been much joking to the effect that she was no longer 'up to the job', but later we were all shocked to hear that she had suffered a nervous breakdown and would probably never teach again. It was especially sobering to learn that only five years previously she had been a successful Head of Department and senior teacher in another school, until she had been 'forced out' after her style was deemed too redolent of 'transmission teaching'.

Our feelings of shock and associated anger dissipated gradually as the older teachers at our school put this distressing episode into a historical perspective. They reminded us that, long before the invention of target setting and *Matrix* software, unrealistic pupils and parents sometimes demanded assured pathways to academic success. Teachers have tended to suffer disproportionately high levels of stress and ‘burn out’ precisely because there is nothing guaranteed about teaching and learning: it is an inherently unpredictable process in which teachers are required to invest substantial amounts of physical and emotional labour.

1.2 Notions of unpredictability

It is not difficult to speculate as to why the teaching and learning process is so inherently unpredictable. Cziko (1989), in questioning the validity of quantitative educational research which “seeks to attain knowledge for prediction and control” (p. 17), posits a number of systemic sources of unpredictability which underlie classroom-based teaching and learning. For a start, the mathematical evidence provided by chaos theory indicates that it is impossible to delineate the deterministic causality of a series of steps of an unfolding process, particularly one which is occurring in the human brain that has 10^{13} synapses which enable $2^{10 \times 13}$ possible different states of mind. Furthermore, any absolutist attempts to predict how pupils will learn will be overpowered by debates concerning the implications of quantum theory, debates concerning consciousness and free will in human behaviour, some biological aspects of learning and development, and individual differences in pupils. Individual differences can be characterised either by reference to physiological factors or in terms of ‘aptitude treatment interactions’, variations in the ways pupils react to different educational ‘treatments’ along different timelines, which in and of themselves may induce further variations in pupil learning.

As noted above, the unpredictability of teaching and learning has its positive and negative aspects. On one hand, in recognising that no two teaching and learning experiences can ever be exactly alike, teachers and pupils are spurred to take active roles in the co-construction of knowledge and are more likely to experience the wonder and fascination which attends new discoveries. On the other hand, the sort of unpredictability that manifests when pupils fail to make the expected progress is just as likely to infuse the classroom with a range of negative emotion, including anger, frustration and despair with consequent disruptions to the delivery of the lesson. In a typical lesson, both aspects of unpredictability tend to supervene as a dynamic mixture, but during lesson observations, when the anxiety levels of a teacher and her pupils rise as their performance is evaluated by a third party, the negative aspects are liable to predominate.

When teachers express their fears regarding the unpredictability that might occur during inspections, therefore, they are usually envisioning the sorts of banal disruptions which paradoxically are all too predictable. One typical unsettling scenario, which I myself have experienced and which I have heard described countless times as colleagues have commiserated in the staffroom after an inspection, originates with a trivial disagreement between two pupils which suddenly and inexplicably flares into a group conflagration that obliges the teacher to disrupt the flow of the lesson while she attempts to deal with the flare-up and then re-engage the pupils in the task at hand. If the teacher is fortunate, the interruption lasts only a minute or two and then the lesson continues successfully, although it may be assigned a lowered grade; in the worst-case scenario, the teacher finds it impossible to refocus the class's attention and the lesson fails. Undoubtedly, the prospect of 'failing' may be distressing in itself, but what disconcerts some teachers even more is their knowledge that they had successfully quelled comparable disruptions

numerous times beforehand and that the unpredictable aspects of the episode were somehow instigated and/or amplified by the operation of unfamiliar channels of interpersonal communication.

However, now that modes of functioning are conditioned by panoptic performativity (Perryman, 2006), teachers internalise the anxiety instigated by inspections and ponder the sources of disruptions and atypical classroom phenomena long after OFSTED inspectors depart. While many teachers find it immensely painful to scrutinise in depth the nature of the pupil disruptions which adversely affect their lesson deliveries, cursory analyses of these types of episodes routinely confirm that they typically involve more than one source of disruption. In the scenario outlined above, for example, there are at least three. First, it is possible that that the pupils who argued initially were behaving *irrationally*, which is defined in popular dictionaries as thinking, speaking or acting without rationality, and without any clear objective or meaning, due to inadequate use of reason, a cognitive deficiency or emotional distress. Over the past forty years the concept of irrationality has been studied extensively and popularised by various cognitive psychologists and behavioural economists including Daniel Kahneman (2011), who have demonstrated numerous irrational biases and heuristics which underlie decision-making in every area of daily life and often encumber the decision-maker with significant material disadvantages.

Second, it is possible that the teacher may have experienced an excessive amount of *uncertainty* as it was understood by Donald Schon (1983), who described it as a teacher's anxiety or confusion of "not knowing" whether to use her explicit or tacit knowledge when deciding what to do with difficult or misbehaving pupils (Mintz, 2014, p.1). As a teacher struggles "in the moment" with the contradictory suppositions prompted by her

competing types of knowledge, she is often propelled towards taking the actions which will yield the most positive outcomes; alternatively, however, the struggle may induce a paralysis in her usual methods of pupil containment which produces unwonted results.

Third, the emotionality evinced in the original disagreement may have diffused through the classroom and attracted the participation of other subsets of pupils through various modes of group dynamics, which were studied extensively in the 1950s and '60s and characterised within behavioural, cognitive and psychoanalytic theoretical frameworks (McLeish et al, 1973). As noted above, in most circumstances a teacher might be able to limit the contagion of misbehaviour with one or two tried-and-tested behavioural techniques, but she may 'lose control' if pupils succeed in dissociating themselves from the reality she imposes upon them and the 'climate' or 'atmosphere' shifts as they immerse themselves in peer interactions.

Notwithstanding the apparently indeterminate nature of many negative unpredictable episodes, it would appear that many are driven inadvertently by the teacher's responses, which may be infused by desires and emotions of which the teacher is unaware. In *Conflict in the Classroom* (Long et al, 1965), a book that was written to translate findings regarding the behaviour of delinquent boys in pupil referral centres to mainstream classrooms, Long and his colleagues investigated why teachers so often became embroiled in or indeed escalated conflicts with emotionally distressed pupils, when they clearly knew better than to do so. After revising their findings over several editions of the book, the authors posited a psychodynamic explanation of classroom conflicts which brought together a combination of factors, including the physiological basis of stress, cognition as triggered thoughts, and defence mechanisms as reinforcement of behaviour and group dynamics (Long, 2015, p.13). Formatted chronologically, the 'conflict cycle'

was distilled into three key steps: first, a stressful incident activates pupils' irrational beliefs and triggers certain feelings; second, the expression of inappropriate pupil behaviour incites the teacher, who mirrors it; and finally, the pupils' adverse reactions to the teacher instigates further inappropriate behaviour and an escalation of the conflict.

However, while the conflict cycle is thought-provoking construct, and one which many teachers would recognise, it does not answer many of the concerns noted above regarding classroom predictability. This thesis seeks to investigate further the unconscious operations and group mentalities which underlie the less apparent aspects of the cycle, including the nature of pupil irrationality, the unconscious instigations of teacher responses and the ways in which conflict can escalate through the classroom.

1.3 Development of the research perspective

As I became increasingly confident that the psychodynamic theory underlying the conceptualisation of 'conflict cycles' would prove useful in elucidating the elusive aspects of a wider range of unpredictable classroom episodes, I decided to carry out further classroom research drawing on psychoanalytic concepts, the area of psychology which seeks to characterise the unconscious operations and group mentalities that permeate all our conscious actions and daily interactions.

The acute power of psychoanalysis lies in its central premise that there are both observable and unobservable sides to human behaviour. It first emerged in the late nineteenth century when Freud deduced, after observing and treating numerous hysterical patients who displayed a wide range of physical and mental symptoms that could not be attributed to somatic causes, that the minds of these patients were in some way dissociated

(Freud, 1909, 1910). After he had begun to use hypnosis to explore the psychical roots of these patients' physiological symptoms, he perceived that there existed a psychic conflict between these patients' conscious awareness of particularly traumatic events and their repressed memories of them. Eventually, after curing a young woman named Anna O. by simply encouraging her to speak at length about her memories of traumatic incidents, Freud challenged the view of a unified, conflict-free self that had underpinned Western thought since the time of Descartes by positing the existence of unconscious mental processes (Elliot, 2002).

In place of a unified self, Freud proposed a tripartite 'iceberg' psychical structure (Davey, 2004) in which the ego and superego, the agents for conscious mental operations, are floating above the surface of the water while the id, the unconscious portion of the psyche, takes up a much bigger space beneath the water's surface. In this model, the id contains a 'great reservoir' of chaotic and largely uncontrollable libidinal and destructive forces and acts as the instinctual pole of the personality, the ego maintains contact with external reality and acts as an agency for adaptation, and the superego sustains conscious self-observation along with the formation of ideals and acts as a judge or censor. Ordinarily, the ego and superego act in tandem to control infiltrations from the id but at times they are overwhelmed by the id's huge amount of energy, in which repressed elements from the id can disrupt, but not fully break into, conscious thought processes, with the result that individuals sometimes act in ways they do not fully understand.

Freud initially thought that the structure of the ego evolved in a series of age-related stages as it responded to the id's eruptions principally through the mode of repression, but later in his career he determined that the ego defence system comprises several distinct, multifaceted mechanisms which operate whenever necessary to protect the individual

from any surfeit of anxiety which threatens his psychical or biological stability. Therefore, a successful course of psychotherapy might need a lengthy perturbation of an individual's defence mechanisms before repressed knowledge or memories can be brought into consciousness.

The Freudian understanding of psychical topography and ego development was interrogated and challenged repeatedly over the course of the 20th century. While Freud had originally proposed nine main categories of defence mechanisms which ranged from simple constructs such as denial, in which an individual temporarily stops thinking about anxiety-inducing events, to more complex mechanisms such as reaction formation, in which an individual transforms an unacceptable impulse into its opposite (Sternberg, 1995, Section 3.2.4.1), in the 1930s and '40s Anna Freud and others extended the concept of a defence mechanism to include more than thirty distinct mechanisms while numerous attempts were made to delineate chronological, developmental and adaptive hierarchies (Draguns, 1993). More recently, behavioural and cognitive psychologists have sought to subsume the concept of defence into the umbrella category of 'coping mechanisms' which embrace both unconscious mental processes and observable actions, such as 'acting out' (Kline, 1993).

In addition, from the 1920s onwards, new schools of psychoanalysis were established in the United States and Europe which argued that ego development proceeded in tandem with incremental developments in individuals' early social relationships, particularly with parents and caretakers, rather than in response to the id's libidinal and destructive eruptions. In England, Melanie Klein formulated an 'object relations' approach to psychoanalysis which appears particularly relevant for the investigation of classroom episodes. She linked personality development to the evolution of the infant-mother

relationship during the first year of life and attributed the variable nature of an individual's anxieties and mechanisms of defence to persistent oscillations between two 'states of mind' which affect the ability to learn both formally and informally. Klein also conceptualised other unconscious operations which enable individuals to contribute to the types of social interactions which sustain teacher-pupil relationships and the co-construction of knowledge (Klein, 1935, 1940, 1946, 1952, 1955, 1957).

In the 1950s and 60s, however, psychoanalysts at the Tavistock Institute extended the application of Kleinian object relations theory far beyond its basis as a clinical treatment for individuals. Jacques (1953), Menzies Lyth (1960) and others assisted the British government with large-scale reforms of publicly-owned industries by carrying out action research on the ways that anxieties and defence mechanisms become embedded into the practices of social organisations. In addition, Bion, who had also worked at the Tavistock, provided a valuable extension of object relation theory as it can be applied to small therapeutic and non-therapeutic groups in *Experiences in Groups* (1961), in which he characterises the group mentalities which function as collective defence mechanisms and the unconscious operations which compel members of a group to become engulfed involuntarily in the manifestation of these mentalities.

More recently, many educational researchers have used object relations psychoanalysis to investigate various aspects of teaching and learning (Section 3.1). In the qualitative study that I carried out for my Masters, I employed methodology extracted from Freudian psychoanalysis and Kleinian object relations theory to analyse four free association narrative interviews with first-year female university students to identify some of the unconscious factors which informed their choices regarding their university-level participation in mathematics and physics (Silverman, 2011). The data indicated that the

students' decisions to either pursue or abandon undergraduate studies in mathematics and physics was linked to anxieties which were rooted in the micro-world of the immediate family. Their broad attitudes towards mathematics and physics appeared to be mediated not only by the expression of defence mechanisms but also by the persistence of personality traits which are typically observed in primary school pupils. Ultimately, choices of university and degree subject appeared to involve strong unconscious identifications with parents, siblings and other figures, such as teachers, who supported participants' unconscious object relations needs.

I then began to think that object relations psychoanalysis might be used to explore the unconscious dimensions of the disruptive and/or unpredictable episodes that occurred in my own Key Stage 3 and 4 mathematics lessons, particularly those associated with an unhealthy emphasis on performance management. Initially I focused on assimilating a deeper understanding of object relations theory and developing my skills as a participant observer. Next, after formulating a methodological approach to classroom observation which derived from the clinical methodology of object relations psychoanalysis, I grounded my study in the examination of my own states of mind and manifestations of defence. I then proceeded over the next two years to survey unconscious elements of teacher-pupil relationships and to characterise pupils' manifestations of defence at individual, subset and group levels. Finally, I contemplated my own role in the instigation and diffusion of disruptive behaviour.

Over the three-year period of the study, my data collection and analysis generated findings which appeared to indicate that defence mechanisms are a principle source of unpredictability. However, the findings also seemed to demonstrate that if a teacher is sufficiently aware of how the teaching and learning process is mediated by individual and

collective expressions of defence mechanisms, she can implement lesson planning and behaviour management strategies that will result in more enjoyable lessons and higher levels of pupil attainment.

1.4 Outline of Chapters

In Chapter 2 I briefly consider the issues that are pertinent to the investigation of the psychodynamic aspects of classroom phenomena and review the literature from the domains of mathematics education, emotion research and psychoanalytically-informed educational research which address the emotional and unconscious aspects of teacher-pupil relationships and classroom-based teaching and learning. I then consider how object relations psychoanalysis may be applied to the investigation of classroom phenomena to generate a deeper understanding of the unconscious processes which underlie the teaching and learning process.

In Chapter 3 I present the object relations theory which supports my methodology and data analysis. After delineating Klein's understanding of how ego defence mechanisms materialise during the first year of life and how they may operate thereafter during classroom interactions, I explain how Bion extended Klein's theory and applied it to group observations. This is necessary because Klein's focus is principally on dyadic relationships. I then present the preliminary observations of a small mixed Year 10 class that I undertook over a six-week period to assess the feasibility and challenges of formulating a methodology that employs several strands of object relations theory.

In Chapter 4 I incrementally formulate a psychoanalytically-informed methodological lens by evaluating the following aspects of psychoanalytically-informed classroom

research: ethical issues; links to autoethnography; constructive methodological precedents; phenomenological issues involving characterisations of unconscious operations and group mentalities; and the establishment of parameters for recognising and characterising the expression of defence mechanisms.

In Chapter 5 I employ an autoethnographic format to analyse data in four stages. In the first stage, I investigate the emotional aspects of my developing relationship with a new Year 11 mathematics class over a period of eight months to characterise unconscious elements of teacher-pupil relationships. In the second stage, I analyse the language and social interactions in a four-lesson sequence I taught to a Year 9 class to examine the unconscious operations and group mentalities which underlie the teaching and learning process. In the third stage, I focus on the classroom performance of Ruby, a Year 8 pupil who tends to behave erratically and disruptively, to assess the relationship between defence manifestation and mathematical attainment. In the final stage, I analyse two lessons I taught to another Year 9 class to evaluate my earlier findings and further investigate my own role in pupils' expressions of defence mechanisms and the instigation of unpredictable episodes.

In Chapter 6 I summarise my findings and assess their contribution to knowledge in view of current classroom practices and mathematics education research. I then evaluate my research design, assess the limitations of my study and suggest some further ways in which object relations psychoanalysis may be used to investigate psychodynamic aspects of classroom-based teaching and learning.

2 Literature Review

2.1 Overview

In this chapter I carry out a sequential review of the literature on mathematical affect that has been produced in the fields of mathematics education, emotion and psychosocial educational research over the last half century and consider how object relations psychoanalysis might be employed to generate new knowledge about teacher-pupil relationships and unpredictable classroom episodes. As I intend to use Klein's and Bion's object relations theory to examine the unconscious psychodynamic aspects of teacher-pupil interactions and unpredictable classroom phenomena, another approach would have been to focus initially on research which have been carried out in the psychosocial area and then reference this to pertinent investigations in emotion research. However, I have chosen to undertake a broader approach for two reasons. First, as my data analysis will subsequently demonstrate, if a researcher seeks to distinguish conscious and unconscious operations and group mentalities by employing an analytical process which derives from the clinical process of object relations psychoanalysis (Section 4.1), she will need to appraise classroom episodes on the conscious observable level prior to undertaking analysis on the unconscious level. Bridging the gap between characterisations of these two levels of analysis may be eased if one is conversant with what mathematics and emotion researchers have discovered about affect on the conscious level.

Second, the literatures of the three research domains forms a continuum in the sense that each seeks to demystify mathematics by elucidating the social contexts underlying attainment, equity and social accountability: they share a philosophy of teaching and learning that can be described as "postmodernist, maverick and fallibilist" (Ernest, 1998, pp.25-26). This philosophy is rooted in constructivist and social constructivist

perspectives, which assert that, rather than passively receiving knowledge, an individual actively constructs unique and idiosyncratic knowledge through the repeated restructuring of her personal knowledge; the co-construction of knowledge is mediated by the qualities of interpersonal relationships and social interactions that sustain the everyday functioning and roles of teachers and pupils in classrooms. Therefore, whereas researchers in the domains of mathematics education, emotion and psychosocial research may have approached the study of mathematical affect through diverse theoretical frameworks, they have all contributed to a holistic body of knowledge which is open to investigating every aspect of teachers and learners' affective experiences in the classroom.

2.2 The study of affect in teaching and learning mathematics

Affect is an umbrella term for a concept that covers attitudes, beliefs, motivations, emotions and all other non-cognitive aspects of human cognition (Hannula, 2014, p.23). In mathematics education, it has been investigated extensively using diverse approaches.

2.2.1 Mathematics education research to 'beliefs, attitudes and emotions' categorisation (McLeod, 1992)

2.2.1.1 Feelings and emotions linked to problem-solving

Even before mathematics education had coalesced into a formal academic discipline, many educators were aware that mathematics instigated a great deal of positive and negative affect in pupils and began to observe the emotions which accompanied the various stages in mathematical problem-solving. Polya (1957) recognised that finding a solution to a school mathematics problem could either be experienced as challenging and exhilarating or frustrating, to the extent where students are hampered in their intellectual

development (p.xxxi), depending upon the way in which the teacher presents the material. He devotes most of his book, therefore, to a detailed series of straightforward heuristics that teachers should use in the classroom to ensure that students are always encouraged to investigate problems further and are never overwhelmed by their complexity. However, Polya also observes that problem-solving is not a “purely intellectual affair” and that the student’s determination and willpower are crucial for solving the most complex problems; however, determination fluctuates with feelings of hope and hopelessness, and satisfaction and disappointment. If a student’s confidence is somehow attenuated, determination ebbs and the student is liable to become depressed (p.93).

By the 1980s, as social constructivist educational frameworks were in the process of being implemented and policy makers in the United Kingdom and the United States were attempting to transform the secondary school mathematics curriculum from one that emphasised the memorisation of procedures and completion of rote exercises to one which afforded pupils a deeper and more powerful understanding of mathematical thinking (Schoenfeld, 1992), mathematics education researchers began to differentiate the cognitive and affective aspects of problem solving and posit theoretical frameworks to explicate their interrelationships. Schoenfeld (1985), for instance, characterised mathematical problem solving as a multi-stranded process which combined an inventory of mathematical knowledge, a familiarity with general problem-solving strategies, a control of how mathematical knowledge is used and a cluster of belief systems, not necessarily conscious, about the self, environment, the specific topic and mathematics in general (p.15).

2.2.1.2 Mathematics anxiety

The first systematic research agenda to study mathematics-related affect was initiated in social psychology in the 1970s, mainly with regards to mathematics anxiety (Hannula, 2014). In a systematic review of the research that had been undertaken up until that point, Hembree (1990) defines anxiety as a “state of emotion underpinned by quantities of fear and dread” (ibid, p.33; Lewis, 1970) and presents it as an ‘omnibus’ construct which comprises several sub-constructs, of which two are test anxiety and mathematics anxiety. Initially, investigations of test anxiety undertaken within a behavioural theoretical framework had indicated that students with low levels of anxiety appeared to outperform those with high levels of anxiety due to what was characterised as learned psychological drives (Mandler and Sarason, 1982) but later researchers had proposed that test anxiety combines emotional components, which are behavioural in nature, and worry, which derives from cognitive processes. Subsequent submissions of models for test anxiety tended to follow either behavioural or cognitive theorisations. In the behavioural sphere, the interference model viewed test anxiety as a distressing memory of prior learning which acted to disrupt cognitive performance while the deficit model claimed that test anxiety is instigated by poor study habits and poor test performance (Tobias, 1985). However, one of the most popular cognitive models (Wine, 1971) asserted that anxious students perform poorly because they divide their attention between task-relevant efforts and preoccupation with worry. After reviewing the findings, Hembree found that test anxiety appears to be behavioural in nature and most accurately characterised by the interference model.

In proceeding to integrate the findings of 151 quantitative investigations on the nature of mathematics anxiety, Hembree enquires if a causal relationship exists between mathematics anxiety and mathematics performance, if mathematics anxiety is subsumed

by test anxiety and if mathematics anxiety behaviours are more prevalent in females. His methodology of meta-analysis involves scale-invariant measurements of coded subsets of data which generate correlational findings. Hembree found that mathematics anxiety is directly related to students' avoidance behaviours linked to mathematics but inversely related to their positive attitudes towards the subject; while there appeared to be no compelling evidence that poor performance causes mathematics anxiety, test anxiety and maths anxiety appeared to share several properties and test effects. Both types of anxieties responded well to systematic desensitisation, the most common behavioural treatment administered at the time, particularly if it was delivered with a cognitively-oriented course in anxiety management. While females tended to report higher levels of mathematics anxiety, they did not obtain lower test results or exhibit increased avoidance behaviour; indeed, in general, males appeared to exhibit greater avoidance behaviour than females.

2.2.1.3 The categorisation of affect into beliefs, attitudes and emotions

In another influential systematic review article, McLeod (1992) considers the state of the literature which addresses other affective issues linked to mathematics education and notes that researchers have failed to coordinate their investigations for at least three reasons (ibid, p.576-577). First, too many studies relied on self-report questionnaires to collect 'common-sense' data on participants' thoughts and feelings about mathematics as a subject and their beliefs and attitudes regarding its practice. Second, there was confusion regarding terminology: many of the terms that mathematics education researchers borrowed from psychology were used in different ways by different research teams or were designated to refer to different phenomena. Third, many previous systematic reviews had focused mainly on attitudes towards mathematics, rather than on the discrete affective elements which impact learning, and tended to use positivist quantitative

methods adopted from behaviourist psychology, which largely voided the collection of data through introspection or verbal reports.

Before attempting to formulate a more effective systematic review of the literature that would provide a platform for the smaller-scale qualitative studies needed for a fine-grained understanding of affect, McLeod promotes the adoption of Mandler's schema for assessing affect, which is based on cognitive psychological approaches offered by social and differential psychology and is more sympathetic to the qualitative examination of beliefs and emotions that had been previously considered 'superfluous' to pure cognition. In Mandler's schema (ibid, p. 578), most affective issues are understood to emanate from an individual's emotional responses to the interruption of a plan of action or planned behaviour. If the plan of action or planned behaviour is 'blocked', the individual is understood to experience a physiological response which re-directs her attention and causes her to evaluate the meaning of this blockage on a cognitive level. The cognitive evaluation results in the expression of positive or negative emotions which are tempered by the individual's knowledge or beliefs. However, while the initial physiological arousal may be of limited duration, repeated 'blockages' within the same environmental context tended to instigate emotions which were less intense and made fewer demands on cognitive interpretation, so that ultimately emotional responses become more and more automatic and may lead to the establishment of an attitude.

Consequently, in the second half of the article, McLeod proceeds to reorganise the existing literature under the headings of individuals' beliefs about mathematics and themselves, the formulation of attitudes and the emotions instigated by interruptions and blockages. Investigations regarding beliefs (ibid, pp. 579-581), which analyse data gathered principally through questionnaires, interviews and observations of teachers and

students, are further classified according to objects of beliefs, such as the teaching and learning of mathematics, gender differences and several subsets related to the concept of self, including self-concept, confidence, self-awareness, self-regulation, metacognition and the causal attributions that students make regarding their successes and failures in solving mathematical problems. While Brown et al (1988) find that most students believe that mathematics is an important academic subject, other studies indicate that beliefs have a great impact on the ways in which students and teachers perform in classrooms: for example, Shoenfeld (1985) demonstrates that students sometimes underestimate the importance of making an effort in problem-solving because they believe that mathematical problems can either be solved quickly or not at all, and that only geniuses can be creative in mathematics, while Stodolsky (1985) shows that many teachers believe problem solving is predicated upon following mathematical rules and algorithms and therefore neglect to plan collaborative activities which can develop higher order skills. With regards to beliefs linked to gender differences, Fennema and Sherman (1976), using a quantitative methodology, report that more males than females find mathematics to be a useful subject, while Meyer and Fennema (1988) suggest that, even in cases in which females have higher attainment, males appear to be more confident than females because they tend to attribute their success in mathematics to their mathematical ability while females are more likely to attribute their successes to effort and their failures to lack of ability, which appears to be linked to a lower rate of female participation in mathematics-related careers.

Fewer investigations were undertaken in cross-cultural settings to evaluate the influence of beliefs regarding the broader social and cultural contexts context (ibid., p.581). Magnusson (1981) analyses many aspects of classroom practice, including the nature of physical settings, rules for behaviour, task designs, teacher expectations and other

emotions expressed in a classroom situation to assess their impact on the teaching and learning of mathematics. Grouws and Cramer (1989), who examine the characteristics of classrooms of 'expert' teachers, find that a 'friendly' rather than a formal atmosphere, an established system of student accountability in relation to their learning and the frequent use of cooperative groups appear to be important in establishing effective teaching and learning; however, they are unable to specify the factors which contribute to 'expert' teaching. Cobb et al (1989) show, in an analysis of a teaching experiment in which a teacher and primary school pupils mutually establish a constructivist teaching consensus, that a teacher's explicit teaching of social norms in a primary classroom relates directly to the types of affective reactions that are subsequently expressed by her pupils. Parsons et al (1982), in seeking influences on affective reactions that are located beyond the classroom, show how parental influences impact the beliefs of students, particularly females, regarding their mathematical identity and participation in mathematical activities.

MacLeod acknowledges that it was often difficult to distinguish the research on beliefs and attitudes and reiterates that attitudes are narrowly defined as affective responses that involve reasonably stable, moderately intense positive or negative feelings, such as 'like geometry' or 'being bored by algebra'. It is unclear if a correlation exists between attitude towards mathematics and achievement in the subject: while Dossey et al (1988) use national assessment data from the USA to find a positive correlation between attitude and achievement in an investigation of students in grades 3, 7 and 11, data collected from the Second International Mathematics appear to show that, even though Japanese mathematical achievement was relatively high, Japanese students had a greater dislike for mathematics than students in other countries (McKnight et al, 1987).

Much of the research undertaken in this period which appraises attitudes towards mathematics is grounded in quantitative methodologies but there are at least two studies that which employ interviews and other qualitative approaches. Corbitt (1984) undertakes individual interviews with 50 eighth grade students to examine their liking for mathematics and how important they perceive the subject to be and ascertains that 92% of the participants think mathematics is a more important school subject than English, social studies, science and P.E., with 40% claiming to enjoy the subject and 92% declaring that they know at least one peer who hates mathematics because they are not 'good' at mathematics, they dislike the teacher or they are not motivated to work in lessons. Marshall (1989), on the other hand, cites the schema knowledge structure theory of long-term memory and describes the role of the feedback a child receives from teachers, peers and parents in the development of persistent emotions and attitudes towards mathematical failure, including embarrassment and shame, which is encoded in the memory as a part of the experience of mathematical problem-solving.

In appraising the literature on emotions, McLeod notes that emotions have not yet constituted a sizable focus in educational research, not only because they are unstable elements which are not easily measured by questionnaires, but also because many studies tended to focus on the products rather than the processes of affect as few educational researchers were in the position to correlate their inferences of emotion with physiological indicators such heart rate. However, he notes Mason et al's (1982) description of the positive feelings engendered by an 'Aha!' experience in finding a correct solution and Buxton's (1981) examinations of adults who report their emotional reactions to mathematical assessments as 'panic', which appears to be linked to a high degree of physiological arousal that disrupts concentration and instigates fear, anxiety and embarrassment. McLeod also notes Ortony et al's (1988) efforts to categorise various

emotional responses to mathematics and the psychoanalytically informed studies undertaken by Nimier (1977), who provides a Freudian interpretation of the impact of fears and defence mechanisms in classrooms, and Legault (1987), who demonstrates how Freudian interpretations can help explicate certain gender differences in mathematics education.

2.2.2 The impact of emotion research

2.2.2.1 Concepts and structures of emotions

While the investigation of mathematical affect continues to date under the headings of belief, attitude, emotion and a fourth category of values that was added in 2006 by DeBellis and Goldin, from the 1990s onwards many mathematics education researchers chose to focus more narrowly on emotions and moods rather than on beliefs and attitudes as there appeared to be a high frequency of emotional expression in all types of classroom proceedings with a seemingly limitless capacity to influence student participation and attainment (Pekrun and Linnenbrink-Garcia, 2014, p.10). Definitions of emotions may be couched in either cognitive or Freudian terms but there is a general agreement that emotions are tripartite entities which comprise physiological processes that regulate the body, subjective experiences that regulate behaviour and expressive processes that regulate social coordination (Hannula, 2012; 2014, p.24). However, according to Shuman and Scherer (2014) and other theorists, emotions are even more complex and involve a cognitive ‘appraisal’ of a situation, motivational ‘action tendency’, physiological changes, a sensory motor component to effect expression and an affective component that gives rise subjective feelings. In a typical characterisation of test anxiety, for instance, five distinct emotional strands can be distinguished, including nervous, uneasy feelings (affective), worries about failing (cognitive), increased heart rate (physiological strand),

impulses to escape (motivational) and facial expressions associated with anxiety (expressive) (Pekrun and Linnenbrink-Garcia, 2014, p.2).

Emotion researchers generally view emotions as short-lived episodes which are instigated by a variety of actually-occurring, imaginary or remembered stimuli around an 'event focus'. They are differentiated from moods, which are understood to possess similar properties to emotions, but are less intense and lack a specific referent (Shuman and Scherer, 2014, p.15). Individuals are not always aware of how they are processing emotions as cognitive 'appraisals' can be manifested consciously or unconsciously through diverse conceptual, schematic and sensory motor channels (Scherer, 2009). However, emotional responses cannot be regarded as simple stimulus-response reflexes as the action tendency component has been shown to exert control on the incremental steps which combine to produce an episode (Shuman and Scherer, 2014, p.17).

The collection of data in most studies of emotions is pursued through self-report questionnaires and descriptions of subjective feelings through interviews and computer-coded subjective feeling labels. However, the analysis of data can be approached through four distinct theoretical perspectives which involve differentiated conceptualisations of emotions, different measurement paradigms and different protocols for regulation (Shuman and Scherer, pp.18-24). A great deal of classroom research is predicated on basic emotion theories (Ekman, 1992; Izard, 1994, 2007) which derive from Darwin's theories on emotions and restrict their focus to a limited number of emotions that have been shown to be necessary for survival and which are shared by humans and related species. In this perspective, an emotional episode is triggered by a stimulus and can be delineated as a sequence which consists of an emotional baseline, the stimulus, an emotional expression and a return to the baseline; the research objective is to discover the

function of an emotion. Observation-based coding systems such as the Facial Action Coding System created by Ekman et al (2002) can be used to identify expressions of happiness, anger, sadness, fear, disgust and surprise in social situations and emotional regulation is understood to be effected through changes in the stimuli to which an individual is exposed, the control of automatic action tendencies and/or the suppression of motor expressions.

Alternatively, appraisal theories identify cognitive appraisals as the triggers of an emotional episode; as it is understood that these triggers may be activated on a discrete or continuous basis, these theories avoid analyses of straightforward causes and effects in emotional sequences and postulate multiple possible pathways for emotional expression. For example, when an individual determines that an event is preventing her from reaching a highly important goal, she may appraise her potential to cope as low, feel utterly dejected and cry; but if she persuades herself that she can turn the situation around, she may become defiant and ready to act again. Researchers who adopt appraisal perspectives attempt to discover the events which lead to an emotion and assess the role of emotional expression in coping. The characterisation of subjective feelings is considered crucial as they are viewed as the integrated representation of all the changes which take place in an emotional sequence.

Psychological constructivist theories posit a concept of core affect that develops within an ever-present neurophysiological state that an individual can consciously access through an appreciation of the valence and arousal of feelings. In these frameworks, the emotional meta-experience, which can be defined as the conceptualisation of one's perceived subjective state in terms of its discrete emotional components, is the focus of study and emotions are assessed typically in terms of *valence*, a measure of the positivity

or negativity of their qualitative states, or *activation*, a reference to its physiological impact, i.e. whether it activates in terms of excitement or deactivates in terms of relaxation. Wundt (1897) was an early exponent of this type of theory, which tends to contextualise emotional meta-experiences within cultural and linguistic influences.

Finally, non-linear dynamic system theories (Fogel et al 1992; Camras, 2011) describe emotions as ‘attractor states’ which result from the propagation of positive and negative emotional feedback loops which are instigated by any component of an emotional episode which may then draw other emotion components into an attractor state. For example, the act of smiling may stimulate the feelings, appraisals and physiological changes associated with happiness (Sherer and Shuman, 2014, p.23). Attractor states are understood to be very difficult to dissipate or dislodge and research is often concerned with describing distinctive attractor states in different social contexts.

2.2.2.2 Recent investigations of emotions linked to mathematics

In his review of the recent investigations of emotions linked to the teaching and learning of mathematics, Goldin (2014) confirms that research has continued to be carried out in the domains recognised by mathematics education researchers, including the affective factors surrounding obstacles in problem-solving (Goldin, 2000; Op’t Eynde et al, 2007; D’Mello and Graesser, 2014), emotions linked to the teaching and learning of mathematical concepts and procedures and the resulting cognitive restructuring and reinterpretation of existing knowledge (Lesh and Lamon, 1992; Firestone et al, 2004; Mora, 2011), mathematical anxiety (see below) and the mathematics-specific beliefs that can meet emotional needs and/or provide defences from pain (Handal, 2003; Leder et al 2002; Maasz and Schloglmann, 2009) (p.395). Now, however, studies tend to be either grouped according the educational function or the focus of the emotion(s) being

examined, such as *epistemic* emotions, which emanate from the cognitive processes which ensue during the completion of a mathematical task and *social* emotions, which refer to the goals and outcomes associated with classroom-based teaching and learning. The other main distinction in educational research is to categorise emotions as either *state* emotions, which can be observed or inferred in the moment, and *trait* emotions, which are differentiated from moods but which are longer standing to their state counterparts, and are often used to describe how one feels at any given moment (Hannula, 2014).

2.2.2.3 Investigations of trait emotions

Goldin reports that, due to its prevalence in all areas of affect associated with mathematics, anxiety is by far the most widely studied trait emotion (p.398). Although Tobias (1993) uses interviews to investigate the phenomenon qualitatively, most investigations continue to be undertaken through large-scale studies which involve questionnaires and quantitative analysis of the information collected through the questionnaires. Beasley et al (2001) catalogue several anxiety measure scales in use, including the Mathematics Anxiety Questionnaire (MAQ) devised by Wigfield and Meece (1988), the Mathematics Anxiety Rating Scale (MARS), which exists in several formats, and the Mathematics Anxiety Scale for Children (MASC), which is essentially a shortened version of MARS. However, while researchers generally agree that mathematical anxiety increases with age and only becomes a significant factor in adolescence, at which point it appears to be more widely reported by females (Dowker, 2012), it has not yet been determined if mathematics anxiety is a single emotion or a combination of emotional components (p.400). While Beasley et al (2001) use the MASC with 278 pupils in Grade 6 and conclude that mathematics anxiety is unidimensional, Ho et al (2000), in a cross-national study of 671 Grade 6 students in China, Taiwan and the USA, sustain the distinction between anxiety's affective components, such as

nervousness, tension, dread and fear, and its cognitive components, which include the worry generated by negative expectations and self-deprecatory thoughts. Lee (2009) investigates the correlations of mathematics anxiety with test scores and conducts factor analyses of the self-constructs of mathematics self-concept, mathematics self-efficacy and mathematics anxiety using 2003 Program for International Student Assessment (PISA) data to support the hypothesis that mathematics anxiety is a separate, empirically distinguishable construct.

Researchers are also still divided as to the nature of the relationship between mathematics anxiety and mathematical achievement. A meta-analysis by Ma (1999) of 26 published and unpublished studies of students in Grades 5 to 12 finds that published studies indicate a statistically significant weaker relationship between mathematical anxiety and achievement than unpublished studies.

Investigations of positive trait emotions have been undertaken much less frequently. Data collected in the 2003 PISA indicate that in many countries students' interest and enjoyment of mathematics are not correlated with mathematical performance. However, as in the investigations of mathematical anxiety, these studies are limited by their tendencies to present characteristic responses obtained through questionnaires and to neglect the emotional expressions that may be subsumed or overridden in the definitions of trait emotions.

2.2.2.4 Investigation of state emotions

Investigations of 'in-the-moment' state emotions tend to be embedded in comprehensive analyses of mathematical problem-solving, self-regulation and motivation and aim to formulate detailed descriptions of emotional episodes that can be substantiated by

theoretical conjectures engendered by theories of emotion (p.402). Most of this research eschews quantitative methods in favour of videotaped observation, open-ended tasks and retrospective interviews but the exact methodology used is dependent upon the nature of the research questions and the theoretical framework adopted by the researcher.

The largest category of state emotion studies uses case studies and observations of small classroom groups to analyse the emotions linked to mathematical problem solving. Walen and Williams (2002) observe two adult women and one Grade 3 pupil in the context of timed assessments and find that, while the assessments do not evoke mathematical anxiety in the strict sense of the term, they do instigate feelings of fear and distress. Lewis (2012) observes 'Helen', a college student highly disaffected by mathematics, experience hatred and anger interspersed with positive emotions engendered by her participation in group activities and her ability to help her colleagues and determines that a student's relationship with mathematics is dependent upon complex motivational and emotional sequences. Nardi and Steward (2003) undertake a one-year investigation of three Year 9 middle ability classes in England using classroom observation, group interviews with pupils and coding procedures that reflect the frequency of pupil statements, many of which indicate a dissatisfaction with mathematics, a disconnect in conceptual procedural understanding, and an engagement with the subject that is maintained through obligation and pressure rather than enjoyment. DeBellis and Goldin (2006) focus on the interaction of emotion and cognition in pupils in Grades 4 to 6 as they performed videotaped tasks by inferring emotions from the children's statements, interjections and tone of voice using Izard's (1983) Maximally Discriminative Facial Movement Coding Scheme (MAX). Various affective pathways, i.e. sequences of emotions interspersed with mathematical cognition, are reported, including the transformation of a boy's emotional expression as he encounters a mathematical insight which is inconsistent with his prior expectations.

Malmivuori (2006) combines a data analysis of the data sets generated by Finnish secondary students' questionnaire responses and their mathematic achievements and the observation of 'Frank' as he solves a problem to highlight the role of affect and self-confidence as an essential aspect of students' cognitive processes and self-regulatory patterns during mathematical activities. Op't Eynde et al (2007) observe the emotional responses of 16 students from 14 junior high schools as they engage in problem-solving exercises and collect additional data through interviews, facial action coding and responses to the Mathematics-Related Beliefs Questionnaire to demonstrate that emotional expressions adjust themselves to continuous changes in the social context and at times appear to follow patterns. Heyd-Metzuyanim and Sfard (2012) study a small Year 7 group working on unfamiliar problems involving fractions and conclude, after coding participant statements, mapping moment-by-moment emotional sequences and capturing the 'flows' of emotional expression (ibid p.404) that pupils' emotional experiences are highly intense and contextualised within identity struggles.

Goldin reports that various research teams at Rutgers University are studying the 'engagement structures' which constitute recurring patterns 'behavioural/affective/social constellations' in individuals by collecting a variety of qualitative data from small groups of middle school students and subjecting it to analysis through the four lenses of flow of mathematical ideas, the inference of strong emotion in key affective events, social interactions among students and significant teacher interventions (Epstein et al, 2007; Alston et al, 2007; Goldin et al, 2007, 2011; Schorr et al, 2010). As many as ten interacting strands have thus far been identified, including sequences of emotions linked to expressions of affect, patterns of behaviour for fulfilling designated motivations, meta-affect, meanings encoded in various emotions, inner-speech and self-talk associated with

emotion, and interactions of emotions with beliefs, attitudes and longer-term traits. Examples of engagement structures which have been delineated to date include “Look How Smart I Am”, “Get the Job Done”, “It’s Not Fair” and “Let Me Teach You”. However, the researchers are still struggling to understand which specific emotional components govern students’ overall engagement or disengagement with mathematics and Goldin notes that investigations of state emotions are limited by the unpredictability of emotional expression, the inability of researchers to replicate the classroom situations in which patterns of emotion are first observed to occur, the unreliability of the inference of emotion and issues regarding generalisability (pp.405-406).

2.2.3 Contributions from psychosocial research

2.2.3.1 Emergence of the ‘psychosocial’

The difficulty in establishing the boundaries between affective and cognitive processes across various aspects of the teaching-learning process (Evans and Tsatsaroni, 1996) has propelled many educational researchers to engage in psychosocial studies, an emergent, inter- and transdisciplinary methodological approach which examines the impact of unconscious mental forces on the construction of social phenomena (Clarke and Hoggett, 2008). In the United Kingdom, the field evolved incrementally along successive research trajectories (Walkerdine, 2008, pp.341-343), the first of which incorporated the previously noted activities undertaken in the 1950s by psychoanalysts at the Tavistock Institute, who sought to transform British public institutions and organisations by the application of object relations theory. This type of approach was then extended by Irigaray, Cixous, Butler and other feminist researchers in the mid-1970s, along with psychologists who had become critical of the limitations of mainstream psychology, but was in turn overtaken by the advent of the structuralists and post-structuralists, including Althusser, Lacan and Foucault, who demonstrated that the role of discourse figures

predominately in the production of both our inner and external worlds, to the extent where there is now a wide perception that ‘psychic’ and ‘social’ domains are “mutually constitutive” or “abstracted levels of a single dialectical process” (Frosh, 2016, p.478) so that the term ‘psychosocial’ has no need for a hyphen.

Currently, psychosocial methodologies continue to operate fluidly across all the research trajectories noted above and draw upon material generated in psychology, sociology, anthropology, feminist studies, postcolonial studies and many other fields to study issues such as identity, gender inequality, political changes and racism. Within the sphere of educational research, they have been used to investigate the unconscious objectives of government policies and associated policies (Clarke, 2013), pupil identity (Straehler-Pohl et al, 2014); teachers’ emotions and emotional labour (Price, 2001), teacher-pupil relationships (Buswell, 2011; Mintz, 2014), and the acquisition of subject knowledge and production of academic work (Charalambous, 2014). Data are typically collected through open or semi-structured interviews guided by psychoanalytic theory, video recordings and field notes of observations, and diaries and other types of records which track researcher reflexivity, countertransference and the limitations on the research engendered by the researcher’s participation. However, while many psychosocial researchers have chosen to base their studies within cognitive and sociocultural frameworks (Zemblas, 2004), a growing number are electing to employing psychoanalysis, usually adopting a Lacanian or an object relations perspective, to the extent where psychoanalysis is beginning to be viewed as a “*sine qua non*” for the discipline (Frosh, 2016, p.478).

The “re-insertion of psychoanalysis” into what is essentially a social scientific critical methodological approach is not without controversy (Frosh and Baraitser, 2008, pp.347-348). While psychoanalysis has the capacity to explain, at least partially, how an

individual both projects her internal thoughts and feelings into the external world and internalises her external world, its individualising tendencies often offend sociologists and those who characterise the human psyche with regards to groups and institutional structures. Furthermore, while psychoanalysis offers a “sophisticated” understanding of how fantasy and emotional expression can operate outside the limits of time and space, which greatly enhances the interpretation of personal narratives (p.351), its insistence on promoting “top-down” (p.348), expert-knowledge epistemological strategies in which interpretive practice trumps the subjects’ knowledge of themselves is often infuriating to structuralists and post-structuralists and others who recognise discursive perspectives; indeed, when researchers endeavour to deploy psychoanalysis in a clinical fashion, such as using their characterisations of transference and countertransference to augment their data analysis, the application of psychoanalysis risks becoming completely ungrounded (p.363). Perhaps one of the biggest problems posed by psychoanalysis is that, as a result of its distinction between conscious and unconscious spheres of knowledge, it nearly nullifies the unified view of the psychic and social strands of human experience, which Frosh conceptualises figuratively as a Moebius strip.

Notwithstanding these controversies, however, Brown (2008) is one of several theorists who claims that psychoanalysis provides an authentic third alternative to Piaget and Vygotsky, whose dominant theories over the last forty years have induced many mathematical educational researchers to limit themselves to the vocabulary generated in other social science areas and thus constrain their data collection and analysis (Brown, 2008, p.6). For instance, the tendency to look at the “positioning of subjects” often becomes restrictive and engenders ‘types’ of participants which appear to respond in predictable ways according to prevailing discourses; ‘subjectivity’ is often understood narrowly as either pupils’ face-value responses or what they think about assimilating

subject knowledge. The adoption of a psychoanalytic perspective, however, enables researchers to extend their remit, principally by embracing Freud's definition of education, which posits that it is essentially 'a process of reconnection' in which the knowledge acquired in the classroom is incrementally assimilated with issues arising from general upbringing and the psychic disturbances emanating from earlier learning to produce a 'coming to know' between self and other (Brown, 2008, p.23). In this view education becomes a process which transcends a linear time frame and is infiltrated by an unwieldy chain of passions, anxieties and defensive reactions. Consequently, Bibby (2008, 2011), Britzman (2011) and other educational researchers regard the true focus of pedagogy as the development of the self rather than the development of subject knowledge and focus their investigations on pupils' affective relationships to the school curriculum, teachers and peers, and the management of their destructive feelings and phantasies in the face of frustration and the perception of imperfection.

In addition to the research that is being undertaken through university programmes, there are other types of organisations which offer training and research opportunities to teachers and educationalists who favour psychoanalytic and/or psychodynamic approaches to issues which impact pupil wellbeing and attainment. The Tavistock Institute continues to offer research, evaluation and consultancy services for organisations, which are disseminated through its in-house peer-reviewed journals, *International Relations* and *Evaluation*, and provides professional development through conferences and courses in group relations and organisational change. The Caspari Foundation, an independent charity that provides educational psychotherapy to children and young people, also provides training for school staff who wish to become educational psychotherapists or learn more about therapeutic approaches to education and publishes the *Journal of Educational Psychotherapy*.

2.2.3.2 Psychosocial perspectives of the relationship between affect and cognition

The study of the interrelationship of affect and cognition in the mathematical problem-solving process can proceed within four distinct theoretical models, each of which promotes specific understandings of the distinctions between affective and cognitive processes, the methodology that is employed to investigate the relationship and the implied consequences for educational practices (Evans and Tsatsaroni, 1996, p.348). Two of these models work within a cognitivist framework and assume that language is a transparent medium for transmitting pre-constituted ideas and thoughts; a learner functions as a rational, unified information processor; and there is a clear separation between a learner and the object of her knowledge. In the individual-differential model, a researcher aims to elucidate individual differences in pupil attainment and classroom participation by carrying out a quantitative measurement of affect using MARS and other scales that were reviewed above (Sections 2.1.2 and 2.1.3) and thereby show that cognitive and affective factors have a causal influence on cognition. Alternatively, in a cognitive-constructivist model, a researcher views emotion as a construction which is the result of the cognitive evaluation of a physiological arousal: she presupposes that affect cannot be considered separately from cognition and that there can be no question of one-way causality. The methodology used in this case tends to be qualitative so that researchers can investigate repeated emotional reactions to categories of mathematical tasks and describe discrete episodes in lessons.

Each of the above models incorporate methodologies that can be tailored to provide specific information to teachers and policymakers, but in assuming that the main role of affect is somehow to interfere with or block cognition, they fail to consider the other ways in which affective factors can act to mediate teaching and learning. However, in the third

type of model that is informed by a psychoanalytic approach, researchers recognise that learners are neither rational nor unified psychically and that much thought and feeling take place outside of conscious awareness so that a learner's actions and emotions sometimes have several meanings. What a researcher construes as one type of affect can be a combination of aggression, anxiety, forbidden desires and defences against these desires which have coalesced along chains of associations predicated on a learner's personal experiences. Thus, a researcher using a psychoanalytical model may use similar methodology to those using a cognitive–constructivist model but will focus on the individual's personal experience in the research situation rather than predetermined categories of affect and cognition.

However, the psychoanalytical model may not be able to distinguish neatly between the portions of experience engendered by the nature of the mathematics and its social context, so some researchers use a fourth model that employs a blended psychoanalytic approach which is informed by post-structuralism and the Lacanian view of *signification*, the production of meaning which ensues through the interplay of signifiers, to analyse the intersection of unconscious and socially derived linguistic meanings which provide the basis for a subject's thoughts and feelings. Affect and cognition are therefore positioned within a subject's discursive practices and may be characterised with the use of 'contextualising' questions which enable a researcher to discover what a subject is thinking consciously and unconsciously in a given situation.

One exemplar of the use of signification in the analysis of an interview is provided by Evans and Tsatsaroni (1994), who describe an episode in which 'Ellen' divides by 15, rather than multiplies by 0.15, to calculate the amount of a tip for a hypothetical restaurant meal. When she discloses, in response to a context-sensing question, that she does not

usually pay the bill when she goes to restaurants but that she always adds up the cost of her meal because she does not wish to be an ‘expense’, Evans and Tsatsaroni identify ‘expense’ as a signifier which links the failure of Ellen’s mathematical calculation to her feelings of being a burden in a relationship; therefore, her mathematical mistake may not derive so much from a lack of mathematical knowledge but be associated with feelings of self.

2.2.3.3 Psychoanalytically-informed investigations of issues related to mathematics

A great deal of psychoanalytically-informed research focuses on the unconscious determinants of students’ thoughts and feelings about mathematics, their participation in the classroom and the choices they make regarding mathematics at university. Boylan and Povey (2009) explore the ‘interior world’ of Louise, a student teacher, who made the choice not to study maths at university. Using semi-structured interviews, they construct an ‘extended research story’, formatted as a monologue, which demonstrates the complex mixture of anxiety, fear, hope, despair, envy, resentment, disappointment, anger and shame that infiltrates her memories of her primary and secondary school experiences. Her distressing memories of competing unsuccessfully against peers in times table competitions and of secondary school teachers who declined to answer questions or clarify her understanding instigate her ‘lack of trust’ in maths and sensations of being in a ‘fog’. Boylan and Povey conclude that Louise’s psychic alienation from mathematics acquired a compulsive dimension during primary school which prevented her from ever developing positive attachments to mathematics or formulating conscious choices with regarding participation: for Louise and some other learners, it appears that their alienation

in respect of mathematics is engendered by the disparity between the logic of its public discourse and the pain of the emotions it engenders (p.56).

Shaw (2009) addresses students' 'flight' from maths (p.87) and suggests that there are many obscure and unconscious elements behind the widespread anxieties and phobias surrounding mathematics. For example, many mathematical terms, such as 'negative numbers' and 'mean' have alternative meanings which evoke adverse or destructive feelings while the designation of solutions as either 'right' or 'wrong' can instigate a fearful sense of finality akin to sudden death. Mathematical tests are often perceived as persecutory, unfair and uncaring. Furthermore, the fear of mathematics may be linked to very early life experiences, including a breakdown in the quality of containment between a pupil and her mother which instigates feelings of anxiety and frustration that are then displaced onto the pupil's teacher.

Krummheuer et al (2013) seek to explain the mathematical creativity of a young boy by undertaking an interdisciplinary investigation involving mathematics educational researchers and psychoanalysts which combines a socio-constructivist perspective of teaching and learning with a psychoanalytic theory of attachment. Their case study of five-year old 'Rene' presents an interactional reconstruction of the working processes he employs while solving mathematics problems in cooperative learning situations at school. Krummheuer et al conclude that Rene's incremental approach to problem solving, in which initially he presents himself as passive and compliant before he asserts his self-reliance by engaging in fantasies and suddenly delivering complete solutions to his surprised peers, is an operational pattern that is impacted by the insecure-avoidant attachment style he developed in his early family relationships.

In a study undertaken to assess the impact of assessment and selection on an individual's 'internal positioning' with reference to the experience of being judged or selected in mathematics classes, Black et al (2009) use the concept of the 'defended subject' and Klein's object relations theory to evaluate three mathematics biographies with regards to the extent of the participants' engagement in the two states of mind which constitute defences against anxiety and how it influences their mathematical participation at school, choice of university and subsequent career progression. To varying extents, Zoe, Nikki and Rachel experience conflicting feelings of pain and pleasure which are linked to the recurrent discourses of assessment and selection and engendered by oscillations from the paranoid-schizoid state of mind, in which an individual experiences destructive, persecutory feelings which cause her to 'split' her perceptions of all things linked to mathematics into 'good' and 'bad' objects, and the depressive state of mind, in which she is able to experience guilt and urges for reparation. Black et al conclude that mathematics can function either as a pleasurable sanctuary or a source of intense pain depending upon the ways in which individuals manifest unconscious defences.

These findings are consonant with research in which researchers carried out unstructured 'free association' narrative interviews at four universities in England with 51 undergraduates in their first year of study who were studying STEM or non-STEM subjects in equal measures. Rodd et al (2014) analysed two of these interviews within an object relations perspective and concluded that Dan and Robin's decisions regarding their choices of university course were not only dependent upon the rational thoughts that emanated from their beliefs linked to self-concept and identity but also upon unconscious defences against anxiety such as splitting.

Psychoanalytic lenses have also been used to examine the unconscious determinants of teachers' emotions. For example, Price (2001) uses object relations psychoanalysis to reconceptualise Hochschild's definition of emotional labour (1983) and examine the emotions of four primary school teachers as they engage in lessons with their classes. She suggests that emotional labour, which is usually used to denote an aspect of paid work that is distinct from the labour of the mind or the hand and which is rarely remunerated in pecuniary terms, can be delineated within an object relations perspective as the manifestation of the depressive state of mind, which enables teachers to maintain an outwardly caring demeanour towards their pupils while concealing their distressed inner emotional states. In her data analysis Price finds that teachers are containing objects who struggle to psychically embrace their pupils as they engage successively in the role of instructor, facilitator, group coordinator and 'maintainer of law and order'.

2.2.3.4 Psychoanalytically-informed perspectives of mathematics classrooms

The second strand of psychoanalytic investigation is grounded in the observation of ordinary classroom phenomena and covers a broad range of epistemological overtures, as evidenced by the works of two researchers who participated in *Children's Learner Identities in Mathematics at Key Stage 2* (2009), a project which utilised lesson observation and a variety of researcher and pupil-led interviews to explore how children at a multi-ethnic urban primary school perceived learning and themselves as learners. Moore (2013) observes that, while emotions have rarely been the objects of systematic classroom investigation, the project demonstrated that all aspects of teaching and learning are infused with the desire of pupils to love and be loved by the teacher, along with the positive and negative affect that is instigated by the gratification or frustration of their

desires. Paradoxically, however, while pupils indicated through interviews that they were aware of their emotional instability and how affective phenomena impacted their learning, many teachers appeared to avoid any interrogation of pupils' emotional outbursts, even though they advertised themselves as a 'caring' staff with a mission to promote empathy and inclusion (Moore, 2013, p.272).

Overall, Moore finds that there is a mismatch between teacher and pupils' perceptions of each other: while the teachers professed to give all pupils the individual attention they require, pupils perceived teachers as adults who are unable to understand their needs, favour selected pupils and who do not care enough about pupils' feelings to make learning enjoyable. Ultimately, pupils tend to associate academic success with validation and affection and often struggle with anger, blame, guilt and a poor self-image when their efforts in class go unrewarded by teachers; at various times, they engage in pseudo learning activities to gain the love that they crave. Moore concludes that it is important for teachers to be qualified to make secure judgements about their own and their pupils' emotional states, not only because negative emotions impact negatively on children's self-esteem and their willingness to learn, but also because they foment children's willingness to engage in pseudo learning. He calls for an 'authorisation' of affect (ibid, p.282) in school discourses and public policies while recognising that many teachers are afraid of losing control and may resist working through their own intrapsychical and subjective conflicts.

In papers which review the data generated by the above study and additional classroom observations, Bibby (2008, 2009) echoes Moore in perceiving that mundane classroom exchanges are accentuated with 'difficult feelings' in addition to expressions of anxiety and aggressive urges: pupils often appear to feel 'diminished' and/or infantilised by

teachers who cannot or will not recognise their feelings, and are apt to experience catastrophic losses of learning when teachers appear to take no interest in them (Bibby, 2008, p.37). In interviews with Key Stage 2 pupils in small classroom groups and Key Stage 3 pupils in friendship groups, she establishes that pupils contextualise the assimilation of their mathematical knowledge within their perceptions of their relationships with their teacher and the rest of the classroom group: “being seen” and “being valued” appeared to be the relational bases on which knowledge was constructed. Bibby suggests that anger, anxiety and other negative emotions are ultimately engendered by a ‘doer/done to’ approach to teaching and learning that is based on the premise that the teacher is perceived as possessing all the knowledge while learners are regarded as being deficient in knowledge. In effecting a unidirectional flow of knowledge that is determined to be appropriate to the age of the pupils, the teacher tends to over-identify with her pupils and unconsciously controls what her pupils are thinking while the pupils tend to hide their ignorance in order to protect their teacher, who is supposed to be there to help them. However, as the teacher-pupil relationship is never predicated on true mutuality, teachers do not try to learn from their pupils and only assess the state of their pupils’ subject knowledge through their misunderstandings, with the result that pupils become increasingly frustrated and angry by what they perceive to be a lack of care and empathy. In so-called ‘difficult’ classes, this situation is repeated endlessly as both parties alternately persecute and are victimised by the other.

In later publications, Bibby examines the relational aspects of the teaching and learning of mathematics in classroom settings by exploring various tools and metaphors from a variety of schools of relational psychoanalysis. In a series of vignettes collected in *Education—An Impossible Profession?* (2011), she demonstrates that the expression of both positive and negative emotions in classrooms can be elucidated with reference to

Bion's conceptualisation of the K links to learning, which demarcate the links between an individual's psychodynamic development, Benjamin's affirmation of an 'intersubjective space' in which a teacher and pupil may surrender to each other at a 'third' vantage point, and the Lacanian concept of a 'mirror stage', in which a child's personality development is linked to the ways in which the child perceives the reactions of those around her to what she is saying and to what she is doing. In *The Creative Self* (2018), Bibby adopts Winnicott's theory to undertake a deeper examination of the ways in which teaching and learning are inextricably linked to relationships and relationality and what it means to be creative in the classroom. She determines that the nature of teacher-pupil relationships can be elucidated to a considerable extent by reference to the construct of the 'good enough' mother and that pupils' compliance and defiance can be understood in terms of the unconscious defences manifested in 'true' and 'false' selves. Creativity is ultimately conceived as an attitude which is enabled by feelings of wellbeing, trust and curiosity engendered by one's relationships with oneself, teachers, peers and the whole-school context.

2.2.3.5 Affect and mathematics education research on identity

Many of the psychoanalytically-informed investigations reviewed above can be cross-referenced to literature on identity within mathematics education, a growing area within the psychosocial research domain that explores the ways in which students and teachers participate in mathematics lessons; how students develop beliefs, attitudes and emotions regarding the subject and their mathematical ability; and how students' feelings linked to mathematics inform their choices of post-school course and career pathway. As in many other types of psychosocial research, identity researchers tend to employ qualitative methods to collect data from small samples of participants which are then analysed to

track variations and contradictions in participants' affective expressions. However, the resulting characterisations of affect are somewhat difficult to evaluate methodologically, principally because they tend to be contextualized within theoretical frameworks which seek to frame the identities of participants in terms of gender, race or another social construct. As Darragh (2016) demonstrates in a systematic review of the literature on identity within mathematics education that was produced over the last twenty years, further complications with respect to the characterisation of affect arise because many of these studies lack clear definitions of identity, employ methodological lenses which blend disparate theoretical frameworks and do not distinguish clearly between the psychological view of identity as an acquisition (Bruner, 1986, 1992) and the sociological view of identity as a process (Mead, 1913; Bernstein, 2000) (p.29).

Nevertheless, it is possible to produce an illustrative sample of the characterisations of affect captured in identity studies by referencing the literature in accordance with the five main approaches to the conceptualisation of identity presented by Darragh (pp.24-26). Several studies that were reviewed above (Black et al, 2009; Boylan and Povey, 2009; Lewis, 2012; Rodd et al, 2014) undertake a narrative approach to identity by examining the structures and contents of stories participants tell about their lives and experiences through semi- and unstructured interviews and/or written submissions (Clandinin and Connelly, 2000). Narrative analyses across a wide range of social scientific fields have drawn variously upon the theoretical frameworks of Dewey, Vygotsky, Bhaktin, Bruner and other theorists and vary widely in the extent to which they select and reconfigure data for analysis. Many mathematics education researchers subscribe to the relatively narrow definition of narrative identity proffered by Sfard and Prusak (2005), who assert that participants' narratives constitute identities in and of themselves, in so far as they are "reifying, endorsable and significant" (pp.15-16) and satisfy Blumer's (1969) three

prerequisites for the operationalization of the construct. In that study, Sfard and Prusak evaluate the efficacy of this definition of identity as an analytic tool for investigating learning in a year-long investigation of an 11th grade advanced mathematics class that was made up of nearly equal numbers of native Israelis and immigrants from the former Soviet Union. After documenting all types of classroom processes and undertaking interviews with pupils, parents and teachers, they undertake a semiotic analysis of unreconstructed data that focuses principally on verbs and verb tenses in participants' narratives. Sfard and Prusak find that the conspicuous intra-group homogeneity and inter-group differences are predicated on the disparities between each group's 'actual' and 'designated' identities. They conclude that identity can also be understood as the 'missing link' (p.19) which constitutes the gap between an individual's present view of what she is now and what she hopes to be in the future.

In a study reviewed above, Heyd-Metzuyanin and Sfard (2012) employ an alternate type of semiotic analysis to demonstrate that the exchanges between a teacher and her Year 7 pupils during an extracurricular mathematics activity consist of discrete cognitive and affective thought processes. By highlighting the 'mathematising' and 'subjectifying' elements of the exchanges, in which pupils ignore one pupil's cogent clear explanation of how to solve a geometry problem but listen avidly to another's incoherent argument, Heyd-Metzuyanin and Sfard show how a 'struggle of identities' arise between the two pupils and the teacher (pp.141-143) and note that unproductivity surrounding peer learning must be further investigated.

Kaasila (2007), in contrast, promotes a wider definition of narrative identity by creating a "mathematical biography" (p.374-375) from data collected over a three-year period through a series of questionnaires, interviews, lesson observations and teaching portfolio

inspections to explore the evolving mathematical identity of Sirpa, an elementary trainee teacher in Finland. The biography is constructed on the bases of *emplotment*, i.e. the episodes which serve to advance the narrative's plot (Polkinghorne, 1995) and *key rhetoric*, the utterances which confer the narrative's continuity and coherence (Tannen, 1979) and shows how Sirpa rationalises the progressive shift in her teaching practice from a teacher-centred to pupil-centred perspective by developing a strong belief in the importance of lifelong learning and emphasising her role as a learner in her teaching training course.

Another group of mathematics education researchers examine identity by employing one or more types of discourse analysis, the systematic study of naturally occurring communication at the level of meaning in the broadest sense (Bavelas et al, 2002). Like narrative analysis, discourse analysis has been developed in various ways across a wide range of social scientific disciplines and investigates semiotic aspects of language as well as the conscious and unconscious meanings and objectives which can be attributed to participants' utterances (Harre and Moghaddam, 2003). Although some of the studies on discursive identity in mathematics education reference Gee (2000), who includes a linguistic parameter in his four-part theoretical framework of identity, the majority of researchers evoke the poststructuralist understanding of discourse analysis delineated by Foucault (1972, 1980), who argued that discourses constitute the dominate ideological thought processes that govern our lives, and Walkerdine (1988, 1998), who employed critical psychology in her examinations of gendered discourses and popularized the terminology of 'subject' and 'positioning'.

In one example of a discursive study of identity which examines gendered patterns of participation in post-compulsory mathematics, Mendick (2005) observes lessons and

interviews 43 participants who are following a further mathematics course at a sixth form college in England and asks why only four identify unequivocally as being ‘good at maths’. Mendick then compiles separate in-depth narratives for three male and two female interviewees that are subjected first to a poststructuralist discursive analysis and then to a psychoanalytically-informed analysis which highlights the participants’ identifications linked to mathematics (Hall, 1996). Mendick finds that male and female participants position themselves within a series of inter-related binary oppositions, including “competitive/collaborative” and “real understanding/rote learning” and that their experiences of school mathematics are rooted in popular cultural stereotypes which are constituted in “fragmented, contradictory and fluid identifications” (pp.212-213). The results appear to confirm Walkerdine’s conclusion (1990) that dominant mathematics discourses in classroom help to maintain the notion of rationality as a ‘masculine’ construct and thereby discourage many women and some men from successful participation.

Two other studies which present alternative approaches to discursive analysis are Bartholomew et al (2011) and Walshaw (2010). In a study which examines third-year university students’ relationships with mathematics at a university in New Zealand and how they developed, Bartholomew et al (2011) employ Gee (2000) and Hollway and Jefferson (2000) to highlight the dominant discourses which arise in 165 questionnaires completed by a multicultural participant sample and in-depth narrative-style interviews with 21 participants. Although no cultural stereotypes are detected with regards to the participants’ degree choices, Bartholomew et al find that the dominant discourses tend to focus on natural ability and institutional identity. They note that certain participants appear to be fragile and defensive while claiming to be ‘mathematical’ and argue, as do Rodd et al (2014), that students’ choices have less to do with rational decision-making

than with constructing defensive identities that protect vulnerable aspects of themselves (p. 915). Walshaw employs theoretical concepts derived from Foucault and Lacanian psychoanalysis to examine the structures which underlie a teacher's narrative concerning his classroom practices. Dave, a teacher who has been qualified for four years, is observed and interviewed over ten consecutive lessons as he is teaching an algebra module to a high attaining Year 9 class. Walshaw finds that Dave's identity is "mobilized, reconceptualised and reformed" through his classroom participation (p.492): his narratives evoke the Lacanian constructs of the 'self-in-conflict', the divide which exists between how Dave sees himself and how he is seen by others, and the 'desire for the Other's recognition', which he elicits by anticipating the points during classroom exchanges at which he is able to adjust his positioning with respect to that of his pupils so as to improve the teacher-pupil relationships as well as the efficacy of the teaching and learning process (p.495).

Other mathematics education researchers have focused more closely on identifying the discursive elements which underpin the positioning of students and teachers rather than identifying and characterizing dominant discourses. Positioning theory derives from the framework developed by Davies and Harre (1990) and Harre and van Langehove (1999) which analyses the dynamics of social interactions and distinguishes between *self* or *reflexive* positioning, the ways in which individuals position themselves, and *interactive* positioning, the ways in which individuals are positioned by others. Turner et al (2011) examine the positionings which develop within a group of 22 middle school pupils over a 12-week period as they work on challenging opened-ended cryptography problems during an after-school mathematics club. After coding 15 hours of video data with respect to task structures and the nature of pupil participation, Turner et al find that closed or narrowly defined tasks resulted in participation that is dominated by one or two students

while open-ended tasks instigate collective problem solving in which pupils position themselves as ‘sense makers’ and align themselves in groups as they redefine tasks in order to facilitate their understanding of the tasks (p.240).

Wood (2013), on the other hand, tracks the ‘moment-to-moment’ positionings that occur within a small group of 4th grade pupils over a course of 32 mathematics lessons by analysing video data with respect to the connections which arise between mathematical micro-identity, mathematical discourse and mathematical learning. Wood highlights the case of Jakiel, a boy who is positioned by his teacher as a ‘mathematical explainer’ but then repositioned by a classmate as a ‘menial worker’, to demonstrate that opportunities for learning shift with the changes in positioning that pupils experience during classroom interactions. Wood concludes that the small changes in the classroom context produce noticeable shifts in pupil identities (p.802).

A fourth definition of identity that is sometimes used by mathematics education researchers that challenges the notion of identity as a discrete entity which can be evidenced through narratives, discourses or positionings is Butler’s (1988, 1997) notion of performative identity, which asserts that identity exists only as it is constituted by the repetition of various actions. In a study which investigates the marginalisation of Tsiggano (Roma) children in a Greek elementary school, Chronaki (2011) presents two case studies, one of which observes the exchanges that occur between two Tsiggano girls and a teacher as they practise selling and buying problems and the other which observes a Tsiggano boy as he teaches his class Tsiggano numerals and street maths. Chronaki finds that teaching and learning in the classroom relies upon culturally-scripted identities and that the Tsiggano participants’ experiences were “unlocked” only as they assimilated the gestures and behaviours which enabled them to embrace the “other” (p.220).

Neumayer-Depiper (2013) operationalises the construct of performativity to examine the nature of teachers' identity work by organizing a seminar which invites a group of mathematics teacher candidates in the U.S.A. to acknowledge the ways in which the prevailing discourses in their schools involving students, mathematics and teaching impact the development of their teaching practices. Although most participants appear to experience a shift in their understanding of themselves as mathematics teachers over the course of the seminar, one participant is unable to re-author her positioning and continues to believe that she will need to choose where and who to teach in order to engage with certain teaching practices (p.11) Neumayer-Depiper concludes that the development of the agency of teacher candidates would be more effectively supported by a system of teacher education that highlighted the connections between the sociopolitical elements of teaching and instructional practices and afforded regular opportunities for identity work.

Finally, Darragh's fifth definition of participative identity views the negotiation of identity through participation and engagement in social groups and is frequently adopted by mathematics education researchers because its theoretical bases are compatible with Vygotsky and other constructivist views of teaching and learning. Within mathematics education research this construct typically draws upon one or more of the following theoretical frameworks: social capital (Bourdieu, 1986); situated learning (Lave and Wenger, 1991); communities of practice (Wenger, 1998); figured worlds (Holland et al, 1998); the notion of identity "as being a certain kind of person" with respect to natural state, position, discourse and experience (Gee, 2000, p.100) and Martin's (2000) interpretive scheme, which proposes that identity is negotiated through sociohistorical, community, school and interpersonal levels. Studies of participative identity in mathematics education research have also been informed by Leontyev's (1978, 1981)

concept of leading identity and Bakhtin's (1981) characterisations of heteroglossia, dialogism and chronotype.

Participative identity has been used to study issues associated with the constructs of school contexts, gender, race and power. Boaler (1999) carries out an ethnographic three-year longitudinal study of British pupils in two schools as they move from Year 9 to Year 11 to examine the ways in which particular aspects of school environments shape the ways in which students develop their mathematical knowledge, beliefs and learning practices. One school employs traditional, textbook-based teaching approaches while the other promotes project-based methods in which students assimilate knowledge and skills that are aligned with the 'real world'. Boaler finds that students in the non-traditional school become active agents who perform better on their GCSEs than their counterparts and concludes that theories of participative identity have the potential to provide an understanding of student agency that crosses the social-psychological divide (p.279). Boaler (2002) subsequently acknowledges that many students attribute their lack of success to reform-oriented curricula which promote open-ended, non-traditional teaching strategies but concludes, after reconsidering the results of her longitudinal study, that it is not the mathematics curriculum, but the way it is mediated by teachers, that impacts pupil participation and associated learning progress.

Solomon (2007a) examines the phenomenon of a functional learner identity in undergraduate mathematics by investigating the dominant discursive positions that are articulated by 12 first-year mathematics undergraduates at an English university with a strong research culture and considering the social and psychic elements that underpin participants' self-positionings. Semi-structured, one-hour interviews that elicit participants' 'mathematics histories' are analysed thematically according to Wenger's

(1998) theory of the *alignment, imagination* and *engagement* modes of belonging as well as combinations of the three. Solomon finds that functional identity does not equate to legitimate peripheral participation in the wider world of mathematics: many students appear to be on the verge of developing a negative mathematics identity as a result of pedagogic practices which promote an “almost universal belief” in fixed mathematical ability and the gender differences highlighted by Boaler and Mendick (p.88). Solomon concludes that identities of non-participation and /or marginalisation involve layers of contradictory feelings which can only be resolved by recognizing that students participate in multiple communities of practice with opposing rules of engagement. In a further study employing Wenger’s three modes of belonging, Solomon (2007b) observes that ability grouping and gender differences appears to be crucial in the development of the participative identities in a sample of 18 boys and girls in Year 9 and 10 in an 11-16 comprehensive school in the northwest of England.

Solomon subsequently examines the ways in which women are finding new spaces for belonging the world of mathematics. One study (2012) employs Bakhtin’s theories of dialogism and heteroglossia to compare the cases of Joanne, a master’s student who was on course to obtain a first-class degree and had already arranged to do a PhD at the same university, and Roz, a mature PhD student who had only begun studying mathematics at a post-1992 university along with her sons but had managed to obtain a first-class bachelor degree and then entry to a master’s degree programme at a prestigious research-led university. Solomon finds that Joanna’s narrative exposes an awareness of gender differences associated with mathematical ability and classroom practices but grounds itself mainly in the arguments and agreements which emanate from her positional identity as the daughter of two mathematics teachers (pp.177-179). Roz’s self-authoring, on the other hand, draws on gendered discourses about mathematics in ways which contrast

starkly with her experiences of challenging teachers who ‘wrote her off’ and being a member of a successful group of five undergraduate women who all obtained first-class degrees.

Solomon et al (2016) revisit the case study of Roz after she has finished her PhD and is undertaking post-doctoral work at an English university with a robust research culture. The authors employ Holland et al’s (1998) figured worlds, Bakhtin’s (1981) notion of heteroglossia and Leontyev’s (1978, 1981) concept of ‘leading identity’, all of which view identity as a continually evolving construct, to gain a further understanding of how Roz structures her narrative with respect to her choices and participation concerning mathematics and to analyse its sources of contradiction. Rather than becoming more masculine as she evolves into a mathematician who wishes to become a professor, Roz has chosen to retain her strong feminine appearance and emphasise her motherly, stay-at-home personality, even though she previously struggled to convince everyone that these attributes were not obstacles to a successful career as a mathematician. Solomon et al argue that surviving “against the odds” in mathematics involves negotiating the contradiction of being a female in a “male” mathematics world by enacting a new, hybridised way of becoming a female mathematician, a process which has propelled Roz towards an imagined leading identity of becoming one of the 6% of female mathematics professors in the UK (p.68).

More recently, Foyn et al (2018) employ Holland et al (1998), Bakhtin (1981) and Jorgensen and Phillips’ (2002) concept of ‘discourse order’, which refers to the tensions and movements which arise within and between competing discourses, to explore the issue of gender and mathematics participation by focusing on the ways in which seven “clever girls” (p.80) self-author within the discourse of a mixed 10th grade high-ability

group over a six-week period in Norway. After observing the participant sample in lessons and carrying out focus group and individual interviews with the seven girls, three individual interviews are analysed in detail to highlight the cultural models and issues surrounding gender and performance. Foyn et al find that the focus groups prompt a discourse order which subtly prescribes behaviours expected of a girl who is good at mathematics while clearly proscribing the figure of the female “nerd”. A close analysis of the interviews indicates that within this discourse order it is good to be “clever” but not to act in such a way that this is made explicit (p.84): Anna, the one who is labelled the “nerd”, pays a high price for challenging gender binaries in her heteroglossic self-authoring as a student who is competitive, careless and not needing to work hard. Although Gina and Marie blame the boys for the labelling of Anna, they too distance themselves from Anna by acting as ‘discourse border guards’ (p.90).

Nasir and de Royston (2013) draw attention to the links between mathematical identity and power by presenting two case studies that are submitted to both a sociocultural analysis, which focuses on the presentation of dominant social and cultural capital (Bourdieu, 1986) and a sociopolitical analysis, which focuses instead on ‘cultural wealth’, the non-dominant cultural capital of marginalized communities (Yosso, 2005). The first study investigates how African-American high school students solve average and percentage problems in relation to the mathematical practices involved in the sport of basketball and the mathematical practices promoted at school. The second study examines the mathematical thinking and learning that occurs in the practice of dominoes. Nasir and de Royston find that both out-of-school activities afford numerous varieties of mathematical knowledge that are not valued or privileged by their classroom teachers but conclude that it is the cultural wealth gained in the practice of dominoes which has

enabled one participant to persevere with his desire to succeed within a highly competitive medical school at a prestigious, largely white campus (pp.280-281).

In a final example which attempts to clarify the definition of participative identity and make it more relevant to mathematics educators' more traditional focus on the teaching and learning of central mathematical ideas (p.41), Cobb et al (2009) present an interpretive scheme for analysing identity as a bipartite construct which incorporates *normative* identity, which is constituted in interaction and shows an individual's sense of affiliation to the ways of acting that are understood to fulfill public expectations, and *personal* identity, which refer to those aspects of identity which are not always on show. In their study 11 eighth grade pupils at an urban middle school are observed in two mathematics classrooms, one of which is a classroom design experiment focusing on statistical analysis while the other is an algebra class conducted by the pupils' regular mathematics teachers in accordance with school policies. After employing Martin's (2000) four-part model to analyse video and interview data, Cobb et al find that the establishment of normative identity in a particular classroom is linked directly to both the general and the specifically mathematical obligations that delineate the role of an effective mathematics student in that classroom (p.63). Personal identity, in contrast, does not appear to be only concerned only with students' accounts of specific classroom practices but also their views and appraisals of how the classroom 'works'.

2.3 Discussion

My literature review shows that, since the investigation of mathematical affect has been taken up successively by researchers in the domains of mathematics education, emotion and psychosocial research, there has been a steady evolution in the understanding of

nature and internal determinants of affect, the relationship between affect and cognition during the mathematical problem-solving process and the role of the social context in generating and regulating affect.

During the 1980s, the characterisation of affect was widened considerably. While Polya (1957) and others beforehand had recognised that problem solving was often accompanied by emotions which hampered the problem-solving process, mathematics education researchers employed a mixture of quantitative and qualitative methods to classify a diverse range of affect that included internalised beliefs, attitudes and anxiety that was specifically associated with mathematics and test taking. As MacLeod (1992) reconfigured the categories of affect into 'beliefs, attitudes and emotions', Cobb et al (1989) used the appraisal theory of emotion to show that the generation of affect in a classroom situation emanated partially from the social context and that teachers could assist pupils in regulating their emotions by managing a classroom's social norms. While much of the research in this period assumed that affect had a negative effect on cognition, Marshall (1989) and others showed that a wide range of short-term and long-term emotional responses might be induced by specific facets of a classroom situation.

The rise of emotion research in the 1990s ensured that an increasing number of investigations focused on trait and state emotions rather than on beliefs and attitudes. While mathematical anxiety became identified as the main trait emotion and continued to be investigated using quantitative methods, state emotions were analysed with respect to an enlarged range of theoretical frameworks, including psychological constructivist and linear dynamic theories. Although many qualitative studies of state emotions continue to rely on self-report questionnaires and description of subjective feelings through interviews and computer-coding labels, Goldin et al (2011) have focused on

characterising ‘engagement’ structures and other patterns of emotions evinced in the classroom. At the same time, a more nuanced view has developed regarding the relationship of affect and cognition, which is no longer seen simply as one of cause and effect.

The research that has been undertaken in psychosocial studies also focuses on emotion but takes another approach entirely. This research domain asserts that there are no firm boundaries between affective and cognitive processes and that, because affect may be instigated by a wide variety of unconscious internal and external anxiety determinants, teachers and learners may not be fully aware of its operation during the teaching and learning process. Researchers who carry out investigations using object relations or Lacanian psychoanalytically-informed methodology understand that much of the emotional expression in the classroom relates to teachers’ and pupils’ needs for love and affection and seek to characterise the unconscious determinants of affect by paying close attention to the nuances, ambiguities and contradictions which pervade participants’ discourses and behaviours. There are no *a priori* suppositions regarding the relationship between affect and mathematical problem-solving: Black et al (2009) and others have used the concept of the ‘defended subject’ and certain aspects of Klein’s object relations theory to demonstrate that learners’ conflicting attitudes toward mathematics are related to their unconscious anxieties and destructive urges and suggest that teachers can improve learning outcomes by ‘containing’ them.

Up until now, however, possibly because many mathematics education researchers have been reluctant to conflate social scientific methodologies with clinical psychoanalysis (Bibby, 2018), only a minority of studies in the psychosocial area have ventured formally to expose the unconscious psychic operations which underpin the inconsistencies in

participants' discourse and behaviour in empirical data. In nearly all the individual case studies reviewed above, the data analysis does not afford clear distinctions between empirical instances of irrationality, emotional oscillations and varieties of heteroglossia and their unconscious psychodynamic counterparts. In the studies which focus on groups, examinations of affective expressions and characterisations of identity are often grounded disproportionately in analyses of participants' observable engagements in dominant discourses and socially-interactive positionings. When psychoanalysis has been employed to characterise affect, its application has generally been restricted to the interpretation of the face-value aspects of participants' narratives and classroom performance in terms of psychoanalytic themes and constructs.

However, the capacity to differentiate conscious and unconscious elements of affective expressions and cognitive processes could be increased significantly if the application of psychoanalysis was extended to characterise these in terms of defence mechanisms, the unconscious operations which are carried out by the ego to protect a person's psychic and biological integrity against overwhelming anxiety and/or unacceptable or harmful impulses and detected in patients in clinical settings through analyses of discourse and behaviour. As I will show in Chapter 3, although different schools of psychoanalysis approach the classification of defence mechanisms in diverse ways, the analysis of a defence mechanism in every psychoanalytical theoretical framework enables the specification of the mechanism that is operating to suppress an individual's unconscious thoughts and feelings, the exploration of those unconscious thoughts and feelings, and the identification of the anxiety determinants which are instigating the unconscious operation. In object relations psychoanalysis, expressions of defence mechanisms in individuals are characterised in terms of Klein's delineations of constellations of defences

and anxieties, or states of mind, while collective expressions of defence mechanisms in groups are characterised with respect to Bion's observations of group mentalities.

It follows that, while this thesis is positioned in the epistemological approaches of the psychosocial domain, it seeks to extend the literature on affect in a number of ways. One of its objectives is to develop a theoretical framework that incorporates a wider radius of Klein's and Bion's object relations theory, in order to undertake a deeper examination of the unconscious determinants of affect on the individual level, the relationship of unconscious affect to mathematical self-concept and attainment, and the role of the social context in the unconscious instigation of group mentalities. In addition, it outlines a methodological approach which incorporates an analytical process that derives from the clinical methodology of object relations psychoanalysis and that has the capacity to reconcile observations in the mathematics education, emotion research and psychosocial domains. Finally, it seeks to enable teachers to more effectively manage lesson deliveries by providing insights into the ways in which individual and collective manifestations of defence can mediate the teaching-learning process.

3 Object Relations Theory for Classroom Observation

3.1 Overview

While all theories of psychoanalysis are based on the supposition that individuals are compelled unconsciously to defend themselves against a range of anxiety determinants, they may be separated broadly into two categories according to their views on ego development. Freud posited what is now termed the ‘drive-structure’ model, in which the ego is understood to develop so as to repress biological drives, rather than to respond to external stimuli (Freud, 1910, 1926; Greenberg and Mitchell, 1983, p.44). By the 1920s, however, other theorists began to perceive that, in addition to biological drives, the ego is perturbed by a variety of anxiety determinants that are linked to changes in the external environment and to physiological and psychic changes associated with personality development. They then proceeded to establish relational models of psychoanalysis which situate an individual’s personality development within the social matrix constituted by the individual’s earliest object relationships. Educational researchers who wish to employ a relational theory of psychoanalysis often choose object relations not only because Klein was a key transitional figure between drive-structure and relational models (Klein, 1920, 1926; *ibid*, p.121) and identified a wide range of anxiety-defence constellations that are relevant to the examination of a classroom-based teaching-learning process, but also because Bion (1962) later established direct links between the quality of the mother-infant relationship and an individual’s subsequent capacity to engage in all types of learning.

However, Young (2009) and other researchers (Frosh and Baraitser, 2008) note that, unlike the Lacanian theory of psychoanalysis, which recognises that the analysis of

unconscious operations and defence manifestation is an elusive and illusory goal, one that can never attain the position of final pronouncement, the adoption of an object relations theory is inconsistent with respect to social science research within a postmodernist context. Kleinian object relations psychoanalysis seeks to formulate ‘coherent’ interpretations of anxieties, defences and ways of relating by “going behind” the fragmentary face value meanings of discourse and behaviour (Klein, 1935, 1940, 1946; Young, 2009, p.18). While this kind of narrative reconstruction may offer insights and possibly even a therapeutic value in a clinical analytical situation, it risks constructing interpretations of classroom phenomena that constitute “fantasies of integration and illusory wholeness” (Frosh, 2008, p.189) or incorporate models of participants’ inner worlds that are encased in a “top down” theoretical framework which falsely presents the researcher as an expert who has the capacity to translate participants’ accounts into “real” knowledge (Parker, 2005, pp.118-119).

Notwithstanding the above concerns, in my data analysis I will demonstrate that it is feasible to apply object relations theory to the study of classroom phenomena in a manner that generates psychoanalytically-informed interpretations which offer multi-layered insights that can subsequently be adjusted to accommodate further information and psychoanalytically-informed reflection. A researcher’s capacity to formulate multi-layered interpretations, however, is contingent upon a comprehensive assimilation of object relations theory and the ability to apply this knowledge to occurrences and episodes holistically. In this chapter, therefore, I will first present Klein’s and Bion’s principle theoretical constructs without ‘signposts’ to their relevance to possible research questions. I will then consider some ways in which these constructs may be applied to the interpretation of classroom phenomena by presenting the findings of a six-week period

of preliminary observations I conducted prior to formalising the methodology that I present in Chapter 4.

3.2 Klein's conceptualisation of anxiety and defence

3.2.1 The genesis of two states of mind within the mother-infant dyad

Klein envisaged the mother-infant relationship that materialises at birth as an abstracted dyad in which the infant was termed the *subject* and the mother was termed the *object*. A primal communication process ensues as the infant alternately *projects* her positive and negative thoughts, feelings and emotions into her mother and takes in or *introjects* her mother's thoughts, feelings and emotions into her internal world, which is constituted by *phantasies* which are experienced by the infant as relationships with internalised objects. (Klein, 1920,1958).

Ultimately, the infant will develop a distinctive "psychic interface" which operates continuously to link her internal world to the external environment and a distinctive version of an unconscious internal world replete with knowledge, emotions and phantasies that incorporate both good and bad objects (Hinshelwood, 1987, p.49). 'Good' objects infuse the infant with a sense of goodness, radiance or power that is felt to be contained inside her and whose loss would result in a complete personal breakdown; 'bad' objects, conversely, are perceived as pain, a debilitating disease or a vengeful conscience, whose aim is the destruction of both the individual and the good objects inside her. As aggregations of good and bad objects are unique for every individual, the internal world of every individual can be regarded as a 'distorting mirror' which mediates her conscious recognition of the external world (ibid, pp.55-56).

The process of individuation ensues in the first year of life as the infant acquires two ‘constellations’ of anxieties, defences and qualities of maternal relationship which operate in tandem to protect her psychic equilibrium (Klein, 1935, 1940; Anderson, 1992, Waddell, 1998, p.6). These constellations, which are commonly termed ‘psychical positions’ or ‘states of mind’, are envisioned by Klein as constructs which are disconnected from stages in personality development and momentarily appear, disappear and interchange throughout the whole of the infant’s life as she is faced with any type of anxiety determinate.

The paranoid-schizoid state of mind materialises during the first four months of life, in which the infant typically is only able to perceive her mother as a partial object in the guise of a breast and experiences feelings of aggression and persecutory anxiety whenever her mother is absent or unable to satisfy her needs straightaway (Klein, 1946). In order to protect her good phantasies concerning her mother, and to defend herself against any maternal retaliation that might be instigated by her own aggression, the infant is compelled to engage in *splitting*, the defence mechanism which separates objects into ‘good’ and ‘bad’ parts, so that the ‘good’ parts can be internalised while ‘bad’ parts can be discarded externally (Klein, 1935, 1946, 1952; Laplanche and Pontalis, 1973). Once the infant splits her internalised representations of her mother into ‘good’ and ‘bad’ parts, she projects the ‘bad’ parts, along with ancillary aspects of her own ego, into her real-life mother, who may either respond positively to the infant or retaliate with expressions of negative emotions. Further to her mother’s response, the infant engages in an operation of *projective identification* in which she re-introjects her projections. Eventually, after repeated cycles of projection and projective identification, the infant comes to identify her mother with projected aspects of her own ego and develops additional defence

mechanisms, including omnipotence, idealisation and denial (Klein, 1946; Anderson, 1992).

However, from the moment the paranoid-schizoid state of mind dissipates, the infant enters the *depressive* state of mind (Klein, 1935, 1940, 1946, 1952; Laplanche and Pontalis, 1973). At this point, the infant ceases to engage in splitting and becomes able to perceive her mother as a whole object. The infant now experiences *depressive anxiety* which emanates from her new found guilty awareness that her aggressive and destructive phantasies may have caused damage to or even loss of her mother. Consequently, the infant's mechanisms of defence alter so that they simultaneously inhibit her aggressive tendencies and promote remorse and reparation of the object. The infant finally overcomes the depressive state of mind, typically at the end of the first year of life, when she is able to undergo a mourning process and to accept the eventual loss of her mother, who is then *introjected*, or taken into the infantile ego, and thereby internalised in her entirety (Klein, 1946, 1952; Laplanche and Pontalis, 1973).

The constellations of anxieties, defences and qualities of object relationships inherent in the paranoid-schizoid and depressive states of minds are summarised in Table 3.1.

Table 3.1: Typography of Kleinian paranoid-schizoid and depressive positions

Paranoid-Schizoid Position	Depressive Position
Persecutory anxiety in the form of threats to the self	Depressive anxiety in the form of sadistic phantasies of destroying and losing mother

Mother is perceived as a partial object	Mother is perceived as whole object
Splitting ensues	Splitting abates
Phantasies of projection	Modification of existing defence mechanisms to inhibit aggression and effect reparation of object
Projective identification	Loss of object is accepted
Constitution of inner world of self and objects	Mourning process ensues
Development of omnipotence, idealization and denial	The mother is introjected into infantile ego

Adapted from LaPlanche and Pontalis (1973)

However, the paranoid-schizoid and depressive positions are not constructs as such, at least in so far as the term is used in social scientific texts, as they are not enduring. Rather, throughout an individual's life, these two defensive positions operate reflexively and wholly involuntarily and unconsciously: if the depressive (manic) defences are at any time overwhelmed by an onrush of depressive anxiety, the paranoid-schizoid defences are reactivated immediately and the individual is once again propelled back to the paranoid-schizoid position. Therefore, it is the intermittent failure of mourning and introjection which trigger oscillations in pupils' states of mind as they are interacting in the classroom (Klein, 1946; Bion, 1963; Steiner, 1992).

From another perspective, Klein's two psychological positions represent the endpoints of a spectrum of perception. As an individual's state of mind shifts from the paranoid-schizoid

position to the depressive position, the individual's perception of and feeling for the object becomes more and more integrated; conversely, as a rise in anxiety causes the shift to occur in the other direction, the individual's world view becomes increasingly fragmented (Segal, 1992). Such shifts in equilibrium have an immediate impact on ongoing learning processes in so far as the defences which are manifested in the paranoid-schizoid position tend to prevent an individual from making either holistic observations of events or accurate assessments of the boundaries between self and objects.

At this point, it is possible to characterise Klein's two psychological positions in everyday terms (Waddell, 1998, pp.7-9). The state of mind associated with the paranoid-schizoid position may be described as one in which the individual experiences both people and events in very extreme terms, either as unrealistically wonderful or as unrealistically bad: she is concerned exclusively with her own interests, and while she experiences a sense of persecution in the face of pain and emotional distress, she focuses on self-preservation at all costs. In the depressive position, however, the individual possesses an altogether more considerate attitude and is capable of undertaking more balanced, though ambivalent, relationships with others. She is able to express remorse for the harm she believes that she may have done to loved ones while she was angry or frustrated and is able to express feelings of guilt and the desire to make reparation. She experiences herself as an independent person, distinct from the object, with a character and a personality that encompasses far more than what is required for ordinary physiological survival.

3.2.2 The two states of mind contrasted with transference and resistance

Oscillations between the paranoid schizoid and depressive states of mind are only one type of unconscious operation that occurs, one that provides communication channels

between an individual's internalised phantasy world and her conscious awareness of external events. As Freud first showed, an individual may also gain access to her internal world by verbalising a conscious memory or reliving the past as part of an unconscious compulsion to repeat patterns of relationships which live on as phantasies. Her internalised phantasies are apt to emerge into the external world whenever she experiences a *transference* in which she unconsciously superimposes her past attitudes, preferences and prejudices onto her present actions. Accordingly, a pupil may experience episodes of transference in which she unconsciously perceives teachers and peers as objects who can be manipulated within a variety of roles to bolster memories and gratify various phantasies about parental and authority figures.

Transference is interpreted differently by various schools of psychoanalysis. Klein conceptualised the phenomenon as a form of projective identification in which an individual engages in splitting and then projects mental contents into the analyst, who experiences them as alien elements which remain under the control of the patient. Bion subsequently stressed its communicative, rather than defensive, function in so far as it enables the transmission of feelings and emotions which cannot be articulated verbally. By the end of my preliminary observation, I was inclined to believe that projective identification did indeed figure prominently in episodes of transference in view of the numerous instances in which I noted that I 'felt' pupils' eagerness to be chosen, aggression or cries for help.

It is also possible for a pupil to experience *resistance*, the unconscious mental operation which opposes any intentional or inadvertent effort by the teacher to enter the pupil's internal world by undermining the operation of the pupil's defence mechanisms.

3.2.3 The two states of mind contextualised in stages of personality development

A classroom observer may find it difficult to neatly distinguish materialisation of the paranoid-schizoid and depressive states of mind because their manifestation is impacted by psychodynamic dimensions of the stages of personality development, which differ markedly throughout the life and undergo one a radical change at the point where pupils make the transition from primary to secondary school.

Primary pupils undergo the *latency* stage of personality development, which falls approximately between the culmination of the Oedipus complex, the set of emotions aroused in children of three to four years of age who develop unconscious sexual desire for the parent of the opposite sex and a corresponding urge to annihilate the parent of the same sex, and the onset of puberty. In both Freudian and Kleinian theory, this period is characterised as the period in which an individual acquires vast amounts of knowledge about the world and assesses her inner capabilities while her sexual drives are dormant. Although family relationships are still important, the formation of the superego at the cessation of the Oedipus complex enables her to explore new ways of learning and to participate in a wider range of social relationships.

Latency stage children demonstrate broadly definable modes of learning and behaving which closely relate to the tasks routinely stipulated in primary school curricula. Their underlying anxieties about separating from her family and discovering new worlds are counterbalanced by the manifestation of defences which limit thinking to a restrictive ordering and sorting mentality. Excesses of imagination are modulated unconsciously by the adoption of learning strategies which focus on the amassing of new information and new skills on a non-analytical level, rather than attempting to know the ‘true meaning’ of

things. Many children enjoy maths in primary school precisely because they enjoy putting numbers in order, filling out tables and obtaining the ‘correct’ answers to simple operational exercises in competitive scenarios or game formats rather than solving multi-step problems or carrying out more complicated analysis.

In general, latency stage children tend to visualise both their academic and extracurricular pursuits within a world view which ruthlessly splits all that it encounters into ‘goodies’ and ‘baddies’ (Waddell, 1998, p.96). They experience potent desires to be ‘a part of something’ and tend to form groups which mirror patterns of family life and external social and political structures. Within these groups, the tendency is for the more aggressive, imaginative children to become the leaders and the more passive ones submit to their authority (Meltzer, 1967, pp.96-97). However, the overriding need for all latency stage children to sustain continuous unconscious defences against the anxiety determinates which lurk beneath the orderly veneer of a primary school classroom is highlighted in much popular school fiction, which frequently features protagonists who are enabled to survive in an adverse external environment by immersing themselves in imaginary worlds marked by loss and fearful emotions (Waddell, 1998, p.97).

An individual’s real growth and development during the latency stage is ultimately contingent upon her ability to sustain her inner imagination while unconsciously exercising defence mechanisms which enable her to acquire knowledge and skills in the face of newly encountered anxiety determinants. As I will discuss in more detail in Sections 3.3.1, the ability to navigate this process is largely dependent on the quality of maternal containment the individual experiences during her first year of life and by what later occurs within her family. An individual’s psychic development may be impacted by the states of mind of other family members or by the organisation of the family of the

whole, which may be ‘split’ in so far as unacceptable character traits may be assigned to just one member while good qualities are attributed to other family members (ibid, p.128).

The latency stage of personality development dissipates when puberty heralds the wide-ranging physiological and emotional changes which mark the next stage of *adolescence*, which spans the ages of ten or eleven to about fifteen and was characterised initially by Freud (1905) as a regression to the infancy stage in which the activity of sexual drives is integrated into intimate and loving aspects of early relationships. Klein and other object relationists, however, view adolescence as the stage in an individual’s life in which the whole personality is restructured as latency attitudes and modes of functioning dissipate. While the latency stage is conceptualised in terms of relatively uniform modes of behaviour and attitudes towards learning, adolescence is understood to be a variable experience that is shaped by the quality of early maternal containment, the degree of stability achieved in the latency years and the intensity of fresh internal and external anxiety determinants.

As adolescence is played out over a five to six-year period, an individual is agitated by the re-emergence of her sexual drives and emotions linked to the Oedipal complex and is therefore subjected to violent oscillations between the paranoid-schizoid and depressive positions. In the early years, as she begins to lose her latency modes of functioning and begins to mentally separate herself from her parents on both conscious and unconscious levels, her ego becomes less stable and her attitudes towards the social and political organisations supported by parents are liable to fluctuate markedly as she alternates between feeling that she knows more than her parents and that she is worthless (Coren, 1997, p.16). The frequent materialisation of the paranoid-schizoid state of mind compels a young adolescent to ‘act out’ a reworking of herself by identifying with a succession of

new ideas while exploring new ways of socialising with ever-shifting groups of peers. At certain times she may find psychic refuge in forms of denial in which external reality is invested with romance and linked to the idealisation of internal heroic figures. At other times she may be so overcome by the operations of splitting and projection that she begins to perceive the targets of her projections as the originators of the projected material, so that 'I hate him' becomes 'he hates me'. This emergence of the *reaction formation* defence mechanism does not defend the adolescent against anxiety determinants but it provides her with a target for attack and an opportunity to 'escape', and thereby may impart a false sense of control (Cramer, 1991).

As the adolescent gradually becomes more independent, she will engage in a series of negative and counter identifications with the purpose of 'finding' herself. Subsequently, in a process which is analogous to the formation of the superego, she will introject new external authority figures who will form the basis of her ego-ideal, the component in the ego which will henceforth serve as the ethical reference point for the ego's evaluation of its real achievements (Laplanche and Pontilis, 1973). But this process of introjection induces a new source of depressive anxiety which compels the adolescent to enter into a mourning process for the impending physical separation from her parents. Ultimately, the adolescent may retreat into a state of "explanatory uncertainty" (Waddell, 1998, p.147) and endeavour to become 'mindless' through experimentation with alcohol and drugs if the intermittent manifestations of splitting, the feelings of loss and guilt engendered by depressive anxiety, the pressures of high stakes exams, and the anger and disappointment instigated by the changing nature of relationships with the opposite sex prove to be too much for her ego defence system.

Towards the end of adolescence, as she is unconsciously struggling to finalise the construction of her ego-ideal, the adolescent may display an exaggerated level of optimism that possesses a 'Pollyannish' quality, which more usually functions as a signal of her hopeful, highly personalised interpretation of her life's events rather than as an outright denial of reality (Cramer, 1991). Maturity only begins to be established incrementally as an adolescent becomes able to overcome the compulsive manifestations of splitting and projection by retrieving her projections and rendering them bearable so that she is able to re-introject them successfully: it is at that point that she is able to engage with her own emotional experiences, learn from them and extricate herself from her roving explorations of various friendship groups and social affiliations.

In technical terms, an individual is understood to have become an adult upon the consolidation of her ego ideal. However, Freudian and Kleinian psychoanalysts recognise that an individual never reaches a static point or phase in personality development. Even as the operation of other defence mechanisms develop into entrenched character traits, it is always possible for the occurrence of anxiety-inducing life events to instigate oscillations between the paranoid-schizoid and depressive positions which may precipitate abrupt regressions to earlier stages of personality development.

3.2.4 Klein's states of mind compared to other psychoanalytic theories of anxiety and defence

Klein's perspective on defence mechanisms is predicated on the anxiety that an infant experiences with regards to her mother, which is focused initially on the retaliation she may suffer as a result of her own aggressive and destructive urges and afterwards on the fear that she may have hurt her mother and associated guilt. This is very different from

both the Freudian perspective of the ego defence system, which considers expressions of defence mechanisms independently of anxiety determinants, and the theories of other relational psychoanalysts, who conceptualise the nature of the mother-infant dyad and the process of ego development in slightly different ways. One example highlighted by Ainsworth (1969), who contrasts the object relations view of ego development with dependency and attachment theories, is Bowlby's attachment theory, which views the infant-mother tie as comprising a set of species-characteristic behavioural systems that are activated or terminated by various types of stimuli.

3.2.4.1 Freudian defence mechanisms

In the Freudian perspective, the ego defence system consists of discrete ego operations which may either originate in an individual's internal psyche or the external environment and which emerge incrementally up until an individual reaches adulthood. Although they are deemed to be expressed unconsciously and involuntarily, it is recognised that it is possible for an individual to be aware of expressing a behaviour, affect or idea that serves a defensive purpose without being aware of the source of the anxiety or the operation of a discrete defence mechanism (Cramer, 1991, p.3). Moreover, psychoanalysts sometimes find it difficult to identify expressions of defence mechanisms from their observations of patients' discourse and behaviour.

Freud's nine basic categories of defence mechanisms are summarised in Table 3.2.

Table 3.2: Nine basic Freudian defence mechanisms

Mechanism	Description	Example
Denial	Occurs when our minds prevent us from thinking about unpleasant, unwanted, or threatening situations. It also screens out anxiety-provoking physical sensations in our bodies.	Families of alcoholics may deny perceiving all the (to others) obvious signs of alcoholism surrounding them; adolescents may not believe that their unsafe sex practices can cause them to catch sexually transmitted infections; or someone with a possibly cancerous mole may deny noticing it and therefore not seek medical attention for it.
Repression	The internal counterpart to denial; we <i>unknowingly</i> exclude from consciousness any unacceptable and potentially dangerous impulses.	A woman may be afraid of intimate contact with men because she was sexually molested by an uncle as a child. However, she has repressed all memory of the sexual molestation and therefore can neither recall the episode nor relate it to her fear of sexual intimacy.
Projection	We attribute our own unacceptable and possibly dangerous thoughts or impulses to another person.	People who are titillated by and attracted to pornography may become very active in anti-pornography associations.
Displacement	We redirect an impulse away from the person who prompts it and towards another person who is a safe substitute.	A young boy who has been punished by his father would like to lash out vengefully against him. However, his ego recognises that he cannot attack such a

		threatening figure, so instead, he becomes a bully and attacks helpless classmates.
Sublimation	We redirect socially unacceptable impulses, transforming the psychic energy of unacceptable impulses into acceptable and even admirable behavioural expressions.	A composer or mathematician may re-channel sexual energy into creative products that are valued by society as a whole.
Reaction formation	This defence mechanism transforms an unacceptable impulse or thought into its opposite. By unconsciously convincing ourselves that we think or feel exactly the opposite of what we actually do unconsciously think or feel, we protect our positive views of ourself.	Experiencing the Oedipus complex (Chapter 3), a son might hate and envy his father because his father has sexual access to his mother, whom the son desires sexually. However, the son cannot consciously admit desiring her, let alone act on his desire. Instead, the son consciously adores and behaves deferentially and lovingly toward his father, constantly telling himself and others how wonderful his father is.
Rationalisation	We can avoid threatening thoughts and explanations of behaviour by replacing them with nonthreatening ones.	A woman married to a compulsive gambler may justify (rationalise) her husband's behaviour by attributing it to his desire to win a lot of money because of his great concern for the financial well-being of the family.

Regression	We revert to thinking and behaving in ways that are characteristic of an earlier stage of socio-emotional development.	When a newborn enters the family, older siblings may start acting more like infants to attract the attention that is now being bestowed on the newborn. Adults, too, may revert to babyish or childish behaviours when they do not get what they want.
Fixation	When a person stops developing socio-emotionally because something prevents the person from advancing to the next stage of socioemotional development. Note that the regressed person has temporarily returned to a previous stage, whereas a fixated person has never progressed to the next stage.	In the anal stage of development, the toddler becomes preoccupied with the excretion and retention of faeces. An adult who was fixated at this stage might be extremely neat, tidy, obsessively clean, concerned with details, and meticulous about all aspects of personal appearance; this person also might avoid anxiety by engaging in compulsive behaviours.

Adapted from Sternberg (1995), pp.602-603

Unlike Klein's delineations of the defences associated with the paranoid-schizoid and depressive states of mind, Freud's constructs are categorised and referenced in clinical analysis according to how they work to defend against different sources of anxiety. For example, *repression* and *denial* function to ensure that an anxiety determinant remains in the unconscious. *Projection*, *displacement* and *sublimation*, however, involve a redirection of the anxiety determinant away from the individual to a safe surrogate. *Reaction formation* and *rationalisation* transform unacceptable thoughts or impulses into non-threatening ones; *regression* and *fixation* enable an individual to evade the stage of personality development in which the anxiety determinant is most keenly felt.

Freud's nine basic categories of defence mechanisms can also be divided into 'successful' and 'unsuccessful' defences (Cramer, 1991, p.12). A 'successful' defence is one which

does not block of the operation of an anxiety determinate but instead provides an alternate conduit for its expression: in *sublimation*, for example, an individual redirects her socially unacceptable impulses into socially admirable activities and thereby permanently alters the functioning of her ego by forming identifications with new objects and activities in her environment. An ‘unsuccessful’ defence, on the other hand, such as *repression* or *denial*, must be manifested repeatedly or continuously to suppress an anxiety determinant and does not alter ego structures.

Freud’s initial understanding of defence mechanisms was subsequently extended substantially by Anna Freud, who compiled a comprehensive list of age-related internal and external anxiety determinants and traced the chronological emergence of defence mechanisms (A Freud, 1936). A substantial portion of her work focused on the detailed examination of the changes in defence instigated by the physiological and psychological changes that take place in adolescence and, in many respects, complements the observations of Kleinian object relations theorists regarding the frequent oscillation between the paranoid-schizoid and depressive states of mind in adolescents. Anna Freud noted that the onset of puberty triggers the simultaneous discharge of anxiety determinants associated with intensified sexual drives and aggressive impulses which emanate from different regions of the psyche: a great deal of the unpredictable nature of adolescence is engendered by the prolonged battle which takes place between the unconscious id and conscious ego. Whenever the id predominates, the adolescent is liable to lapse into attitudes and behaviour which accentuate her sexual drives and aggressive impulses through fantasies, attempts at sexual gratification and various forms of antagonistic and criminal behaviours. But as the ego regains its strength, the adolescent is apt to develop exaggerated ascetic traits, abstract intellectual attitudes, and a variety of personal and social inhibitions.

Fenichel (1945) confirmed Anna Freud's findings but identified two other anxiety determinants which are likely to figure largely in interpretations of pupils' classroom behaviours. After hypothesizing that the ego was primed from the very beginning of life to anticipate anxiety signals in the form of a *primary anxiety*, he identified the other main instigator of defence manifestation as guilt, which he traced back to the feelings of annihilation and loss experienced by the infant when she was deprived of her mother's breast (Cramer, 1991, p.6). In linking defence mechanisms with a broader range of anxiety sources, Fenichel demonstrated that failures of an individual's ego defence system results in sustained feelings of annihilation and loss of self-esteem.

3.2.4.2 Alternate conceptualisations of splitting

Splitting is a term that is used by different schools of psychoanalysis to describe disparate unconscious mental processes, many of which are not fully defined when they are referenced in the educational research literature. Whereas 'splitting' is often employed to refer narrowly to the mechanism of splitting inherent in the paranoid-schizoid state of mind, which separates representations in phantasy, Kleinian object relations theory links these separations to a concomitant split in the structure of the ego as these representations are subsequently re-introjected. It is now recognised that there are at least three other types of splitting, including: *splitting of consciousness*, the separation of a group of mental contents from the dominant mass of ideas; *splitting of the personality*, different behavioural states; and *splitting of the mind*, the simultaneous existence of conscious and unconscious ideation (Lichtenberg and Slap, 1973).

I believe that four alternate conceptualisations of splitting should be considered in an examination of manifestations of splitting during lessons. Fairbairn (1952), who greatly influenced Klein's final conceptualisation of the paranoid-schizoid position, offers a

persuasive theoretical account of how the splitting of the ego results in the formation of individualised defence mechanisms (Greenberg and Mitchell, 1983; Rubens, 1994). Fairbairn viewed the 'self' as a dynamic structure which extends beyond the ego and functions primarily to seek out object relationships. At birth, the self is a unified structure but, as the individual engages in a succession of object relationships which present her with variegated affective elements, it becomes split into a *central* self, i.e. the shrunken remainder of the original self, and two new substructures known as the *libidinal* and *antilibidinal* selves. At the end of the splitting process, the central self functions as the part of the self which remains available for relationships with real people in the outside world. The libidinal and anti-libidinal selves, however, function as pre-existing templates for the types of negative object relationships the psyche has deemed to be crucial to its continuing survival. Even though they are repressed and split off from the central self, they press continually for the reiteration of the experiences which occasioned their creation and ultimately limit the healthy functioning of the central self in the later stages of personality development and the overlay of everyday experience (Rubens, 1994).

Mahler's delineation of the separation-individuation process that takes place during the first three years of the mother-infant relationship is regarded as the one that correlates most closely with clinical research and experience and which provides a theoretical basis for manifestations of splitting which impact personality development. His framework is articulated in observable stages and begins with the *symbiotic* phase (0 to 4-5 months), in which the infant is so dependent upon her mother that they form a 'dual unit' (Carser, 1979). The infant, motivated unconsciously by the need to attach herself to her mother, endeavours to rid herself of feelings of abandonment and disorganisation by employing magical thinking to make her mother meet her demands. The mother, acting as an

auxiliary ego, makes the environment safe for the infant, who differentiates between 'good' and 'bad' experiences based on the quality of her mother's response.

In the *differentiation* phase (4-5 to 7-10 months) the infant has the physical ability to explore her mother's face, observe her from a distance and synthesize these data internally. She becomes aware of and develops an anxiety towards strangers, and may adopt a transitional object such as a doll or blanket to help herself remember her mother until she has internalised a memory trace of her. In the subsequent *practising* phase (7-10 to 16-18 months), the infant routinely crawls substantial distances away from her mother but still needs her as a 'home base' for a sort of 'emotional refuelling' (ibid, p.22). At first, she continues to crawl back to her to reassure herself of her mother's love, but later, when she is walking upright and beginning her "love affair with the world" (ibid, p.22), she becomes less perturbed by frustrations and begins to draw away from her mother. As she focuses more closely on her own interests and discoveries, she abandons magical thinking to engage in reality testing.

However, in the *rapprochement* stage (16-18 to 24 months), as the child continues to develop her cognitive and motor skills and superficially separates further from her mother, she becomes increasingly aware of how helpless and vulnerable she really is. She abruptly experiences an onrush of separation anxiety as well as a decrease in self-esteem, and again craves to be with her mother to share her new experiences. Crucially, the child's successful independence and continued exploration of her environment will be contingent upon her mother's interest and quality of her containment, but this is not a simple repetition of the *practising* phase. At this point the child is deeply conflicted between retaining her independence and reuniting with her mother, which is demonstrated in ambivalent physical displays. The *rapprochement crisis* peaks as the child experiences

temper tantrums while she struggles to make her mother fulfil her needs; in the best-case scenario, the mother now transforms herself into the ‘good enough mother’ described by Winnicott (1958) and sets limits in complying with her infant’s requests. The child can then introject her good and bad qualities to construct a unified internalised image of her mother which will enable the development of a ‘beloved self’ who can empathise with the behaviour of others, tolerate frustration and delay the gratification of her impulses with better control.

During the final phase of *rapprochement* (24-36 months), the child fully attains the ego functions of reality testing, frustration tolerance and autonomous impulse control as the individuation process is consolidated. If the maternal object has been introjected within a relationship of trust, the child proceeds to internalise parental values and develop a superego; if not, the child may arrest her independent movements and develop feelings of aggression and frustration which leave her with feelings of emptiness and no sense of a ‘beloved self’.

If the child is thereby left with a weak, developmentally stunted ego, she is then likely to develop defence mechanisms of splitting which enable her to simultaneously express her narcissistic desire to merge with her mother and project into the external environment her associated infantile feelings of rage. However, repeated episodes of splitting and projection prevent the child from dealing with the source of her aggression and heighten her feelings of persecutory anxiety. As she grows older, she may become trapped in a maladaptive personality style that masks underlying feelings of anger, emptiness, sadness and poor self-esteem and tends to project unwanted aspects of herself whenever she is subjected to stressful situations (Carser, 1979, p.24).

Kohut (1971), a leading proponent of self psychology, distinguished two types of splitting operations linked to representations of the self. In vertical splitting, the separated representations remain simultaneously within awareness and may produce contradictory personality organisations. In horizontal splitting, the separated representations are placed either alternatively or permanently outside conscious awareness through additional repression: the 'split' in this case is instigated by a break between the reality ego and unfulfilled archaic narcissistic demands.

In phenomenological terms, episodes of pupil splitting in a classroom situation may manifest themselves as instances of dissociation, i.e. divisions in consciousness. In the late 19th century, Janet, Freud and other psychoanalysts reserved the term *dissociation* to describe somnambulism, automatic writing, cases of multiple personality and other pathological phenomena which involved the splitting of consciousness due to stress or trauma (Van der Hart et al, 2009). By the 1970s, however, dissociation was viewed increasingly as a continuum of phenomena which include normal experiences such as being absorbed in fantasy, staring into space and not remembering if something really happened (Ray, 1996). After determining that splitting mechanisms underlie observable dissociation processes, various relational psychoanalysts have recognised that splitting of the conscious may be expressed as 'multiple selves' according to social context (Van der Hart et al, 2009; Aron et al, 2012). For example, Sullivan posited that individuals develop a number of 'self states' that are shaped by their efforts to avoid or minimise threats of anxiety as they internalise the recurring patterns of interactions in their early object relationships (Howell, 2005). In perceiving that some of her actions meet with approval and tenderness while others generate disapproval and anxiety, a child unconsciously recognises a 'good me,' a 'bad me' and a 'not me', the last of which arouses the most intense levels of anxiety in her mother. She then dissociates the 'not me' part of her self

from the recognised version of her self in order to avoid assuming an identity which is infiltrated with feelings of dread. In later life, the individual is apt to dissociate whenever she is compelled by acute anxiety to block out the most unacceptable aspects of her self.

According to Davies (1996), each self state is engendered by the internalisation of an object relationship and is constituted by a self representation, an object relationship, an affective component, a physiological component and a specific cognitive level of development. The process of leaving one self state and entering another may have a defensive function but Bromberg and other theorists view an individual's ability to simultaneously hold several dissociated self states within her mind as a significant psychic achievement (Bromberg, 1998). At the very least, the defensive mechanisms of splitting and dissociation safeguard the individual on several levels and help her to engage in all types of learning activities by assisting the ego in testing and distinguishing various aspects of reality (Cramer, 1991).

3.3. Bion's extensions of Kleinian object relations theory

3.3.1 The reassessment of the mother-infant dyad

Object relations theorists now look upon the infant's first-year relationship with her mother as the 'model' which informs the creation of all future learning models largely as a result of Wilfred Bion's reconceptualisation of Klein's mother-infant dyad. Bion imagined the mother-infant dyad as a 'container-contained' model (Bion, 1962, p.90) in which the process of projective identification is transformed into a learning process by qualities of maternal containment. The infant manifests the defence of projective identification by projecting her 'bad' feelings into the 'good' breast of the mother and then, after some time, removing and re-introjecting them back into her psyche. During

their sojourn in the mother, the 'bad' feelings ought to have been modified in such a way that they are more tolerable to the infant. However, this process is never straightforward, either for the infant or the mother: it is either permeated with emotion, which can take on positive or negative aspects, or it can be stripped of emotion entirely and imbued with apathy.

If the mother is able to participate actively and constructively in the containment of the infant's communications of impulses, pain and desires, and thereby lend shape and form to the infant's emotions, the infant will slowly become capable of thinking symbolically, learning from experience and developing beyond it (Bion, 1962; Waddell, 1998). However, if the mother's capacity for 'reverie', i.e. 'the psychological supply source for the infant's need for love and understanding' (Bion, 1962, p.90; Bion, 1970) is inadequate for meaningful containment, and/or if the infant is excessively envious or wholly intolerant of frustration, the learning capacity of the infant may be considerably compromised. In the absence of a satisfying containing presence, an infant may develop a 'nameless dread', the psychic pain associated with the knowledge that she has no mind into which she can project her distress. If this occurs, the infant may refuse to allow thoughts into her psyche or may resort to living within a 'second skin' of her own defence mechanisms to provide substitute containment (Waddell, 1998, p.49).

Bion eventually defined the quality of an individual's learning experience in terms of a 'K link' which he proposed to represent the mutual dependency and possibilities for growth which exist between the infant and the mother in the container-contained model. When K+ learning predominates, the individual is able to retain her previously acquired knowledge and experience while remaining receptive to new ideas (Bion, 1962; Waddell, 1998); however, when K- learning predominates, the individual's feelings of envy and

unrelenting omniscience act together to strip new ideas of their meaning and to impose an inherent resistance to change. In this case, learning occurs defensively and the three-dimensionality of a containing experience is transformed into a materialistic, ‘two-dimensional sticking-of-the-self-onto-the-other’ (Waddell, 1998, p.118).

3.3.2 The rationale for the applying Klein’s theory to groups

Bion’s decision to apply Klein’s object relations theory to the observation and treatment of small groups of combat personnel who were suffering from shell shock and other psychiatric disorders at Northfield Military Base during World War II was not without precedent. In *Group Psychology and the Analysis of the Ego* (1922), Freud became the first psychoanalyst to consider group psychoanalysis by questioning the nature of groups, the mental changes they force upon their individual members and the inordinate influence they acquire in all areas of society. Initially, Freud reiterates the assessment of group mentality provided by LeBon (1895), who noted that individuals palpably feel, think and act differently as soon as they join a group and adopt entirely new characteristics as they lose their individuality. Along with the disappearance of their ‘conscious personalities’, they are liable to behave as if they were ‘hypnotised’ or under the influence of suggestion (Freud, 1922, pp.6-11); the intellectual capacity of the group decreases far below the capacities of its individual members, so that it rejects logical argument; and, while at times ethical conduct and ideals remain high, sometimes “cruel, brutal and destructive instincts are unleashed” which call for the imposition of a will of a strong leader (ibid, p.17). However, to counterbalance this view, Freud also cites McDougall (1920), who distinguished between spontaneously formed groups and organised groups and argued that the latter, while generally acting to intensify the emotions of their members, often reinforce their positive attributes.

Freud then offers a summative analysis of groups in which he identified the psychodynamic forces which enable the formation and continuing cohesion of groups. The first are the libidinal forces which operate unconsciously to attract group members to one another and to make them subject to 'suggestion'. For example, in an organised group such as the Church, for example, where all members are 'brothers or sisters in Christ', the cohesion of the group is linked intrinsically to the illusion of a leader who loves every member of the group equally and to the binding libidinal ties which exist between all other group members. The second force is comprised of varieties of *identification* in which individual members of a group unconsciously assimilate aspects or attributes of other members. A series of elementary identifications are manifested within a group whenever individuals perceive that they share qualities with others, even if they lack feelings of empathy or sympathy for each other or pre-existing object relationships. An even stronger type of identification between group members and their leader is liable to occur if each member's ego ideal (Section 3.2.2) is supplanted by the group ideal embodied in the leader, who is representative of a primal parental figure.

Freud offers two further hypotheses regarding the nature of groups. First, he suggests that the 'herd instinct' originally characterised by Wilfred Trotter (1919) derives from biological propensities that are shared with other species. Its genesis is observable in family groups as elder children suppress the jealousy and hostility they experience towards their younger siblings and develop, via the reaction formation defence mechanism (Section 3.2.3.1), a communal feeling for justice and equal treatment for all that is further encouraged at school (ibid, p.86). Second, the features of group mentality which appear to be regressive may be interpreted as artefacts of primitive societies (ibid, p.120), which Freud had previously surveyed at length in *Totem and Taboo* (1913).

Once Freud established that psychoanalysis could be applied to groups as validly as it could be applied to individuals, it was only a short matter of time before a theorist transposed clinical methodology from a 'two body' to a group situation. The first methodology for 'group psychotherapy' was developed in the 1930s by Foulkes, who asserted that the constitution of a group facilitates all aspects of the therapeutic process: while the group may never take precedence over its individual members, who continue to express individual defence mechanisms within the group's 'interactional matrix' (Foulkes and Anthony, 1965, p.27), its constitution engenders a greater degree of free association as strangers, with totally different neuroses and individual conditions, react and respond to each other and come to accept that the ideas and comments expressed by different members have the value of unconscious interpretations (ibid, p.29).

In addition to the introduction of the concepts of 'matrix' and 'network', both of which reiterate Freud's presupposition of the precedence of the psychology of the group over that of the individual, Foulkes introduced many group analytical constructs which are now standard, such as mirroring, exchange, and 'free-floating' discussions, all of which considerably extended the articulation of clinical psychoanalytic experience (Nitsun, 1996, p.23). From 1957 onwards, after Kurt Lewin, Carl Rogers and others had formulated alternate theories of group analysis, many teachers in the United Kingdom attended the annual Leicester Conferences run by the Tavistock Institute to educate professionals about the psychodynamic aspects of groups and systems which affect the success of work projects and organisational changes (Richardson, 1967). Notably, the overwhelming majority of the theoretical and practical approaches to groups that were developed in this period tended to extol the positive aspects of experiences in groups in as much as they neglected many of their negative features.

3.3.3 Bion's theory of defensive group mentalities

Bion's examination of group behaviour in *Experiences in Groups* (1961) is remarkable for its dispassionate scrutiny of the destructive aspects of groups. He commenced his observations and therapeutic treatment of small group in the belief that psychoanalytic approaches to individuals and groups were 'merely different facets of the same phenomena' (Bion, 1961, p.8) and was initially more concerned with satisfying military objectives of rapidly treating and redeploying personnel than investigating the unconscious mental operations which shaped group behaviours. However, after he began to work with groups of eight or nine patients at the Tavistock Clinic after the war and became confident that he understood the essential qualities of a 'good group spirit' (ibid, p.23), he formulated a routine of 'taking' a group without actually leading so that he could observe the unconscious mental processes underlying the individual members' comments and the group's interactions could emerge freely.

By observing the initial actions of the group members, which always involved a certain amount of indignation arising from Bion's refusal to accept the role of a traditional leader, Bion deduced the phenomenon of a 'group transference' (ibid, p.38) that materialised as a 'unanimous expression of the will of the group' (ibid, p.65) and which negatively affected the minds of individual members whenever they ventured to think in ways which opposed the prevailing group mentality. Moreover, whenever the conversations in the groups strayed from the therapeutic work task at hand, they lost much of their intellectual content and critical judgement and became charged with frustration, resentment and other powerful emotions, with the result that members appeared to wrestle with the sort of intellectual problems that an individual would solve easily by herself in another situation.

Bion eventually came to believe that a group's power to fulfil the needs of its individual members was in fact challenged by the group mentality itself. After repeated observations of oscillations in group behaviour, Bion characterised the existence of three *basic assumption* mentalities, i.e. collective defence mechanisms, which are liable to arise whenever a group is subsumed with overwhelming anxiety that either threatens its existence or constitutes a 'hostile attack to its religious beliefs' as it meets to complete a work task, specifically one which involves rational thinking with consequent learning (Bion, 1961, p.85). Each mentality involves the existence of a leader and rejects the existence of time but is differentiated from the two other types by its distinctive mood and culture. Paradoxically, while individual group members are able to perceive the emergence of basic assumption mentality, the group as whole cannot, with the result that each basic assumption is self-propagating through an unconscious 'machinery of intercommunication' (ibid, p.65).

In the *dependent* group, the basic assumption in the group is that its immature organisation in some way depends upon an external object, which may in fact be a 'bible' or history of the group as opposed to an actual person (ibid, p.155). Bion found that when the group unconsciously designates an ordinary group member rather than the official leader to be the dependent leader, they invariably choose the most pathological member, a 'mad genius' type, most likely because a group unconsciously fears the establishment of an entrenched dictatorship. Group members who are caught in a dependent mentality tend to evince a mood of inadequacy and frustration and manifest hostility to any work-related activity; they may become silent or they may demand a 'magician' who can wave away the scientific material which supports the work task (ibid, p.85). Even though they may alternatively adulate and denigrate the designated leader, they will each feel somewhat depleted if they do not attain an individual, direct relationship with him.

In a group dominated by the basic assumption of *fight-flight*, members of the group become preoccupied with self-preservation, which can only be retained by fighting an enemy or fleeing from danger. The leader in this case is chosen for her courage and self-sacrifice (ibid, p.94) and is sometimes accorded a role as a solitary guard who must remain close to but separated from the group. In the *fight* mode, the group may be convulsed by aggression, but in *flight* mode the members are apt to simply drift into smaller subgroups and ignore any requests by the leader to attend to the work task.

Finally, in a group dominated by *pairing* mentality, two members of the group, irrespective of their sexes, carry on a discussion while the rest of the group listen attentively and apparently forget their own concerns. The basic assumption underlying this mentality incorporates a phantasy that the two speakers are sexually involved and will produce a messianic leader who will later rescue and preserve the group's identity.

Paradoxically, even though the manifestation of basic assumption mentality serves to provide the group-as-a-whole with psychic security, the emotional states of the individual members of a group which is dominated by a basic assumption are not wholly pleasurable. Individuals often complain that they 'cannot think in a group' (ibid, p.95) because they are compelled unconsciously to engage in splitting whenever their individual emotions conflict with the group's emotional state and they may become distressed as they sense the fragmentation of their perception and overwhelming negative feelings towards other group members, which may in turn instigate disturbing group interactions. However, although individual members may consciously endeavour to decouple themselves from the patent manifestation of a basic assumption mentality, their unconscious participation is unavoidable because of their physical presence in the group.

Bion denoted the term 'valency' to describe an individual's readiness to enter a group's basic assumption mentality (ibid, p.116). The valencies of assorted members of a group can vary enormously, as most individuals adhere to one or two subgroups within the group-as-a-whole (ibid, p.127); in certain cases, basic assumption mentality may be manifested within one subgroup while work mentality is maintained throughout the rest of the group. Crucially, however, Bion observed that, while certain individuals may appear to play habitual roles within the enactment of a basic assumption, the genesis and evolution of basic assumption mentality is entirely independent of individual personalities and should be regarded strictly as a systemic expression of a prototypical system of defence against primitive anxiety. Although only one basic assumption dominates a group at any time, it always co-exists in tension with work mentality and is apt to change its form in erratic, unpredictably ways.

Bion concluded later in his career that his observations and theories concerning groups were similar to those put forth by Freud and declined to proceed further with the academic elaboration of his investigations. For the purposes of the data analysis which is to follow, however, it is important to note that, while Freud distinguished libido and identification as the unconscious forces which hold groups together, Bion emphasised the importance of the object relations constructs of splitting and projective identification. Although French and Simpson (2010) argue that Bion's theories would have made a greater impact on social science research if he had focused more on elucidating the elements of work mentality, Yalom (1970), Kernberg (1978), Schermer (2002) and others have made considerable efforts to produce overarching categorisations of basic assumption mentality, as exemplified in Table 3.3, which presents Schermer's classification of Bion's basic assumption mentalities.

Table 3.3 Schermer's classification of Bion's basic assumption mentalities

	Dependency	Pairing	Fight-flight
Predominate defence mechanisms	Introjection Idealisation Devaluation	Denial Repression	Splitting Projection
Object relations	Leader as container-breast	Condensation of Oedipal and pre-Oedipal object relations via the primal scene	Bad externalised object is pervasive Internal world is objectless
Narcissistic features	Over idealisation of leader as defence against narcissistic injury	Narcissistic self-object merger with the pair	Primary narcissism Narcissistic rage
Mythic features	The leader is anti-hero, prophet and deity	Messianic myths such as the Birth of the Hero and Creation mythologies	Struggle between good and evil 'Paradise Lost'
Roles	The 'dual' of the leader Dependents and counterdependents	'Mary and Joseph' Overpersonal and impersonal	Fight leader Flight leader

Biogenetic core	Child-rearing and bonding	Reproduction and production	Protection of a group from danger
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Schermer (2002), p.141

A further investigation of the manifestation of basic assumption mentality in classrooms, in tandem with studies of other aspects of the behaviour of pupil groups, was undertaken by Thelen at the University of Chicago over a 35-year period starting in 1947 (Thelen, 2000). While he and his graduate students initially restricted themselves to recording new types of data such as classroom noise levels, measures of pupils' introspection and classifying overt behaviours within a behavioural context, they gradually established a methodology of 'sequential analysis' (ibid, pp.115-118) in which they framed classroom events in relation to antecedent and subsequent episodes and identified feelings and affects as basic data of experience. They noted that the 'culture' of a group shifted continually as affective behaviours were communicated non-verbally and that the group's 'emotions' appeared to constitute the precedent rather than the result of so-called objective behaviour (ibid, p.122). Further research appeared to demonstrate that, while leaders' affective preferences play a part in the character and development of a group, leaders could be pressed into behaving in particular ways in response to pressures generated by a group's composition. In various classroom investigations which attempted to operationalise Bion's observations of groups and conceptualisation of basic assumption mentality, Thelen and his colleagues became convinced of the viability of Bion's fundamental insight, that a group as a whole can be seen to operate on certain shared assumptions which lie outside awareness, even though macro-level patterns of behaviour could not be extrapolated from their observation data, which 'by definition' were collected at the micro-level of individual utterances and actions (ibid, p.131).

3.4 Preliminary observations and inferences of defence manifestation in classroom settings

3.4.1 Synopsis of the study

Inferring defence manifestation in typical lessons is challenging, particularly as oscillations of the paranoid schizoid and depressive states of minds as well as alternative expressions of defence mechanisms may operate in the absence of observable behavioural changes. Moreover, every pupil will manifest defence in ways that depend upon her individual characteristics and stage of personality development, which may continue to incorporate latency modes of functioning and learning until the end of Key Stage 4. It may be difficult for a teacher who is acting as a participant-observer to identify exactly when manifestations of defence begin and end: one pupil may manifest defensive behaviour which appears to spread throughout the rest of the class or a group behaviour may appear to abruptly culminate in the actions of an individual.

The interfaces between manifestations of defence by individuals, subsets and the class-as-a-whole will be examined in detail in the data analysis in Chapter 5. In the following sections I will briefly consider how defence may be manifested differently on individual and group levels by recounting some of the preliminary observations I made of a low-attainment, mixed-gender Year 10 set of 15 pupils over a six-week period before formulating the methodology I present in Chapter 4. Although I had not yet fully addressed the distinction between the metapsychological theory of object relations and the analytical process which derives from the clinical process of object relations psychoanalysis (Section 4.1), I collected data in accordance with the ethical guidelines then set by the British Association of Educational Researchers (BERA) (2011, Section 4.2) and employed pseudonyms while noting my observations.

3.4.2 On the individual level

3.4.2.1 Internalised manifestations

Internalised manifestations of defence would appear to be comprised of paranoid-schizoid and depressive states of mind, other defence mechanisms, transference and resistance (Section 3.2). On many occasions, I observed ostensible episodes of transference which incorporated behaviours that were not highlighted in Klein and Bion's delineations. Two separate pairs of pupils were apt to engage in 'play-fighting' scenarios which incorporated repetitive gestures and discourse whenever a whole-class problem solving activity ceased and I paused to assign individual exercises on the board or distribute worksheets. The scripts of these scenarios did not seem to derive from anything that was ever said or done in our lessons but appeared to originate in the pupils' private social activities that took place after school and to be similar to the 'parataxic distortions' characterised by Sullivan (1953) who linked transference to lasting distortions in perception which sometimes triggers an unconscious identification with an emotionally significant individual from the past and compel an individual to relate to a person in her immediate vicinity using previously established patterns of behaviour and language (Sullivan, 1953; Barton, 1996).

I also observed varieties of transference during short, intensive paired and small-group problem-solving activities which appeared to support the theoretical framework of Kohut (1971), who linked transference to an individual's feelings and her emotions for her *self-objects*, the objects which she experiences as parts of herself or as psychological functions because they once performed life-sustaining roles in her early development (Siegel, 1996). Often, especially when pupils were initially trying to decipher word problems, one person in the pair or group would verbalise her thoughts while gazing intently at the other(s) and the other(s) would repeat her words while nodding their heads. This ritualistic

behaviour sometimes occurred repeatedly as the pair or group worked through successive steps of problems and appeared to correspond to Kohut's descriptions of *mirror* and *alter ego-twinship* transferences in which an individual attaches herself to someone who can reflect and reactivate her grandiose self, the part of herself which supports her self-esteem.

At times, I found it exceedingly difficult to distinguish the unconscious operations of resistance that infiltrate manifestations of the paranoid-schizoid state of mind and other types of defence manifestation from conscious forms of resistance. I am unable to state that I 'observed' the unconscious operation in its pure form, only that at times I 'sensed' or 'felt' pupils' aggressive and destructive thoughts and feelings enter my awareness, at which points I tended to become distressed and experienced difficulties in maintaining my composure. However, while I believe that these unspoken transmissions were sustained by some type of projective identification operation (Bion, 1961; Roth, 2005), I was insufficiently cognisant of the operation of my own defence mechanisms to analyse them further.

After interviewing several of the participants, I realised that many pupils develop a 'split self' (Section 3.2.2) in which either they become the 'good' child at home and the 'bad' child at school, or *vice versa*; alternatively, a pupil may develop a more complicated version of split self in which she 'acts out' one version to her teachers and peers and reserves the other version for another audience. When I carried out an unstructured interview with Cathy, for example, I was discovered that, although she tended to interact with the most disruptive pupils in the class and only worked intermittently, she possessed a 'secret', 'business-minded' identity which she disclosed only to her family and a few

close friends outside of school who was working diligently to develop her English, dance and social skills so that she could join an aunt in Chicago and forge a career in the media.

3.4.2.2 Externalised manifestations

Many of the classroom disruptions I observed appeared to be instigated by ‘mood’ changes in individual pupils and the whole class that could be described broadly as abrupt oscillations from the depressive to the paranoid-schizoid state of mind. The paranoid-schizoid state of mind appeared to manifest in individuals in various ways. Two or three pupils tended to regress to the pre-latency stage of personality development by speaking in ‘baby talk’, getting out of their seats to walk about the classroom and throw items across the room whenever they were distressed by the utterances or actions of their peers or overly challenged by a task I had assigned to the class. However, others engaged in more intense degrees of splitting and projection which took the form of temper tantrums.

On one occasion, after I had given Eddie a sanction on the board for ‘talking over me’ while I was teaching at the board, he swore at me, wished aloud that he hoped I “would die”, threw his books to the floor, overturned his desk and exited the classroom without permission. Although I never managed to persuade him to discuss the full extent of his anger with me, I was aware that violent temper tantrums are the result of excessive splitting and projection in which a teacher becomes the embodiment of the pupils ‘bad’ thoughts and feelings (Waddell, 1998). Furthermore, pupils who are prone to violent tantrums may later display bullying behaviour as they attempt to rid themselves of further aggressive impulses or may deplete themselves to the point where they become withdrawn or exhibit the pseudo-intellectual demeanour that is commonly observed in latency stage children.

Two other pupils, however, appeared to engage in splitting by projecting their 'bad' thoughts into one cohort of teachers while saving their 'good' thoughts for another cohort others in the manner described by Carser (1979). Their unconscious efforts to assemble an 'in-group' of supporters often begin when a pupil issues some sort of public 'sentimental appeal' (ibid, p.24). Teachers who are susceptible to the operation of primal defence mechanisms, and nurture these pupils because they are gratified to have been 'chosen', are then promoted to the membership of 'in-groups', while teachers who are able to operate from the reality principle and respond to the pupil in a non-defensive manner are relegated to 'out-groups'. However, the designation of who is 'in' and who is 'out' is liable to change without warning: teachers often complain that pupils who exhibit this pattern of behaviour are 'manipulative', although on an unconscious level the teachers themselves may be colluding with pupils and competing with colleagues for positions in the 'in-groups'.

Pupils who frequently display this type of fickleness often feel exhilarated by having 'put something over' their teachers or 'gotten away' with making incredible demands. Some become 'special cases' who instigate considerable resentment and feelings of unfairness in their peers. They may never complete action plans to improve their behaviour because, while they may consciously wish to comply with school policies, they are unconsciously unable to achieve the re-introjection of their negative projections which is essential if they are to formulate an integrated perspective of their performance in different school contexts.

At various points pupils appeared to display the vertical and horizontal splitting operations characterised by Kohut (Section 3.2.3.2). In episodes of vertical splitting a pupil who is performing confidently and enthusiastically in one activity may suddenly

became dejected and unable to participate constructively in another; alternatively, a pupil may experience 'good' and 'bad' days. Tania, for example, tended to perform erratically because, as she continually reiterated, she had 'sunny' days in which she 'liked' mathematics and usually completed both the core and extension tasks and 'dark' days when she could only 'drop' at her desk and put her head down. On the other hand, other pupils appeared to engage in horizontal splitting operations by manifesting behaviour of which they later claimed to be wholly unaware, such as chattering incessantly during the presentation of new material on the board, or 'zoning out' involuntarily when they were beginning to find a topic too challenging.

In retrospect, most of the pupils tended to display the qualities that are typically associated with the adolescent stage of personality development (Section 3.2.2). Their anxiety levels increased significantly and instigated more frequent manifestations of all versions of the paranoid schizoid position whenever they were obliged to compare the F and G grades they had obtained on mock exams to the C, D and E targets they had been assigned as targets by the Head of Mathematics. They also experienced intermittent difficulties in achieving successful transitions from the concrete operational modes of thinking prevalent in the latency stage of personality to the higher level analytical strategies required by various topics of the Key Stage 4 mathematics curriculum. I was not able to confirm if these learning difficulties derived from the K- links that were characterised by Bion (Section 3.3.1) but I observed that pupils appeared to form defensive identifications with peers who enabled them to they feel safe or more superior in an academic or social sense (Waddell, 1998).

3.4.3 On the group level

Over the six-week period I observed frequent manifestations of various types of ‘non-work’ mentalities which often appeared to corroborate many aspects of Bion’s characterisations of basic assumption mentalities but which never attained an exact correspondence. As separate subsets of the class belonged to rival social factions on the nearby housing estate, the fight element of the fight-flight mentality was apt to materialise briefly as pupils were discussing events that had occurred outside school as they were entering the classroom and unpacking their bags. It also operated on the few occasions the class claimed in unison that I had “unfairly” given certain pupils overly severe sanctions for disruptive behaviour. In every instance, I managed to diffuse the class’s anger and aggression by engaging with pupils in open and even-handed discussions while maintaining a calm and cheerful manner.

The flight element of the fight-flight mentality was harder to discern and characterise. In many lessons, after they had participated earnestly in the whole-class and practical activities I had introduced in the first 30 minutes, the pupils’ focus and energy appeared to dissipate abruptly as I would assign differentiated textbook exercises; as they worked through the problems they would position themselves at their desks and speak to each other in pairs and trios as if they were at a cafe. It was not clear if this occurred because the pupils were physically tired or whether they experienced anxiety in switching from group to individual tasks. In the instances in which most pupils appeared to ‘switch off’ as I presented new material or new types of tasks, I did not immediately attribute the changes in pupils’ mentality to increases in anxiety levels but rather to my failure to adequately link my explanations to their capacity to understand.

The dependent mode of basic assumption mentality appeared to manifest whenever Simon, a pupil who was once excluded from school after he had stood up from his seat and dropped his trousers, performed another outrageous act. Although pupils described him as “crazy”, “mad” and “an accident waiting to happen”, it was evident that on an unconscious level they could be entranced by him. At other times, particularly in the last week of the term when they were due to sit their last mock exam of the year, they appeared to become ‘dependent’ upon me by continually raising their hands and asking for help to solve differentiated revision exercises but then, when I arrived at their desks, only asking me how my day was going or seeking information not related to mathematics when I arrived at their desks.

The pairing mentality appeared to materialise in extraneous conversations that were carried out by three or four pupils as opposed to a pair, perhaps because the size of the class exceeded the typical sizes of Bion’s treatment groups at the Tavistock, which averaged eight or nine individuals. In almost all manifestations of the pairing mentality, the speakers were spread out across the room and spoke about social events which had occurred outside school. Once they had started to converse and attracted the attention of the rest of the class, it would take me at least 10 minutes to restore any sort of work mentality.

In certain complicated disruptive episodes, discrete elements of all three basic assumption mentalities appeared to combine to produce a ‘dramatisation’ in which members of a group are involuntarily compelled to participate in an unfolding ‘drama’ (Hinshelwood, 1987, pp.31-32). As a dramatisation unfolds, individuals are assigned specific roles according to their commonly acknowledged personalities and propensities towards defensive behaviour while sub-groups form to instigate the splitting and projective

operations which act in tandem to enable projective identification. Dramatisations in lessons are often orchestrated by the provocation of certain pupils who are known to be vulnerable and particularly susceptible to aggressive behaviour. After a period of several weeks, a history or 'bible' of class memory is built up around repeated episodes of dramatization which involve individuals who attain prominent roles as they align themselves with the internal object relationships of the majority of group members, who channel their own bad feelings into these individuals using projective identification.

However, it is important to note that dramatisations and manifestations of basic assumption mentality in classrooms are embedded within the unconscious systems of collective defence which infiltrate the school organisation at all levels (Mosse, 1994). As I was carrying out my preliminary observations, a newly constituted Senior Leadership Team was beginning the process of articulating a new action plan in response to a 'Notice to Improve', a judgement given as a result of an OFSTED inspection under Section 8 of the Education Act 2005, in which a school is deemed to be failing to provide an acceptable standard of education but to possess the capacity to improve. The implementation of frequent inspections and changes to performance management routines, which impacted negatively on workloads and morale, had induced a fight-flight mentality amongst the staff. Dramatisations were occurring regularly in staff meetings as the staff engaged in splitting, divided themselves unconsciously into 'in' and 'out' factions with respect to the Senior Leadership Team, and succumbed to projection, which served to localise aggressive or destructive feelings in designated individuals. The staff then began to regard the new Principal as a persecuting object and the ensuing projective identification between the staff and Senior Leadership Team assumed a 'virulent' aspect (Young, 2005; Main, 1975). Several teachers appeared to lose their capacity to engage in reality testing in order to sense what was 'right' and what was 'wrong'.

Nonetheless, even if the school had not been experiencing difficulties with OFSTED, it was evident that the pupils and I were impacted unconsciously by various formalised school practices which may have been intended to dissipate anxiety but which inadvertently heightened our emotional anguish, like the ostensibly ‘good’ nursing practices described by Menzies-Lyth (1960) which instigated the dissatisfaction and high drop-out levels of trainee nurses. For example, the newly prescribed requirement for seriously disruptive pupils to report successively to the class teacher, Head of Department and various senior teachers served on an unconscious level to provide several additional channels for splitting and projection, which did very little to encourage the reparation processes needed for the materialisation of the depressive state of mind.

3.5 Discussion

After a comprehensive review of the theory, the choice of an object relations lens for the investigation of psychodynamic aspects of classroom phenomena appears to be expedient for three reasons. First, as a school of psychoanalysis that takes account of the biological drives identified by Freud and the relational perspective of early relationships on the development of the ego defence system, it has the capacity to investigate pupils’ expressions of defence mechanisms that are instigated by the widest possible variety of anxiety determinants. Second, the constellations of anxieties and defences which characterise the paranoid-schizoid and depressive states of mind are easily adapted to the investigation of individuals, whole classes and their subsets as well as a whole school. Third, Bion’s re-conceptualisation of the operation of projective identification and supposition of the K links to learning specifically contextualise the defensive aspects of

an individual's personality in her ability to learn, not only in the classroom, but through life's experiences.

My preliminary study highlighted many of the difficulties associated with assuming the role of a participant observer, which I consider further in Section 4.5.1, and appeared to confirm that expressions of defence mechanisms may spread through individual, subset and whole group levels of a class through the emergence of either one basic assumption mentality or a mentality which combines elements of all three basic assumptions. It also appeared to demonstrate that pupils' manifestations of defence may not always conform exactly to Klein's or Bion's theoretical framework. Therefore, as I embarked on the process of formalising my research design, I determined that it would be sensible to employ an inductive approach to data analysis by employing the Kleinian paradigm as a starting point only and noting any other relational psychoanalytic constructs which would prove necessary to more precisely characterise pupils' interactions and mentalities in classrooms.

4 Methodology

4.1 Overview

In the chapter I present the theoretical and practical considerations which shaped the formulation of my research design. When I was writing my proposal for PhD research, my primary objective was to carry out a study as a researcher participant which employed object relations psychoanalysis to explore the unconscious operations and mentalities which underlie unpredictable classroom episodes. Following my six-week period of preliminary observations, I realised that, to achieve this objective with any degree of validity and reliability, I would first need to probe the boundaries between ‘predictability’ and ‘unpredictability’ by examining the unconscious operations and mentalities which operate in more predictable circumstances. It was essential, therefore, to formulate my research design as a series of open-ended stages so that I could examine unconscious elements of my relationships with pupils and the more typical phenomena which occur during Key Stage 3 and Key Stage 4 mathematics lessons before I turned my attention to ‘unpredictable’ episodes.

My preliminary observations of pupils’ verbalisations and behaviours which might possibly be interpreted as manifestations of defence mechanisms (Section 3.4) had also highlighted several epistemological and phenomenological issues which had the potential to seriously compromise the validity and reliability of my study. Prior to further data collection and analysis, it was imperative to formulate methods and methodology that were robust enough to address these issues by considering the two distinct ways in which object relations psychoanalysis can be applied as a methodological tool (Hinshelwood, 2013, p.81). In one approach, after carrying out a series of empirical observations, the researcher could reference the metapsychology, i.e. the theoretical principles, of object

relations to characterise the ‘face-value’ emotions and behaviours that she noted consciously in the field; such an approach would be compatible with the approaches adopted by many theorists who position their studies in the field of emotions research. Alternatively, the researcher might employ an analytical process which derives from the clinical process of object relations psychoanalysis, in which an analyst identifies expressions of defence mechanisms in an analysand’s freely associated talk and then elicits the analysand’s unconscious knowledge through the formulation of a psychoanalytic interpretation.

The chasm in epistemological understanding that is generated by these diverse formulations of an object relations lens is neatly illustrated by the differences in understanding illustrated by my reaction to some casual oral feedback offered to me by the Head of Year 8 halfway through my research, after he had come to visit one of my lessons to observe Jake, a pupil who was in the process of being referred to an educational psychologist after having a series of highly disruptive temper tantrums with two of his teachers:

Well, I can certainly see that you are having problems with Jake, or should I say, he is having problems with you. I was watching his face as he was walked up to the board to write the answer to the starter and then I watched him when you refused to let him answer any more questions. Man, he looked like he was going to kill you! Later on, as you saw, I sat next to him while he was working in his book and we had a chat, which was mostly about you. Jake told me he hates maths because you always cut him off, you never really let him have his say. Look, you don’t have to remind me, he can be a real nightmare, but this was how he sees you and actually, I got his point. This is what he said: “Mrs S, she’s never fair, first she tells me I’ve got to do these things and then she tells me to shut up. She never really listens to me and look what I do for her”. From where I was sitting, that was somewhat true. I know you have 28 pupils in the class, but maybe you can work on your relationship a bit. Now don’t get mad at me but I think there’s a need for some improvement there.

However, I did become very angry with the Head of Year 8. Apparently, after observing my interactions with Jake for only thirty minutes, he had concluded, based on his beliefs about teaching and the professional experience he had obtained in his pastoral role, that Jake became disruptive in my lessons because my communication with Jake was inadequate and I was failing to address all his emotional needs. If he had been employing object relations terminology, the Head of Year 8 might have said that I was not meaningfully ‘containing’ Jake. My interpretation of what had occurred in the lesson was very different: after teaching Jake for two terms, it appeared to me that Jake’s affection for me had grown considerably but that he had ‘good’ days when he behaved and worked impeccably and even helped to tutor his classmates and ‘bad’ days when he had clamoured for exclusive attention and lashed out when I insisted on sharing my attention amongst his peers; in other words, from where ‘I was sitting’, Jake displayed patterns of splitting and projection that were similar to those described by Mahler (Section 3.3).

As I was not at the stage of testing of a hypothesis, and planning to adopt an inductive approach to psychoanalytically-informed interpretation, I determined that I would need to formulate a methodological lens that would enable discrete applications of the clinical process and metapsychological theory of object relations psychoanalysis to empirical phenomena. In order to ensure a reasonable level of validity and reliability across conscious and unconscious levels of observation and interpretation, I embedded the following methods in every stage of my study: an ongoing process of psychoanalytically-informed reflection that would highlight my role in the production, collection and analysis of data; a procedure for avoiding unconscious selection bias while recording field notes of observations and interviews; and finally, a fixed set of parameters for selecting particular occurrences and episodes for psychoanalytically-informed interpretation.

Once I had specified the essential components of my methodological lens and my starting points for the collection and analysis of data, I proceeded to formulate my research design on an incremental basis. In this chapter I first discuss the ethical issues linked to autoethnography and psychoanalytically-informed research as well as the limitations of each research format. I then review the methodology which enables object relations psychoanalysis to be used as a tool to elicit unconscious knowledge, some of the methodological precedents which influenced my choice of research design and the formalisation of my research questions. After introducing the school setting and outlining the theoretical and practical aspects of my data collection and analysis, I discuss how I ultimately positioned my research design in the educational research literature and address issues of generalisation.

4.2 Ethical Issues

4.2.1 Issues arising with respect to an autoethnographic research design

Autoethnography is a qualitative research method that permits a researcher to write in a highly-personalised style about her subjective experiences in order to extend the understanding of social phenomena (Wall, 2006, p.146). By foregrounding the ‘self’ in the processes of data collection and analysis, and by often disclosing internal thoughts and emotions which cannot be ‘thought out’ in advance and which sometimes appear to exceed the remit of the research design, the production of an autoethnography raises several ethical issues which are not addressed specifically in the procedures which are stipulated by the British Educational Research Association (BERA) and other organisations that issue guidelines which cover social scientific research. In his examination of some recent autoethnographies, Tolich (2010) confirms that there often gaps between the ethical practices autoethnographers undertake to follow and what they

actually do in the field. He reveals a wide range of dilemmas linked to the production of personal narratives, including the heightened vulnerability and possible coercion of participants, who cannot possibly know the extent of their participation, the difficulties of maintaining ‘internal confidentiality’ and gaining informed consent retrospectively. In order to balance the interests of the researcher’s ‘self’ against the rights of the ‘others’, he proposes ten guidelines for recognising the conflicts of interest which may arise when the process of gaining informed consent may have to be gained retrospectively and participant confidentiality is threatened by data collection methods and publication. At the most basic level, Tolich reiterates Medford’s advice (2006) that researchers should not publish anything they would not show beforehand to all participants mentioned in the text and consider adopting a ‘nom de plume’.

Understandably, many autoethnographers have taken issue with Tolich’s critique of autoethnography and his specialised guidelines. Dickson and Holland (2017), in championing the emergence of autoethnography as a response to the inadequacy of traditional social science to represent human subjectivity, question the viability of applying the ‘moral laws’ laid down by Institutional Review Boards to a type of research design which purposely seeks to break down the barriers which are typically erected between researchers and participants in traditional social scientific studies (p.134). They challenge Tolich’s proposed guidelines for autoethnographic research by highlighting autoethnographies as examples of Lacan’s ‘hysteric’ (p.137), a construct which denotes a variety of a discourse which refuses unconsciously to align itself with the master signifiers which govern a university’s discourse but which paradoxically incorporates its unconscious refusals within its conscious attempts to adopt the subject positions offered by the university. Therefore, whereas the ethics committees of universities are trying to maintain the illusion that the academic and personal worlds of researchers are separate,

autoethnographers are unconsciously striving to negotiate the ‘split subject’ which is engendered by the disparities between the university’s discourse and their unconscious doubts, anxieties and alternative sources of knowledge.

Dickson and Holland also suggest that some of Tolich’s proposed guidelines, such as those which stipulate the needs to “document the informed consent process” and “respect the voluntary nature of participation” are simply impossible in classroom situations, especially when participants’ thoughts and feelings are apt to change during the research process (p.142). I would argue, nevertheless, that autoethnographers have a moral duty of care to endeavour to avoid, as far as possible, the ethical dilemmas proffered by Tolich by carefully considering his guidelines in advance of formulating a research design. It may not be a realistic to require participants’ informed consent to be obtained on a rolling basis but it is realistic to expect a researcher to undertake an ethical risk assessment prior to carrying out autoethnographic fieldwork and to structure her personal narrative in such a way that disclosures of her personalised thoughts and feelings about the participants as well as personal information about the participants are presented only when they become necessary components of the data analysis.

4.2.2 Choice of ethical guidelines

As I formally began my PhD research as a participant observer in a school setting in September 2011, the finalisation of my research design and my collection and analysis of data was undertaken in accordance with the 2011 edition of the British Education Research Association guidelines on research ethics. These guidelines stipulate that educational researchers should “operate with an ethic of respect” for any persons involved in their research they are undertaking (p.5) and outline a researcher’s responsibilities to participants in 28 provisions (pp.5-8) which cover issues such as informed consent,

openness and disclosure of research objectives, the prevention of distress and detriment, confidentiality and debriefing.

4.2.3 An analysis of BERA 2011 guidelines with reference to psychosocial issues

The use of psychoanalytically-informed methodology raises several ethical issues that are engendered by the fundamental premise of all theories of psychoanalysis: that the human psyche possesses indeterminate unconscious thoughts, feelings and memories which are excluded from conscious awareness by expressions of defence mechanisms, which themselves operate outside of conscious awareness. This disconnect between conscious and unconscious levels of knowledge may impact the researcher's capacity to sustain the validity and reliability of her research design and compromise her responsibilities to participants, who may become distressed by psychoanalytically-informed interpretations made by the researcher. Young (2009) therefore expresses strong reservations about applying a Kleinian psychoanalytic approach which is a 'theory driven tool' that seeks to produce interpretations of data which are certain and inculcate narrative coherence. Hollway and Jefferson (2000) believe that researchers may be justified in claiming to possess a level of expert knowledge but must nevertheless approach their data "openly and even-handedly, in spirit of inquiry rather than advocacy" by deploying a justified theoretical framework and making limited judgements sympathetically (p.100). They also highlight the need for researchers to assess the ways in which psychoanalytically-informed methodology impacts the ethical guidelines they have elected to follow, which I do below.

4.2.3.1 “voluntary informed consent” (BERA 2011:10)

If research participants are approached as ‘defended subjects’ who are initially heedless of their unconscious impulses, thoughts and memories (Hollway and Jefferson, 2001, 2008), it becomes technically impossible for the researcher to collect data within the limits of ‘informed consent’. Kvale (1999) views this ethical quandary as a symptom of the inherent illogicality which exists between one of the main objectives of psychoanalytic research, which is to reveal the ontological gulf between the conscious and unconscious areas of the minds of research participants, and the ethically stipulated respect for their ‘integrity’, particularly when participants are compelled to disclose ambiguous information spontaneously.

Even in cases where participants consent expressly to the collection and analysis of their unconscious thoughts and feelings, the researcher’s dependence upon free association in collecting and analysing data, along with the operation of projective identification and countertransference, considerably restricts her capacity to advise participants as to the exact basis on which they will be engaged and to forestall the emergence of ‘sensitive issues’. Throughout my data collection, I endeavoured to forestall undesirable disclosures of information by refraining from unduly pressing participants for further information while carrying out free association narrative interviews (Hollway and Jefferson, 2000; Section 4.4.3) and by taking care to conceal, so far as I was able, any adverse feelings I experienced as participants were speaking during interviews. In all cases, I endeavoured to accommodate participants’ need to talk and be heard. My experiences of these interviews concurred largely with Hollway and Jefferson’s assertion that, as completely unstructured interviews are participant-led, participants become active co-participants in the production of interview data, so while their decisions to participate could not be reduced to conscious, cognitive process, they could be characterised as cases of

“emotional awareness that characterised every interaction”, which had more to do with their feelings about me rather than the process (ibid, p.105).

4.2.3.2 “how reflective research impinges on dual role of teacher/researcher” (BERA 2011:12)

Although I continually reiterated to participants that I was not a psychoanalyst and therefore not in the position to use my knowledge of psychoanalytic theory to offer psychotherapeutic advice, at many points they sought unconsciously and compulsively, in a manifestation of primitive defence mechanisms, to establish a ‘special relationship’ with me on the basis of my interest in their open-ended thoughts and feelings (Hinshelwood, 1987). During lessons, participants tended to manifest their unconscious emotional demands by either surreptitiously publicising their roles in my research or by instigating disruptions when I refused to pay them special attention. On one occasion, after participants who had consented to interviews began to compare their interview experiences and disclose the topics of discussion to participants who had chosen to forgo interviews, the demarcation between my teacher and researcher roles became strained as pupils stopped the lesson to ask me openly if I could genuinely separate my knowledge of their mathematical skills from the knowledge I had gained in interviews and continue to treat them fairly.

At the same time, several colleagues and parents of research participants came to believe that their own relationships with pupil participants were being analysed furtively. Despite my repeated insistence to the contrary, they often demanded my assistance in situations which exceeded the remit of my role as a teacher and sometimes became angry or distressed when I explained that, on an ethical level, it would be inappropriate for me to become involved.

At the beginning of my study I made a conscious decision to always fulfil my teaching responsibilities before I pursued my research interests, even if that meant that I had to sacrifice the collection of what appeared to be valuable data. However, as I carried out observations, recorded field notes and engaged in psychoanalytically-informed reflection on almost a daily basis over a period of three years, my thoughts and beliefs about teaching changed dramatically and I slowly but surely changed the ways in which I interacted with pupils.

4.2.3.3 “researchers must recognise that participants may experience distress or discomfort” (BERA 2011:20)

I took great care during interviews to ensure that participants were comfortable and endeavoured at all points in the process to make them feel good about their participation. As stated above, I tried to refrain from pressing them for information they clearly did not wish to disclose and at no time during my study did a participant visibly express undue distress or discomfort while being interviewed. However, I recognise that participants may have experienced painful thoughts and feelings consciously and unconsciously both during and after the interview process. Hollway and Jefferson (2000) note that, although the possibility that pain may be engendered will always remain a cause for concern, it may be therapeutic for participants to speak about distressing episodes in their life and to be reassured in a safe context (pp.86-87).

4.2.3.4 “participants’ data is to be confidential and anonymised” (BERA 2011:25)

On the technical level, it was a straightforward task to create pseudonyms for participants and arrange for the storage of all my data on an off-site digital platform. However, as

Tolich (2010; Section 4.2.2) points out, it became problematic to maintain internal confidentiality when interview participants discussed their interviews with peers and when parents of participants referred to my study when liaising with middle managers and members of the Senior Leadership Team. Whenever I was approached directly to divulge the identities of participants or clarify the extent of their participation, I invoked the BERA 2011 guidelines to refrain from answering and in the staff room I purposely downplayed my research interests and the amount of time I spent on data collection and analysis. However, I am aware that many pupils, middle managers and members of the Senior Leadership Team obtained significant amounts of information regarding pupil participation through informal social networks which operated across the school.

4.2.3.5 “it is good practice for researchers to debrief at the conclusion of the research” (BERA 2011:31)

Many researchers have used debriefing as a valuable part of their data analysis (Lapping, 2012) and Hollway and Jefferson (2000) observe that debriefing may provide participants with the information that is necessary to complete their understanding of the nature of the research and the opportunity to advise the researcher of any unforeseen or negative effects (p.89-90). I decided, however, that debriefing would be inadvisable within the context of my study. First, many participants had formally recognised emotional and behavioural difficulties and were apt to suffer further distress when presented with my interpretations of their classroom behaviour and narratives. Second, it was likely that the debriefing process would be interpreted as a ‘diagnosis’ and compromise the ethical bases of my study and my role as a teacher. Rather than offer participants a debriefing process, at the end of interviews I advised them that they were welcome to speak to me in a private capacity at any time if they wished to know more about how I was planning to use their interviews in my data analysis or if they experienced any negative effects as a result of

the experience. Over the three-year period, only one participant requested to do so in order to clarify the meaning of a portion of her first narrative.

4.2.4 Issues arising with respect to employing clinical methods of psychoanalysis in social scientific research designs

Further to the issues linked discussed above, many social scientists question the scientific validity of psychoanalytic theory and methodology and its capacity to generate scientific findings within a postmodern epistemological context. One faction of critics supports the types of argument that was famously summarised by Karl Popper, who maintained that, as psychoanalysis cannot satisfy the condition of falsifiability, it must be a pseudoscience rather than a science (Mayes, 2009). A second faction, however, is more inclined to endorse Grunbaum (1984), who concluded that psychoanalysis can be evaluated scientifically but that it is empirically weak in demonstrating the causal efficacy of its cure. Others abandon the attempt to justify psychoanalysis as a science and align themselves with Habermas (1971) and Ricoeur (1974) in repositioning it as a communication theory in the hermeneutic mode which can employed in re-examining issues such as representation and subjectivity in politics, economic behaviour and other social science areas (Hunt, 1984; Lapping, 2011).

However, notwithstanding the significant epistemological uncertainty surrounding the legitimacy of psychoanalysis as a methodological tool, there are two ways in which a researcher can ensure that psychoanalytically-informed methodology is being applied appropriately. First, the researcher must make a firm commitment to attain a comprehensive understanding of the school of psychoanalysis she elects as her theoretical framework and undertake the psychoanalytically-informed reflection necessary to overcome her own defence manifestations (Young, 2009). As this might possibly turn out

to be a lengthy, arduous and painful process, she must be prepared to seek the assistance of a psychoanalyst or an individual who has had psychotherapeutic training.

Second, even if a researcher has chosen to use object relations psychoanalysis, which I have already highlighted as a ‘top-down’ methodology which engenders ‘certain’ judgements (Section 3.1), she must espouse the postmodern perspectives which inform contemporary clinical psychoanalytic practices to differentiate her psychoanalytically-informed interpretations from diagnoses (Hinshelwood, 2013). Although an interpretation may ‘sound’ like a diagnosis because of the way it is articulated in a text, the two are separate entities. A diagnosis is defined technically as the identification of the nature of an illness or other problem by an examination of the symptoms, which are understood to be caused directly by the illness or underlying problem. While it is true that Freud and many early psychoanalysts attempted to eliminate disturbing symptoms by identifying the sources of the symptoms in analysands’ transferences and unconscious knowledge, which they treated as objective reality, contemporary psychoanalysts have largely abandoned approaches which are predicated on revealing objective truths in favour of subjectively nuanced appreciations of a more tenuous meta-perspective on the enactment between an analyst and analysand (Hinshelwood, 2013, p.91). This shift in emphasis from ‘diagnosis’ to the examination of moment-to-moment changes in the intrapsychic interactions between the analyst and analysand tallies with the approaches advocated by many psychosocial researchers, who advocate the importance of tolerating uncertainty and continuously modifying interpretations as affective shifts are observed in participants’ discourse and behaviour (Clarke et al, 2008). The ‘layers’ of psychoanalytically-informed interpretations encountered in social scientific research will be discussed in more depth in Section 4.9.

4.3 Setting the margins of an autoethnography

As I wished to examine what is ‘less visible’ in pupil discourse and behaviour by undertaking psychoanalytically-informed reflection, which is only accessible from the ‘inside’ (Ball, 2000), I decided to situate my research design in my own classroom practice and to present my data analysis in the form of an autoethnography. However, as it is a such a fluid genre that attracts a wide range of criticisms (Sparkes, 2000), it took me several months to devise an autoethnographic format that would generate the production of insights which would be useful to teachers and researchers and contribute something new to the existing literature on affect in mathematics classrooms (Walford, 2004).

Emerging in response to the calls in the 1980s for researchers to place greater emphasis on the ways they interact with participants and mediate the production of data, autoethnographies are written to display multiple layers of consciousness which connect the academic and emotional perspectives of the researcher with the social perspectives being observed (Mendez, 2013, p.281). Although their structures are not regulated by any formal rules and the writing styles of researchers can vary from those that are typical of traditional academic texts to informal accounts, they may be classified broadly under two headings: the *analytic*, in which the researcher is visible in the published text as a fully-fledged member of the research setting and is primarily concerned with developing the theoretical understanding of a social phenomenon, and the *evocative*, which draws readers into the researcher’s feelings and experiences. Both types of autoethnography, in keeping with postmodern views of qualitative research, enable the researcher to disclose all aspects of the research process and encourage readers to be actively engaged with the text; at the same time, however, they can render narratives which are ‘solipsistic’ and/or

‘narcissistic’ and sometimes expose the researcher to various degrees of embarrassment (Sparkes, 2000; Wall, 2006; Ball, 2000).

I eventually determined that my research objectives would be best served by an analytic format which limited the disclosures of my private thoughts and feelings to only those which were strictly necessary for describing my manifestations of defence and validating my psychoanalytically-informed interpretations. But throughout my data collection and analysis I became increasingly aware that it would be extremely difficult to produce a personal narrative that would strike a balance between making a substantial scholarly contribution to the knowledge concerning affect associated with the teaching and learning of mathematics and contemplating my thoughts and emotions. In his analysis of comments made by six reviewers on the first draft of a personal narrative he wrote to explore his feelings of inhabiting a 38 year-old body that was wracked with lower back pain that had terminated his career in an elite sport (2000, p.24), Sparkes not only demonstrates that their opinions lacked a firm consensus but that each reviewer employed a personalised set of criteria in assessing the viability of the draft for publication; while some were suspicious of personal accounts and called for more effective “boundary maintenance” between theory and the evocation of experience, others lauded the sensitivity and emotionality engendered by his reflexivity (p.29). Along with other qualitative researchers such as Garratt and Hodkinson (1999), Sparkes notes that it makes little sense to evaluate autoethnographies in traditional social scientific terms and asserts that readers have an “ethical imperative” to read carefully and attempt to grasp what is being expressed in an alien tradition (p.29).

4.4 Specific requirements of psychoanalytically-informed research

4.4.1 Psychoanalytically-informed reflexivity

Notwithstanding their prominent position in autoethnography, reflexive accounts have been published since the feudal era and have adopted various substantive forms (Skeggs, 2002). In Western academic circles during the nineteenth century, the most conventional form was that of the ‘confessional’, in which theoreticians evaluated their subjectivities with reference to the existing moral order. By the time Foucault and other post-modernist philosophers began writing in the 1970s, however, the focus of the confessional had shifted from the issue of conscience, or what people tend to hide from themselves and others on a conscious level, to the examination of what is hidden in the unconscious. Hunter (1992) maintains that, even as the focus shifted from conscious to unconscious elements, the confessional has facilitated the consolidation of the ‘self-reflexive’ persona as a romantic principle which imbues self-analysis with notions of idealistic and culturally cultivated attempts to overcome incompleteness and reconcile incompatible facets of adulthood.

More recently within the social sciences, May and Williams (1998), along with other researchers, have recognised two main types of reflexivity (Adkins, 2002): *endogenous*, which refers to the ways in which the actions of the researcher and research participants contribute to the production, representation and analysis of data and the *referential*, which concerns the dialectic which ensues as the researcher and the research participants engage each other on subjective and/or unconscious levels. However, no matter how it is characterised, the reflexive turn is widely understood to clarify the relationship between the researcher and the researched by exposing the ontological and epistemological assumptions behind the discourse (ibid, 2002). And while there are obvious limitations

to reflexivity, particularly as the reflexivity of the researcher dominates that of the research participants, it continues to be valued generally because it provides an ‘antidote’ to relativism and enables readers to make certain connections between the socially constructed data and the social reality.

In psychoanalytic circles, as an analyst must be able to recognise and overcome the *countertransference*, or unconscious emotional reactions, she experiences as she is carrying out a psychoanalysis, reflexivity is an indispensable constitute of clinical methodology. Correspondingly, the educational researcher who has decided to carry out a psychoanalytically-informed study must carry out some type of reflection while collecting and analysing data. It is questionable whether psychoanalytically-informed reflection should ever be carried out in a private capacity: not only does the process tend to be time-consuming, erratic and intermittently distressing, it may inadvertently reinforce the researcher’s narcissistic tendencies if it is not supported by a professional analyst or a trained supervisor who is willing to engage on an emotional level and act as a focal point for transference.

A researcher may inculcate her abilities to evaluate the nature of her subjectivity and retrieve her unconscious thoughts by tracking variations in her emotions as she interacts with her subjects, first by noting irrational thoughts or fears, surges of anger, sexual impulses and feelings of fatigue and boredom and then by using free association (see Section 4.4.2) to link these feelings with other thoughts. If chains of freely associated thoughts cannot be constructed using collected data, then dream analysis may be more successful (Hunt, 1984). Once the researcher is aware of at least some of her unconscious fears and desires, she can begin to evaluate her research actions on the basis of whether or not they serve covert defensive purposes; if research tasks are being avoided, or the

capture of data appears to be dwindling, without any overt changes to the research design, it is possible that transference and countertransference reactions are interfering with the construction of data and further self-analysis is necessary before the project can continue.

It is also necessary for the researcher to be aware of the subtle projective identification processes that are liable to operate as she observes and interacts with groups and individuals. For example, during an observation or interview, she may suddenly become aware of a change in her thoughts or feelings which feel 'forced' and cannot be explained circumstantially; alternatively, like Bion in his observations of groups, she may 'sense' that a participant in a group observation has been a recipient of projective identification which has abruptly engendered a significant change in her observable behaviour and discourse (Bion, 1961, p.182). Wetherill (2003) may not be accurate in likening projective identification processes to the 'change in subject positions' which are often referenced in discourse theory (Clarke and Hoggett, 2008) but the tenor of an interview may be transformed unexpectedly as a participant unconsciously experiences the overwhelming need to project unbearable feelings such as anger, fear and envy into the researcher and/or to communicate a state of mind which cannot be put into words (Roth, 2005). The researcher might be intimidated by projective identification to the point where the completion of a research task is imperilled.

Initially, like many educational researchers who have employed psychoanalysis, I endeavoured to track the countertransference reactions I experienced as a participant-observer by adopting the approach to observation outlined in Esther Bick's (1964) infant observation method, which was designed to teach trainee psychoanalysts how to discern their countertransference reactions and integrate the diverse strands of knowledge which are engendered by empirical observations and the affective experiences which linked to

observations (Carbine, 2013). As I was working in a sole capacity, I did not have opportunities to attend seminar groups with fellow observers to discuss my observations and reflections, but I adopted the practice of writing separate descriptive and reflective accounts of classroom episodes while allowing inferences and meanings to emerge slowly as I reflected upon and overcame my countertransference reactions (Ruston, 2006; 2009).

The psychoanalytically-informed reflection processes I employed to explore my countertransference reactions and sustain my data collection and analysis derive from free association narrative interview methodology (see Section 4.2.2 below) and are detailed in Sections 4.8.2-4. In my first year of research I found psychoanalytically-informed reflection to be an extremely painful experience. Over the next two years, however, I developed the capacity to produce ‘whole’ narratives of classroom episodes with much less effort and began to experience it as a mode of reflexivity which seemed to operate separately from my other cognitive processes. Gradually, I developed an “inner witness” of the type described by Mason in *The Discipline of Noticing* (1994, p.19), but one who “noticed, marked and recorded” pupils’ observable discourse and interactions by intensively focusing on the emotions of the moment, rather than separating herself from them, and who then proceeded to “seek threads” and “dredge” (p.65) for underlying meanings on the unconscious level.

4.4.2 Free association

In clinical psychoanalysis, the analytical situation is structured in line with the ‘fundamental rule’ that obliges the analysand to say whatever she thinks and feels, selecting nothing and omitting nothing, no matter how unpleasant, embarrassing or impertinent it may seem (Laplanche and Pontalis, 1973, p.178). The free association method, which builds upon this rule, encourages analysands to produce chains or

‘associations’ of thoughts which forge discursive pathways to unconscious knowledge that has been repressed (Freud, 1910). Its main objective is not to gain ‘free’ or direct access to the unconscious, but rather to suspend the secondary censorship that operates between conscious and unconscious psychic mechanisms (Laplanche and Pontalis, 1973, p.170).

Free association can be embedded within observation schedules and interviews by minimising the operation of the researcher’s and participants’ selection biases during the production and collection of data. At the beginning of a classroom observation schedule, a researcher should avoid any narrow focus on particular pupils or subsets. Thereafter, classroom episodes should initially be analysed in sequential order so as to track the unfolding chain of associations and identify the points, or *nodes*, at which various chains of discourse and/or behaviour intersect, even when the ultimate goal of the research is to produce a thematic study of manifestations of various behaviours rather than to theorise the unconscious determinants of behaviour. While analysts normally rely on notes to support their observations and interpretations, the researcher may be overwhelmed by the quantity of verbal exchanges which call for *verbatim* analysis, so lesson observations should be audio- or video-recorded wherever possible, ideally using multiple sets of recorders.

Free association narrative interview methodology was first developed after World War II by German biographers who were seeking new ways to elicit the narratives of ex-Nazi soldiers and was later extended by Hollway and Jefferson (2001, 2008), who developed a technique of interpreting respondents’ information which negotiates both socio-dynamic and psychodynamic factors to produce a ‘whole’ account that corresponds to Wertheimer’s principle of gestalt (Clarke and Hoggett, 2008). An interview that is based on free association overturns the assumptions that an interviewee is a unitary, rational subject who always ‘tells it like it is’ and that the transparency of language guarantees

that different readers will share the same meanings when it comes to making sense of the interviewee's narrative (ibid, p.105). Rather, by situating its central premise in the theories of Freud and Klein, free association narrative methodology views respondents as 'defended subjects' whose narratives, riddled with inconsistencies and contradictions, are products of psychic conflict which need to be interrogated within a psychoanalytical context. The production of the 'whole' of a respondent's meaning consequently encapsulates the respondent's unconscious as well as conscious knowledge.

The structure of a free association narrative interview is based on four principles which aim to reduce anxiety levels and associated manifestations of defence while facilitating the narration of a chain of associations (Hollway and Jefferson, 2008). The researcher uses only open-ended questions and begins the interview with a starter question which is narrow enough to elicit information that relates directly to the field of investigation but nevertheless empowers the respondent to dictate the subsequent structure of the interview. As far as it is possible, she asks the respondent to relate stories or reminiscences rather than to provide specific answers as such in order to maintain the impetus of free association; 'why' questions are avoided to stave off defensive intellectualisations. And finally, she follows up the respondent's responses using the respondent's own ordering and phrasing in order to remain 'almost invisible' and to preserve the respondent's input into the structuring of the interview (ibid, 2008, p.307).

In her subsequent analysis of such an interview, the researcher strives to produce a 'whole' account of the data by using all the knowledge she has accumulated about the respondent to locate links between inconsistencies in the respondent's narrative(s). While these links might at first appear to be 'low level', the researcher may use her intuition, as well as her knowledge of sociology and psychoanalysis, to further elaborate the links in

an incremental process which is often as arduous as it is time consuming (ibid, p.117). The researcher's capacity for simultaneously dealing with objective and intuitive, or unconscious, data may be extended considerably by using the free association technique to compile random thoughts and feelings about a respondent in a diary format or 'pen portrait'. However, no matter which method is used to collate extraneous strands of knowledge about the respondent, the researcher should make every effort to articulate the emotional dynamics and formative experiences of the research process in order to attain an understanding of the respondent which goes beyond the surface meanings presented in her narrative.

4.4.3 Inferring unconscious operations

4.4.3.1 Validating glimpses of defence manifestation

The notional prototype for all glimpses of defence manifestation is the *parapraxis*, an act which is apparently 'bungled' when its explicit goal is involuntarily replaced with another one (Laplanche and Pontalis, 1973). Such 'bungled' acts include errors of speech, which have come to be known as *Freudian slips*, errors in cognitive operations, such as forgetting information, misreading text or inadvertently writing disjointed text, and mistakes or oversights in actions, such as forgetting the location of the test centre or misplacing one's car keys before setting off before a crucial exam. While social scientists tend to regard these sorts of everyday occurrences as temporary, meaningless lapses in mnemonic functioning, psychoanalysts regard them as meaningful links between unconscious and conscious mental operations which occur due to momentary lapses in the ego defence system. They might even claim that, while the action appears to be 'bungled' on the conscious level, it may actually be 'successful' one on the unconscious level by fulfilling the bungler's unconscious wishes, often in a manner that is readily

apparent to an observer (ibid, 1973). For instance, a pupil in a mathematics lesson who fears unconsciously that she will embarrass herself when it is her turn to solve a problem on the board may orchestrate an argument amongst her peers to disrupt the flow of the lesson and pre-empt the board activity.

In classroom observations which involve 25 pupils or more it can be extremely challenging for researchers to distinguish genuine parapraxes from episodes in which blunders, oversights and discontinuities in actions derive expressly from pupils' difficulties in acquiring new subject knowledge and negotiating the teaching and learning process. In my experience, the 'Freudian slips' which are most apt to occur, and to be acknowledged as such, are the instances in which pupils inadvertently call teachers 'mum' or 'dad' or suddenly speak to the class as if a previous lesson were in progress. In most classroom observations, the researcher will be able to note the abrupt and/or contradictory alterations in pupils' discourse, temperament and actions which signal manifestations of defence but will be unable to confirm the nature of the underlying unconscious material. Over several weeks or months of observation with the same participant sample, however, it should be possible to formulate a comprehensive picture of pupils' most commonly manifested defence mechanisms; at that point, by collating additional social and cultural information and carrying out free association narrative interviews, the researcher may gain considerable insight into these individuals' states of mind and the unconscious determinants of their anxieties.

With regards to detecting parapraxes and other manifestations of defence in free association narrative interviews, the researcher must initially undertake a line-by-line examination of the interview transcript to note every discontinuity in the narrative chronology, including non-sequiturs, contradictory clauses, gaps in information and any

abrupt or abnormally lengthy pauses. However, Nelson et al (2009) have recently developed a method of assessing a respondent's degree of defensivity or avoidance based upon the formal analysis of narrative grammar undertaken by William Labov and confirmed by numerous cross-cultural studies, which demonstrates that most people spontaneously relate their past experiences as narratives in which a series of events are recounted in the past tense and in chronological order or in the order in which they are remembered as happening (Nelson et al, 2009, p.563). After hypothesising that people who are unconsciously defending themselves against the emotional pain of their recounted memories do so by avoiding a chronological retelling of events, which is measurable using the parameter of 'narrative immersion', Nelson et al carried out a study involving 168 non-clinical adolescents who spoke for ten minutes about a stressful life event and confirmed that a negative association was found between narrative immersion and avoidance, as operationalised by scores on the Marlowe Crowne Social Desirability Scale. In other words, as psychoanalysts and the police have known for decades, a non-chronological narrative account is a credible indicator of the manifestation of defence or avoidance.

As many participants tend to experience frequent oscillations in states of mind during free association narrative interviews, the researcher must refrain from categorising a participant as being generally 'defensive' or 'non-defensive'. For instance, in a pilot interview I carried out with Kate, a Year 10 pupil, she responded to my starter question "What do you think of maths?" with a set of sentences which featured two non-sequiturs and relatively low degree of narrative immersion:

I like it. I really do, I just think it's ... it gets harder every day and people I'm surrounded with don't really want to do it so it makes me more concentrated a lot in maths, but I think I could do better.

But ten minutes later, approximately a third of the way into the interview, when I ask her to give some details about the changes in her work habits in maths lessons between Year 9 and Year 10, her degree of narrative immersion increases considerably:

I think I ... just got angry a lot, it took over my work and everything. Now I'm in Year 10 so I might as well not get angry as much and just do my work ... because Year 10 is like the beginning of my GCSEs and then I've got one more year and then I've got my GCSEs coming and what am I going to do playing about now? Before I wouldn't do a lot of work, I would laugh and talk and everything but now I might as well just do my work.

It is therefore essential for free association narrative interviews to be subjected to a secondary analysis in which the researcher assesses the themes which link various segments of the interview. Any conjecture regarding the participant's state of mind or anxiety determinants should be made only with reference to the 'whole' of the information disclosed in the interview, along with any other knowledge gained about a participant by the researcher (Hollway and Jefferson, 2001).

4.4.3.2 Induction versus deduction

According to Agazarian and Peters (1981, pp.155-156), the validity of a sequential analysis of a typical lesson rests upon the aggregation of the researcher's pedagogical knowledge concerning pupils' interactions and her psychoanalytically-informed understanding of the unconscious operations which underlie the conscious 'visible' group, whose operations should be characterised through inductive reasoning, and the unconscious 'invisible' group, whose operations should be characterised through deductive reasoning.

However, in his contemplation on the nature of psychoanalytical knowledge, Hinshelwood (2013) demonstrates that deductive and inductive approaches to psychoanalytically-informed characterisations and interpretations cannot be intermixed casually on an epistemological level. He argues (p.53) that knowledge consists of a belief and some type of justification, which may be engendered either through an argument that employs a precise formal logical approach based on deduction or one that involves empirical observation based on an inductive approach. If a researcher wishes to rely on deduction, she must formulate a research design in the hypothetical-deductive tradition which poses an answerable question and provides the experiential data to answer it (p.37). But if she does not yet have a firm hypothesis and/or cannot formulate an experiment with single independent and dependent variables, then the use of a deductive approach to characterise and/or interpret empirical observations may result in the sorts of ‘circular arguments’ which result when a researcher unconsciously selects data for analysis which substantiate the metapsychology of her chosen school of psychoanalysis (pp.112-116).

As I was not in the position to formulate the type of experiment which satisfied the requirements of a hypothetical-deductive approach, I was obliged to adopt an inductive approach to data collection and analysis, which generates alternate problems involving validity and reliability. Hinshelwood notes that, as it is impossible to ‘see’ psychoanalytic phenomena or perceive what is in someone’s mind, the same occurrence may be inferred very differently by different psychoanalytic theories (pp.91-92) and these inferences are liable to raise further issues involving the validity and reliability of psychoanalytically-informed interpretation, which will be discussed in Section 4.8.5. However, Hinshelwood argues that, even though inductive approaches do not “possess a logical inevitability” (p.38), they have the capacity to identify meaningful patterns and to engender general rules which can be distinguished from the ‘observed occurrences’ which precede pattern

recognition (pp.55-58). These rules can then be modified through further observations and modifications and then corroborated by research designs which employ formal logical approaches based on deduction.

4.5 Formalisation of the research design

4.5.1 Insights from the preliminary study

As I noted in Section 3.4, my preliminary study highlighted a range of difficulties associated with participant observation. At first, I found it extremely demanding to note participants' utterances and track the evolution of complex episodes while continuing to deliver lessons which met the requirements set by the Senior Leadership Team and Mathematics Department. Although I had decided beforehand that I would not 'code' varieties of discourse or behaviour, I soon acknowledged that I would need to develop some type of mnemonic shorthand to remember the sequential details of occurrences until I was in the position to write field notes.

The process of devising such a shorthand immediately forced me to confront the innate precariousness which pervades the attempts of a participant observer to attribute underlying emotions and psychoanalytic notions to observable behaviours. I realised that in the context of participant observation, the act of 'observing' constituted a multifaceted experience which involved the manifestation of perceptions, thoughts, feelings and involuntary, reflexive reactions to what was happening externally. At two or three points during the first week of my study, I was so overwhelmed by the sheer physical effort that was needed to sustain the collection of what were essentially multisensory data that I nearly decided to abandon any idea of observing standard-sized classes.

I then realised that, in my rush to collect data so that I could formalise a research design by the beginning of the 2011 academic year, I had inadvertently and unconsciously become entrapped in the ‘opacity of memory and desire’ which distorts the flow of narratives and prevents psychoanalysts (and psychoanalytically-informed researchers) from sensing anxiety and engaging in the psychoanalytic process (Bion, 1970, p.41). It was only when I made the decision to simply relax and ‘live in the moment’, and focus primarily on my teaching practice, that I was able to sift through the constituents of my conscious awareness to isolate and highlight the instances in which participants’ utterances or behaviours were palpably unexpected or disruptive.

At the end of the six-week period, I was still very far away from the point developing the “inner witness” I describe in Section 4.4.1, or undertaking the quality of data analysis I outline in Section 4.8, but I had considerably extended my capacity to record field notes. As it became clear that I tended to experience high levels of anxiety and anger while I was teaching which were related only tangentially to what was actually occurring in the classroom, I became convinced that any attempts to characterise pupils’ manifestations of defence on the individual, subset or group levels needed to be preceded by a substantive period in which I examined the psychodynamic aspects of my relationships with pupils along with my countertransference reactions.

4.5.2 The research questions

After negotiating the challenges of participant observation, I generated the research questions by starting with my original question, “What types of unconscious operations and group mentalities engender unpredictable classroom episodes”, and then working backwards on an epistemological level to identify the knowledge I would need to acquire incrementally to generate an answer. As I noted in Section 4.1, in order to characterise

‘unpredictable’ classroom episodes, I would first need to characterise predictable episodes, which I would do by referring to the group mentalities characterised by Bion. However, as work and basic assumption mentalities are mediated by expressions of defence mechanisms, I needed to examine manifestations of defences on individual, subset and whole-class levels, which could only be done if I already possessed insights into my countertransference reactions and some cognisance of the unconscious dimensions of my relationships with individual pupils and classes.

By reversing this train of thought, I formulated the following research questions:

1. What are unconscious elements of teacher-pupil relationships?
2. How can I infer pupils’ manifestations of defence at individual, subset and whole-class levels in typical lessons?
3. To what extent can lesson outcomes be explained by Klein’s and Bion’s object relations theories?

4.5.3 Timeline for data collection and analysis

As anyone who has ever surveyed the contrasting approaches to group analysis promoted by opposing schools of psychoanalysis knows, there is no prescribed way to carry out observations of groups. As I posed successive research questions and worked with different Key Stage 3 and Key Stage 4 participant samples, I implemented an open-ended, holistic and ‘need-to-know’ approach which was linked far more closely with the progress I was able to make in overcoming the expression of my defence mechanisms through psychoanalytically informed interpretation than with any intention to corroborate aspects of object relations theory.

By the time I had worked with my third participant sample, my approach to the observation of participant samples had more or less crystallised into a four-step protocol, which can be summarised as follows. First, I would spend at least one half term observing the ways in which pupils typically interacted with each other in a variety of situations, identifying those who tended to play prominent roles in the class and/or were members of the ‘pairing subset’ (Sections 3.3.3, 3.4.2). Second, I would spend another half term inculcating an integrated perspective of my conscious and unconscious thoughts and feelings as a participant researcher by analysing my countertransference reactions through psychoanalytically-informed reflection. Third, I would begin to characterise defence manifestations on individual, subset and whole class levels and carry out interviews with selected pupils to assess the validity of my inferences and interpretations. Finally, after reviewing all the existing data analysis, I would endeavour to correlate pupils’ manifestations of defence with oscillations in subset and whole class mentalities.

Ultimately, it took me three years of nearly continuous classroom observation and psychoanalytically-informed reflection to address all three research questions. In Chapter 5, my data analysis is presented chronologically, beginning with my exploration of my relationship with a high-ability Year 11 class (September 2011 to March 2012) and followed by analyses of the unconscious operations and group mentalities which mediated a sequence of four lessons I taught to a high-ability Year 9 class (July 2013), the states of mind underlying the disparate performance of one Year 8 girl (January 2014), and two lessons in which I was observed teaching a low-ability Year 9 class, one of which was rated ‘good’ and the other ‘unsatisfactory’ (March/April 2014).

4.6 The research setting

4.6.1 The school

Information from OFSTED reports and RAISEonline Summary Report Data: The school was a mixed 11 to 18 secondary school of approximately 1100 pupils which was opened by a prominent academy chain in an inner London borough in the years leading up to 2010. Its specialisms were English and Business and Enterprise. At the time of data collection, over 75% of the pupils were from ethnic minority backgrounds, of which the numbers of the Black Caribbean and Black African pupils were increasing steadily. At least 60% of those enrolled were eligible for free school meals under the revised 2012 categorisation and nearly half had a first language believed not to be English. The numbers of pupils either on statements or supported by School Action and School Action Plus was approximately 60% higher than the national average and the school deprivation factor exceeded the 80th percentile in a ‘quintile graph’ covering all mainstream secondary schools. Between 2011 and 2013, the school’s General Certificate of Secondary Education (GCSE) results across all categories improved by more than 20%. By 2013 the percentage of pupils achieving 5 A-C grades including English and mathematics was slightly over 60%, while 70% were achieving grades A-C in English and/or maths was 70%, in line with national averages.

Additional background: The school had undergone an extensive programme of structural and managerial change following an inspection in 2010 when it was given a ‘Notice to Improve’ (Section 3.4.3, p. 100). At the beginning of 2011 the Principal announced a series of rolling inspections and initiated a whole school programme to revamp the school’s approach to teaching and learning, methods of assessment and marking strategies. Although these inspections, which were carried out at monthly intervals over the next six months, demonstrated immediate measurable improvements in standards of

teaching and behaviour and the next set of GCSE results improved over 10% on those from the preceding year, a new principal was instated during the next calendar year. After a second cycle of inspections was carried out over the next six months, sweeping changes were made to the routines, policies and the ethos of the school. The daily lesson timetable was changed from three 100-minute lessons to five 60-minute lessons, vertical tutor groups were abolished in favour of traditional year groups and the curriculum was streamlined in order to reflect the government's changes to league table calculations and its introduction of the English Baccalaureate (EBacc), a performance measure based on Key Stage 4 pupils' performance in a subject core consisting of English, mathematics, geography or history, science and a modern foreign language.

During this period, the whole-school behaviour policy continued to be implemented through a combined system of sanctions, which were recorded in pupils' School Information Management System (SIMS) profiles, and various levels of counselling which were delivered through the line management system. In lessons teachers used the C1/C2/C3 system in which a pupil, after receiving a C3 (10 behaviour points), was 'parked' by an on-call senior manager in another room in the department and required to participate in a 'restorative' meeting with the teacher before she could return to lessons. As pupils continued to accumulate C3s, they were obliged to attend a series of meetings in the company of their parents with the Head of Department, Head of Year and members of the Senior Leadership Team before they were excluded either internally or externally. Pupils who were dangerously disruptive were given 'gross misconducts' and excluded internally with immediate effect until their parents were able to meet a member of the senior leadership team.

While GCSE results continued to improve steadily over the next couple of years, staff turnover increased dramatically. In the first year of the new Principal's tenure, several members of the senior and middle management tiers left in the middle of the academic year and over 25% of the teaching and support staff left in July. This pattern of resignations was more or less repeated in each of the two successive years. As the size of the Senior Leadership Team dwindled, a series of new 'training' posts carrying little or nominal remuneration were created to enable ordinary teachers to gain management experience at a whole school level. The median age and years of experience of the teaching staff decreased rapidly. A majority of the new teachers who joined the school after the new principal's arrival were either newly qualified teachers (NQTs) or engaged under the auspices of *Teach First* and *Schools Direct*; several experienced teachers, including some who had worked at the school since its inception, were dismissed constructively by being placed on 'support plans' and threatened with capability procedures. As teacher turnover gained momentum and various union representatives began to visit the school to meet with the principal, members of the office, maintenance and catering staffs also began to leave intermittently.

The pressures on teaching staff linked to target-setting continued to increase steadily, with targets for 5 A-C grades including English and maths rising by 5-10% every year. Although the timetabling of mock assessments for each module in Years 10 and 11 had been a regular feature across the school since the first GCSE classes were taught, from 2012 onwards teacher assessments of pupil attainment were evaluated with reference to computerised real-time measurements of teachers' value-added performance generated by the *Matrix* software programme and used as an additional criterion in performance management. In the Mathematics Department, for example, failures to produce stipulated linear improvements in predicted grades resulted in the repeated rearrangement of sets

and teacher timetables as well as abrupt switches between different examination boards. In the 2013-2014 academic year, for example, more than half of the Year 11 cohort were taught mathematics by at least three different members of the staff.

Notwithstanding the increasing transience and frequent redeployments of the teaching staff, the school steadily established a secure ethos. The arrival of the new Principal in 2012 had heralded a new building and rebranding programme which transformed the physical layout of the school, its mission statement, website and uniform. Formal email and social media conventions were introduced and an annual calendar of events were launched which included cultural, charitable and a wide range of extracurricular activities, sports days and arts competitions. Year 7 and Year 11 pupils were provided with Saturday morning programmes and parent-teacher groups were established to involve parents in academic matters and extracurricular events.

4.6.2 Availability and choice of participants

I was originally given permission by the Principal and Senior Leadership Team to implement an open-ended study as a participant-observer on the condition that I continued to fulfil my contractual obligations as a full-time member of staff and did not request special privileges from the Mathematics Department with respect to my research interests. Consequently, I was limited to choosing participant samples from my annual teaching timetables. In the first year of my study, as I wished to explore unconscious elements of teacher-pupil relationships with a class I had never taught before, I was obliged to work with a high-ability Year 11 class, the only 'new' class on my timetable. In the second year, I chose a high-ability Year 8 set as my second participant sample after I was told that they were the only class that I would 'keep' for two years; at the start of the spring term, I chose a middle-ability Year 8 class to act as a comparative sample. In

the third year, I 'lost' the middle-ability Year 8 set and replaced it with a low-ability Year 9 set.

4.6.3 Consents and constraints

Initially I was authorised to observe my classes, record field notes, carry out interviews and video-record lessons. I was not required to inform anyone of my choices of participants, but whenever I wished to carry out interviews or video-record lessons I was required to obtain permission from a designated member of the Senior Leadership Team, who would oversee my production, distribution and collection of the necessary pupil/parent consent forms.

After the new Principal arrived in 2012, however, my research activities were constrained considerably. I was permitted to carry out only a limited number of interviews and my requests to video-record lessons were repeatedly set aside. In July 2013 I was allowed to audio-record a sequence of four lessons with my high-ability Year 9 participant sample but thereafter I was obliged to restrict my data collection to carrying out observations and recording field notes.

4.7 Data collection

4.7.1 Recording field notes

Following the principles of the infant observation method (Ruston, 2006; Carbine, 2013), I recorded descriptive sequential accounts of my classroom observations as soon as possible after lessons in A4 spiral notebooks. My accounts refrained from making any type of analytical evaluation, did not adhere to any pre-determined format and tended to

vary from one or two lines to two or three pages in length, depending upon what had occurred in the classroom and how I was feeling as I sat down to write.

4.7.2 Interviewing

During the second and third years of my study I carried out free association narrative interviews with nine individual pupils and four groups of two to four pupils. In nearly all cases I scheduled interviews during the lunch breaks that followed participants' lessons and I encouraged participants to relax by offering them drinks and snacks and arranging for them to sit at a table near a window in the quietest corner of the classroom. Once they were seated comfortably, I explained the unstructured nature of a free association narrative interview, reiterated that they could terminate the interview at any time they wished and obtained permission to audio-record. Finally, to prompt the participants' free association of their conscious and unconscious thoughts and feelings and to ensure the development of a genuinely unstructured interview, I would ask the starter question, "What happened in this lesson?". As they spoke I would make notes that would enable me to remember the ordering and phrasing of the participants' responses in the event I subsequently wished to elicit more details.

4.7.3 Audio-recording

All interviews and the sequence of four lessons were recorded on an Olympus WS-811 Voice Recorder and transcribed manually using the codes listed in Table 4.1.

Table 4.1: Transcription codes

Code	Meaning
...	pause, 2 to 6 seconds
(pause)	pause, 6 to 10 seconds
(stop)	pause in excess of 10 seconds
-	interrupted response
(sic)	odd word or colloquialism
[]	material omitted
(comment)	observation
(Line number)	the number of the line in the transcript

4.8 Data Analysis

4.8.1 Selection of data for analysis

In psychoanalytically-informed research designs, data collection and analysis are not discrete processes. In this study, I found that I was obliged to submit the empirical data I collected in the form of field notes and interview transcripts to at least two discrete types

of preliminary analysis before I produced a ‘whole’ data analysis which incorporated characterisations of participants’ unconscious operations and group mentalities and psychoanalytically-informed interpretations of what had occurred on the unconscious level during classroom episodes. First, I needed to probe the empirical data for its range of ‘face value’ meanings. Second, I needed to apply psychoanalytically-informed reflection to prompt a preliminary understanding of the unconscious dimensions of the data that were unencumbered by my own manifestations of defence and resistances. At various points, as I stated above, my preliminary understanding went through several versions.

As I was selecting ‘slices’ of data for presentation in the data analysis chapter which follows, I was aware that I needed to choose occurrences and episodes which chronologically addressed my research questions. However, to avoid the ‘circular arguments’ which are liable to emerge whenever a researcher collects and analyses data using the same metapsychological theory (Hinshelwood, 2013; Section 4.4.2), and to preclude the precariousness which enveloped the preliminary observations I described in Chapter 3, I only selected ‘slices’ which fulfilled three conditions. In the first instance, each ‘slice’ had been subjected to the three levels of analysis described above. Second, each ‘slice’ incorporated occurrences and/or episodes which I was able to characterise as manifestations of defence using the clinical process, rather than the metapsychology, of object relations theory. Third, except for my examination of my countertransference reactions in the first section of the chapter, all ‘slices’ incorporated empirical data other than that contained in field notes, such as pupil interviews, audio files and comments made by observers.

4.8.2 Ongoing analysis of countertransference and psychoanalytically-informed reflection

Initially, when I was attempting to undertake psychoanalytically-informed reflection, I modelled my approach on the analytical objectives of free association narrative interview methodology by aiming to transform the fragmentary thoughts and feelings I experienced as a participant-observer into ‘whole’ narratives that integrated the various strands of my conscious and unconscious knowledge (Hollway and Jefferson, 2000, 2001; Section 4.4.2). I did not schedule sessions for reflection but, whenever I had sufficient free time and the stamina to do so, I would review my field notes and speak into a digital recorder, saying anything that ‘came into my head’. After listening to the audio files as many times as I felt necessary, I then attempted to compose a ‘whole’ narrative of either a single occurrence or a series of episodes. By following this procedure throughout the first six weeks of my study, however, I was able to produce only two short ‘whole’ narratives: I was obliged to abort the majority of attempts because I became distressed to the point of being physically ill when I became engulfed by manifestations of defence and countertransference reactions.

In the second half term of my study I decided to implement a rigorous three-tier process to produce ‘whole’ accounts. First, as soon as I had recorded field notes of classroom occurrences and episodes, I forced myself to highlight any content which seemed to instigate incongruous and/or disproportionate emotions. Second, no matter how long it took, and sometimes the process would carry on over several days, I accessed chains of freely associated thoughts, feelings and memories to formulate links between these emotions and my past life experiences. Finally, usually by writing at length, I attempted to understand these past experiences as discrete units of unconscious data until I managed

to identify the anxieties and defence mechanisms which were associated with each experience.

Once I was able to articulate the operation of each defence mechanism, my unconscious knowledge emerged, sometimes slowly and painfully, but at other times explosively. It was at this point that I would genuinely begin to overcome the ‘opacity of memory and desire’ (Bion, 1970) that prevents a psychoanalytic researcher from articulating her unconscious knowledge concerning empirical observations and the unconscious operations underlying her countertransference reactions, and finally I would be able to produce a ‘whole’ narrative.

4.8.3 Analysis of classroom observations

In addition to carrying out psychoanalytically-informed reflection to produce ‘whole’ narratives concerning classroom occurrences and episodes, I carried out sequential analyses of my field notes of observations in which I noted all disruptive occurrences and episodes and characterised them on a conscious level in terms of the ordinary ‘face value’ meanings associated with the participants’ comments, behaviours and emotions they expressed. I next examined each disruption on an unconscious level by locating the ‘nodes’ (Section 4.4.2) at which the participants’ comments and behaviours had intersected to instigate a manifestation of defence and employing object relations theory to characterize the manifestation in terms of the underlying nature of its defence mechanism. I then interpreted each manifestation of defense with reference to the participants’ face value comments and non-verbal expression as well as my presumptions as to the anxieties and states of minds associated with these mechanisms. Finally, with reference to the more complex disruptive episodes, I tracked manifestations of defence

as they unfolded through individual, subset and whole-class levels and characterised the unconscious operations and group mentalities which engendered their development.

4.8.4 Analysis of interview transcripts

In addition to carrying out psychoanalytically-informed reflection to produce ‘whole’ narratives concerning my interview experiences, I submitted each transcript to a line-by-line analysis to identify manifestations of defence indicated by breaks in narrative chronology, such as non-sequiturs, sudden pauses or stoppages, exaggerations, avoidances or ‘slips of the tongue’ (Hollway and Jefferson, 2001). I then interpreted these manifestations of defence within the holistic context of the participant’s face value comments and non-verbal expressions in order to highlight a number of the participant’s key defence mechanisms and my presumptions as to the anxieties and states of mind associated with these mechanisms. In the final step of the analysis, I reassessed the participant’s presentation in lessons with reference to my psychoanalytically-informed reflection, all of the factual and subjective knowledge I had acquired about the participant and all of the object relations theory I outline in Chapter 3.

4.8.5 Formulating psychoanalytically-informed interpretations

Interpretation is defined as the act of explaining the meaning of something but psychoanalytically-informed interpretation does not engender an unconditional meaning of an occurrence or episode in any sense, either with reference to the theory of psychoanalysis which generated the meaning or in formal logical terms of ‘cause and effect’.

Instead, psychoanalytically-informed reflection is a reiterative process in which a researcher chooses to contemplate an occurrence or episode which already possesses a range of objective and subjective meanings. As she aims to produce a ‘whole’ narrative that will ultimately integrate the strands of her conscious and unconscious knowledge concerning events, she will formulate chains of freely associated thoughts, memories and feelings which engender successive layers of unconscious meaning. These layers, which often lack a chronological order, are linked by divergent affinities, such as contiguity in time, thematic affinity or continuity across developmental phases of the researcher’s life (Hinshelwood, 2013).

However, psychoanalytically-informed reflection is additionally tenuous in that it unfolds in unpredictable ways and has the potential to instigate a wide range of positive and negative emotions in the researcher. At various points during the implementation of my research design I felt it necessary to suspend my other strands of data collection and analysis until I was able to write a ‘whole’ narrative or to recover from the anguish caused by my reflexive efforts.

4.9 Discussion

In nominal terms, my autoethnography may be positioned in the psychosocial research that I reviewed in Chapter 2, as it explores the unconscious dimensions of the affect which mediates teacher-pupil relationships, peer interactions and the teaching and learning of mathematics that takes place in Key Stage 3 and Key Stage 4 classrooms. In epistemological terms, however, it represents a somewhat idiosyncratic approach to meaning-making which employs a methodology which seeks to undertake a ‘top-down’ application of object relations theory to the characterisation of observable phenomena while maintaining a broad perspective with respect to characterisation and

psychoanalytically-informed interpretation. That is to say that, while my methodology incorporates a considerable amount of Klein and Bion's object relations theory and distinguishes between the clinical process and metapsychological facets of the theory, I have also strived to maintain the ethnographic perspective described by LeCompte and Preissle (1993), who promote description rather than prediction, induction rather than deduction, the generation of theory rather than its verification, construction rather than enumeration and subjectivity rather than objective knowledge (Cohen et al, 2007, p.169).

It may be argued that my study is not generalisable, not only in view of the highly subjective nature of autoethnographic and psychoanalytically-informed investigations (Section 4.3; Section 4.4.1), but also because I have undertaken an inductive approach to data analysis without the opportunity to purposively select participant samples (Section 4.6.2). However, while my research design cannot constitute an evidence-based study (Polit and Beck, 2010) as the phrase is typically understood, for example by policy makers, I believe that I have managed to achieve a *moderatum* approach to generalisation. Payne and Williams (2005, p.291) describe a *moderatum* generalisation as an 'intermediate' type of limited, modest and pragmatic generalisation that is drawn from personal experience and enables an understanding of everyday life by bringing order and consistency to social interactions. Williams (2002, p.125) notes that it may be accepted as legitimate if it is based on inductive reasoning and understood to contribute a 'working hypothesis' (Guba and Lincoln, 1982) that is tenuously held and open to change and external verification.

My research design was finalised with the explicit objective of employing all of the necessary measures for generating *moderatum* generalisations (Payne and Williams, 2005, pp.297-305). I have maintained an internal validity by undertaking a rigorous data

collection over a three-year period of careful observation and recording and by carrying out three different levels of data analysis which produces psychoanalytically-informed interpretations of classroom phenomena that are provisional and open to further deliberation. I have provided the groundwork for external verification by providing descriptions of my fieldwork which are ‘thick’ enough to enable a reader to decide if they are meaningful in other settings. However, notwithstanding my efforts to produce findings that are relevant to researchers in mathematics education and other research domains, I have not attempted to avoid the consideration of data that does not align perfectly with my methodological approach.

Chapter 5 Data Analysis

5.1 Overview

In this chapter I present my data analysis for the three research questions I formulated in Section 4.5.1. The introduction of each research question is followed by a description of the participant sample, the schedule for data collection and the successive strands of analysis I used to assess and characterise states of mind, manifestations of defence and other classroom phenomena. As each strand of analysis addresses a discrete aspect of a research question, the partial perception it generates should in the first instance be considered in isolation from the rest of the text; however, as my research design was formulated incrementally and psychoanalytic interpretations comprise chains of associated thoughts, feelings and memories, the data analysis in its entirety should be understood as an iterative account of an on-going examination of the unconscious operations and group mentalities which underlie teacher-pupil relationships and mediate teaching and learning in typical secondary school lessons.

Each research question incorporates several finer threads of inquiry. For example, as I investigate unconscious elements of teacher-pupil relationships, I first examine the oscillations that occurred in my state of mind as I started to teach the class and contrast these with two episodes of countertransference I experienced during two lessons which differed greatly with respect to 'climate'. Next, as I explore pupils' manifestations of defence in typical lessons, I delineate some ways in which unconscious operations appear to mediate a variety of teaching and learning activities as well as the behaviour of pupils who are members of what I have previously referred to as the 'pairing subset' (Section 3.4.2). Finally, as I contemplate to what extent Bion's characterisations of groups may explain what differentiates a 'good' lesson from an 'unsatisfactory' one, I assess the role

of the teacher's conscious and unconscious emotional expressions in instigating and managing pupils' behaviour on both conscious and unconscious levels.

I realise that my data analysis incorporates various layers of my internalised thoughts and feelings, along with subjective descriptions of classroom episodes, which may not resonate with many teachers and educational researchers, particularly those who work in schools with different pupil intakes and teaching practices. However, as this is an autoethnographic account, the validity of my findings should not be evaluated within traditional social scientific contexts or with reference to the personal criteria of readers (Sparke, 2000; Section 4.3). Rather, I would hope that my data analysis is viewed as an example of an object relations psychoanalytically-informed methodological approach that is transferrable to other school contexts. (Polit and Beck, 2010, p.1453).

As soon I embarked upon my data collection I became aware that my findings would be contingent both upon the keenness of my observations and my ability to reproduce them in writing. I have endeavoured, therefore, as far as possible, to provide data analyses which incorporate detailed and accurate 'thick' description for external validation and to maintain a narrative style which honestly depicts how my engagement in the processes of sequential analysis and the formulation of psychoanalytically-informed interpretations developed as I proceeded to collect data and assimilate object relations theory. Whenever I have intentionally omitted material, either for ethical reasons or because it was redundant and/or distracting with respect to my analyses, any resulting narrative gaps are indicated clearly.

5.1.1 Methodological specifications

As there is a danger of creating a ‘circular argument’ by searching initially for unconscious operations and expressions of defence mechanisms and then applying the metapsychology of object relations theory to characterise them, I have not employed discrete methods for investigating countertransference reactions, unconscious elements of teacher-pupil relationships, splitting or any other types of defence manifestation. Instead, in every section of the data analysis below, I have followed the general methodological approach outlined in Sections 4.8.1 – 4.8.5, which, in conjunction with ongoing psychoanalytically-informed reflection, unfolds in three steps: 1) a face value appraisal of an occurrence or event; 2) a sequential analysis of the occurrence or event deriving from the clinical process of object relations theory to identify and/or isolate the expression(s) of defence mechanism(s); and 3) a psychoanalytically-informed interpretation.

Each methodological step is differentiated with respect to its analytical nature. A ‘face value’ appraisal is not analysis in the pure sense of the term in so far as it is not undertaken in the light of a theoretical framework; rather, it represents the type of ‘on-the-spot’ judgement that is made routinely by OFSTED inspectors and other classroom observers who evaluate classroom phenomena with reference to a mixture of objective checklists and subjective thoughts and feelings which are engendered by their previous experiences in classrooms and ‘gut’ instincts as to ‘what is going on’. Face value appraisals may differ considerably from one observer to another and are therefore meant to be understood as ‘snapshots’ rather than as final pronouncements.

The sequential analyses of classroom observations vary widely in the types of inferences I note to identify expressions of defence mechanisms. In some cases, I note changes in

group mentalities while in others I note an utterance and/or changes in the behaviour of an individual or a subset of the class which constitutes a 'node' of defence manifestation. This variation in my empirical focus was contingent upon the inherent complexity of the classroom events under observation and oscillations in my conscious awareness which were triggered by manifestations of defence.

Finally, as I noted in Section 4.8.5, each psychoanalytic interpretation comprises successive layers of meaning which integrate strands of my conscious and unconscious knowledge. I will reiterate here that, no matter how definite they might 'sound', my interpretations are intended to be tenuous and open to correction and/or extension. My interpretations of my countertransference reactions tend to be more comprehensive because they are constituted upon lengthier chains of unconscious associations and a greater degree of conscious knowledge than those which characterise the unconscious operations and group mentalities that sustain classroom interactions.

5.2 Research Question No. 1: What are unconscious elements of teacher-pupil relationships?

5.2.1 The participant sample

The pupils were a mixed, ethnically diverse Year 11 top maths set consisting of nine girls and fourteen boys whose mean Cognitive Abilities Tests (CATs) scores ranged from 104 to 123. Approximately half the class had Fischer Family Trust (FFT) targets at Grade A. In June 2010, at the end of Year 10, the class had been entered for the first part of the Oxford, Cambridge and RSA (OCR) Higher Tier Twin Pilot paper, which afforded pupils the chance to obtain two GCSEs in maths by completing several modules that were not covered in the ordinary Higher Tier paper; approximately two thirds of the class obtained a CD grade combination while the remainder obtained either a DD or a DE combination.

In November 2011, in order to appraise the feasibility of continuing with the Twin Pilot, the Head of Mathematics entered the three pupils who had obtained the lowest results in the summer for the ordinary OCR Higher Tier paper and each received a C grade; I was then advised that the Senior Leadership Team was in favour of abandoning the Twin Pilot but in the interim I was to continue delivering the Twin Pilot syllabus. In February 2012, the Senior Leadership Team suddenly decided, in conjunction with a consultant from Partners in Excellence (Pixl), to enter the class for the March sitting of the Edexcel Higher Tier paper. In May 2012, after 10 pupils obtained A grades and the rest B grades, the class was disbanded. Of the four pupils who attended further lessons and who were entered for the ordinary OCR Higher Tier paper in June, only one obtained an A grade.

The class had had a different teacher in every year of their enrolment and had met me before the start of data collection only once in the role of an observer. In September, after I had ascertained from a question-level analysis of their mock exam papers that pupils were unfamiliar with many topics listed in the first half of the OCR syllabus and that most were still unable to solve two-step algebraic equations with negative signs, I abandoned the pupil-led, project-based style of teaching that was promoted by the school and introduced a traditional style of teaching based on board presentations, whole-class problem solving and individual written work. I followed a textbook and systematically covered numerical and algebraic topics in the autumn term, geometry and statistical topics in the spring term and an intensive practice of exam questions and exam technique before the exams in March and June.

In terms of formal teaching time, the class were timetabled for four 100-minute maths lessons per week and one revision session on Wednesdays after school. However, throughout the autumn term, I regularly met individual pupils who required extra help

during my lunch breaks and free periods and at the start of the spring term I agreed to tutor one of the pupils in weekly private after-school sessions free of charge. In the six-week run-up to the March exam I offered extra tuition daily, held three-hour topic-based revision sessions every Saturday morning and organised two separate ‘drop days’, in which the class and I dispensed with our normal timetables and revised intensively over the entire school day. Throughout the academic year I was in constant communication with parents, several of whom were worried about their child’s progress and the Head of Mathematics’ decision to enter the class for the OCR Twin Pilot.

As I noted in Section 4.6.2, I was limited to choosing participant samples from my ordinary teaching timetable; however, this class genuinely comprised an ideal sample for the initial stage of my research design for several reasons. First, as I had never formally interacted with any of the pupils on an academic or pastoral level, I would be able to study the synthesis of our teacher-pupil relationship from its very first moment. Second, as the pupils had repeated experience of having to relate to new teachers and were under great strain to produce the best set of GSCE results in the school’s history, they were likely openly to express their thoughts and emotions regarding the ways in which they liked to learn maths and what they needed from their teacher. Finally, in addition to the familiar types of anxiety associated with typical teaching and learning, the pupils were subject to a host of supplementary pressures which derived from efforts by the Senior Leadership Team to ‘turn the school around’ in view of the ‘Notice to Improve’. Although there was a considerable risk that the high levels of pupil stress would impact negatively on classroom interactions and exacerbate the painful aspects of analysis, I conjectured that this choice of sample presented a good opportunity to observe the unconscious elements of a teacher-pupil relationship, as raised levels of anxiety would highlight the manifestations of all types of defence.

5.2.2 The schedule for data collection

The observation/reflection schedule was designated to run from September 2011 to June 2012 and its objectives were two-fold: in the first instance to examine the nature of my episodes of countertransference, and thus overcome my defence manifestation to the extent where I could integrate my conscious and unconscious knowledge of classroom phenomena in the production of ‘whole’ narratives (Section 4.8.2), and then to study the ways in which pupils interacted with me and each other during lessons. To achieve these objectives, I had planned to implement ongoing empirical observation and psychoanalytically-informed reflection during the first half-term and, once the class had begun to make significant learning progress, to supplement these methods with rolling individual pupil interviews. However, as pupils continually complained about the pressures they were experiencing in their GCSE year and repeatedly requested as much teaching time as possible to achieve their predicted mathematics grades, I refrained from asking anyone in the class to give oral or written accounts of their thoughts and feelings, even when I became concerned that I was jeopardising the validity of my data analysis by collecting all my data through reflexive processes which were undoubtedly impacted by resistance and other types of defence manifestation.

In the first half term of the schedule, as I was trying but not infrequently failing on a conscious level to establish a constructive relationship with the participants, I found it extremely painful, almost tortuous, to revisit my memories of the ways in which I had interacted with them. Although I did manage to record field notes during the school week, I did so sporadically and only when I felt that I was ‘up’ to the task; on many days, I felt so depleted and despondent after attempting to unpick the discrete stages of our destructive interactions with the participant sample that I felt too ashamed to write anything in my notebook, even though I reminded myself that no one was watching me

and that I could always throw away the most embarrassing pages. I avoided undertaking psychoanalytically-informed reflection until the weekends, when I could either relax at home or go for a solitary walk and speak into a digital recorder before committing my thoughts to paper, but even then I was liable to become extremely distressed, to the point where I became physically ill. By the October 2011 half term holiday, I had produced only two extremely brief 'whole' narratives and had begun to believe that my research design was untenable (Hollway and Jefferson, 2001).

In the second term, however, after my relationship with the participant sample had improved considerably and my feelings of aggression and frustration began to dissipate, I managed to implement the more rigorous approach to producing whole narratives that I delineated in Section 4.8.3. Over the next month, as I slowly began to become aware of the operations of my defence mechanisms and perceive the unconscious motivations behind my teaching style and lesson planning, I found that I was able to produce at least one brief 'whole' narrative of a classroom episode per week. In December 2011, after intensive reflection and repeated written drafts over the Christmas holiday period, I produced a substantive 'whole' narrative entitled 'Admissions of an Armchair Killer' detailing the development of my relationship with the participant sample from the day I learned that I would be teaching the class in September until the end of the autumn term. Afterwards, however, I again felt too depleted to maintain the exacting programme of observation and reflection necessary to explore further aspects of my countertransference; However, I managed to record additional notes on pupil interactions in the spring term and to undertake an in-depth analysis of a lesson observation which occurred during the short period between the March exams and the Easter holiday break.

5.2.3 Analyses of ‘Admissions of an Armchair Killer’

5.2.3.1 Overview

Although I felt so mortified when I reread the text of this ‘whole’ narrative that I initially contrived to assign it to the appendix, I present it in its entirety as it provides a comprehensive insight into my thoughts, memories, feelings and emotions as I was implementing the first stage of my research design. I then submit the text to face value and sequential analysis (Section 4.8.3) before formulating a preliminary psychoanalytically-informed interpretation of the oscillations in my states of mind as I gradually established a constructive relationship with the participant sample. Finally, after analysing the text’s two major nodes of defence manifestation, I consider the nature of the two countertransference episodes which underpin two non-sequiturs in my ‘whole’ narrative.

5.2.3.2 The text

Introduction

When I was first asked to write about my experiences of teaching different year groups in my classroom, I thought it would be relatively straightforward task. I very quickly formulated a sketch in my mind that featured an anecdotal evidence from my colleagues, journal research and diary-style extracts of planning and delivering lessons, and I was so relaxed with my vision that I did not have a second thought about the project for several days, at least not until I resolved to undertake an analysis of my teaching style using Freudian and psychoanalytic methodology. But now I am not at all complacent: I finally have to face the fact that, for the past twelve years, ever since I began to teach at a tough London comprehensive, I have been on a killing spree. While I was nurturing pupils superficially, I was killing them covertly, to small and larger extents, more aggressively at certain times than at others. And even worse, although I have high hopes that one day I will be able to control my murderous tendencies, I know for certain now that I will never be able to eradicate them completely.

I suspect that my colleagues and pupils have known this all along but that they forgive me as they know that I will forgive them. Everyone who teaches in a school knows, even if they cannot articulate their thoughts consciously, that

classrooms are dangerous places where pupils are apt to inflict pain and pleasure wildly and unpredictably. I must admit that until now I was gravely unaware of the huge levels of aggression that I continually project into pupils and I am still grappling with my newfound awareness. The following analysis of the ways in which I have been thinking about and teaching my current Year 11 class is still underdeveloped and is replete with layers of resistances and screen memories which require hours of further scrutiny.

Primary Analysis

I became nervous about taking on this class as soon as the Head of Maths stepped into my room in June to tell me that he was giving me the top Year 11 set in September in order “to make it up to me” for having had such a difficult initiation into the department. Robert had kept his distance from me since I had joined the school in January and had cruelly sat on the side lines as I struggled to take charge of five difficult classes who had lacked a permanent teacher for months. The Senior Leadership Team had publicly acknowledged that the Year 10s were an alarmingly weak year group and Robert clearly wanted to avoid any responsibility for achieving their idealistic A/B grade maths targets.

My fears were confirmed when I went to observe my prospective class revising for their first real GCSE examination. The pupils clearly adored Mr Graham, who made it clear to me that he had taken the decision not to burden them with any tasks that would destroy their positive feelings for maths, stretch them beyond certain ‘developmental points’ (he knew a thing or two about Piaget) or oblige him to spend hours marking their exercise books, a nuisance task. As I observed in the lesson, they spent almost all their time carrying out ‘rich tasks’ in groups, cutting and pasting Assessing Pupils’ Progress (APP) key question exercises, following maths trails that were posted on the cabinet drawers and matching loop cards. I could not complain about the behaviour and I found myself laughing along with pupils at various humorous exchanges during the lesson but I was inwardly depressed by thoughts that I could never emulate Mr Graham, not even if I had the personality or the professional beliefs to do so, and that I was heading for trouble, perhaps even more trouble than I’d had during my first term at the school.

My anxieties gnawed away at me during the summer and by the time we returned to school in September I was rather tense and irritable. The news about my class was not good: although Mr Graham had predicted everyone A and B grades in the first part of the OCR Twin Pilot examinations, two thirds of the class had scored no higher than CD and the rest had scored two DD. Luckily, both the GCSE and A level results across the whole school had improved significantly over the previous year and the Senior Leadership Team were too busy backslapping each other to focus their attention on the Year 10 maths results. But then they proposed a new set of wholly unrealistic, almost impossible-to-achieve 2012 GCSE targets for the maths department and they made it clear during subsequent In-Service Training (INSET) sessions that they expected the maths teachers to “fight on all

fronts” and do whatever was necessary to “turn the situation around”. The Principal even made a personal appearance at our first departmental meeting of the year to underline the importance of achieving our new targets so that we would not have to return to the constant round of inspections which took place when we failed our targets the previous year.

Inwardly I could not help but fret that, in one way or another, my wellbeing at work was on the line and involuntarily I began to feel as nervous and as intimidated as I did on the day I started my first-ever teaching job. My stomach took on an erstwhile nauseated, cramped sensation as I placed myself on a war footing with regards to planning my Year 11 lessons. Mr Graham had left me a question level analysis of the class’s final Year 10 mock assessment and I queasily confirmed that, besides certain geometrical topics, they knew almost nothing. I would have to teach them everything in just one year and that thought made me frustrated and angry, although at first I could not pinpoint why exactly. In fact, I was angry about so many things: I was both angry with myself for, yet again, having joined a difficult school without facing up to the rigours of a proper job search and angry with my previous school, which had never valued me and which had made me redundant. And then I was angry with the loss of my husband’s business, which had propelled me into teaching in the first place, and I was angry with my line manager, whom I had come to loathe.

Within two days, however, my overt anger had seemingly dissipated as I acknowledge, without too much reluctance, that I could only blame myself for repeatedly becoming trapped in unhappy, desperate professional situations in which I was obliged to fulfil high expectations with few resources and little support. To change my perpetual situation, I would need to change myself, but that could wait. I had pulled through before and I would do so again. At that point, I had to admit to myself that, even though I had sworn that I would no longer kill myself for a dysfunctional middle management or leadership team, I was preparing to kill myself again. I wanted to show everyone that I could survive in spite of them. I then perceived that much of the idealism I exhibited in school settings was just a smokescreen for deep-seated feelings of frustration and superciliousness. I hoped that the Year 11 class would either give me a break or not notice.

The first lesson established a battle ground for the inevitable hostilities. I had decided beforehand that I would forgo all ‘rich activities’ for traditional teaching on the board, whole-class problem solving and masses of written exercises and, after a light-hearted introduction with an offer of on-demand revision sessions after school, I started as I meant to go on. Our first topic was index numbers and I had arranged the activities of our 100- minute lesson in such a way that we would revise C/D level questions before moving incrementally towards A* questions. I wanted to set a brisk pace but I was as tense as I had ever been and too reluctant to praise their efforts; after ten minutes or so, several pupils turned to their neighbours and declared that they had had enough with the “board talk” and were

not listening any more. I then asked them how they were supposed to reach their targets and they replied, without answering my question directly, that they had never worked like that with Mr Graham and they were not going to work like that now. But they needed to improve their grades massively, I reminded them, and they had a lot to learn: there was too much material, not enough time and they badly needed practice in writing exam style answers. They knew nothing about their poor results and they demanded to see them immediately; I suggested that we continue the lesson to the point where they could work from the textbook and I could speak to each of them personally. They agreed but never proceeded to engage properly with the topic and several pupils reacted disruptively when they saw their grades. Although I eventually helped a few pupils to solve some problems, most just talked to their friends and shouted across the room without bothering to attempt to learn anything and I was greatly relieved when the bell rang and they stormed out the door.

The next lesson was even more painful. Many pupils were openly dismissive of me and commented rudely on my teaching as I went through the starter and introductory activities. Once or twice I politely reminded them that it was important to listen and that we did not have any time to waste, but when one or two boys shouted out that I was talking to myself, I retorted that pupils with D grades were not in the position to criticise anyone else. Two or three rounds of booing ensued and I became angrier and decided to be meaner. I told them that if they had proved themselves with A or B grades, maybe their booing would bother me, but at this point I was not minded to either take them seriously or give their opinions a second thought. Either they could take my lessons or leave them; if they wanted to fail so badly, I would let them. One boy shouted out “But it’s your job to care what we think” and one of the girls shrieked “What kind of teacher are you that you don’t care?” I should have calmed everyone down at this point, including myself, but I wanted to shoot them down. “Teaching and learning is a two-way street,” I said, “so don’t think *you* are going to make the rules here. If you are rude to me, I will probably be rude to you. Maybe if you will like me, I will like and care about you. You need to grow up and see things from an adult’s point of view.”

There was complete uproar. “Oh my God, do you hear how she’s talking to us? She’s a bad man. I’m going to report her to Mr P (the Principal).” I told them to go ahead: with their present credentials, he was going to listen to them for about two seconds. I shocked myself by speaking as if I were confronting my relatives back in New York City. I then assigned them a task which I fully knew they were unable to do and told them to show me just how clued up there were. Quite a few of them sat there in silence, looking around at their friends, not knowing how to react. I grudgingly helped a few pupils who asked me to show them how to start the exercise but when one of the girls, who had earlier blurted out that I was a “rubbish” teacher, asked me to look at her book, I purposely embarrassed her by making a joke about her previous derisory comments and getting a laugh from the

class. Again, when the bell rang, the pupils made a rush for the door. I was strangely exhilarated but already dreading the next lesson.

I was able to deliver the next two lessons more or less the way I had planned them but three or four stalwarts continued to openly criticise my teaching as I took my place at the board, even though many of the pupils were beginning to quietly thank me for going through the “nitty-gritty” and for taking the time to mark their books so thoroughly. I phoned parents to wreak revenge and elicit punishments, two of which turned out to be unexpectedly severe. I am ashamed to say this pleased me inordinately; I was still suffering and I wanted them to suffer as well.

And then, within a ten-minute episode at the end of that week, my classroom was transformed. I had not planned a dramatic intervention, but before we embarked on the topic of surds, I gave them a short history about the invention of different types of numbers and compared rational and irrational numbers on the board. I did this without in any way testing their knowledge or abilities and their expressions changed. For the very first time they were totally engrossed in what I was saying, and when someone interrupted the ensuing discussion with a silly remark, he was told to shut up and let me go on. We were all enjoying ourselves for once and I allowed the lesson to drift before I finally called for a return to routine. To my absolute delight and surprise, they did everything I asked of them and proceeded to work in their exercise books without a single complaint. Many of them eagerly called me over to check their answers, and when the bell rang many of them lingered and helped me to straighten up the tables and gather up the books. I do not believe that anyone in the room could have explained exactly what had happened but everyone was much happier and certainly calmer.

I badly craved the new-found affection and for the next few days, before our next lesson, I wondered what I could do to cement the basis of our new relationship. At all costs, I had to block my killer tendencies. I decided to give them a lesson on proportion and to show them how to sneak the techniques into their science examinations. No one at my new school knew that I had taught science for seven years before becoming a fulltime maths teacher so it was easy to lie and say that I had made a special effort to research the science questions just for them. They were not only gobsmacked when I demonstrated how a clear understanding of proportion could save them at least twenty minutes in a GCSE science paper but also extremely appreciative, especially as many of them were on C/D borderlines in science. There were absolutely no problems with behaviour in that lesson and I even felt confident enough to allow a girl to imitate my American accent.

I cannot say that it has been perfect since then, as many of the pupils have taken to engaging in arguments outside of lessons and often come to maths in truculent or distressed moods and too concerned with the relevant gossip to discipline themselves to work to their utmost. But they no longer pick fights with me and I no longer pick fights with them, at least not most of the time. If provoked sufficiently, I still react by trying to take them down a peg, to humiliate them in

public and deflate their egos, even though I know that they have low self-esteem and are angry about the poor preparation they have had for many of their upcoming exams. I can now admit that, if I were really and truly a fully-fledged adult, I would never need to respond to adolescents with such a high degree of vindictiveness.

But I am not always an adult in my own classroom: too often, when I am confronted by particularly disruptive pupil behaviours, I revert to feeling the way I did when I was five or six years old and the 'snake girls', some teenage neighbours, chased after me with handfuls of nylon ringlets they wrapped around my head and neck. I was never able to fend them off and I was never able to relax or enjoy myself while I was playing outside with my friends. For a very long time I was a desperately unhappy, agitated little girl who secretly yearned to stab her tormentors but who assuaged her fear and bitterness by immersing herself in films and novels in the safety of her bedroom, and perhaps that is still who I am. I wonder if my Year 11s have already twigged.

Secondary Analysis

In some ways I was not shocked to perceive that, despite being conscientious and charitable with my time as a maths teacher, I am certainly a killer of sorts, an assassin who strikes from her armchair the moment she begins to plan her lessons and who kills her pupils one brain cell at a time under the cover of 1960s New York sarcasm. Can I really claim to kill them, when I have such a successful record in meeting targets and producing great examination results? Unfortunately, the answer is yes: I compulsively seek to kill off bits of pupils who seek to attack or ridicule me, or who simply provoke my contempt. But any guilt I feel now is not linked directly to events which have actually taken place in any of my classrooms; in some as yet undefined way, my feelings of guilt point straight back to various episodes that occurred in my early childhood, while I was still at infant school.

It has taken me several days to fathom my memories of the snake girls. I had not thought of them for years and years, not even when I had to rush back to Boston in 2007 because my mother was terribly ill or when I later visited my childhood home for the first time in eighteen years while I was planning her funeral. But my dread of the snake girls, which is translating into a feeling of sickness as I write, is not about the nasty girls or the silly nylon snakes or the physical bullying which occurred when I got knocked down and roughed up. Rather, my snake girl memories encapsulate my mother's and brother's contempt for my lack of self-esteem and my repeated failures to stand up for myself, my mother's preference for my brother, her adoration of him and her disdain for me, and last, but not least, her hatred of my father, who once admitted to me that he had left our home and abandoned me to my fate because he could no longer tolerate my mother and brother's lying and scheming. The snake girls remind me

how I had hated my mother and loved my father and then, after I left home, had only found love by acting out a certain role.

There it is: whenever pupils bully me in the classroom the way in a particular way, I regress to my infantile state of mind, which is engulfed by rage and terror. To defend against this onslaught of anxiety and emotion, I become aggressive and seek to kill and/or overpower. It will take many more weeks to delve further but already I can see that my compulsion to take, and then to remain in, certain teaching positions is really just a compulsion to re-enact my early family situation; and moreover, as much as I hated my mother, in my killer aspects I have become a great deal like her.

Addendum

As I reflect upon the above analysis, I am becoming aware of at least one ethical issue: I might be able to rely upon videotape observations to illustrate constructs of anxious and defensive behaviours, but I could never rely on observable factors to provide a rationale for these manifestations. What I have learned about my teaching in this analysis was wholly inaccessible to myself, let alone anyone else, until I had overcome various unconscious resistances.

5.2.3.3 Face value appraisal

The text above is not a 'whole' narrative. Its four-part pseudo-academic structure, which comprises an introduction, 'primary' analysis, a 'secondary' analysis, and an addendum, demonstrates plainly that throughout its formulation I continued to manifest defence through a variety of mechanisms to avoid my feelings of guilt associated with hating my mother but then becoming a 'killer' teacher who, in very much the way her [my] mother often behaved, acts unconsciously to destroy her pupils' self-esteem. Superficially, in describing how I conquered my innate aggression and established a positive relationship with my pupils in which we were both able to gratify our academic and emotional desires, my narrative raises a theme of redemption; on an unconscious level, however, I cannot be sure to what extent its production has actualised a psychic act of redemption or impacted my internal world.

5.2.3.4 Sequential analysis

The four sections of the whole narrative exemplify levels of defence manifestation which vary markedly. My introduction broaches my realisation that I am a cruel and aggressive teacher in the most understated manner possible: its style emulates *Double Indemnity* and many of the Hollywood *film noirs* I liked to watch when I was in secondary school myself, which often open with a voiceover in which the protagonist (usually male) alludes to or confesses to a crime in such a way that he instigates the audience's sympathy and generates an air of mystery and suspense that effectively camouflages the moral ambivalence in the plot. Its first two sentences are clearly duplicitous in view of the schedule of data collection I delineated in Section 5.2.2 (p.153), in which I describe how I found it "painful" and "tortuous" to remember my lessons with the participant sample and how I sometimes felt physically ill when I attempted to produce whole narratives.

The first half of the primary analysis, however, confronts the relentless anxiety and anger which engulfed me as soon as I learned that I would be the teacher who would be responsible for realising the participant sample's GCSE mathematics targets. I do not immediately perceive the sheer irrationality of these negative emotions, which I might have done by juxtaposing them against my first impressions of the class captured in my field notes, which state that I thought they were "really very pleasant, with many members who liked to laugh at a good joke". However, I do manage to track my aggression through a freely associated chain of thoughts and memories which begins and ends with my anger towards my line manager, the Head of Mathematics, and encompasses my envy of Mr Graham, who is adored by the participants, the frustration I feel with myself for repeatedly accepting the same roles at schools and the bitterness I continue to harbour concerning the loss of my husband's business and my consequent entry into the teaching profession. Although I subsequently attempt to vindicate these insights by declaring that I have "no

choice but to go on”, I am beginning to see that my subsequent choice of teaching strategies unconsciously served my needs for projection rather than the participant sample’s overt needs to meet their GCSE targets.

The second half of the primary analysis focuses on the melodramatic change in the tenor of my interactions with the participant sample when I finally stop wreaking anger and destruction upon them and begin to behave as a responsible teacher who assuages her pupils’ fears, shows them affection and respect and carefully nurtures the growth of their subject knowledge. I still do not understand fully why my anxiety dissipated so suddenly and unexpectedly at the beginning of a lesson I had taught many times before and that held no special significance for either my performance management or my data collection. It may be that the projection of my anger had largely worked itself out or it may be due to my involuntary unconscious mediation on the ‘rational’ and ‘irrational’ aspects of my classroom performance as I was explaining to the class the differences between ‘rational’ and ‘irrational’ numbers. But in the subsequent course of our daily interactions, the reasons for my initial anger and my emotional about-face are not important: what is notable is that, once offered the opportunity of a positive teacher-pupil relationship, the participants seize upon it and continue to put up with my lesser though reoccurring bouts of malevolence that I subsequently describe using the present tense.

The secondary analysis continues in the present tense and constitutes a bridge of free association which links one of my most painful and persistent episodes of countertransference to earlier childhood memories of my mother, brother and father, the first two of whom I come to recognise as the original objects for my aggressive and destructive tendencies. As this episode is analysed separately in Section 5.2.3.6.1, I will

only note here that the text excludes any reference to the visual imagery or the physical sensations surrounding the ‘snake girls’ that can be found in my field notes of the episode.

The addendum functions as an attempt to block any further revelations concerning my early childhood or the similarities between myself and my mother by casting doubt upon the possibility of gaining insights into unconscious operations with the use of videotaped observations. My idiosyncratic use of the word ‘ethical’ rather than ‘methodological’ to refer to the process of videotaping indicates that I am still highly anxious and defensive, and perhaps not yet prepared to be as honest as I could be in undertaking psychoanalytically-informed reflection.

5.2.3.5 A psychoanalytically-informed interpretation of the ‘whole narrative’

The narrative begins at the moment the Head of Mathematics directed me to teach the participant sample and I was overwhelmed by a type of anxiety which epitomised my pre-existing fears, frustrations and angry feelings. I lost my capacity to maintain the depressive position, which enables an individual to maintain a balanced view of the ‘good’ and the ‘bad’ in everyday situations while being able to express remorse and the desire to make reparation, and became engulfed by the paranoid-schizoid position, in which an individual feels persecuted, experiences people and events in very extreme terms, and engages in splitting and projection as she struggles for self-preservation (Section 3.2.1).

Although oscillations between the depressive and paranoid-schizoid positions may occur rapidly, I remained fixed in the paranoid-schizoid position with respect to my thoughts concerning the participant sample throughout the summer and the first three and a half

weeks of our interaction, irrespective of whether or not we were in physical proximity. After the participant sample and I ‘reset’ our relationship during an enjoyable and emotionally fulfilling lesson, I resumed the depressive position but was apt to experience more typical oscillations between the depressive and paranoid-schizoid states of mind at various points in lessons, which at times were accompanied by episodes of countertransference.

5.2.3.6 Two episodes of countertransference linked to section breaks in the ‘whole narrative’

The following countertransference episodes prompted the second and third section breaks in my ‘whole’ narrative. Technically, each episode constitutes a ‘node’ in my psychoanalytically-informed reflection at which thoughts, feelings and memories of past and present events intersect to instigate an unconscious manifestation of defence with respect to the clinical process of object relations psychoanalysis (Section 4.1).

5.2.3.6.1 First episode

5.2.3.6.1.1 The field notes

23rd September 2011

It’s getting even worse. We started a mini-unit on direct proportion. For once, most of the class had arrived before the late bell, so I walked around the room and tried to smile. Nadja in the front asked me for some help with the starter and thanked me for my help but there were no other takers. No one interrupted me when I started speaking at the board but then Katy in the back row started to echo me. At first, she just repeated a few of the words of what I was saying, then she started making comments about how I was writing on the board and explaining how to set up problems. She’s a tall girl with gangly arms and legs and she kept moving her head from side to side in an exaggerated fashion, pretending she was trying to learn and take notes but expressing pseudo-horror at not being able to

understand me. I told her to stop a few times and tried giving her sanctions on the board but the class laughed at the sanctions and then started to laugh with her at me. I then stopped speaking for a minute or two but finally decided to get to the point where pupils could work independently and then phone a member of the Senior Leadership Team to remove her from the classroom.

Of course, no one answered my phone call and some of the class called out, “Bad luck!” As it was the last lesson of the week and Katy abruptly grew quiet and started going through her rucksack, I started to walk around again to offer help. Dan raised his hand and so did Terry. Then Stacey, Katy’s neighbour, bellowed “Yo, miss, I don’t get this”. Katy leaned over behind Stacy and said, in a sing-song voice, “Oh no, you don’t get it, that’s terrible. Why don’t you get it? Were you listening, or is it because Miss is just a rubbish teacher? I think it’s because Miss is a rubbish teacher”.

I headed over to the corner where the two girls sat and sternly told Katy to keep her mouth shut. She put one hand over her mouth and rolled her eyes and shook her head as she waved her other hand in the air. As several boys on the other side of the room hooted, Stacey bellowed again, “Alright, give her a break now”. Katy put both hands in the air now and growled, imitating a monster. “No, she doesn’t give us a break and I’m not going to give her one. I’m going to get miss”. I know that I kept my eyes on Katy and Stacey, but for a moment I saw something else. The girls looked different: Katy wore glasses and had braids and Stacey became tubbier. My stomach muscles lurched and I wanted to run out of the room. Then I heard Stacey asking, “Miss, miss, do we smell? Are you going to come to me and give me some help?” I heard someone behind me say, “Maybe she died inside” and someone else reply, “Woah, now, that’s being too mean”. I finally walked over to Stacey and began to help her but I felt disorientated as we worked through a calculation and Katy continued to poke her head around and interject. I was still a bit stunned during the plenary.

5.2.3.6.1.2 Face value appraisal

A classroom observer might have concluded, as so many pupils mocked me during the first twenty minutes of the lesson and I was not making any robust efforts to assert my authority, that my relationship with the participant sample was dire and had probably never manifested any positive aspects. In the episode with Katy and Stacey, this same observer might have assumed that I ‘froze’ and declined to respond to Katy because I was uncertain as to how I should manage her and/or I entrapped in despair.

5.2.3.6.1.3 Sequential analysis

Ostensibly, the episode consists of a continuous series of teacher-pupil interactions which reflect inherently poor teacher-pupil relationships. However, the confluence of Katy's and Stacey's verbalisations and behaviour involuntarily compelled me to perceive Katy and Stacey as two of the 'snake girls' who repeatedly bullied me as we played in the street outside our houses after school and to 'freeze' as I always did whenever the snake girls succeeded in catching me. This dislocation in my awareness, which seemed to span both conscious and unconscious levels, caused me to appear 'dead' to the participant sample and to feel disorientated for some time afterward, which further affected my ability to teach pupils and manage their behaviour.

5.2.3.6.1.4 A psychoanalytically-informed interpretation

During the first twenty minutes of the lesson, although I was consciously trying to convince myself otherwise, my anxiety and feelings of being persecuted had risen to an almost unbearable level. My interaction with Katy and Stacey then instigated an instance of splitting and projection (Sections 3.2.1 and 3.2.2) in which I momentarily perceived Katy and Stacey as incarnations of the 'bad' girls who had bullied me in my early childhood. Although this episode of countertransference initially extinguished my ability to function as a classroom teacher, it instigated a chain of associations which later enabled me to overcome some of my defence manifestation, develop a positive relationship with the class and carry out data analysis.

5.2.3.6.2 Second episode

5.2.3.6.2.1 The field notes

6th December 2011

We continued with solving algebraic equations involving fractions. Renata arrived twenty minutes late and announced that her flat had caught fire the night before. The lesson stopped as the class and I gasped and began to ask what we could do for her. She said not to worry, as she was going to stay with her auntie but maybe she would need some extra maths help: she couldn't find her notes and believed she had left them in the flat. Several pupils promised to copy their notes for her and I assured her that I would email her all whiteboard presentations. Patty asked me if Renata could move next to her rather than sit by herself in the 'late' seat by the wall and I said, "Sure", stopping the lesson until Renata was settled.

The class worked intently and relatively silently after that. When the bell rang, several pupils surrounded Renata and carried her away into the corridor. Everyone else said goodbye and hurried to their next classes in another part of the school but Tom lingered behind and looked at me. "Can I come to your room sometimes to play your board games?", he asked. I kept them for a Year 7 lunchtime group that met in my room every Wednesday but I said, "Yes". After a moment's pause, he asked me if he could keep some of his books in my room. I suddenly felt the situation had become dangerous. We stared at each other and I told him, "That would not be a good idea". We kept staring at each other and then he said, "I might stop by sometimes" before darting out the door.

5.2.3.6.2.2 Face value appraisal

Renata's announcement concerning the loss of her flat instigated a palpable groundswell of empathy and compassion in the pupils and myself. Possibly propelled by this unprecedented emotional outburst, Tom signalled his affection for me in a way that subtly overstepped the recognised boundaries of a teacher-pupil relationship. I discouraged his attention verbally but my facial expressions and manner of my reply conveyed some degree of reciprocity.

5.2.3.6.2.3 Sequential analysis

Although it seemed odd for a Year 11 pupil to ask permission to attend a Year 7 lunch club, I only sensed ‘danger’ when Tom asked if he could keep some of his books in my classroom; it was the sort of question my early boyfriends used to ask when they wished to establish serious relationships. I believed that I managed to ‘keep a straight face’ but various thoughts came to mind as I felt shocked by the underlying sexualised tone of his proposition. First, I briefly remembered my eighth-grade English teacher, who had liked one of the boys in my class so much that she had given him a key to the locker that she kept behind her desk and often drove him home after school: their relationship was the object of frenzied gossip when he was nearly expelled and she was sacked when they were seen in a club drinking wine together. Then I thought of the affair I’d had with a colleague at my previous school, which had greatly alleviated the tedium and stress of teaching for two years but which had ended badly and left me feeling bereft. And then I remembered another person whom I had loved, but who had gone off to marry someone else, and two other early childhood episodes which I do not wish to disclose here.

As I was engrossed by this mnemonic chain, I developed a distinctly queasy feeling in my gut. It dissipated about ten minutes after Tom had left the classroom but it re-emerged to a slightly lesser extent whenever Tom ventured to demonstrate his support for me during lessons or speak with me privately. I always looked forward to seeing him and, although I tried not to admit it to myself, I felt somewhat bereft whenever he was absent or our lesson timetable was altered at short notice. Sometimes I found myself thinking about him when I should have been attending to other matters (Sikes, 2006).

5.2.3.6.2.4 A psychoanalytically-informed interpretation

The ‘danger’ I perceived was my own involuntary, incipient sexual desire for Tom. Although I continue to avoid the sort of in-depth analysis that Gallop (1992) carried out when she abruptly fell in love with one of her graduate students and ultimately linked her sexual desire for him to her childhood fantasies of “playing teacher”, I realised early on that my attraction to Tom was predicated on the urgent needs for protection and physical comfort that I had experienced during an early object relationship. At various points, I believed that my internal desire for him was not only acceptable, but motivational: certainly, my enjoyment and my enthusiasm for teaching the class soared whenever he winked at me from his seat (Sikes, 2006). At other times, however, my unconscious resistance to further analysis of this countertransference episode, along with my guilty feelings, attenuated my psychoanalytically-informed reflection, as when it precipitated the last break in my ‘whole’ narrative.

5.2.3.6.3 Further insights concerning the interface of states of mind and countertransference

In Kleinian object relations theory, the phenomenon of transference is understood to be more than simply the redirection of thoughts and feelings that emanate from an early childhood relationship towards a new object. Rather, it is regarded as a re-enactment of a current phantasy experience which is situated in the here-and-now and communicated silently to an analyst during a therapy session through the process of projective identification, which is examined in depth as it operates in classroom interactions in Sections 5.3 and 5.4 (Hinshelwood, 1989, pp.448-49; Goldberg, 2012, p.70). Similarly, my experiences of countertransference did not simply constitute unconscious reactions to

what my pupils were saying or doing: to a certain extent, they were an elaboration of the constellations of anxiety and defence that had defined my personality since early childhood. Both countertransference episodes discussed above mirrored the patterns of splitting and projection that materialised whenever I was compelled to assume the paranoid-schizoid position. Ultimately, my routine analyses of countertransference episodes yielded valuable insights into the typography of my mind in the paranoid-schizoid state.

5.2.4 Subsequent observations of pupils

Once a respectful teacher-pupil rapport and congenial classroom climate were securely in place, I observed a substantial increase in pupils' calls for me to check the work in their exercise books as they were working at their desks. Many of the field notes I made in the second half of the autumn term refer to this phenomenon, which at one point escalated to such an extent that I became worried about the mental state of the group. In the beginning, I had displayed answer keys on my electronic whiteboard so that the pupils, who had been given differentiated exercises, could quickly self-assess and move on to new material; I stopped this, however, as pupils demanded more and more individual attention. In some lessons, I found myself almost jogging from desk to desk to mark their books. As the Christmas holiday break approached, several pupils developed the habit of imploring me to 'tick' their correct answers, even though they had already checked them by looking at their neighbours' exercise books. This phenomenon continued intermittently until the class was disbanded in May.

At the same time, I noted that pupils were spending increasing amounts of time in my classroom. In stark contrast to the ways in which they had "stormed out" of the first few

weeks of unpleasant lessons, as the year unfolded pupils took longer and longer to pack up and often appeared early or stayed late to have conversations which were entirely unrelated to maths. Increasingly, pupils dropped in simply to ‘say hello’ or sit in my room after school while they were waiting for peers to finish revision with other teachers. During lessons, they began to bicker over who had the ‘right’ to my immediate attention.

Another strand of field notes focuses on a subset of five pupils, whose prominent status was evident in the first lesson but whose ability to influence the group grew incrementally over the course of the autumn term. With one exception, these pupils tended to be slow in taking their seats at the beginning of lessons and continued to talk across the room, even though the rest of the class had become silent, as I assumed my customary place at the board, ready to discuss the starter; although they were generally cooperative after the transformative surds lesson described above, they tended to signal their approval or disapproval of my strategies by commenting on my interactions with other pupils or interjecting remarks during whole-class discussions and problem-solving sessions. Bea, a subset member with Asperger’s Syndrome who often complained that she could not understand what I was saying and stopped lessons to interrogate my explanations, usually to the accompaniment of laughter, would regularly trigger a loss of momentum in pupils’ individual work rates by announcing that she had ‘given up’. Conversely, Katy, who had largely forsaken the bullying manner towards me that she had exhibited in September (Section 5.2.3.6.1.1), became the subset member who functioned as a sort of ‘switch light’ to constructive engagement with class: I came to understand that if I managed to capture her positive attention and good will at the beginning of a lesson, I could nearly always count on the others to focus and achieve the lesson objectives.

5.2.5 An unexpected lesson observation

While I did not write many notes after pupils sat the Edexcel exam in March, I was unnerved enough to record two entries about an incident which took place just before the Easter holiday, when a mathematics advanced skills teacher (AST) who was acting as a consultant to the Senior Leadership Team appeared without notice to inspect the Mathematics Department.

5.2.5.1 The field notes

19th March 2012

There was a commotion in the corridor just before my lesson with Year 11 was due to start and several pupils drifted into the classroom in small clusters up to 10 minutes late. The AST arrived unexpectedly and threw me, along with everyone else, off-guard. Tom [Section 5.2.3.6.2.1] saw that I was unnerved and unintentionally instigated a wholesale change in the seating plan by first escorting the AST to a seat on the far side of the room and then directing other pupils to sit down wherever they were and begin work on the starter exercise. By the time Bea arrived, her normal seat directly in front of the whiteboard was taken, and she was unable to persuade its new occupant to move. When I whispered to her to quietly take the empty seat in the back, she stood in front of the class and argued about the “unfairness” of the situation before trudging angrily to the back when several pupils shook their heads and told her in baby voices to follow “Miss’s instructions”.

The lesson focused on probability calculations using probability trees and was presented in my typical ‘traditional’ style. Rather than organising a pupil-led activity in which pupils gained insights into the workings of probability trees by experimenting with blank tree templates, I presented a following word problem and then demonstrated the way one would construct the tree and calculate various probabilities. I then asked the class to construct a tree for a second word problem, first in their exercise books, either individually or in pairs, and then in a whole-class format so that pupils could agree the rules for the most effective procedure. I darted about the room as pupils began to discuss possible solutions and after approximately eight minutes, when I was confident that several had found at least partial solutions, I returned to the board. But the ensuing discussion was totally disrupted by Bea, who began to complain aloud that she could never understand me and that I was such a poor teacher. Inwardly, I was totally nonplussed. I calmly asked her to stop talking so that the lesson could proceed and a few pupils turned around and told her to be quiet, but she would not desist. Then, before I could

decide what to do, Tom admonished her to remember the May and June exams and asked her to “give Miss a break”. I did not catch their next words but then I heard Bea say, “Hey, big man, you really gave it to *her*” and Tom answer, “Hey, little sister, what do you know” several times in succession. As everybody laughed I attempted to engage pupils in a whole class discussion of the probability problem at hand, but Bea and Tom continued to talk over the class and the group’s concentration was lost. When it came to completing individual work, many pupils professed to be “confused” and I spent the remainder of the lesson re-teaching individuals what I had attempted to teach to the class on the board.

20th March 2012

The pupils returned today with an oddly tense, reinvigorated work ethic, and as we started to review the starter problem, I decided to forgo any reference to the previous lesson. Bea participated avidly, urging the class on, and completed the entire extension exercise without debating the wording of the questions, which had never happened before. Tom sidled up to me at the end of the lesson to apologise for getting “caught up” with Bea: he explained that he had only started to joke with her to “shut her up”, but then had not been able to stop “reacting to her”. The other pupils were more solemn than usual as they packed away and straightened their desks before going to their next lesson. I sensed that they were in some way communicating an apology for their disappointing performance in front of the AST, although no one apart from Tom spoke to me specifically about the observation.

5.2.5.2 The AST’s face value appraisal

As soon as the lesson was over, the AST insisted that we should have a lengthy ‘debrief’ over a cup of coffee in the school cafeteria. He had found the lesson unsatisfactory and suggested that my traditional teaching approach, with its lack of properly scaffolded activities, was the main cause for the failure of learning progress. When I told him that it was my approach that had been instrumental in producing predicted GCSE grades that were on target, and that the pupils normally behaved differently, he declared that they were “obviously a nice class” and were doing their “absolute best” to succeed. But he was not so sure about me. He reminded me of the recent INSET session that he had

devised and chaired only a few weeks before, which had not referred to the research of Cobb et al (1989) and Marshall (1989) but had highlighted the responsibility teachers had for managing their pupils' anxiety and emotions. The AST reiterated that he was convinced that if a teacher delivered the right learning environment and lesson activities, everything else would follow, including the optimum behaviour for learning and the highest possible attainment levels.

The AST concluded that I had failed to acquire any appreciation of my pupils' dispositions or levels of subject knowledge. I was later informed by a member of the senior leadership team that at the beginning of the next academic year I would be placed on a 'plan' to improve my teaching.

5.2.5.3 A sequential analysis of the observed lesson

There were three major dislocations in the lesson which constituted nodes for manifestations of defence and the consequent dissipation in pupils' work mentality and attainment. The first of these was the appearance of the AST and the corresponding rearrangement of the seating plan. The second was Bea's incessant diatribes, in which she highlighted the "unfairness" of the seating changes and called me a "poor teacher" whom she could never understand. The third was Bea and Tom's cyclical two-handed dialogue in which the pair further disrupted the class's concentration and ultimately undermined the learning objectives of the lesson.

5.2.5.4 A psychoanalytically-informed interpretation of the observed lesson

Although the class had already sat their GCSE mathematics examination and were confident of obtaining As and Bs, I believe that they became visibly nervous when the AST entered the classroom because the new Principal had announced in assemblies that she was restructuring the curriculum and teaching staff and they perceived that the lesson observation was a test for me. In this context, Bea's outbursts were attempts to undermine the class's trust in my ability as a leader. While the anxiety in the classroom would probably have abated gradually had she not appeared, Bea's interjections had a disproportionately negative effect on the way pupils focused during my presentation of the first probability problem and the way they collaborated on solving subsequent problems. As a subset member who often spoke for the group, Bea may have been verbalising their unconscious thoughts when she observed that I was a "poor" teacher for permitting a new and "unfair" seating arrangement. Even if this was not the case, the vehemence which underscored her remarks seemed to ricochet around the room and invade everyone's mind, causing a dissonance in thinking and lack of focus. Bion would have identified Bea as an archetype of a 'dependent leader', an inherently pathological member of the class who induces in a group a dependent mentality which includes feelings of inadequacy, frustration and a hostility to work-related activities (Section 3.3.3).

By taking charge of the AST and the class's seating, Tom was demonstrating his support for me and reiterating the affection he had evinced in one of the countertransference episodes described above (Section 5.2.3.6.2). I should have reasserted my authority immediately and directed the class to return to their original seats but, as I began to panic about losing my job, I simply 'froze', just as I had done when I was confronted by Katy

and Stacey (Sections 5.2.3.6.1).

The subsequent two-handed dialogue that ensued between Bea and Tom, in which Bea was ostensibly teasing Tom about someone he was dating, can also be interpreted on an unconscious level in two different ways. On one level, Bea and Tom, whilst attempting to constrain each other's utterances, may have inadvertently been caught up in an unconscious identification or transference which compelled them to engage in parataxic distortions, repetitive discourse and gestures that are linked to patterns of behaviour established in earlier relationships (Section 3.4.2.1). Alternatively, their conversation could be described as a manifestation of Bion's pairing mentality, which incorporates a phantasy that the two speakers are sexually involved and will produce a messianic leader who will rescue the group. In either event, as the rest of the class could not help but listen avidly to what Bea and Tom were saying, the work mentality that was linked to the teaching and learning activities and ultimately nearly all the pupils failed to meet their learning objectives.

5.2.6 Discussion

Many researchers would characterise the mutual hostility that was manifested during the first three weeks of term as a prolonged manifestation of the 'separation protest' mechanism in Bowlby's behavioural attachment theory, which is understood to occur when care-seekers are biologically compelled to express rage when they either are shunned by a caregiver or are threatened with physical and/or psychological annihilation (Bowlby, 1960; Riley, 2011). Nevertheless, particularly in view of the ways in which they appear to mimic verbalisations and behaviours often displayed in early childhood, I would assert that my aggressive posturing and the pupils' antagonistic responses corroborate the underlying operation of transference and countertransference in teacher-pupil

interactions. Even when I subsequently attempted to interact with pupils in ways which took account of their subjectivities and the distinction between the ‘doer/done to’ and the ‘intersubjective third’ models of learning (Bibby, 2011; Benjamin, 2004), I remained susceptible to momentary restrictions in perception instigated by the operation of countertransference in which I experienced pupil responses as relics of my early object relationships.

Consequently, the relationship I had with my Year 11 class at any single moment was never a matter of ‘what you see is what you get’: rather, it was a dynamic, reflexive affiliation which incorporated both parties’ conscious and unconscious responses to anxiety determinants which originated in personal histories and the whole school context. As I gradually analysed my episodes of countertransference and overcame a persistent paranoid-schizoid state of mind, I observed myself ‘morphing’ into an authoritative, yet affectionate and caring maternal figure while, at many times, pupils appeared to regress to the latency stage of personality development (Section 3.2.3) in which they compulsively sought emotional gratification as members of a family. A ‘container-contained’ relationship (Section 3.3.1) seemed to materialise automatically. Notably, even though individual members of the class gradually assumed distinctive roles within the group with respect to teaching, learning and behaviour, I tended to think about the class as an entity which exhibited its own distinct moods and emotional needs.

Intermittent episodes of pupil disengagement and erratic, disruptive behaviour were often linked to the utterances and behaviour of the pairing subset and tended to occur at times when pupils were experiencing anxiety that was instigated by social factors and the whole school context rather than difficulties associated with mathematical problem-solving. Some of the oscillations in the class’s behaviour appeared to corroborate Bion’s

conceptualisation of basic assumption mentalities: for example, during the first two weeks of lessons, the class intermittently appeared to manifest fight-flight mentality but later, as positive teacher-pupil relationships developed, members of the class were susceptible to manifestations of dependent mentality, which were particularly discernible when the pupils were imploring me to ‘tick’ their exercise books.

5.3 Research Question No. 2: How can I infer pupils’ manifestations of defence at individual, subset and whole-class levels in typical lessons?

5.3.1 The subset and whole-class levels: a four-lesson research design

In the following sections I examine the verbalisations and behaviours that are likely to constitute pupils’ manifestations of defence at individual, subset and whole-class levels in a sequence of four lessons which were designed to constrain the instigation of anxiety linked to the teaching and learning of new mathematical content while replicating the format and routines of typical lessons. Each lesson was followed by a free association narrative group interview in which two to four pupils discussed their perceptions of what occurred during the lesson and any other thoughts and feelings they wished to raise.

5.3.1.1 The participant sample

The pupils were a mixed, ethnically diverse Year 9 second maths set consisting of 9 girls and 18 boys, of whom one girl and one boy had joined just after the Christmas holiday. The range of whole-school data for the class was unusually large for a nominally high ability set: while two pupils had been identified as gifted and talented, approximately one

quarter of the pupils had been assigned to Jesson band Levels 2 and 3. Mean CATs scores ranged from 100 to 124 but were mostly at the lower end of the range. The same degree of disparity was evidenced in the mathematics departmental data. In Year 8, these pupils had sat a mixture of Level 4 to 6 and Level 5 to 7 assessment papers and had attained end-of-year levels which ranged from a high Level 4 to a high Level 6. An examination of the SIMS profiles for Year 9 pupils in the top, second and third sets indicated that the second set contained a disproportionate number of pupils with either a high number of behaviour points or emotional and behavioural difficulties. At least five of the boys had 300+ behaviour points or more and had been identified by the Year 9 tutor team as having whole-school behavioural issues while two of them were in the process of being assessed by Child and Adolescent Mental Health Services (CAMHSS) with regards to events which were linked to a troubled home situation.

By the time my research with the sample commenced in September 2013, I had already established multifaceted relationships with many of these pupils. I had taught 22 of the 27 pupils for at least one academic year as members of either the top Year 7 or top Year 8 set and had maintained almost continuous telephone and email contact with several parents for eighteen months. However, I had not previously met the five pupils who had been moved up from Set 3, who complained frequently that the level of their subject knowledge was not commensurate with that of Set 2 pupils and that they disliked my teaching style, which they described as featuring too much whole-class problem solving. Although I took immediate steps to provide differentiated work and to pair 'new' pupils with 'old' ones, who reassured and guided their peers without any prompting from me, only three of the former Set 3 pupils made satisfactory or better progress by the end of the year while two appeared to disengage and develop overtly negative attitudes towards all types of maths activities.

While pupils were accustomed to working in groups in many of their other classes, as per the whole school initiative encouraging group work, they sat in rows facing the board in most lessons in my classroom. However, apart from times at which I was presenting new material on the board or the class was engaged in whole-class problem solving, pupils were permitted to converse quietly with their neighbours about the tasks at hand. Although they were not permitted to get out of their seats, the room was small and the desks so close together that they were encouraged to swivel their chairs around to avail themselves of the widest choice of partners and small groupings.

Within the first half term, four boys, including two of those who had 300+ behaviour points, had formed a 'pairing subset' (Section 3.3) which, *apropos* of Bion's characterisation of the pairing phenomenon, manifested a distinctive set of discourses, behaviours and mentality which distinguished them from other members of the class. On occasion, this subset co-opted the attention of another four boys, of whom three also had a high number of behaviour points. While subset members were fiercely competitive with regards to their performance in assessments and displayed a wide range of effusive emotion whenever results were handed back, their moment-by-moment participation in formal teaching and learning routines varied unpredictably and appeared to have a disproportionate impact on teaching and learning. In some lessons, although they had taken longer than the others to arrive at their seats, unpack and work on the starter question, pairing subset members would attempt to take control of discussions and whole-class problem solving by either 'hogging' my attention or 'talking over' other class members; in other lessons, a cluster of subset members might arrive late, fail to settle properly and become argumentative and obstructive as I struggled to lead the class through the lesson. Their progress with individual work was just as unpredictable. At

times, subset members appeared intent on completing a great deal of work and, along with other class members, called me over to check their answers; at other times, they merely went through the motions of deliberating and writing and, while focusing their attention exclusively on each other, accomplished very little mathematical work.

Prior to the commencement of data collection with this class, I had established three components of the qualitative nature of the pairing subset. First and foremost, the subset was entirely unaffected by numerous changes in seating plan: subset members communicated with each other both intentionally and, as they repeatedly claimed, involuntarily, even if they were separated by several rows of desks. Second, the subset tended to become reticent when either its leader, Derrick, or the pupil they most often goaded, Danny, were absent from class. Third, while subset members often interjected themselves into the interactions of the rest of the class, the other pupils usually only initiated communication with the subset by asking subset members questions or addressing statements to specific subset members.

5.3.1.2 The research design and schedule for data collection

The scheme of work for the four-lesson sequence was designed to extend pupils' skills in carrying out calculations using the formulae for the circumference and area of circles, which had been introduced to all maths sets in Year 8 and reviewed by the participant sample in March 2013. It expressly precluded any presentation of new material or overemphasis on any particular area of mathematics which would have been likely to increase pupils' anxiety levels. In addition to straightforward numerical calculations, each lesson incorporated the visualisation of parts of circles within compound shape and shaded region diagrams and the analysis of word problems with the aid of diagrams.

Nearly all the more complex textbook exercises could be solved using a variety of strategies that pupils had previously been taught and pupils were to be encouraged to apply their ingenuity and cooperate with colleagues to formulate solutions.

I taught the four-lesson sequence to the participant sample over four consecutive lessons in the second week of July 2013 and carried out post-lesson free association narrative interviews with groups of two to four pupils using the methodology I described in Section 4.7.2. As various end-of-year events had begun to interrupt normal lesson schedules and the attendance of several participants had become erratic by the time I received permission to proceed with the data collection, I was unable to organise purposive groups for the interviews and had no choice but to recruit interviewees on an ad-hoc basis in the order in which they had submitted their parental consent forms.

The textbook exercises, lesson plans and transcripts which link to the data analysis are provided in Appendices 5.3 – 5.7.

5.3.1.3 Comments on audio-recording quality and transcription

Audio files were produced using the same audio recorder, methodology and codes described in Section 4.7. Each audio file took several weeks to transcribe, not only because conversations of individual pupils were superimposed on the dialogues linked to the whole class teaching and learning activities, but also because the files had captured a disproportionate amount of background noise from the corridor adjoining the classroom. As many verbal exchanges were either indistinct or wholly inaudible, I resorted to producing ‘skeleton’ transcripts in which the transcription of every audible verbal exchange was referenced to the recorder’s timer.

5.3.1.4 General comments on the four-lesson sequence

Although the lesson materials and planning were consistent across the sequence, the lesson deliveries and outcomes were affected significantly by unanticipated events and conditions that were caused by the gradual end-of-year dissolution of the whole-school timetable. In the first lesson, for example, one-third of the class arrived unexpectedly halfway through the lesson because they had been invited belatedly to attend a careers workshop and no one had remembered to inform their subject teachers; in the third lesson, a consultant arrived without warning to observe the lesson. Throughout the whole of the four-lesson sequence, very few members of the Senior Leadership Team were available to carry out their normal patrolling duties. As a result, stray pupils appeared intermittently in the corridor outside my classroom and the school site was generally much noisier.

Notwithstanding the extraneous sources of anxiety that may have been introduced into the classroom by the disordered conditions in the rest of the school, all participants continued to play their established roles and most of the episodes which unfolded during the sequence were fairly characteristic of what I had previously observed of the class's verbalisations and behaviour. However, the 'persistent' episode which ensued over the last ten minutes of the third lesson and the first twenty minutes of the fourth lesson was extraordinary, both in terms of the vitality of the group mentalities it instigated initially and pupils' subsequent assumption of the depressive position as a group.

5.3.1.5 General comments on the free association narrative group interviews

In the strictest sense, these interviews failed to serve their original purpose, which was to furnish a timely and decisive elaboration of the significant episodes in the audio-recorded

lessons. At many points during the interviews it appeared that the participants' conscious attempts to obtain recognition and gratification through their intellectual contributions to the study were overwhelmed by their unconscious needs to use the interviews as 'special' opportunities to obtain love and containment. Moreover, judging by the participants' facial expressions as I asked the starter question in the third and fourth interviews, it is likely that participants had been communicating with other about the free association group interviews during the four-lesson sequence and may have compromised the extemporaneity of each other's answers. Nonetheless, their comments provided me with valuable information concerning the variety of experiences that constituted the class's 'bible' (Section 3.3.3), the thoughts and feelings of some of the class's quieter members, and the role of Derrick, the subset leader, in both typical lessons and disruptive episodes, all of which assisted me in formulating more accurate psychoanalytically-informed interpretations.

5.3.1.6 Inferring unconscious operations and group mentalities: reassessing the operation of projective identification

When I carried out my preliminary observations (Section 3.4), I had not yet fully distinguished applications of the clinical process of object relations theory from its metapsychological constructs to infer unconscious operations and group mentalities, and therefore tended to ground my observations in conscious sensory perceptions. However, once I had determined to make inferences using a 'sequential' process of analysis which derived from the clinical process of object relations theory, I found that I was tending to validate them through my growing awareness of the obscure but powerful two-way tacit communications between the participants and myself which were analogous to the projective identification processes described by Klein and Bion (Section 3.2.1 and 3.3.1).

Throughout the remainder of my data analysis, even though I may not always refer to it explicitly, I experienced several varieties of projective identification across a range of teaching and learning activities. As before, whenever pupils turned their attention away from me or dissociated themselves from class activities, I as much ‘felt’ their lack of engagement as observed it; and whenever pupils were frustrated or angry, either because they were having difficulties in assimilating new material or because they were displaying varieties of basic assumption mentality, I often experienced the pathogenic type of projective identification originally characterised by Klein (1946), who described it as the process by which infants could aggressively and destructively project ‘bad’ things into their mother and then re-introject them in a less distressing form (Section 3.2.1).

But gradually I became aware that I frequently projected my good and bad thoughts and feelings into pupils, either to retaliate against their destructive projections or to engage in purposive silent communications. For example, whenever observers were present, or colleagues would enter the class without warning, I would involuntarily ‘enter’ the minds of particular pupils in the attempt to control their behaviour. When a whole-class question-and-answer session was going smoothly and I ‘felt’ my pupils’ ‘good’ thoughts and feelings pervaded my consciousness, I experienced an inner thrill when I was able to reciprocate by supplying a satisfying quality of containment. At times, I was consciously aware of re-enacting Bion’s ‘container-contained’ mode of communication (Section 3.3.1) but sometimes I only became aware of having become enthralled in ‘reverie’ several minutes after a lesson had ended, which appeared to confirm Sandler’s (1987) identification of three orders of conscious and unconscious projective identification.

5.3.1.7 Lesson 1: A breakdown in work mentality

5.3.1.7.1 The field notes

4th July 2013

Pupils arrived at the lesson in twos and threes and quietly began work on the starter question. After five minutes I was told that eight members of the class were away at a career workshop; I took attendance and noted that only one member of the pairing subset (William) and one high-valency pupil (James) were present. Over the next forty minutes a singular work mentality materialised, even though the pairing subset member and two neighbouring colleagues briefly became disruptive. Then, with twenty minutes to go until the end of the lesson, the rest of the subset, three high-valency pupils and two others straggled in. The reconstituted pairing subset initially sat and listened silently for two to three minutes as the rest of the class finished solving a problem on the board, but as soon as I assigned a written exercise, the subset members went completely off-task, arguing with each other across the room about an incident that had occurred on the muga pitches the day before and ignoring all my directives to quiet down and look at the worksheets. I then noticed that, although most of the other pupils had maintained a working posture in their seats, they had in fact stopped writing in their exercise books and were talking to their partners. When I asked a few why they were no longer working, they insisted in a non-defensive manner that they still were and showed me their exercise books.

5.3.1.7.2 Face value appraisal

In the past, when a third of the class had arrived forty minutes into a lesson, I had blamed the resulting disturbances on a combination of the latecomers' inability to understand the task at hand and a concurrent breakdown in the concentration of pupils who had been working. The teaching coach who was currently working with the mathematics department, however, would have blamed the wholesale disruption on my 'failure to impose [my] culture on the pupils' culture'. An observer with some knowledge of non-linear dynamic system theories in emotion research (Camras, 2011, Section 2.2.2.1) may have concluded that the late appearance of a sizeable number of pupils had induced the materialisation of an attractor state in which Danny's initial utterance concerning the

incident on the muga pitches incrementally ‘drew in’ related emotional components from other pupils in the subset and became increasingly entrenched.

5.3.1.7.3 Sequential analysis

The lesson can be divided into five phases with respect to oscillations in group mentalities. In the first phase, after having settled quietly into their seats without any of the usual two- and three-handed arguments, pupils tackled the starter question with an unusual tranquillity. As I walked around the room to check answers and to assist those who needed help, I noted that all but three pupils appeared to be working in pairs, several pairs were not actually in the process of co-constructing solutions in a logical, stepwise fashion. Instead, they were discussing non-academic matters as they did so, and at intermittent intervals they would pause briefly while they made eye contact, inspected each other’s exercise books or verbalised their mathematical thoughts in a bombastic fashion.

In the second phase, the class and I engaged in a highly enjoyable and emotionally pleasing whole-class discussion in which many pupils contributed excitedly as I posed an uninterrupted series of closed questions and simply repeated and/or amplified their answers to draw all of them in:

JS: All right, we are going to make a start ... and so that means that everyone has to stop talking. (Pause as background noise dies down.) OK, Abbey and Lisa, we are going to start ... and the same goes for Eddie, Betty and Vi. Now, before we do this (pointing to the starter), I am going to ask you one more time about numbers: what is the difference between a rational and an irrational number? Don’t shout out: think about it. People have it on the tips of their tongues and then they can’t think ... OK, Abbey?

Abbey: A rational number is a number which can be made into an exact fraction.

JS: Well done, a rational number is a number than can be made into an exact fraction. So, what then is an irrational number?

Michael: One that can't be.
JS: OK, an irrational number is one that can't be made into an exact fraction. When you think of irrational numbers, what do you think of?
Two pupils: Opposites! Weird numbers.
JS: Opposites!? Weird numbers!?
Another pupil: A recurring decimal.
JS: Good! Someone tell me about another well-known type of irrational number.
Another pupil: Pi!
JS: Good! Pi is definitely an irrational number and ...
Another pupil: The golden ratio!
JS: Wow! Good.
Another pupil: Sin, tan and cos -
JS: Yes, sometimes, depending on the actual numbers in the ratios-
Other pupils: Oh, square roots-
JS: OK (above increasing sounds of argumentative discussion) Someone said square roots and sometimes they can be irrational but what have we been working with for the last couple of days?
Other pupils: Surds.
JS: Yes, surds ... these are the square roots that are irrational. So how do irrational numbers link up with problems [about circles?]

As I proceeded to review the formulae for circumferences and areas of circles and to guide pupils in solving a word problem involving the circumference of a circular tin, I maintained the high degree of pupil engagement by carefully grading my open questions and framing my explanations and demonstrations of problem-solving techniques almost exclusively in terms of pupil contributions.

As pupils made special efforts to listen and present ingenious solutions, I reciprocated automatically by lavishing praise and helping them patiently to spot and correct their own mistakes. The work mentality in the room was such that no one paid any attention to William, the only pairing subset member present, when he tried to distract two neighbouring pupils.

In the third phase, the quality of the work mentality altered as the latecomers entered the room and brusquely took their seats. Although none of them said anything while the class

and I finished reviewing a problem on the board, the atmosphere in the room rapidly took on an oppressive air and the class discussion became strained. The fourth phase began only a few minutes later when Danny, one of the two subset leaders, recalled the troubling incident on the muga pitches in a loud fitful voice and Derrick, the other subset leader, started berating him about how he had handled it. The other subset members then moved their chairs around to face Danny and joined Derrick in goading him.

In the fifth and final phase of the lesson, two things appeared to happen simultaneously. As I attempted repeatedly to silence and disperse the subset, members of the pairing subset ignored me as if I were not in the room. The rest of the class, however, appeared to dissociate from the disruptive behaviour of the pairing subset and claimed to be continuing to work even though they were no longer writing in their exercise books or discussing solutions to exercises. Several pupils who had stopped writing and had evidently abandoned their states of mind associated with maths lessons appeared to be wholly unaware that they were no longer writing in their exercise books or discussing solutions to exercises.

5.3.1.7.4 Multi-stranded analysis of James and William's comments

Although the interview was attended by George, an enthusiastic pupil who had just arrived from Portugal, and Robert, one of the shyest pupils in the class, it was dominated by James, a conscientious, high-valency pupil who was bilingual in Portuguese and English, and William, a pairing subset member who had been moved up from Set 3. The four participants had initially responded to the starter question by regurgitating many of the problem-solving and visualisation strategies we had covered in the lesson. However, after the discussion faltered and I gave them permission to speak about what had

happened “in the actual lesson” rather than “just math-wise”, as James put it, the focus turned to what had happened when the latecomers had arrived:

James: It changed everyone’s attention-

William: Everyone was-

George: It was more confused-

James: Yeah, everyone was getting distracted seeing other people, they started talking to them already, and then they aren’t concentrating on the work (pause) (William and George are nodding their heads and agree with James; Joe nods his head too but is still very quiet.).

JS: How does that happen?

James and William found it difficult to articulate an accurate description but instead highlighted a similar phenomenon which occurs in the pairing subset at the beginning of every lesson:

James: Yeah, right at the beginning when there is a lot of people around, like when everyone is in the class and it takes ten minutes maybe to settle-

William: Yeah-

James: Just ‘cause everyone comes up from outside and starts talking, talking, talking, talking and then that’s when they realise “Oh, we have to do work”. But by then lots of the lesson has already passed.

William: We have to go through the process of everyone getting their warnings, doing everything, when everyone has gone through that process, then we start to learn our work, because it’s like a process. Like the class don’t come in straight away and settle down –

James: Then they want to go around the class-

William: Then they sit down.

James: Then they sit down but they still talk, then they mess about-

William: Then they do the work-

James: Then you give them C1, C2, C3, then they realise “Oh, we’ll get sent out so we’d better be quiet”, then that’s when you’re allowed to speak and stuff and everyone starts working ... (inaudible words) ... It’s just that people are more interested in the surroundings than in the actual lesson. So, if like, something happened, or someone ... if I have to tell this to that person ... then that person says I have to tell this to the other person, that’s how the talking starts and people start talking.

Although William subsequently suggested that these sorts of disruptions could be avoided by changing the seating plan to prevent certain pupils from speaking, James supplied an alternate point of view:

James: Even though they're spread out and there's less chance of talking, even though ... same way, it's going to be distractive (sic), because basically, even though they're spread out, they're going to have to talk. My friend's down there and I'm going to have to talk to him, so I am going to talk a bit louder and see if he hears ... but then again, if we are all together, they are just going to make noise and not focus, they are not going to focus-

William: Do you know what I think you should do? What you want to do is to enforce the law on them-

James: The law! (Laughter) Consequences!

As the discussion shifted from what occurred in the previous lesson to the general standard of behaviour in maths lessons, the participants spontaneously suggested that group work, as opposed to sanctions, rewards or even phone calls to parents, constitutes the most effective antidote to the distractions presented by the sights and conversations of other pupils, particularly when it incorporates a competitive element:

James: Everyone wants to beat that team-

William: Everyone wants the prize. Everyone is focused and they actually do work, and if you want the prize really, you're like, "Yes, I really need to get this done. I am going to listen and take notes". Yeah, yeah...

And later in the interview:

George: [It's good to work in groups] because people like to work together.

James: Yeah, if they are in a group of friends,

George: No, not friend-

James: No, not friend groups but, like, mixed ... like they're still-

William: Like one or two together-

James: Like one or two friends but not too many 'cause they'll start talking and stuff-

George: Yes-

James: But if it's more or less one or two friends, it's like "We'll do your work, but we can still talk, but we will do your work and we have to contribute"-

William: Yes.

James: And we have to contribute to get (indistinct words, George is speaking Portuguese to James) oh, to get people to help other people. So, like, people who know more can help people who don't know.

Although James and William spent most of the remainder of the interview elaborating the benefits of group work, at no point did they allude to the fact that the breakdown of the previous lesson was instigated by the verbalisations and behaviour of the subset of pupils to whom they were attached. And as they were then anxious to terminate the interview in time to go to lunch, I did not have the opportunity to ask them to elaborate upon the ‘bad’ aspects of groupings within the class.

5.3.1.7.5 A psychoanalytically-informed interpretation

The serenity that pervaded the pupils’ work mentality during the first phase of the lesson was enabled by the absence of most of the pairing subset, whose inability to settle down speedily at the beginnings of lessons regularly caused the anxiety levels in the classroom to rise. I was so relaxed that I allowed pupils to work on the starter in any way they wished; as a result, pupils appeared to effortlessly maintain vertically split dissociated self-states, which may have broadened their learning progress, and to engage in brief mirror transferences with peers sitting next to them, which almost certainly bolstered their confidence in their mathematical solutions (Section 3.2.4).

The subsequent whole-class question and answer exchanges in the second phase of the lesson probably assumed an exaggerated, maternal ‘container/contained’ quality usually associated with infant school teaching because I did not have to defend myself against the negative feelings so often projected into me by the pairing subset. Instead, I allowed those present to project their ‘good’ mathematical ideas into me and considered each contribution carefully and affectionately before posing the next question. As the class and I elaborated our ideas and co-constructed new knowledge, an immensely satisfying quality of ‘reverie’ arose (Section 3.3.1). At various points during the presentation of new

material, pupil interactions acquired a good-natured, sibling-like quality that ultimately raise the noise level in the room but served to underscore a vibrant collaborative atmosphere, which persevered despite William's attempts to form a new pairing subset with his neighbours.

In the third and fourth phases of the lesson, most of the pairing subset members found themselves thrust into the middle of a teaching and learning activity without having had the opportunity to go through the lengthy, and often tortuous, settling routines described by James and William. Although their facial expressions were sullen rather than fearful, they were apparently too unsettled to join the class discussion in a constructive way and instead projected their negative thoughts and emotions into Danny, who may have been voicing the underlying anxiety of the subset when he abruptly began to lament the episode which took place on the muga pitches; this assertion cannot be validated, however, as Danny's exact words and most of the ensuing conversation between subset members was not captured in the audio file. However, it was clear that the disruption intensified as Derrick and the others assumed their characteristic roles and avidly engaged in the banter and gesturing which featured typically in the manifestation of the subset's mentality.

In the final phase, the rest of the class appeared to have detached themselves from the hostility which ensued between myself and the subset as they refused to listen to my admonishments. In object relations terms, they may have been responding to the annihilation of my authority by dissociating horizontally as they unconsciously attempted to split the 'good' teacher who had loved and contained them throughout most of the lesson from the 'bad' teacher who had been too weak to control the class's destructive members.

5.3.1.8 Lesson 2: Rivalry during a work task

5.3.1.8.1 The field notes

5th July 2013

As I welcomed pupils into the classroom, I was shocked to find myself threatening William, who had repeatedly distracted neighbouring pupils in the previous lesson. Many pupils worked frenetically during the review of the starter and first stage of the lesson even though three or four pupils in the middle of the room squabbled briefly over a rucksack and Derrick made a series of offensive comments about subset and non-subset members. At one point, in an unusual move, the class as a whole pointed out that Jason did not deserve my praise for his solution of a progress check problem. Mickey, who had arrived late as usual, opened his exercise book but remained totally disengaged, even though I repeatedly cajoled him in a sympathetic manner to work.

5.3.1.8.2 Face value appraisal

Notwithstanding Derrick's repeated aggressive attempts to 'hog my attention', this was a 'good' lesson with respect to the enthusiasm and substantial learning progress exhibited by the majority of pupils, even if their momentary spitefulness towards Jason would appear wholly disproportionate and undeserved within a rational context (Heyd-Metzuyanin and Sfard, 2012). An observer checking the exercise books, however, would have found that Mickey, Abbey and Sam, who participated in the subsequent interview, had completed only a bare minimum of work.

5.3.1.8.3 Sequential analysis

A vigorous work mentality was established in the first ten minutes of the lesson as my excessive anxiety evaporated when William laughed good-naturedly at my threat to "take action" if he behaved badly again and pupils worked on the starter without any negative

interference from the subset, who remained relatively inactive without the presence of Danny and Derrick. However, when Derrick finally arrived and perceived that he was unable to gain the attention of any of the other subset members, he initiated an argument with Larry, a high valency pupil who sat in the next row, by kicking his bag and snatching his worksheet. This incident functioned as a node for defiance manifestation and ushered in the second phase of the lesson, in which Derrick made repeated bids to capture my full attention by regressing into infantile state and demanded that I remain by his side as he worked out a starter solution. Whenever I left him to help other pupils, he shouted angrily at me to come back and perturbed the pupils around him until I reappeared.

The third phase of the lesson materialised as Derrick's hyperactive participation was subsumed into the work mentality of the class-as-a-whole, which assumed a peculiarly competitive edge. After four or five pupils hastened to help Justin, a high valency pupil, present a solution to the problem involving the overlap of a label on a tin can, the class as a whole abruptly balked as I singled Justin out for praise and insisted that I recognise everyone's efforts. An atypically elevated level of envy appeared to persist as pairs and small groups of pupils squabbled and competed to find the most efficient ways of drawing diagrams for circumference word problems as they completed the individual exercises.

The fourth phase of the lesson was initiated after I had suggested that the calculation of perimeters of compound shapes involves visualisation skills which are not directly related to mathematical ability and the competition between pupils became ever more strident. As soon as they were directed to work individually, pupils' work mentality assumed a maniacal quality as they grabbed their worksheets and challenged each other to 'name the shape' and 'sort' its perimeter in as little time as possible; the noise level rose precipitously as pupils congratulated each other on their correct answers and blamed each

other for errors and omissions. Derrick, who had finally begun to work independently, rejoiced jubilantly whenever he obtained a correct answer and scorned a neighbouring pupil, who later complained to me that Derrick was “racist”, whenever he made a mistake. By the time I presented the final progress check problem on the whiteboard, pupils could not stop debating the visualisation aspect of the diagram and a final solution was never reached.

5.3.1.8.4 Multi-stranded analysis of Mickey, Abby and Sam’s comments

The interview was attended by Mickey, a habitual latecomer who tended to contribute interesting ideas in discussions but exhibited high levels of valency for the pairing subset and rarely completed significant amounts of written work; Abby, a gifted and talented pupil who was moved up from Set 3 in September and routinely insisted on assistance from me or a peer before embarking on individual exercises; and Sam, bilingual in English and Portuguese, a good-natured pupil who was adept at handling algorithms but avoided any engagement with word problems. All three had exhibited their characteristic defensive behaviours throughout the lesson with respect to the teaching and learning activities and I was consciously annoyed when they sat down at the interview table and immediately projected a combination of angst and despair. Although I went through the superficial motions of establishing the grounds of a free association narrative interview, I repeatedly obstructed Mickey and Sam’s sober attempts to recount the ineffective aspects of the lesson delivery and virtually bullied the participants to acknowledge they had not been working:

JS: OK, so what else went on?

Mickey: Well ... that’s about it ... there was a plenary-

JS: OK, great, that was all about the maths, but what else went on?

Sam: You mean about the English?

JS: (Pause) When you go out and remember this lesson, what are you going to remember?

Sam: Well, I don't know ... I think the separate questions, when we come up to the GCSEs (stop)

JS: Anything else?

Mickey: I ... I will always remember something you said, how far ... how the writing is an important side of maths, 'cause I will remember the writing and try to read and understand what the writing says and then I can get higher in maths ... I'll put it away from this lesson.

JS: OK ... I said that I wasn't going to ask a lot of questions, but I am going to ask one now: when were you working in this lesson?

Mickey: Well ... (stop)

JS: Were you working throughout?

Mickey: No (stop)

JS: (To Sam): Were you working throughout?

Sam: I tried ... but ... not all the time ... (full stop)

JS: (To Abby): Were you working throughout?

Abby: Kind of_

Mickey: Personally?

JS: (To Mickey) Were you working throughout?

Mickey: Oh, no.

JS: Were people working throughout?

Abby: Some people were.

JS: When were people working and when weren't they?

Abby: Some were told to work.

JS: Were told to work?

Sam: Some people did like, just one question to start with.

JS: How come?

Sam: Because they didn't, they weren't bothered ... it was too much, or too hard, or it was both.

JS: Why do you think they weren't bothered?

Abby: Because it was too hard, and long.

Mickey: (Indistinct word) ... because they didn't understand what was happening in the lesson, so they thought ... they didn't know what to do, they just sat and talked 'til they blacked out the lesson.

As Mickey, Abby and Sam began to expose their “nameless dread” (Bion, 1962, Waddell, 1998) of not understanding the mathematics and not knowing what to do, I managed to suppress my aggression and encourage them to openly discuss their conscious thought processes and experiences during the lesson:

JS: OK, so what was happening when people weren't understanding it?
 Sam: Just talking out loud-
 Mickey: Who were distracting the rest of the people who were trying to understand.
 JS: OK, so what were you doing? (Mickey and Sam look at each other and laugh.)
 Seriously! What was happening with you in lots of the lesson?
 Mickey: I didn't understand 'cause of ... I didn't think I was here yesterday and I didn't really get it and because we started straight from No. 7 today, so that in the middle of it, I didn't really get what was happening, so I kind of zoned out for the rest...
 JS: OK, when you zoned out, what happened?
 Mickey: I just spoke (pause).
 JS: You just spoke? (Mickey nods). OK, so what was happening ... (to Abby) what were you doing during the lesson? Kind of what happened during the lesson?
 Abby: I done some work, I (pause) ... I talked. And I slept.
 JS: OK, just talking about you guys, do you go "in" and "out" during a lesson?
 Mickey: Personally, I do. There are times I am in the lesson and times I just (indistinct words, to the effect that he is not).
 JS: (To Sam) Does that happen to you, Sam?
 Sam: Especially when it is hard. I don't understand it, I can't do it, I would like to try but I can't do it.
 JS: Really? OK... (to Abby) Would you say it was the same for you? (Abby nods)

During the remainder of the interview, the participants recollected how they come to feel 'uninvolved' and dissociated from the work mentality of the class as a whole. They agreed that it happened only when they were unable to understand the maths in the very early stages of a lesson and lacked easy access to assistance from either myself or a colleague. As Mickey put it, he become disengaged whenever he was "trying to [focus], but [there was] another thing coming, and it [was] hard to juggle both"; he then tended to abandon his thoughts about maths and looked around the room to either 'occupy his mind' or find a peer with whom to talk, even someone who was sitting several rows away.

Crucially, however, the participants' dissociative experiences in mathematics lessons did not extinguish their wishes to cultivate and attain high end-of-the-year target grades: all three participants asserted that they tried to understand and participate constructively in every lesson and Mickey revealed that, although he never completed homework

assignments, he regularly used the *MyMaths* website to keep abreast of the new material I presented.

5.3.1.8.5 A psychoanalytically-informed interpretation

As in the previous lesson, the early establishment of a robust work mentality was enabled by a combination of the absence of the subset leaders and my ability to devote all my attention to providing ‘meaningful containment’. When Derrick arrived later and found himself unable to elicit and enter the defensive mentality of the pairing subset, he attempted to form a sort of Kleinian dyad with me that excluded all other pupils. The class and Derrick then appeared to vie for my attention. As Derrick became increasingly temperamental and aggressive, so did the rest of the class, to the point where the work mentality of the class began to acquire qualities of a prototype of a basic assumption mentality (Section 3.3.3).

A group transference may have occurred at the point where the class as a whole objected when I singly praised Justin for his problem-solving efforts (Section 3.3.3). It is notable that, although Mickey, Abbey and Sam later claimed to have dissociated from many of the teaching and learning activities, they appeared to participate fully in the act of objection, but not enough data were collected during the interview to ascertain if these dissociations resembled the horizontal or vertical varieties of splitting characterised by Kohut or any of the other types of splitting which sustain multiple self states (Section 3.2.4).

5.3.1.9 Lesson 3: A persistent episode (Part I)

5.3.1.9.1 The field notes

9th July 2013

A consultant, who had previously observed the class and spoken privately with them about my teaching style, appeared unexpectedly as pupils were drifting into the classroom and took a seat in the back corner, where she began to take notes. As the class became aware of her presence, they abandoned their usual settling-in routines and immediately went to work. The subset members were soon working in a frenzied manner, shouting out to each other to check their working and answers. As I was walking around the room helping pupils and checking exercise books, I involuntarily attempted to initiate the first whole class teaching activity, even though I was nowhere near the board and could see that many pupils were still engrossed in the starter exercise. Then, when they insisted on more time, I involuntarily attacked Sandy, a subset member, who had promised me earlier in the week in the company of his mother that he would “change his attitude”.

As I took my place at the board, the noise level decreased but pupils began to emit unusual hooting noises which sounded intermittently throughout the lesson. Although the class worked keenly to produce an invigorated solution of the starter exercise, they progressively lost focus as an English teacher entered the room to distribute worksheets to individual pupils, I argued with Sandy and Derrick, and then Derrick became openly hostile and abusive. Pupils temporarily regained their concentration after Derrick was taken away by a senior teacher but it broke down again as a stray pupil shouted abusive comments while standing in the corridor and Derrick reappeared to disrupt the final whole class teaching activity.

With less than ten minutes to go until the end of the lesson, as I was standing next to Sandy’s desk, Sandy spotted the tape recorder I was carrying in my pocket and shouted out, “Hey, she’s been taping us!” Several pupils screamed and began to stamp around with their arms held up in the air; soon, nearly every pupil was standing up, shouting and beating their desks. The racket continued for at least thirty seconds and I struggled to make myself heard as I reminded pupils that everyone had been given letters, and had been informed several times, that four consecutive lessons were going to be audio-recorded. The consultant, who had stood up along with the class, announced that she had seen excellent work in the lesson and that pupils had no need to be angry. Derrick lost his temper and shouted out that, as she had not moved from her seat once during the lesson, she had not ‘seen’ anything and that all she had done was to write bad things about him and the lesson. As the lunch break was signalled by rising noise levels in the corridor, pupils packed up silently and brought their books up to the front of the room in a sullen manner. The consultant attempted to engage Derrick in a friendly conversation but he refused to look at her.

5.3.1.9.2 Face value appraisal

Although the class work appeared to be working feverishly at several points in the lesson, the class and I were utterly overwhelmed by successive waves of anxiety that were instigated by the presence of the consultant, Derrick's bellicose behaviour and unexpected visitors. A composed work mentality was never properly established. The whole-class eruption of mindless shouting and stamping that occurred after Sandy shouted out, "Hey, she's been taping us!" was shocking in the first instance but appeared to make sense only a moment later when Derrick accused the consultant of writing 'bad' things about the lesson.

5.3.1.9.3 Sequential analysis

Although superficially this appeared to be a complicated lesson, it can be distilled into five phases. The first phase was initiated by a palpable upsurge of anxiety that was evidenced on the audio file as random emissions of strange hooting and whining noises. However, while the subset managed to subsume their disruptive interactions into the work task, I became incapacitated temporarily with respect to my normal classroom role and instigated further anxiety by venting my fear and anger onto Sandy, who did not deserve such an attack, and by mistiming the start of the lesson.

The second phase began as my unprecedented attention towards Sandy provoked an envious response in Derrick, who then became increasingly volatile as he failed to establish exclusive contact with me, either by gaining my undivided attention in the whole-class problem solving exercises or by disrupting the class. The unexpected intrusions of the English teacher and a stray pupil appeared to further perturb Derrick and instigate a full-blown temper tantrum:

Derrick: OK, I'm going to calm down now.
 JS: I know, Derrick, but I don't want to sit with you now.
 Derrick: No, I'm calm now-
 JS: No, you're not ... if you want to be in Set 1 ... you can't do this-
 Derrick: You're threatening me now! (Inaudible response by JS). OK, just let me go!
 JS: No, you can't get your own way all the time. (Indistinct words)
 Derrick: What are you talking about man?
 JS: Man?
 Derrick: (Shouting) Noooooooo! I want to go use the toilet ...
 JS: I'm going to let you go, Derrick, but things happen-
 Derrick: Things happen? What?
 JS: Well, you need to do what everyone else does.
 Derrick: Yeah, but no one else is asking. (As Derrick's noise level rises so does the surrounding noise level.)
 JS: But they wouldn't ask-
 Derrick: (Shouting) Yes they would! They would! (Argument continues for three or four exchanges but is not completely audible due to increasing noise level in room.)

However, as I became aware that my failure to contain Derrick was leading to the failure of the lesson, I again involuntarily discharged my negative thoughts and emotions into Sandy, who was apparently incensed by the unconscious motives behind my aggression:

Sandy: No, no, no, no, no ... it's because that lady's here that you want to-
 JS: Oh, no ... (further words with Sandy are indistinct as other pupils are commenting inaudibly in the background).
 Sandy: You come up to me while I'm trying to do my work ... (Getting angry) ... I'm trying to do my work-
 JS: Sandy ... Larry, sit down please ... I was just asking you to stop talking-
 Sandy: No, you just came ... I was working well and-
 JS: No, you-
 Sandy: You came (Indistinct exchange).
 JS: Larry, what should you be doing there? ... What is this about? It's about maths, don't involved ... (Larry and I have an indistinct exchange) ... No, it's only about the maths.
 (Exchange with Derrick, who begs for help with individual exercises.)
 Sandy (angrily): (First words indistinct) ... then you come up to me and (several pupils make a whooping sound which normally signals a fight in the playground).
 JS: Sandy, this is not going to help matters-
 Sandy: You just won't (keeps on speaking indistinctly against braying noises in the background).
 JS: We'll have a word afterwards outside. I am not going to do this in the lesson, OK? Stop it now.

Sandy: Yeah, cool. (Exchange ends.)

The third phase of the lesson began as Sandy calmed down and a senior manager arrived to collect Derrick, which enabled the pupils to re-establish a serious work mentality which appeared to persist, albeit at a lower intensity, through the repeated insults of various subset members shouted from the corridor by a Year 8 pupil and the reappearance of Derrick, who abused everyone who contributed to the ongoing problem-solving activities on the board. However, when he cried out, “Oh my God, her tape recorder is on!”, Sandy provided the node of defence manifestation which ushered in the fourth phase in which the class as a whole, along with the consultant, appeared to be engulfed by a variant of a fight-flight mentality in which they abandoned all pretence of being in a classroom and erupted in a flagrant wave of mixed emotions.

The final phase of the lesson was constituted by the exchange between the consultant and Derrick in an abruptly silenced classroom, in which Derrick responded to the consultant’s claim to having seen “excellent work” by accusing her of writing “bad” things about the lesson and himself.

5.3.1.9.4 Notes of a meeting with Sandy’s mother

A few weeks before the implementation of the four-lesson sequence I had invited Sandy’s mother to meet with me to discuss his disappointing performance in lessons. I explained to her that I knew he wanted to go to medical school and that he could easily obtain an A grade in mathematics if he put his mind to it, but all too often he became distracted by his peers and failed to complete important tasks. Sandy’s mother explained that, since Sandy’s father had left, Sandy was “her man at home” and a “really good boy”; he would

not misbehave if I treated him properly. At first I did not know what to say, but as Sandy stood by her chair and they grinned at each other, I suddenly perceived that her indulgence of Sandy's displays of narcissism and omnipotence was linked to her unconscious craving for love and affection from Sandy's absent father. Sandy's mother then talked about her marriage and, through a long chain of associations, I came to identify her failed marriage with my own. After we had commiserated for several minutes, Sandy unilaterally promised to change his attitude and behaviour and remarked to his mother that he could see that he was going to have a better relationship with me.

5.3.1.9.5 The consultant's comments

After Derrick had refused to speak with her, the consultant advised me that she was going to withhold an immediate judgement and would speak to me after she had done some thinking during her lunch break. When she returned to my room, I blurted out an apology but she reassured me that she was not going to grade the lesson or even write a report. She only wanted to know what I thought about Derrick's behaviour and the comments he made at the end of the lesson. When I told her that I believed that Derrick often disrupted the group because he required excessive amounts of attention but that inwardly he really liked mathematics and the camaraderie of our class, she thought for a moment and declared, "Then we must accept his comments". She reiterated that she had nothing more to say and left the room.

5.3.1.9.6 Multi-stranded analysis of Derrick and Rosa's comments

The interview was attended by Derrick, a subset leader, who tended to be extremely disruptive but extraordinarily competitive with regards to his performance in whole class discussions and assessment results and Rosa, an avid problem solver, who often

contributed to whole class discussions but sometimes panicked in assessments and lost her temper. Although both participants approached the interview table with benign expressions on their faces, it was evident that Derrick remained in the grip of denial (Section 3.2.4) and that Rosa had identified positively with some aspect of Derrick's state of mind:

JS: What happened in this lesson?
Derrick: What ... what you taught us?
JS: Just ... what happened?
Derrick: Well, we came in-
Rosa: Yeah-
Derrick: Sat down, learned-
Rosa: Pupils had their own conversations (Stop)
JS: What else?
Derrick: Then a woman-
Rosa: I don't know what her name is. (Rosa looks at Derrick.)
JS: (To Derrick) Do you want to add something to this?
Derrick: (Recites an indistinct nonsense rhyme.)

Although they later became less defensive, both participants avoided making references to the virulent aspects of Derrick's altercation with the consultant and only referred obliquely to the rude exchange which occurred earlier in the lesson when Derrick, waiting to be removed by the on-call senior manager, had denigrated the work of two subset members by making racist comments with regards to their African parentage:

Derrick: ... [It was just] varied talk ... it can be about anything.
JS: Like what?
Derrick: Like, what was I talking about?
JS: Yeah, people just talk, tell me about it.
Derrick: (Sighs.) Just about life.
Rosa: And other goings-on in school. (Indistinct words.)
Derrick: And about ... their knowledge ... of what ... just everything. (Stop).
JS: You mean their knowledge of other subjects?
Derrick: Well, even other subjects, but just ... everything (indistinct word).
JS: How does that start?
Derrick: I don't know... just someone will just say, he'll just-
Rosa: Someone will start off a conversation, innit (sic)?

Derrick: Yeah, but ... then I don't know ... it just comes-

Rosa: Yeah, it just comes (pause)

JS: Tell me more about it, really ... that's the kind of thing I'm interested in.

Derrick: Well, I don't know ... we'd just be sitting there and, uhm, someone would be like, "Uhm," I don't know, it's like ... they'll bring up a thing, like, whatever-

Rosa: Like a-

Derrick: Or something like, like African ... like, no ... just to give you an example, just say something like Africa, and then people start talking about Africa or something, uhm ... or ... I don't know...

JS: What's the connection between maths and Africa?

Rosa: There isn't one.

Derrick: There isn't one but-

JS: So, what happens?

Rosa: Everyone dares think about something and then they bring it up because people in the room-

Derrick: I don't think they're ... 'cause we can't discuss, we wouldn't talk about maths ... just, we wouldn't. It's not a thing we would do. (Stop).

JS: No?

Derrick: No ... I was going to say we don't care, but ... it's more that we're not really bothered about ... we are bothered, but like, it's not like ... we just won't talk about maths. We just won't think about the maths 'cause, like maths is not boring, but like, there are better things to talk about, or-

Rosa: Like we talk about something social.

Derrick: Yeah.

Rosa: Yeah.

JS: So even when you're doing the maths?

Derrick: Yeah. Well, sometimes we just-

Rosa: Some people they can talk and still get the answers, it's very easy for them. Like, you'll be working, and then you'll bring up a conversation or something-

Derrick: Yeah! Some subject ...

In stating that sometimes pupils "dare" to think about things which have no connection with maths and that "some people [can] talk and still get the answers", Rosa began to acknowledge the ways in which pupils experience multiple mental states in a classroom situation. But to prevent Rosa from disclosing further unpleasant insights into the relationship between 'maths work' and 'social conversation', which might reveal the true extent of his aggressive and destructive tendencies, Derrick abruptly links 'maths work' to the maternal aspects of my teaching role:

JS: OK, so now you just ... you did a lot of work though today (turning to Rosa).
Rosa: Yeah.
JS: So, it was just-
Derrick: People do work so you-
Rosa: You work because when you speak to people ... it's easier to do work when you're speaking to someone than (indistinct words) ... like in computer science ...
Derrick: No, people just do the work so that you don't get annoyed with them or ... like, they just do the work without really ...
JS: So, what happens in the lesson that ... did anything surprise you today about the lesson?
Derrick: It was a bit hyper but that's always the way it is when it comes after PE.

It is not until I prompted them, near the end of the interview, that Rosa and Derrick broached the subject of the last eight minutes of the lesson:

JS: What about the interactions near the end? (Silence.) What about what happened, what about what people were saying and stuff? What happened there?
Derrick: What, with- (Derrick and Rosa talk at once; some indistinct words).
Rosa: Like about the teacher?
Derrick: Like about (indistinct word) ...
JS: Well, there was a lot of talking, you (turning to Derrick) were saying a lot of ... what was all that about?
Derrick: 'Cause ... you know, you don't understand, yeah ... Miss, also Miss ... you used to teach us before ... you taught us before ... and then she was like ... "No, I wasn't talking to you" and then the whole class ... like, thought it was kind of rude, so like there was a "Aahhhhhh!", making noise and stuff (Pause).
JS: So, was there a feeling that ... did you see her at the beginning of the class?
Derrick: No-
Rosa: Yeah. I did.
Derrick: I didn't.
JS: So, did that change things?
Derrick: It changes things when they're in there, cause-
Rosa: Yeah.
Derrick: Because they expect you to work. She's just, like, watching you and writing things-
Rosa: Yeah!
JS: Alright ... how could we have avoided what happened at the end? (Silence).
Derrick: I don't know ... things happen. Things happen.

The low degree of narrative immersion in Derrick's unwieldy references to the consultant (Nelson et al, 2009; Section 4.4.3.1), as well as his subsequent interjection of the phrase

“things happen”, which I used in the previous lesson when I warned him about his possible exclusion from Set 1 in the next academic year, seems to highlight his avoidance of the emotions associated with an infant’s engagement in pathogenic projective identification in the paranoid-schizoid position (Section 3.2.1).

5.3.1.9.7 A psychoanalytically-informed interpretation

It is highly likely that the class and I were engulfed by an unprecedented groundswell of anxiety as the consultant appeared because we unconsciously perceived her visit, within the context of the recent wholesale staff restructuring, as a threat to the survival of the group (Bion, 1961; Section 3.3.3). While the pairing subset managed to merge their mentality into that of the class as a whole, I temporarily succumbed to a horizontal splitting operation and for a few moments lost all sense of being in the classroom. When I managed to stop dissociating and regain my capacity to offer meaningful containment, I involuntarily projected my excessive fear and aggression into Sandy, who now identified me with his mother and often attempted to contain me whenever the interactions of the pairing subset became too boisterous.

My subsequent apology to Sandy provoked an envious response in Derrick, who immediately turned in his seat and launched his own attack on Sandy by snatching away his worksheet. Although I acted rapidly to contain their disruptive behaviour, I was unable to stop them from engaging in a series of parataxic distortions (Section 3.4.2.2) which intensified upon the appearance of the English teacher, who stopped to speak with selected pupils as he distributed worksheets. However, while Sandy eventually managed to lower his voice and tame his physical movements as he turned his attention to his neighbour, Derrick became increasingly volatile as he was unable to establish an exclusive ‘container-contained’ dyad with me either by gaining my undivided attention

in the whole-class problem solving exercises or through his disruptive behaviour. When he began to abuse me and I felt I had no choice but to request an on-call senior manager to remove him from the classroom, Derrick appeared to experience a violent bout of splitting in which he alternately beseeched the ‘good’ part of me to return and vilified the ‘bad’ part of me who was treating him like any other member of the class.

As I became aware that my failure to contain Derrick was leading to the failure of the lesson, I again discharged my feelings of dread and annihilation into Sandy. He appeared to understand the unconscious motives behind my aggression but finally, after suffering further distressing intrusions from the pupil in the corridor and Derrick, he suddenly and involuntarily perceived me as a wholly ‘bad’ receptacle for his pent-up rage and frustration. When he cried out, “Oh my God, her tape recorder is on!”, many other pupils were also on the verge of splitting and projecting their anguished thoughts and emotions. The collective hostility that suddenly materialised was subsequently channelled into the consultant by Derrick, who appeared to deliver the “unanimous expression of the will of the group” (Bion, 1961, p.65; Section 3.3.3.) as he berated her for writing “bad things” about the lesson rather than walking around to inspect exercise books.

Although the consultant never admitted to either writing negative comments or observing the lesson for the purpose of doing so, she appeared to at least confirm Derrick’s interpretation of her visit, if not to directly acknowledge her guilt, by ‘accepting’ his comments in lieu of providing her customary feedback and entering a formal OFSTED grade for her observation.

5.3.1.10 Lesson 4: The persistent episode (Part II)

5.3.1.10.1 The field notes

10th July 2013

Although a fight was erupting in the corridor, pupils entered the classroom in an unusually restrained manner and went to work on the starter question without any of their usual banter; three or four asked questions about circumference and area of circles as soon as they greeted me at the door. All latecomers, including Derrick, who momentarily stood by his chair quietly scanning the class, were admonished to sit down and unpack quickly. The pairing subset members remained subdued. When I chided a subset member and two high valency pupils for staring into space instead of writing in their exercise books and threatened to write their names on the board, no one complained.

The class quickly fell silent as I interrupted their work to announce the timetable for the last week of lessons and to begin a review of the starter. A strained work mentality evolved as pupils reconsidered the derivations of the formulae for circumference and area of circles and attempted to solve the first shaded region problem. Although I wrote the names of two or three pupils on the board for looking around the room, no one objected.

As pupils worked on the first set of individual exercises, the noise level in the classroom gradually returned to its normal level and the subset members began to interact as they habitually did, albeit in a restrained manner. Most pupils paid minimal attention as Derrick became rude and disruptive as he tried to monopolise my attention and Larry, a high-valency pupil, got out of his seat to remonstrate with a pupil on the far side of the room for stealing his bag. The final whole class discussion, which focused on a tricky shaded area problem, generated a lively discussion but before the bell rang I was compelled to escort Derrick into the corridor to confront him privately about his behaviour.

5.3.1.10.2 Face value appraisal

It was as if the class had undergone some kind of ‘personality change’: for the first thirty minutes, pupils abandoned their usual class roles, remained uncharacteristically subdued and appeared contrite, but once they had completed the first set of individual exercises, they almost instantaneously re-established their previous patterns of verbalisation and

behaviour. Many observers would have been surprised by the extensive change in the ‘class climate’, which could almost be classified as a ‘Dr Jekyll and Mr Hyde’ moment.

5.3.1.10.3 Sequential analysis

In the first phase of the lesson, the pupils were sombre and uncommonly compliant, to the extent that most were careful not to shout out or talk over each other as they contributed answers to the starter and first shaded area problems. No one uttered the slightest objection when I felt compelled at one point to write an unnecessarily long list of names on the board.

In the second half of the lesson, as the class reverted to its normal state but were careful to maintain a robust work mentality, Derrick regressed to a temperamental infantile state and for the rest of the lesson demanded my undivided attention, alternately begging me to stay with him and then abusing me whenever I admonished him to desist:

JS: Derrick, I don’t want to have to park you ... Derrick-

Derrick: What do you mean, park you? I never even done anything. I’ve been waiting for you to help me! I’ve been waiting! I’ve got all the times and-

JS: I’ve been around to everyone.

Derrick: Now what? I got all the times and (indistinct word) and the radius, what about - (JS is looking at his work and reads some numbers) ... No, no, no, I haven’t got the answer but ... look, I’ve done that bit. Look! I’ve done the 64 minus ...

However, his demeanour became beseeching and plaintive after my patience finally snapped and I escorted him into the corridor for a private conversation:

Derrick: I am working!

JS: Not really! ... Derrick, you want to be in Set 1?

Derrick (dejectedly): Yeah.

JS: Then I don't need you calling names ... (inaudible words)
Derrick: I hate sitting at the front! ... It's hot in here!
JS: Don't you think everyone feels hot? ... (loud corridor noises, inaudible words)

Although the final lines of our dialogue are inaudible on the audio file, the tenor of our verbalisations then assumed a grieving tone as our anger dissipated and Derrick and I made reciprocal promises to cooperate with each other during our few remaining lessons together.

5.3.1.10.4 Multi-stranded analysis of Cheryl and Michael's comments

The interview was attended by Cheryl, a highly imaginative pupil who often completed extension exercises but rarely obtained her targeted grades in assessments and Michael, one of the class's fastest problem-solvers who routinely lost marks because he neglected to show his working in his exercise book and in assessments. Although I was anxious to begin as soon as the other pupils had left, Cheryl and Michael stood in front of the board and argued how best to approach a 'difficult' area calculation that had remained unsolved at the end of the lesson. When I applauded after they had worked out a neat two step solution, they expressed their gratification in a non-defensive manner, but as soon as I asked, "What happened in this lesson?", they smiled contemptuously at each other as they agreed that, as usual, "not much" had been accomplished because a few pupils had been disruptive and then arguments broke out:

JS: So ... why is this?
Michael: I think there are just four people who always want to be louder than everyone else and want to distract ... not distract everyone else, they want to, like, get away without doing work and the only way that they can talk is to talk loudly. And if they're loud, everyone else can just talk under them.

Cheryl: Yeah, because certain people will come out of a lesson and be like “Oh, I didn’t do any work” and they’ll be “Oh, wow, that’s so cool” ... “great job!” ... and then they just keep doing it and they ... people just don’t know how to have a quiet, inside voice, so they just go really loud. (Laughs). So they just get really loud and then other people are like “Oh, well they’re talking” ... or the people who are like shouting on a controversial issue ... everyone starts chipping in and it gets worse and worse.

JS: Can you be a bit more detailed? Like, I kind of understand it, but ... can you give me an example?

Although Cheryl and Michael proceeded to provide a general example, their choice of letter abbreviations and their mention of Africa suggested that they were referring to the episode in the previous lesson in which Derrick disrupted the work of a subset member and two neighbouring pupils by calling attention to their family links with Africa. The extended length of their integrated description, together with its high degree of narrative immersion, indicates that it had been rehearsed beforehand, most likely because Cheryl and Michael had been appraised of the starter question in advance:

Michael: Like ... if S cusses [sic] D then D will, like, pull in V and then S will just pull in everyone else.

Cheryl: (Slowly). Yeah.

JS: How does he pull?

Cheryl: It will happen because, like, as Michael said, S will cuss D and D will say to V, because they’re both ... they’re all mates because of where you’re from, so V will be like to D “Oh, we’re both like from Africa-”

Michael: We’re the (indistinct word)

Cheryl: Yeah, so they’ll be like “Oh, we’re both like from the same place, you have to back me up on this” so V will kind of like come in because S will normally say things that are quite racist, like “All black people are ugly” and like “African people are stupid” and stuff, like that, and obviously, if you’re from there, you’ll get offended, so more people from that area are offended and more people get into it and people who are on S’s side, not necessarily because they’re from the same place as him but, because they are “friends”, and I quote “friends” with him, they kind of chip in as well, and then it brings up other issues because like everyone will kind of back and forth go “Well, we’re not as bad as that place”, and then the people from that place will go “Well, we’re not as bad as someone from another place”. It will just keep going.

JS: Why do you think S chooses those topics? I suppose there are loads of things that he could talk about.

Michael: He loves the attention? He likes to feel smart.

Cheryl: Yeah ... I suppose they're issues that can quite easily be brought up quite easily, like they're brought up in normal society like nowadays, and I actually think that S is kind of racist, like some of the things he says-

Michael: That is such an understatement!

Cheryl: (Laughs) OK! He is racist, like everything he says is offensive to someone because of something. Like, it won't even be for a good reason, he'll say something and he'll say it because it's a way of cussing someone else because they have looked at his general direction or they are not speaking to him, but he's having a debate.

In the remainder of the interview Cheryl and Michael continued to exude scornful attitudes as they understated their extensive participation in the whole-class problem solving exercises, neglected to remember any "important" events and contrasted the constructive curriculum-linked "arguments" in English and RE lessons with the localised ones in maths lessons which so often undermined the teaching and learning. In finally declaring that, "depending upon what lesson it is, like who's teaching and who's in the class, you can kind of tell whether it's going to run smoothly or whether there is going to be arguments and stuff", Cheryl unconsciously crystallised pupils' anger at my perpetual inability to manage the disruptions instigated by Derrick and the other subset members and their yearning for me to assume the omniscient leader persona desired by group members in Bion's *Experiences in Groups* (1961).

5.3.1.10.5 A psychoanalytically-informed interpretation

The class may have expected me to be sacked after their performance in the previous lesson and the first thirty minutes of teaching and learning was permeated with pupils' desire to mourn and affect reparation. A palpable sense of guilt infiltrated their work mentality, which assumed the sort of austere tone usually observed at funerals and

remembrance ceremonies. It is likely that I felt compelled to write sanctions on the board because the class as a whole was unconsciously engaging in a projective identification operation in which they enabled me to issue sanctions for relatively harmless misdemeanours so that they could compensate for their behaviour in the previous lesson and elicit my forgiveness.

In the second half of the lesson, as pupils tepidly re-assumed their normal roles and modes of interaction, Derrick once again demanded my undivided attention and appeared to re-enact the agitated infantile state he had evinced in the previous lesson. In view of Cheryl and Michael's comments about Derrick's behaviour, as well as Derrick's behaviour in the second lesson of the sequence, it may be that this latest episode simply constituted yet another repetition of Derrick's characteristic splitting operations with regards to myself and his peers. However, our subsequent conversation in the corridor suggested that Derrick's behaviour in mathematics lessons was mediated significantly by the ways in which I sought to contain him, which were predicated on the anger and guilt I had often felt when I, as a child, experienced separation from my own mother. My own role in the instigation of pupils' defence manifestations and resulting unpredictable episodes will be examined in greater depth in Section 5.4.

5.3.1.11 Discussion

After correlating and analysing the data gathered in the four audio-recorded lessons and interviews, I felt able to extend some of the tentative suppositions that I had discussed in Sections 5.2.6. and 5.3.1.10 concerning the impact of unconscious operations and group mentalities on pupils' performance in mathematics lessons. First, it appeared that James and many other pupils regarded 'the maths' as only one element of the 'actual lesson'

because they unconsciously experienced the teaching and learning process as a subordinate component of the overarching operation of a group of unconscious mental processes which compelled them to satisfy above all else their needs for love and containment. Even though they may have insisted consciously, *apropos* whole-school policy, that they were well on their way to becoming ‘independent learners’, they involuntarily sought object relationships with teachers, support staff and other pupils in order to cope with the anxieties associated with adolescence, the attainment of predicted grades and the negotiation of their social positions in various domains of the school.

Within the classroom setting, where the inchoate nature of many pupil interactions magnified the potency of these anxiety determinants, pupils often appeared to regress to infantile states of mind in which they regarded me as either an incarnation of a parent and/or an omniscient leader who ‘scaffolded’ their learning and protected them from the disruptive intrusions of colleagues. Moreover, many pupils involuntarily appeared to develop dyadic liaisons with peers who possessed qualities which enabled them to formulate defensive identifications and idealised transferences.

Pupil interactions, which incorporated momentary transformations in discourse and behaviour as well as splits in attention, appeared to be mediated by the operation of multiple self states (Davies, 1996; Bromberg, 1998). When pupils like Rosa and Cheryl were consciously aware of being able to ‘work’ and ‘talk’, or when James and William felt compelled to ‘get the big discussions out of the way’ while they were supposed to focusing on the starter questions, these self states appeared to be aligned in a ‘vertical’ splitting arrangement in which the separated experiences associated with each self state remain within conscious awareness ; in other instances, however, such as when Mickey ‘zoned out’ during whole class discussions, these self states appeared to be aligned in a

‘horizontal’ arrangement in which one or more self states are placed temporarily or permanently outside conscious awareness in order to offset various anxiety determinants and unfulfilled narcissistic demands (Kohut, 1971; Lichtenberg and Slap, 1973; Section 3.2.4).

In any single lesson, pupils’ entry into and out of various self states appeared to be mediated by the channels for projective identification specified by my lesson plan. In whole-class problem-solving sessions, for example, most pupils, even those who displayed ‘second skin’ defensive modes of functioning and were reliant on gestures and facial expressions to enable their participation (Bick, 1968; Waddell, 1998), appeared to project the ‘good’ parts of themselves and their mathematics knowledge into me so that on an unconscious level they could satisfy their needs for positive containment. During individual and group exercises, however, pupils appeared to engage in ‘mirroring’ and ‘idealising’ transferences (Kohut, 1971) in the attempt to demarcate the ‘good’ and ‘bad’ parts of their maths understanding. Disruptions to the flow of teaching and learning often occurred when pupils were compelled by the involuntary expression of defence mechanisms to project the ‘bad’ rather than the ‘good’ parts of their thoughts, feelings and emotions, such as when Derrick, propelled by envy or separation anxiety, projected his anger by shouting rude comments or ‘talking over’ other pupils’ contributions.

The establishment of a ‘pairing’ subset appeared to be effected unconsciously by pupils who had higher-than-average levels of anxiety and required disproportionate levels of my capacity to offer containment. These pupils shared a series of identifications and manifested a distinctive group mentality as they involuntarily sought each other as objects into which they projected and thereby discharged their negative thoughts and emotions, often in the form of ‘parataxic distortions’, i.e. repetitive ‘triggering behaviours’ and

hostile comments (Section 3.4.2). Furthermore, it appeared that Derrick, the ‘leader’ of a pairing subset, who tended to dominate the other members, and whose absence usually attenuated the subset’s typical disruptive behaviour, was particularly susceptible to high levels of splitting and aggression (Bion, 1961).

Over a period of time, individual pupils took on customary ‘roles’ as they expressed characteristic defence mechanisms. The potency of work mentality in the class as a whole appeared to be dependent upon the nature of the operation of projective identification, my momentary capacity to contain pupils and increases in anxiety levels instigated by observers and whole school influences (Sections 3.3.2 and 5.3.2.6). The unpredictable oscillations between work and basic assumption mentalities, however, appeared to be governed disproportionately by the pairing subset, whose verbal exchanges sometimes appeared to ‘speak’ for the class, and whose behaviour often served to safeguard the survival of the group by acting as an ‘overspill’ for the discharge of excessive anxiety.

5.3.2 Defence manifestation and affect linked to mathematics: Ruby’s episode

Although my analyses of the four-lesson sequence enabled me to characterise many of the ways in which pupils manifested defence in typical mathematics lessons, they did not enable me to explore in any depth the relationship between defence manifestation and mathematical affect, particularly as Derrick and other key players declined to engage in additional interviews. However, in January 2014 I happened to observe Ruby as she experienced a clear manifestation of splitting and projection just before a scheduled interview in which she discussed the episode at length. The transcript of Ruby’s interview is provided in Appendix 5.1.

5.3.2.1 Year 8 baseline data

CATs scores: Verbal 120, Quantitative 96, Non-verbal 113, Mean 110

End-of-year target levels: 6A in mathematics, 6A – 6B in all other subjects.

5.3.2.2 Notes on the School Information Management System (SIMS)

While Ruby's Year 7 reports are generally positive, and laud her work ethic and contributions in discussions, her maths teacher notes that her "motivation and attention can vary alarmingly depending upon her mood". Her Year 8 reports indicate that, while Ruby's behaviour and attainment continued to remain high in the majority of subjects, she routinely obtained C2s and C3s in maths and French lessons, where her classroom performance was extremely erratic.

From October 2013 to July 2014 Ruby was 'parked' at least once per week but at various times, in more-or-less monthly cycles, she was parked practically daily for being 'rude', 'talking across the class' or walking out of the room. In one week in March and in another week in May, she obtained C2s and C3s in most lessons and in July she received a 'gross misconduct' and an internal half day exclusion for swearing at a teacher after her mobile and tablet were confiscated.

5.3.2.3 Ruby's class

Ruby's class comprised an ethnically diverse mixture of Year 8 middle ability pupils which had been reset several times by the Mathematics Department, Senior Leadership Team and the Head of Year 8 in repeated bids to improve the Year 8 cohort's 'behaviour for learning' and attainment in English and mathematics. At the time of Ruby's interview,

it consisted of 11 girls and 15 boys whose mean CATs scores ranged from 102 to 115 and Year 7 end-of-year exam scores ranged from a high Level 4 to a low Level 6. Two girls and four boys had more than 200 behaviour points logged on SIMS and tended to interact as a subset; Ruby and another boy tended to be ‘parked’ regularly while the others obtained C1s and C2s in many lessons. During successive detentions and restorative meetings, all subset members had reiterated a desire to achieve their targeted levels, please their parents and work ‘calmly’ with their peers. Two of these pupils even claimed that mathematics was one of their favourite subjects.

As I had taught nearly a quarter of the sample in Year 7 and had become a Year 8 tutor to three of the participants, in September 2013 I initiated informal telephone and email communication with several parents as a matter of course. By the beginning of October, however, I was spending two to three hours each week informing the parents of the most disruptive pupils in this class about detentions, impending exclusions and the impact of poor behaviour on assessment levels, as per the whole school behavioural policy. From January onwards, as the classroom performance of several pupils failed to improve substantially either in mathematics or in other lessons, I was also obliged to attend a series of meetings with their parents led by the Head and Assistant Head of Year 8.

5.3.2.4 Ruby’s presentation in mathematics lessons

During the first half term Ruby led many class discussions and produced written work of a high standard but tended to speak in a babyish voice whenever she interacted at length with other disruptive and high-valency pupils (Section 3.3.3). Often, when she was angered, she regressed into an infantile exhibitionist: she would get out of her seat and strut unsteadily around the room like a toddler, or would smile, slide quietly to the floor and crawl under a desk so that she could carry out a surprise attack upon a peer who was

annoying her. Whenever she did not wish to learn mathematics, she would inform me blithely that she “didn’t care” that day and speak quietly to neighbours and/or draw in her exercise book until she was ‘parked’.

Over the course of the academic year, Ruby’s ‘moods’ appeared to become ever more polarised: either she worked constructively as soon as she sat down at her desk and berated other pupils, including subset members, whenever they disturbed her, or she immersed herself in subset discourses and declined to participate in any of the planned teaching and learning activities. If she happened to have a temper tantrum, she walked out of the room and did not return.

During the winter and spring terms, the number of pupils in the class sometimes exceeded the number of available seats and one pupil was required to sit at my desk. Ruby clamoured to be assigned this place and then manifested a strong identification with me by chastising peers for talking or failing to pay attention while I was teaching at the board. Thereafter, whenever she sat at my desk, she ignored the starter problem on the board and worked directly from the textbook, claiming that she needed ‘special’ extension work because the overall ‘level’ of the lesson was too easy for her.

5.3.2.5 Field notes of the episode

28th January 2014

(Lesson earmarked for data analysis.) The class settled quickly and for once no one challenged Ruby as she nabbed my desk. Ruby worked quietly and was very strict, telling anyone who began to chatter to their partners to “shut up” and work. Halfway through the lesson, after we had looked at congruent shapes and pupils were working individually, I allowed Annie to wear her hoodie, rather than her blazer, as she was sitting in a cold draught but everyone wanted to keep the only window open, as it was very warm in other parts of the classroom. A few minutes

later, as I was returning to my desk, Ruby shouted at Annie to take off her hoodie. When Annie failed to do so, Ruby got out of her seat and starting screaming: she banged on desks as she stomped over to Annie to reiterated her demand. As Annie began to laugh, Ruby continued to bang on desks as she walked up and down the room and screamed at Annie to remove her hoodie. Then Nancy, a generally diligent but high-valency pupil, began to imitate Ruby and the rest of the class followed, pulling exaggeratedly angry faces and banging their desks. Ruby finally banged open the door and walked out of the room. I did not expect her to return for her interview but she reappeared just after the room had emptied and spoke with me for twenty minutes.

5.3.2.6 Face value appraisal of the episode

Superficially, the narrative of this episode echoed numerous earlier instances in which Ruby castigated one of her peers as she experienced a temper tantrum and then made a dramatic exit from the classroom. It was distinguished, however, by the excessive degrees to which Ruby vented her rage and the class participated in her disruptive behaviour.

5.3.2.7 Sequential analysis of the episode

Initially, the nodes for defence manifestation appeared to be the points at which Ruby got out of her seat to attack Annie and Nancy began to imitate Ruby's angry facial expression and hand gestures. I modified this assessment, however, after undertaking a sequential analysis of Ruby's interview.

5.3.2.8 Sequential analysis of the interview (see Appendix 5.1 for line number references)

Although I reassured Ruby that I was not angry about what had occurred in the lesson, she appeared apprehensive as we sat down and I prepared to turn on the audio recorder.

Her response to the starter question was frivolous and delivered in her familiar, slightly higher babyish voice, which signalled a bout of regression which lasted for several exchanges:

JS: [So my question to you is]: What happens in maths classes?

R: We learn maths?

JS: (Low laugh) What else?

R: Well, we talk and, like ... other stuff.

JS: Yeah? (Pause; lots of noise coming from corridor) So what else happens in maths?

R: Well, you get into trouble, and you get parked and stuff, and ... like, sometimes, like they'll be throwing stuff and like (outside noise obscures Ruby's subsequent comment) we have fun.

JS: (More noise.) So you said "We have fun". What kinds of things are fun?

R: Uhm, when we're throwing stuff, and whenever I get in trouble, and (loud noise obscures next comments) when you are getting rid of the ones getting into trouble ...

JS: OK ... and what's not so fun?

R: When we have to learn stuff ... it's like, fun to learn stuff, but ... it's just like, boring ... actually there's no child that likes to learn stuff, you ... just have to ... learn stuff ...

Ruby's disjointed response in Lines 14-15, which incorporates the contradictory clauses 'it's fun to learn stuff' and 'actually there's no child that likes to learn stuff', exposes her conflicting attitudes towards learning mathematics. However, as she relates the sequence of events which led to her walkout in the previous lesson in Lines 21-36, the narrative immersion of her statements increases (Section 4.4.3.1) and her tone steadies:

R: Uhm, we were learning about the congruent thing (sic) ... the shapes ... and it was about how shapes fit on top of each other? And kind of like the way they are? And ... I walked out ... and then I went to the teacher down in M1 ... and then I walked out of his room ... and then I came back in.

JS: Why did you walk out?

R: Uh ... because I ... because a girl, she didn't want to take off her hoodie, and it wasn't school policy.

JS: (Pause) What was so bad about that?

R: Cause ... if she was allowed to wear a hoodie, then I should be allowed to wear a hoodie. If I wore my hoodie, then I would get in trouble.

JS: OK. (Pause) When you asked about her, what was the explanation?

R: Uhm, you said, “Don’t worry about it because she is by the window”.

JS: OK, and why did you not think that was a good explanation?

R: She had a blazer, she could have worn her blazer, but no, she tried to wear her hoodie.

Notably, Ruby does not refer to Annie by name and omits any mention of the violent outburst which preceded her departure from the classroom, but highlights my failure to uphold the whole school policy by allowing Annie to wear a hoodie without a sanction. In the next phase of the interview (Lines 36-63), Ruby proceeds to reveal the true depths of her indignation concerning Annie:

JS: What sorts of things [did] you see? (Inaudible words) ... Where did it all start?

R: It ... it started in dance, and she was wearing a hoodie in dance, and I said, “It’s not raining indoors, so you don’t have to put your hood up and wear a hoodie.” And then she said, “OK” and she took the hoodie off. And then she put it back on and I was like, “It’s still not (inaudible words) you don’t have to wear a hoodie, like watch it, your hoodie might get confiscated.” And then she came here and she was wearing a hoodie. And like, she has a blazer, she doesn’t have to wear a hoodie.

JS: And so ... that really upset you?

R: Yeah.

JS: OK ... so when that upset you ... what did you start saying to her, I forget?

R: Uhm, I told her that ... uhm, that’s what a blazer’s for ... and she could buy a jumper (an approved school uniform item).

JS: OK, so what happened when you started saying something to her and ... then what happened?

R: I asked her (inaudible words).

JS: OK, like ... who started-

R: I started it then Nancy joined in and then other people joined in.

JS: How do you think she felt?

R: I don’t really know.

JS: Did you expect anything to happen?

R: No.

JS: OK ... after you said it, how did you feel?

R: I felt bad.

JS: Then after you said it, you-

R: Walked out.

JS: You just walked out. So how were you feeling when you walked out?

R: I felt kind of like, fine.

JS: You felt fine but why couldn’t you stay?

R: I just didn't know what to say. I don't know why, I just didn't ... I just walked out. I didn't really want to say anything.

Ruby's statements concerning her feelings about shouting at Annie and walking out of the classroom are somewhat contradictory: first she states that she felt "bad" after she lost her temper but subsequently she states that she felt "kind of like, fine" when she walked out of the classroom. This inconsistency appears to be predicated on the ambivalence implicit in Ruby's reference to "Nancy [and the other people]" who are described as "joining in" but not against Annie specifically. As Ruby never actually explains her decision to walk out of the room, it may have "felt bad" either because she felt remorseful for attacking Annie or because she believed that the class was mocking her rather than supporting her.

In Lines 67-68 Ruby asserts benignly that she works best in maths lessons when she is seated at my desk "on her own", but when I ask her about the "other things" that happen to her in lessons, she launches into a convoluted narrative (Lines 83-148) of how she is "set off" by pupils and teachers in various lessons:

R: Yeah ... in English, usually Danny ... in PE Penny and other people ... in music I get set off by Lew and Wills and Tim ... uhm, in French I get set off by the teacher ... uhm, in RE, it's Lew again ... and geography, it's Sal ... so, yeah (pause).

JS: So, it's specific people in specific lessons? (Ruby nods.) Wow. Why do you think that is? How does that develop?

R: Because, uhm ... I think it's because I can't control that ... my (incoherent word) stuff and what I say, so when I do get angry, it will come out and stuff ... It's just like that and I get in trouble for it.

JS: And it's only certain people? ... you just mentioned you know the people in the lessons it's going to happen with (pause).

R: Uhm, Lew is racist and uhm, my teacher just doesn't like me ... uhm, Danny I haven't like since Year 7 and uhm....

JS: So, Danny is in maths with us ... so what can he do ... like, what can he do to set you off?

R: Like if he talks to me ... like, if he says something rude.

JS: Wait a minute ... you said he talks to you. How-

R: I've told him loads of times "Don't talk to me when I'm trying to work" 'cause I will get set off easily and like he will talk to me and then he will carry on talking to me and then, like, he will get rude to somebody else and get rude to me and I'll just ... I don't know ...

JS: Have you tried ... have you, I don't know, have you tried to ... ignore ... him?

Mick, or any of the others? (Pause.) Have you ever even tried? (Ruby says no.)

Why? How come?

R: Because I don't try.

JS: So you would rather just ... I don't know ... disrupt your work? Or get consequences, or whatever?

R: Yeah.

While Ruby admits in Lines 88-90 that she is unable to control her temper, she subsequently relinquishes responsibility for doing so by claiming that her tantrums are triggered by negative identifications with various pupils which involuntarily provoke her anger. On a conscious level she claims that she does "not care" about getting consequences, but on an unconscious level she may have no control over the abrupt oscillations between the depressive and paranoid-schizoid positions that she experiences during lessons or the unconscious operations which transmit negative and/or aggressive impulses to Ruby from the pupils who function as triggers. Although Ruby never refers specifically to mathematics during the exchanges above, it is possible that the tantrums which are "set off" by specific pupils in mathematics lessons involve anxieties which are mathematics specific.

In Lines 123-147 Ruby offers several insights into the nature of pupil anger which serve to underscore her underlying sense of despondency and ongoing defensiveness concerning her inability to control her emotional outbursts. Ruby initially declares that teachers cannot prevent pupils from being "set off" as "it's the child's behaviour" which

generates pupil anger, which is ultimately directed to a second person if it is blocked from reaching its original target. Finally, however, Ruby manifests defence within the structure of a Freudian reaction formation (Section 3.2.4) by claiming in Lines 146-147 that she walked out of the previous lesson to give Annie the chance to calm down, whereas earlier Ruby said that she walked out of the classroom because she felt “bad”.

Much of the remainder of the interview is concerned with Ruby’s learning preferences in mathematics lessons and her beliefs about subject knowledge. In Line 150, after I ask her if the “things that happen in class” relate to the learning that takes place, she replies in the negative and asserts that, for her, learning is “separate”. Ruby’s subsequent responses in Lines 155-188 indicate that her conscious attempts to split the instances in which she learns ‘independently’ with the aid of the textbook from the episodes in which she is “set off” by peers is supported by a horizontal splitting operation (Section 3.2.4) which enables Ruby to maintain contradictory and often specious perceptions of her mathematics level and her ability to assimilate new material:

JS: Do you think that, looking at the levels here (JS is leafing through Ruby’s textbook), how would you rate yourself, as to level?

R: Like a Level 4.

JS: Well, I think you’re more than a ... you’re definitely more than a Level 4. But say relative to everyone else-

R: Uhm, Jo is smart and Cate, and Tina ... I would put them at the top of the class ... and then, people like me, Connor, Nancy and Al, I would put (pause).

JS: And where do you put yourself?

R: At the bottom.

JS: You put yourself at the bottom-

R: Because I’m not (inaudible words) ... special?

JS: Yeah, but ... wait ... you do all the work, and then you find the starters too easy sometimes ... so how can you put yourself at the bottom, when some people can’t do the starters?

R: ‘Cause a lot of the time I ain’t in the class actually, in the lesson, because I’m getting parked and stuff, so then uhm (inaudible words) because I don’t really know that much about some stuff now. ‘Cause I wasn’t really interested in learning.

JS: Are you parked in other lessons? Are you parked a lot or do you walk out a lot?

R: Uhm, I walk out a lot in English and I get parked a lot in French.

JS: OK, so now you're kind of ... you don't know ... you're losing track of what's going on? Is that you?

R: No, because I'm a fast learner so I can do a page of work and then I just catch on.

After describing mathematics as “near the top, but not at the very, very top” of her subject preferences, Ruby highlights her preference for working from a textbook by stressing the aspects of the textbook which promote non-analytical latency learning patterns, such as the index listing of topics and demonstration solutions (Section 3.2.3), rather than its “challenging” features, as she did earlier in the interview. When I ask Ruby if she has a “good feeling just getting into the book”, she is non-committal and notes simply that “you don't really notice everyone around you”.

In the final segment of the interview (Lines 230-266), when I ask her to remember other “episodes” in maths lessons, Ruby once again regresses to the infantile state she presented at the beginning of the interview. However, when I ask her to remember “lessons in which she did well”, she abruptly snaps back to an age-appropriate personality stage and cogently recalls recent lessons on quadrilaterals and angles in triangles. In the remaining exchanges, however, Ruby discloses that, after she walked out of our previous lesson, she joined another Year 8 lesson and was unable to remember anything about ratio. Even though I remind her that she performed especially well in that topic during the Christmas competition, Ruby cannot stop fretting and thereby exposes her high level of anxiety concerning her mathematical ability.

5.3.2.9 A psychoanalytically-informed interpretation of the episode

Although I had originally believed that Annie's insouciant facial expression and/or insolent hand gestures had instigated Ruby's temper tantrum, the above analysis indicates that Ruby probably engaged in splitting and projection, the primary defences of the paranoid-schizoid position (Section 3.2.1), by my impromptu decision to grant Annie 'special' consideration. As many pupils in the class were contravening whole-school policy by wearing other prohibited items, such as large earrings and non-regulation jumpers, it is doubtful if Ruby developed a festering anger for Annie on account of her hoodie; it is more likely that Ruby had begun to feel envious of Annie, and to feel aggressive towards her, because Annie had recently won an award for making excellent progress in English and maths, one that Ruby had hoped to obtain herself.

Although at one point in her interview Ruby tries to rationalise her departure from the classroom by saying that she had wanted to give Annie a "break", she admits at another point that she felt "bad" when she walked out; although she never explains what she means by "bad" in this context, it may mean that she experienced negative thoughts and emotions in connection with disrupting the lesson and/or felt embarrassed by the reactions of Nancy and the other pupils, who appeared to temporarily enter Ruby's mentality as they mimicked her. Given Ruby's disclosures concerning the sizeable collection of pupils who "set her off" in a variety of classes, it would appear that her peers had witnessed Ruby's temper tantrums more frequently than any individual teacher and perhaps anticipated these episodes on an unconscious level as opportunities in which they too could split off their 'bad' thoughts and project them into the external environment and/or into Ruby without garnering any sanctions for poor behaviour.

5.3.2.10 A psychoanalytically-informed interpretation of Ruby's presentation in mathematics lessons

Ruby's recurrent bouts of attention-seeking regression to infantile states, both in lessons and in interview, suggested that she may have experienced splitting according to the schema formulated by Mahler (Section 3.2.4). As a result, Ruby craved special attention from me and was overly jealous of the attention or special treatment I gave to other pupils, which often sparked temper tantrums. However, she rationalised her disruptive behaviour on an unconscious level by formulating identifications with pupils who functioned as transference objects for her aggression. At times, she could obtain love and 'special' attention from me by participating in whole-class teaching and learning activities, but all too often her continuing reliance on latency phase learning approaches (Section 3.2.3), rather than her limited understanding of mathematics, propelled her to seek the safety of a textbook behind my desk, from whence she laid claim to further 'special' treatment. Her erratic class presentation, supported by a horizontal splitting operation, enabled her to preserve her memories of 'good lessons' while constricting her awareness of what happened in 'bad' episodes.

5.3.2.11 Discussion

During my time as a participant-observer, I taught many disruptive pupils who appeared to display patterns of behaviour like Ruby's. Although it is impossible to extrapolate generalised psychodynamic profiles from psychoanalytically-informed analyses of individual case studies (Section 4.9), the classroom performances of these pupils appeared to possess several commonalities. First, they frequently perceived themselves as being 'picked on', 'misunderstood' or 'not liked' by peers and teachers and characterised themselves as 'special cases' (Carsar, 1979; Section 3.2.4). For a variety of reasons, they tended to find it difficult to participate equitably in whole class teaching

and learning activities and were apt to have ‘temper tantrums’ or lose control over their behaviour when their envy of their peers became intolerable or they were overwhelmed by anxiety determinants. Their abrupt mood changes and the erratic vacillations in their work habits appeared to be provoked by the operation of splitting mechanisms (Sections 3.2.2 and 3.2.4) which tended to function simultaneously as key instigators of basic assumption mentality in the class as a whole (Section 3.3.3).

Second, their expressed desires to perform well in maths lessons appeared to be linked to their craving for love and adulation from their peers and teachers rather than their preference for maths as a school subject (Moore, 2013). Unlike the participants in Nimier’s study (1993, Appendix 5.2), they did not manifest explicit phobic or manic defensive attitudes towards maths itself but characterised their experiences of maths lessons as ‘good’ or ‘bad’ depending upon how they had fared with respect to selection and assessment *vis a vis* their peers (Black et al, 2009). Their ‘bad’ maths experiences appeared to be instigated at least partially by difficulties in coping with the more complex conceptual and analytical levels of understanding posed by selected topics in the secondary school maths curriculum. The participants also appeared to have difficulties in coping with various ‘independent’ learning activities and group work because they were unable to control and/or contain their interactions with peers, either with respect to the completion of the teaching and learning activities or extracurricular issues linked to friendship groups or events which had occurred in other areas of the school.

Finally, although the nature of the participants’ relationships with other ‘disruptive’ pupils appeared to vary significantly from one class to another, the memberships of the resultant disruptive subsets, which will be examined in more depth below, were routinely based on complex peer identifications that were often initiated in primary school and

maintained in various lessons and extracurricular activities. Transfers of pupils from one class to another, either due to behavioural difficulties or fluctuations in learning progress, appeared to change the 'mood' in a reconstituted class because its members were unconsciously compelled to establish new transference relationships for the purposes of projection and projective identification.

5.4 Research Question No.3: To what extent can lesson outcomes be explained by Klein's and Bion's object relations theories?

As I embarked on my third year of my data collection, the Senior Leadership Team dramatically increased the frequency of lesson observations in a bid to complete their restructuring of the teaching staff. Lesson observations now went beyond the award of an OFSTED grade to interrogate a range of 'lesson outcomes', which might include a teacher's 'talking time', her management of various classroom episodes and the relationship of pupils' learning progress in a lesson to the attainment levels recorded in SIMS and monitored by *Matrix*. I managed to retain my teaching role after I was placed on my first six-week observation plan in September 2012 but I was directed to resign after I was placed on a similar plan in March 2014, having obtained a 'satisfactory with several good features' grade in my penultimate observation but an 'unsatisfactory' grade in my final one. As the planning for both lessons was deemed to be equally 'good' by the professional mentor and observers, I analyse them below using Klein and Bion's object relations theory to see if the unpredictability of the participant sample's behaviour and the resulting lesson outcomes can be explained on the basis of their psychodynamic aspects.

5.4.1 The participant sample

The pupils were a mixed, ethnically diverse Year 9 set of 7 girls and 8 boys who were in the lowest ability Year 9 maths class but possessed attainment levels that overlapped those of the pupils in the next two higher ability classes, as measured with reference to whole-school and departmental data. Although Key Stage 2 data and CATs scores were unavailable for the three pupils who had joined the school in December, of whom two were sisters who had resided previously in another British city and one was a boy who had arrived from Uganda, for the others mean CATs scores ranged from 70 to 118, Jesson band levels ranged from 1 to 3, and Year 8 end-of-year levels ranged from a low Level 2 to a low Level 5. This disparity in attainment widened further during the winter term: while one pupil starting at Level 2 had progressed to Level 3, and all pupils who had started at Level 3 or higher had advanced at least one sublevel, three pupils at Level 2 had failed to make any progress.

More than half the class had 300+ behaviour points in the SIMS register and had pronounced emotional and behavioural special needs. While four or five pupils at any time were on report to the Head of Year 9, four of the pupils at Levels 4 to 5 were especially prone to temper tantrums and were routinely assigned half-day and one-day internal exclusions for fighting with other pupils, behaving aggressively towards teachers and leaving the classroom without permission. From February 2014 onwards, when a girl from the next highest set was moved down, the pairing subset comprised three of the pupils at risk of exclusion and two other Level 4 to 5 pupils. Four additional pupils, all at Levels 3 to 4, could be classified as high-valency.

On a day-to-day basis, pupil behaviour tended to be highly unpredictable as nearly every pupil was prone to precipitous changes in mood and concentration levels due to elevated

levels of splitting and projection. The girl with the highest mean CATs score, for example, often arrived to lessons in a dissociated state and would walk to an unoccupied seat in one of the far corners of the room and put her head down; if I challenged her to behave 'normally' or phoned a member of the Senior Leadership Team to 'park' her, she often responded by having a temper tantrum and leaving the room. Two boys regularly complained of feeling ill and spent lengthy periods of time with their heads on their desks; other pupils were prone to fighting amongst themselves, sometimes physically, when they were 'in a mood'. The Level 2 pupils, who all struggled to carry out the four operations and were often unable to proceed with individual exercises without additional guidance from me or neighbouring peers, always tried initially to participate in the designated activities but were apt to stop working if anyone laughed at their mistakes or at the level of their differentiated exercises.

At the beginning of the year many pupils felt angry and frustrated about their inability to 'move up' to higher ability maths sets, despite their maths teachers' repeated assurances that diligent efforts in maths lessons invariably led to improvements in attainment levels. The air of despondency which infiltrated our first month of lessons was so discouraging that at the beginning of October I temporarily abandoned the Year 9 syllabus and resources provided by the department and planned lessons which staged topics as a series of GCSE problems that progressed in difficulty from grades G to E, which most of the class acknowledged as 'easy' and 'do-able'. After pupils' hopes for their GCSE results were restored and one of the Level 2 pupils succeeded in obtaining a Level 3 in the November assessment, the class routinely manifested varieties of work mentality which were not strictly commensurate with 'behaviour for learning' but nevertheless motivated most pupils to participate in whole-class discussions, complete differentiated exercises,

undertake practical exercises such as origami and achieve an overall level of learning progress with a high valued-added measure.

5.4.2 The schedule for data collection

The timing of these lessons was stipulated by the template of the six-week lesson observation ‘plan’ that was then in use across the school. Although I was permitted to choose the class I wished to be observed, in truth my choice was limited, as the Head of Mathematics and members of the Senior Leadership Team had to be available at selected times. In the same manner as I had done previously and was continuing to do for the Year 9 participant sample which featured in Section 5.3, I carried out psychoanalytically-informed reflection throughout the six-week period of the plan and wrote ‘whole’ narratives after each lesson observation. The lesson plans and textbook exercises which link to the lessons are provided in Appendices 5.8 and 5.9.

5.4.3 The ‘good’ lesson

Title: Balancing Equations Part I

Lesson objectives: Pupils were expected to write and solve one and two-step algebraic equations using a balancing method.

Observation focus: The lesson was a formal observation that had been scheduled during the fourth week of a second six week ‘plan’ to improve my teaching. I had been advised beforehand that, at this point in the plan, I was not required to obtain either a ‘good’ or an ‘outstanding’ from the designated observer, who was to be a member of the Senior

Leadership Team, but that I needed to demonstrate that my teaching had improved significantly since I had last been observed.

Ofsted grade: ‘Satisfactory’ overall but with several ‘good’ features.

5.4.3.1 The ‘whole’ narrative

I was emotionally exhausted. During my free period before the observation I had gone over the flipchart, sharpened pencils, distributed textbooks and exercise books and read another chapter in a John Le Carre novel.

The corridor was empty as I took my place at the door, ready to welcome pupils into the room. There was no sign of the VP, the designated observer, as Miri and Yolanda popped around the corner and waved hello, followed by the remnants of the rest of the class. I had to force myself to relax as they entered the classroom, sniffed around their desks and meandered to their seats. When Joey, one of the most irritable pupils in the group, flew past me to the back of the room to clap his mate Craig on the head, I deliberately refrained from yelling at him so as not to provoke his ire and gingerly escorted him to his seat in a joking manner: my manoeuvre was successful, as the other pupils laughed rather than try to defend Joey, as they did on numerous occasions. My terror dissipated a notch. Not all the pupils proceeded to work immediately on the starter question but I felt it was important to remain relaxed in order to nourish the calm atmosphere further before the VP appeared in the room.

The lesson was the first of a three on balancing and solving equations and the starter directed pupils to solve equations of varying difficulty using the inverse function method practised in the previous lesson. Katy finished rummaging noisily in her bag, squinted at the starter and announced to the class, “Yeah, I can do the starter!” before writing in her exercise book. It was a good sign. Susan asked me if they could skip the easy ones; I told the class that they could work on any they liked so long as they solved three problems. The VP poked his head in the door at this point and, looking at me with a sheepish grin, apologised to me for being late. The pupils threw me questioning looks but I smiled broadly and invited him to take the seat of one of the absentees. As I looked at him and he looked around the class, pupils wrote in the exercise books, showed each other their answers and laughed softly at what they had written in their exercise books. I allowed two minutes on the clock to go by before I moved to the whiteboard and asked the class to stop working and look at the board.

I called the class to order by saying that we were going to learn a new way of solving equations but that first I needed to see that if they could do so using the inverse function method. Sherry, who had only recently joined our group, interrupted me to say that she had already learned the balancing method in her other class and I told her that I would count on her to help if people were having lots of problems later in the lesson. Leyla asked if she could solve the most difficult starter problem and I told her that she could so long as someone solved the top left-hand one first. Many pupils began to shout out instructions without raising their hands and I gestured with my hands to calm down before asking Sharon to “start the ball rolling”. Three problems were solved by successive pupils in a slightly frantic manner before Leyla had the chance to attempt the “most difficult” one and she bowed to the class as I congratulated her on her solution.

I was buoyed by the pleasurable atmosphere. I breezily reviewed the day’s objectives and moved the flipchart to a page presenting the word ‘balance’. Could anyone explain what that meant? Several pupils bobbed up and down and began to speak but, before I could speak or act, Katy and Joey bawled out explanations that clashed and somehow cancelled each other out. I looked pointedly at the VP, and then around the class, and declared that I wouldn’t allow rampant “showing off”: everyone had a lot of knowledge but everyone had to raise their hands to speak. Katy then raised her hand and repeated that balance has something to do with an equal sign.

Encouraged by Katy’s immediate compliance with my instruction, I pretended to scan the room and then asked Joey if he would like to take part in a demonstration, something that I rarely attempted with the class. He looked around the room with a raised eyebrow and asked “Really?” before he jumped up from his seat and took the metre rule that I put into his hands. As he stood by his desk he started to twirl it around but I quickly positioned him in front of my desk so that he was directly facing the VP. “OK, Joey,” I said, “show us how you would make that balance on your arm.” Joey laughed and said it was easy: you just had to make sure that the exact middle of the ruler was resting on his arm. He was very satisfied with himself as he demonstrated this to the class. Several pupils wanted to explain why the ruler was balanced and then volunteered to speak again when I took small weights out of a box and wondered aloud how those could be placed on the ruler to create a balance. The VP looked slightly alarmed as I allowed the group to interact and squabble about the various ways in which the weights could be repositioned to balance each other and appeared relieved when the class established that, once a balance was created, it could be maintained by making equivalent changes to weights on both sides.

I thanked Joey and then showed the class a balance puzzle. Someone yelled that it looked like a nursery mobile and the class roared with laughter but the outburst dissipated as soon as I invited one pupil to begin a solution and she hesitated, thus affording Leyla an opportunity to cut in and gloat as she exhibited her problem-solving skills. I pointed out the ‘tricks’ for solving balance puzzles as we solved

two more on the board and then challenged the class to complete a differentiated worksheet in under ten minutes. The noise in the room rose perceptibly as everyone liaised with their nearest colleagues but once more I chose to ignore it. Instead I made a beeline to help Miri, who was unable to embark on an individual assignment without patient assistance from either myself or a peer.

The class groaned when I announced that it was time to move on. Katy and Sharon shouted out that they hadn't finished and they were going to keep working and that was that. The VP raised his eyebrows and for the first time in that lesson I felt physically ill with anxiety as I recollected how Leyla had exploded in the previous lesson when I had challenged her rude behaviour. So I lied and told the class that I had saved more balance puzzles for the start of the next lesson. Leyla stared at me as if she didn't believe me, but when I reassured her repeatedly that I really had, she let out a long sigh and reluctantly joined the others in checking solutions and making ticks on her worksheet.

I next showed the class a series of diagrams which featured kitchen scales with combinations of letters and numbers on the pans of each scale. Could anyone write an equation to represent the first drawing? Ron, who, more often than not, refused to engage in teaching and learning discussions, nearly fell off his chair as he jumped up to raise his hand. His eyes glistened as he deftly stated the correct answer and I wrote it under the diagram. Beth made a mistake when she attempted the next one and unintentionally provoked a whole-class argument about when to use addition and when to use multiplication signs. I eventually put my finger to my lips and held my hand up as a stop but I managed to provide a succinct review of algebraic notation without raising my voice and becoming exasperated; inwardly, I was thankful for the confluence of episodes which had enabled me to proceed successfully with my lesson plan.

There was really one hurdle left to surmount before it was time to pack up and the VP would be out of my room. I moved the flipchart back to the first kitchen scale diagram and asked the class to show me a way to solve for x using their knowledge of how the ruler balanced on Joey's arm. Katy advised that we should just "turn the equation round" as we always did but I insisted that there was another way, a faster way. "I know what to do!" exclaimed Susan, "let me do it!" I asked the class if anyone wished to "have a go" first, but they all deferred to Susan, who came up to the board and demonstrated to the class that, as the equation was $X + 2 = 8$, all one had to do was to take away 2 from both sides of the equations to see that $X = 6$. I congratulated her and noted that Susan had solved the equation by isolating the X so that it was equal to a single number. The class and I used the balancing technique to solve three more one-step equations before I directed them to complete a ten-minute exercise in their books and check their answers. The VP walked around the room, checked one or two books, and then sat next to Geoff, asking him to show him how he was solving an equation in his exercise book. By the time I had shown Miri the exercise I wanted her to complete, the VP had gone.

With two minutes until the end of the lesson, I asked pupils to check their answers from the board and then scooted around the class, gratefully handing out blue cards for participation and hard work. Yolanda told me in a loud voice that it had been a “lovely” lesson and that she felt very good; from the other side of the room Joey agreed that it have been “really nice”. I told the class that I had thought so too and many pupils thanked me as they left the room to go to tutor time.

5.4.3.2 The Vice Principal’s face value appraisal

While the Vice Principal advised me later that day that he had seen “lots of good things” in the lesson, including ‘clear’ learning progress, he was reluctant to judge it as ‘good’ because he could not be certain that I had been able to “control the class”. He had dealt with many of the pupils in the class and understood that they could be “extremely difficult”, and that, “once they got out of line”, it was not an easy task to “get them back again”. But he had to voice his concerns about my “class control”, as I had certainly “overlooked” several instances of behaviour which were proscribed by the whole-school behaviour policy and neglected repeatedly to assign sanctions as per the designated departmental procedures. He would describe my “teaching style” as “accommodating” rather than “assertive”: it focused more on preventing various pupils from having temper tantrums and “acting out” than on leading the class members to achieve their targeted attainment levels. When I pointed out that I had one of the highest-value added scores in the analysis of Year 9 mathematics attainment generated termly by *Matrix*, the software programme used by the senior leadership team to monitor teachers’ performance, he shrugged his shoulders and advised me to liaise further with the professional mentor.

5.4.3.3 Sequential analysis

Throughout the lesson, my perception as a participant observer was that the lesson was constantly on the verge of descending into basic assumption mentality. Technically, however, there were just five events which provided potential nodes for the expression of defence mechanisms: Joey's early rush into the classroom and attack on another pupil; Katy and Joey's argument about the meaning of the term 'balance'; the segment in which Joey demonstrated the balancing of a meter stick and the class squabbled about how the weights should be repositioned; Katy and Sharon's demand to continue with balance puzzles; and the argument which nearly broke out when Beth made a mistake in her calculations. In the instances which unfolded in the verbalisations and behaviours of two or three pupils, I managed to discourage any full-blown manifestations of defence by paying attention to the specific emotional needs of the participants and rapidly offering them meaningful containment. During the demonstration, I was unable to restrain the emergence of a prototypical basic assumption mentality but fortunately it was constrained by pupils' overriding urge to exhibit their mathematical knowledge.

5.4.3.4 A psychoanalytically-informed interpretation of the lesson

In an anxiety-ridden attempt to guarantee a smooth lesson delivery, I aimed unconsciously from the moment pupils were entering the classroom to convert their basic assumption verbal expressions and gestures into work mentality elements rather than postulate a genuine work mentality (Bion, 1961, p.157). As soon as Joey rushed past me to attack a high-valency pupil, I did not reprimand him, as I would have done in most lessons, but escorted him back to his seat in a joking manner that enabled the class as-a-whole to laugh good naturedly rather than seek to defend Joey. Once Joey was

successfully ‘contained’ at his desk, the establishment of a mentality with superficially robust work elements appeared to be considerably reinforced by Katy’s identification with Joey, which was rooted in both the prevailing pairing subset structure and the class’s ‘bible’ (Section 3.3.3): not only were Katy and Joey the most unstable members of the class who were most liable to be ‘wound up’ by the other members and function as dependent leaders (Section 3.3.3), they were continually getting into trouble in other areas of the school and comparing the ways in which they were sanctioned by the Head of Year 9 and members of the Senior Leadership Team.

Subsequently, whenever an uncontrolled verbal exchange threatened to subvert the tenuous ‘behaviour for learning’ into a full-blown basic assumption mentality, I acted involuntarily and reflexively to contain the class’s anxiety and block any associated manifestations of defence; this inspired all pupils to projectively identify their ‘good’ mathematical knowledge and skills through their participation in whole class teaching and learning and simultaneously enabled me to contain and assuage all of the ‘bad’ thoughts and feelings associated with their ongoing social interactions or mathematical affect. It was only when I directed Joey to demonstrate a metre rule balance that the class engaged in a brief dramatisation (Hinshelwood, 1987; Section 3.4) that featured assorted elements of all three types of basic assumption mentality. By the time the Vice Principal was leaving the room with only ten minutes left to go until the end of the lesson, pupils had completed many more written exercises than usual and appeared to involuntarily engage me in childlike positive transferences as I walked around the room and expressed my gratitude in maternal terms by handing out blue cards.

5.4.4 The ‘unsatisfactory’ lesson

Title: Calculating the Slope of a Diagonal Line

Lesson objectives: Pupils were expected to write equations for diagonal lines by determining the slopes and y-intercepts of plotted lines and to visualise diagrams of diagonal lines based on their knowledge of slopes.

Observation focus: This was the final lesson observation in my six week ‘plan’. It was essential that I delivered a ‘good’ or ‘outstanding’ lesson which demonstrated learning progress at 10- to 15-minute intervals as any lower grade would trigger proceedings that would lead to a termination of my contract at the end of the exam season.

Ofsted grade: ‘Unsatisfactory’ although the planning was deemed ‘good’.

5.4.4.1 The ‘whole’ narrative

I had opened the flipchart on the whiteboard, passed out the books and swept the carpet in my free period before the observation. By the time the corridor was filling up with pupils on the way to Period 5 I had been standing by my door for five minutes trying to ease the lump in my throat and the nausea in my gut. My mind and body felt leaden. I marvelled at the insouciance of my Year 9 pupils as I greeted them at the door on the way to their seats. James, the new pupil from Uganda, smiled sweetly and got to work immediately, checking the board carefully and writing the title and date in his exercise book, but everyone else ignored him. No one was particularly disruptive but several pupils remained standing by their desks a bit longer than usual, speaking and play-fighting with friends. I gingerly walked around the room, urging them into their seats.

The main objective of the lesson was to teach pupils how to deduce the equation of a diagonal line which had been plotted on a graph by calculating its slope and y intercept. But first I presented a starter exercise which checked pupils’ ability to write equations of horizontal and vertical lines and identify the coordinates of the intersections, two topics which had perturbed the group in the previous lesson. Just as Ari, who had been ill earlier in the week, raised his hand to announce that

he had forgotten what an equation for a line looked like, a VP and the Head of Maths strode in and took adjoining seats at a free desk in the middle of the room.

A few other pupils soon confessed to having difficulties in remembering equations for lines. I took a deep breath and reassured them that all one had to do was to mark three points on the line, write down the coordinates of each point, and see which coordinate remained constant. I modelled this method on Line A, a vertical line in the diagram, and Leyla and Beth shouted that the x was always a 1 so the line was 1. I corrected them, wrote $x = 1$ and reminded them that every equation had to have at least one letter, one number and an equal sign. Ari nodded his head and said it was easy. I cautiously exhaled and asked for a volunteer to try Line B, a horizontal line. Susan shouted out $x = 3$ and I involuntarily became irritated as the VP frowned and wrote something on her clipboard. I lowered my board pen and scowled at the class. “I won’t have you shouting out,” I growled. “You need to follow school routines and, if you don’t, I will have to give you sanctions.” Susan looked hurt and I deliberately softened my tone as I marked three points on Line B and asked her to name the coordinates. She produced the correct coordinates without any further prompts and again the VP noted it down.

We wrote the equations for all the other lines and named the intersections without further mishaps. I quickly read through the objectives on the board before turning to the next part of the lesson, which reviewed the types of equations which generate diagonal lines. Most pupils quickly saw that the equations of diagonal lines, unlike those for horizontal and vertical lines, incorporated both x ’s and y ’s, and I began to relax: their explanations had been fairly sophisticated and had incorporated several keywords. But when I moved the flipchart to a mostly empty slide entitled, “What steps must you take in order to plot the line $y = 2x$?” the disposition of the group changed abruptly. The air was infused with a static quality and several pupils craned their necks around to look at the observers. I immediately rephrased the question: “What does $y = 2x$ look like?” Nearly all the pupils murmured that it was a diagonal line but even though the VP and the Head of Maths sent inviting smiles around the class, no one attempted any elaboration, even when I suggested to pupils that they could show me using their hands.

I had been prepared for this and was not unduly worried about failing this particular progress check. I reminded the class that, although I would be teaching them a very quick method for looking at a diagonal line and write its equation, they already knew a way to look at an equation and generate a line—it wasn’t quick but it was a very nice topic to get on a test. Did anyone remember how to plot lines? When no one answered immediately, I flipped through a few slides which reviewed the lengthy process of constructing a table, making successive substitutions to generate coordinate pairs, plotting the points and finally generating a line. Joey cut in: “Yeah, yeah, yeah, we did this last week. Why are you going on about it again?” I looked around the class and said, “Well, when I asked you how to plot the equation and you didn’t say anything, I thought you forgot. And actually it’s really important that you remember before we go on.”

The VP peered at me with a rather sullen expression and, against gut instinct, I challenged the class to take a few minutes to make a quick sketch of $y = 2x$ and then describe the line. Leyla and Katy groaned it was “long” and that they were all finished with that; the boys in the back concurred noisily. The temperature in the room appeared to rise and when no one bothered to pay attention to my requests for constructive participation, I stepped over to the small white board and, without any verbal warning, started to write down the names of those who had switched off and begun to chat with their neighbours.

“Why are you writing down my name?” screeched Katy, as she shook her plait off her shoulder and momentarily caught sight of the white board. “You’re talking,” I replied coolly, “and we need to go on with the lesson.” I called a few names and asked everyone to face forward and look at me but Katy would not let me speak further and ranted to the group: “I wasn’t talking, take my name off the board. Why are you still speaking at the board? We ought to be doing a worksheet now or something, not doing work that we’ve done before. Don’t tell me that *I* need to stop talking. *You* need to stop talking and teach us something.”

This wasn’t the first time Katy had lost her temper in class but as the VP and Head of Maths started to write notes I became paralysed and could not remember how I usually calmed her down. I simply stood there, shocked, as Ari chimed in, “Sometimes you do talk too much.” Soon pupils were taking it in turns to say how they hated to work on the board and how they wanted me to give them worksheets, like all their other teachers. Then Leyla pointed her finger at me and accused me of renegeing on my promise to take the class out to the muga pitches to carry out a practical bearings exercise. “You lied to us!” she growled in a mock legalistic voice. I wanted to pass away as the room echoed with pupils yelling, “You lied, you lied.” Nearly half a minute passed as I grappled with an urgent impulse to drop everything and walk out of the room, then out of the building. “When did I say I would take you out?” I interrogated them, with more than a touch of sarcasm in my voice. “Does anyone ever pay attention when I speak?”

The VP evidently concluded that they didn’t. She looked at me mournfully, elbowed the Head of Maths, and excused herself; the Head of Maths smiled and waved to the pupils and followed the VP into the corridor. Someone, I don’t know who, drummed on the table and said, “Well there they go.” Yolanda and Beth, who sat just in front of my desk, studied my face and announced to the class that “Mrs S is upset”. I smiled ruefully. “Are you finally going to teach us something?” asked Sharon. I knew that the lesson had failed and decided then and there that I would be going home as early as possible that afternoon rather than staying late to revamp the next day’s lesson. “Yes,” I murmured and turned to the board. “We have a schedule to keep to this week.”

I turned to a slide which featured the plots of two lines, $y = 2x$ and $y = 2x + 1$, and asked the class to think about their similarities and differences. I allowed them to shout out and squabble and congratulated individual pupils as they described what they saw. The pupils paid close attention as I showed them how to calculate the

slope and y-intercept of each line; Joey actually thought it was “cool”. With the exception of Miri, who had a great deal of difficulty counting squares on a grid, they peacefully completed the textbook exercise and then checked their answers. With only a few minutes to go until the end of the lesson, I presented two equations, $y = 3x$ and $y = 4x$, and asked them how these lines would compare on a grid. “I am not exactly sure,” wailed Susan. “So what could you do in that case?” I asked and looked around the room. “Come on, what can you do?”

“We can plot it,” chimed Katy and Leyla. “But will you?” I asked cynically. I turned to the next slide which had two prepared grids. “I’ll do it, Mrs S,” shouted Ari. “No, I can do it,” said Joey. I directed Ari to do the first one and Joey the second one. They respectively identified three coordinate pairs without completing a table and I drew in the lines. “So as the number before the x gets bigger, the slope gets steeper,” said Ron. “You’ve got it,” I said and motioned for Jill and Beth to collect in the exercise books and textbooks. Everyone packed up and stood behind their chairs. “Can we leave now?” Beth asked me. I nodded my head as I stooped to check my emails to see if a message from the VP had arrived. A subsequent analysis of their exercise books confirmed that every pupil had completed at least a satisfactory if not considerable amount of written work.

The next day the class entered the class room in a rather glum manner. When I asked them what had happened in the previous lesson, they accused me of “showing them up” in front of the VP and Ms W—and they weren’t going to “take that”.

5.4.4.2 The Head of Mathematics’ and Vice Principal’s face value appraisal

The Head of Mathematics and another Vice Principal judged the planning as ‘good’ but believed that the pupils “had been acting up” because they were “sending out a serious message” about the state of our teacher-pupil relationship, which precluded any further consideration on their part of my high-valued added scores on *Matrix* or the numerous issues associated with having so many pupils with emotional and behavioural issues in one class. They advised me that they would “stop bothering me” if I resigned immediately but that they would commence legal proceedings to terminate my contract if I tried to “cling on”. I did not have the emotional stamina to continue the discussion but I

contemplated these options and later that day sent the Principal an email to say that I would be leaving my post at the end of the academic year.

5.4.4.3 Sequential analysis

The lesson progressed through five phases in which oscillations in group mentalities were highly volatile. In the first ten minutes, as pupils appeared to struggle in gathering the confidence necessary to tackle the starter problem, the mentality of the class-as-a-whole was desultory. When Ari declared that he had forgotten what an equation for a line looked like, perhaps because he had been ill for a few lessons, the focus of the group dissipated further as many subset members turned to face each other and agree.

The next phase of the lesson was initiated as the Head of Mathematics and the Vice Principal entered the classroom, took prominent seats in the centre and actively attempted to win pupils' attention by peering conspicuously around the room and smiling. Pupils visibly became more anxious as they resettled themselves in their seats: as they proceeded to engage in the review of the starter activity and the introduction of new material, they frequently turned their heads to steal glances at the observers.

The third phase of the lesson after I had asked the class to make a quick sketch of the equation $y = 2x$ and then reiterated that it was important for them to do so because they may have 'forgotten'. At this point pupils began to become aggressive and an embryonic fight-flight mentality materialised.

The fourth phase of the lesson commenced as Katy experienced a violent temper tantrum when I wrote her name on the board rather than calmly quiet her down, as I usually did,

when she spoke out of turn during the graphing exercise. Her anger and destructive feelings then spread throughout the class, who erupted in a full-blown fight-flight mentality and then accused me of being a ‘bad’ teacher who talked too much and lied to the group.

Once the observers had departed, the final phase of the lesson unfolded as I reassumed my usual persona and the class worked enthusiastically to effect reparation.

5.4.4.4 A psychoanalytically-informed interpretation of the lesson

Although pupils were already struggling to manifest a work mentality, Ari appeared to forestall its secure establishment by voicing his inability to remember what “equations look like”, thereby projecting his confusion into the class as a whole, which instigated a rise of anxiety and a series of parataxic distortions within the pairing subset (Section 3.4.2.2). Subsequently, the Head of Mathematics and the Vice Principal may have projected persecutory anxiety into the class as they conspicuously made eye contact with pupils as they participated in the first two whole-class activities. At this point, I became too overwhelmed with anxiety and anger to provide a quality of containment that was sufficient for the gratification of the pupils’ individualised needs for ‘special attention’ (Section 3.2.4.2).

For the next five to ten minutes, a moderate work mentality emerged as I engaged pupils in a series of neatly scaffolded questions regarding the equations of diagonal lines. But when I produced a slide that was headed “What does $y = 2x$ look like?” an embryonic fight-flight mentality materialised as I inadvertently antagonised pupils by asking them to carry out an exercise which was meant to showcase their knowledge of plotting lines,

but appeared instead to expose apparent ‘gaps’ in their knowledge to the observers and threaten the integrity of the group.

When I announced that I had thought they had ‘forgot[ten]’ some of their knowledge regarding equations, pupils’ anxiety levels rose and the underlying ‘container-contained’ substructure of our teacher-pupil relationship (Section 3.3.1) began to dissipate. In subsequently responding to Katy in an atypically harsh manner, I instigated an episode of violent splitting and projection that appeared to radiate from Katy throughout the rest of the class, who projected their anger and frustration into me by branding me a ‘bad’ teacher who spoke too much and lied to the class.

As soon as I realised that the lesson had failed, my anxiety and aggression evaporated and I automatically reassumed the persona I customarily displayed to the class. Upon the re-establishment of a secure ‘container-contained’ model with channels for positive projective identification operations in both directions, the class speedily reassumed the depressive position and unconsciously endeavoured to effect reparation by re-engaging in an operative work mentality.

5.4.5 Discussion

A comparative analysis of the ‘good’ and ‘failing’ lesson appears to indicate that the unpredictability of the lesson outcomes can be explained largely in terms of Bion’s characterisations of group mentalities. When pupils manifested work mentality, they appeared to function as a unified ‘sophisticated’ group which voluntarily negotiated the completion of work tasks in fixed time intervals by “mobilising the emotions of one basic assumption” to suppress the manifestation of basic assumption mentality (Bion, 1961, pp.97-98). At the points at which the ‘sophisticated’ group ceased to operate, pupils

abandoned their constructive engagement in mathematical activities and manifested basic assumption mentality, either through the distinctive discourse of the pairing subset group, which comprised four rather than two pupils, or through fight-flight mentality, in which pupils projected their anger and aggression into me as my vocalisations appeared to threaten the integrity and survival of the group. However, oscillations between various mentalities were not always clear-cut: even as pupils erupted vociferously in fight-flight mentality during the second lesson, I sensed that Bion was correct in asserting that the basic assumptions always operate in tandem with work mentality and derive from a latent 'proto-mental' system in which their components are only partially differentiated (ibid, p.100). For example, the liveliness of the hostility that sustained the outburst of fight-flight mentality in the 'failed' lesson shared many descriptive characteristics with the creative energy underlying work mentality in the 'good' lesson, and both mentalities were mediated by the distinctive discourse and behaviours of the pairing subset.

However, notwithstanding the unstable interface between work and basic assumption mentalities, the 'unpredictable' eruption of fight-flight mentality in the second lesson and the resulting 'failing' grade appeared to be triggered by the momentary unconscious lapse in my ability to sustain my habitual containment style that was induced by the overwhelming persecutory anxiety associated with being observed. Whereas in the 'good' lesson I had facilitated pupil learning and attainment by engaging in containment strategies that managed to re-contextualise all manifestations of defence as constructive features of the teaching and learning process (Section 3.3.1), in the 'bad' lesson I abruptly assumed a paranoid-schizoid state of mind while interacting with Katy and inadvertently, suspended the operation of the distinctively-styled 'container-contained' model of learning that the class and I had co-constructed over a lengthy period.

In many of the other lessons I subsequently taught to this participant sample, however, my ability to contain the group a less decisive factor in the abrupt activation of oscillations and ‘unpredictable’ and/or disruptive behaviour. In episodes in which pairing mentality predominated, Joey, Katy and a variety of subset members and high-valency pupils tended to spurn my authority all together while the rest of the class appeared to dissociate and a desultory ethos would proceed to descend upon the classroom. But in episodes which were instigated by the emergence of a dependent leader, various qualities of the ongoing work mentality would incrementally morph into a dependent mentality that appeared to be stipulated through unconscious rules and conventions introduced by the dependent leader.

Chapter 6 Review of the Findings and Conclusions

6.1 Overview

This thesis can be read on two levels. Nominally, in accordance with its original research objectives, it comprises a participant observer's psychoanalytically-informed exploration of the psychodynamic aspects of the teaching and learning process in mathematics lessons using a methodological approach that derives from the clinical methodology of object relations psychoanalysis. It incrementally generates new knowledge by exploring the unconscious thoughts and feelings which underpin one teacher's classroom practice, surveying unconscious elements of teacher-pupil relationships, and characterising some of the ways in which pupils manifest unconscious defensive operations on the individual and collective levels. The study finds that teacher-pupil interactions and pupils' participation and attainment in lessons are impacted by a wider range of anxiety determinants and social constructs than have been considered previously by psychosocial research and identity studies. It also reiterates the conclusions of many studies in the domains of mathematics education and emotion research, which assert that teachers have the capacity to manage and facilitate the co-construction of mathematical knowledge. On the unconscious level within the context of object relations psychoanalysis, however, this capacity would appear to be exercised principally through the containment of pupils' anxieties and the satisfaction of their needs and desires for love and affection.

At the same time, in view of my decision to present the data analysis in an autoethnographic format, this thesis functions as an exegesis of the extensive and sometimes excruciating informal professional development I underwent as a consequence of my participation in the study. In this chapter, therefore, as I summarise my findings,

evaluate the efficacy of my research design and suggest ways in which object relations psychoanalysis might inform contemporary dilemmas in British education, I also endeavour to transpose my open-ended research questions into more modest lines of psychoanalytically-informed inquiry so that my conclusions may be incorporated into CPD programmes for teachers as well as more traditionally-oriented social scientific research.

6.2 Summary of the findings

The objective of this research was to examine how unpredictable and disruptive episodes during secondary school mathematics lessons are mediated by unconscious operations and the manifestation of group mentalities. The collection and analysis of data at individual, subset and whole class levels using object relations theory and methodology reveals a generally under-appreciated dimension of teaching and learning in which discourse and social interactions function as unconscious channels for the fulfilment of teachers' and pupils' needs and desires for love and containment. The contemporaneous operation of conscious and unconscious thoughts, feelings and emotions during the unfolding of classroom events helps to explain why the 'co-construction of knowledge' conceptualised by social constructivist learning paradigms is so susceptible to the infiltration of pleasurable and painful emotions and can result in apparently unpredictable learning outcomes.

6.2.1 Unconscious elements of teacher-pupil relationships

In the context of object relations psychoanalysis, every teacher and pupil who participates in a typical classroom-based lesson is understood to possess a unique "psychic interface" which links her distinctive internal world to the external environment. Although it was

beyond the scope of this thesis to carry out an across-the-board examination of how a pupil's psychic interface mediates her social interactions and attainment in mathematics lessons, my psychoanalytically-informed reflexive study as a participant observer demonstrated how a teacher's lesson planning and teaching style can be mediated by the constellations of anxieties and defences which underlie her prevailing state of mind and the countertransference reactions she experiences while she delivers her lessons.

On both unconscious and conscious levels, teachers and pupils appeared to construct relationships which emulate many aspects of the mother-infant dyad characterised by Klein and the 'container-contained' model subsequently formulated by Bion. The teaching and learning of mathematics appeared to be subsumed within a much broader bandwidth of dynamic and reflexive affiliation which incorporated the conscious and unconscious responses of the teacher and pupils to a wide range of anxiety determinants that are unrelated to the acquisition of mathematical knowledge. These anxiety determinants appeared to emanate from: oscillations between the paranoid-schizoid and depressive states of mind; distressing changes in pupils' analytical ability and learning preferences that are induced by the transition from the latency state to the adolescent stage of personality development; social events which have occurred outside the classroom; and personal and/or family narratives.

A 'container-contained' model tended to materialise as I was induced unconsciously to provide meaningful containment to my pupils, who involuntarily desired me to assuage their anxieties, provide them with love and attention, and gratify their other emotional needs. Over a period, I found myself developing a maternal demeanour while my pupils intermittently regressed to infantile or latency stages of personality development in which they behaved as siblings who were competing for their mother's attention.

6.2.2 Inferences of defence manifestation

In the object relations theoretical perspective, an individual manifests defence in response to anxiety by involuntarily assuming either the paranoid-schizoid or depressive state of mind, each of which is characterised by distinctive ‘constellations’ of anxieties, defences and qualities of maternal relationship. As defence manifestation is both unconscious and involuntary, and may not be accompanied by observable expressions of emotion, the manifestation of defence may only be inferred through an analytical process deriving from the clinical methodology of object relations psychoanalysis, which recognises an occurrence of defence manifestation as a dislocation, contradiction or disproportionate pause in the ongoing discourse and/or behaviour. Once a manifestation of defence is identified, it may be interpreted within the context of object relations metapsychology.

Over the course of my study, pupils’ manifestations of defence did not always significantly disrupt the delivery of lessons. As the potency of anxiety determinants tended to be magnified by the inchoate social interactions in typical classroom settings, pupils appear to involuntarily assume characteristic roles and develop additional dyadic liaisons with peers and support staff who possessed qualities which enabled them to formulate defensive identifications and idealised transferences. Commonplace pupil interactions regularly appeared to incorporate momentary transformations in discourse and behaviour and splits in attention which appeared to be mediated by the operation of vertical and horizontal splitting operations induced by multiple self states (Davies, 1996; Bromberg, 1998), by ‘mirroring’, ‘idealising’ as other types of transference, and by positive and negative varieties of projective identification. Occasionally, pupils also manifested the defences associated with the depressive state of mind to express their feelings of guilt and remorse.

Certain pupils, however, such as Derrick and Ruby, appeared to experience high levels of persecutory anxiety and find it especially difficult to share their teacher's attention with their peers. These pupils tended often to engage in splitting and projection associated with the paranoid-schizoid state of mind, which often took the form of a temper tantrum which was liable to disrupt, sometimes completely, the ongoing teaching and learning activities. The most defensive pupils were apt to form a 'pairing' subset, a group of four to six pupils which developed a distinctive discourse and mentality *apropos* Bion's characterisation of pairing mentality, as an additional layer of defence and assumed a disproportionate role in modulating the behaviour of the class as a whole.

Collective manifestations of defence appeared to occur in the class as a whole whenever pupils' work mentality morphed into one of the three basic assumption mentalities characterised by Bion (1961) in *Experiences in Groups* or a dramatisation, a mixture of basic assumption mentalities. Alternatively, collective manifestations of defence appeared to be instigated by manifestations of defence which began in an individual or the pairing subset and subsequently 'spread' throughout the classroom, either through a group transference or the operation of projection identification, so that a 'unanimous will' of the class seemed to materialise. In either case, the emergence of defensive mentalities in the class as a whole appeared to be governed disproportionately by members of the pairing subset, whose spoken exchanges sometimes seemed to 'speak' for the class and whose behaviour often functioned as the class's 'overspill' for the discharge of excessive anxiety.

6.2.3 The relationship between defence manifestation and affect linked to mathematics

A sequential analysis of Ruby's interview appears to indicate that the splitting and projection which underlies many of her temper tantrums emanates from the envy she intermittently feels towards her peers and the persecutory anxiety she experiences whenever she is 'set off' by certain pupils. However, she appears to engage in another type of splitting with regards to the teaching and learning of mathematics. In 'good' lessons, Ruby tended to participate constructively in the planned teaching and learning activities alongside her peers; in 'bad' lessons, however, she tended to work individually from a textbook while seated separately from the class. Although this latter type of splitting appears to be at least partially instigated by Ruby's inability to assimilate the more complex conceptual and analytical levels of understanding required by selected mathematical topics, it may emanate from Ruby's difficulties in coping during teaching and learning activities that require a relatively high level of peer interaction and do not offer the prospect of ready praise from the teacher. As the data analysis does not provide sufficient evidence of how Ruby's distinct anxieties and associated splitting operations can be distinguished, further work is needed to ascertain the specific role of mathematical affect in defence manifestation.

6.2.4 Bion's characterisations of group mentalities

In typical lessons the class as a whole, or a sizeable subset of pupils, may appear to oscillate between manifestations of work mentality, in which they are involved in a time-dependent task which involves rational thinking and genuine learning, and basic assumption mentality, in which they cease to work because they are overwhelmed by an

anxiety determinant that threatens their existence and/or constitutes an attack on the group. The data analysis confirms that pupils manifest the fight-flight, dependent and pairing variants of basic assumption mentality characterised by Bion (1961), although pairing mentality appears to feature most often in the interactions of the pairing subset. In certain cases, pupils' work mentality may be infused with basic assumption elements, which appears to confirm Bion's belief that work and basic assumption mentalities emanate from a single prototypical precursor.

6.2.5 Unconscious determinants of unpredictability

In view of the above, it would appear that disruptive and/or 'unpredictable' classrooms can occur when a rising level of anxiety causes a critical breakdown in the distinctive 'container-contained' model that sustains a teacher-pupil relationship. The breakdown may occur simply because the class's negative projective identification operations abruptly overcome their positive ones to such an extent that a variant of basic assumption mentality is instigated which is too overpowering for the teacher to contain on any level. In many instances, however, such a breakdown occurs because the teacher momentarily loses her capacity to offer the proactive and constructive containment needed to either to limit a manifestation of defence at the individual or subset level or to halt its spread into the class as a whole. In the course of my data analysis, for example, at various points I was overcome by countertransference reactions, splitting and projection associated with the paranoid-schizoid state of mind, and a type of dissociation.

6.3 Implications of the findings with respect to constructivist perspectives on teaching and learning

Over the last half century or so, constructivism has played an important role in much of the teaching and learning in British schools. Yilmaz (2008) argues that constructivism is not a single or unified theory but rather an assemblage of eighteen distinct epistemological frameworks which emerged in opposition to positivism and other objectivist intellectual movements. Although the methodological orientations of these frameworks tend to be categorised as social, psychological or ‘radical’, they share the following core principles: as knowledge does not exist outside our mind, truth cannot be absolute; therefore, knowledge is not ‘discovered’ but ‘constructed’ by individuals in accordance with their experiences; as such, knowledge is a temporary, internalised construct mediated by developmental, social and cultural factors that must be appraised in terms of its viability rather than its correctness (ibid, p.163).

Many teachers who have been trained to consider Piaget’s theory of cognitive development and Vygotsky’s social constructivist theory have tended to develop their classroom practices accordingly. They understand that they are no longer in the straightforward business of transmitting information that their pupils are to learn by rote: instead, they are obliged to plan teaching and learning activities that give pupils numerous opportunities actively to develop a range of linguistic and cognitive skills. Not only do teachers need to demonstrate that they value pupils’ opinions, they must be able to modify schemes of work in order to address pupils’ beliefs and misconceptions.

However, educational researchers now recognise that the implementation of constructivist theories in classroom-based teaching and learning does not always promote the qualities of teacher-pupil relationships and social interactions which are necessary to

foster pupil attainment. Bibby (2008, p.37), for example, observed that Vygotsky's characterisation of learning within the zone of proximal development did not always accord with her empirical observations. She noted that, in presenting teaching and learning as a gentle, idyllic process of reciprocation, Vygotsky ignores many of its intrinsic problems, including the palpable resistance of pupils to many of their teachers' well-intentioned overtures and directions and their ever-present desire to do what they wish. Furthermore, in presenting such a benign view of teacher-pupil relationships, Vygotsky inadvertently causes the teacher to be idealised as an omnipotent figure whose psychic difficulties are subsequently liable to become 'unspeakable' and 'intolerable'.

Le Cornu and Collins (2004) argue that, in placing so much reliance upon pupils' social skills as drivers of teaching and learning, constructivist instructional frameworks often engender complications in lessons for both pupils and teachers which are not found in 'traditional' classrooms. For example, certain pupils may shrink from the emphasis on social interaction because they lack self-esteem, suffer from anxiety or depression or tend to be the perpetrators or victims of bullying. Those in large class sizes may not be able to participate wholeheartedly in discussions and other interactive activities because they have not been able to identify peers whose zones of proximal development dovetail neatly with their own. LeCornu and Collins assert that on social and psychological levels pupils may experience a number of stresses and strains that are apt to materialise as a result of the ways in which they are positioned discursively with regards to culture, ethnicity and gender and that the "culturally specified criteria related to success and failure" may change their sense of self in ways which reduce their performativity and attainment (ibid, pp.28-29).

The adoption of constructivist perspectives may also negatively impact teachers, who are obliged to develop a wider range of the behaviour management and interpersonal skills in order to elicit pupils' thoughts and opinions, scaffold their learning progress and contain the anxiety and emotions which materialise as they engage socially in interactive tasks. They may then struggle to retain their sense of emotional well-being as their social interactions with pupils are assessed in performance management procedures which involve incessant monitoring and assessment and engender a "panoptic performativity" mind-set (Perryman, 2006, p.30).

But it is possible to address many of these problematic aspects of constructivist perspectives by considering psychoanalytically-informed understandings of teacher-pupil relationships, stages of personality development and group dynamics, which have circulated since the 1920s. Despite the angst and controversy that enveloped the evolution of various schools of psychoanalysis, Pfister (1922), A Freud (1930), Isaacs (1932) and other early prominent psychoanalysts endeavoured to promote a collaboration of psychoanalysis and pedagogy that would make teaching and learning more engaging for pupils and less painful for teachers. In the years leading up to World War II, their core objective was to instruct teachers in psychoanalytic theory so that teachers could improve the quality of their pupils' education and social interactions by channelling their pupils' unconscious sexual impulses towards socially normative behaviour and constructive modes of learning (Mayes, 2009, p.544).

After the war, successive psychoanalysts endeavoured to alert educationalists to the impact of emotions on the ability of pupils to learn. In the United Kingdom, Klein proposed that many of the difficulties children experience in school stemmed from unresolved issues surrounding the Oedipus complex (Klein, 1932; Mayes, 2009) and

Fairbairn (1958) highlighted 'excessive intellectualisation' and a 'false self' as defence mechanisms which were often symptomatic of a student's attempts to exclude external reality. Oeser (1955) and others, in collaboration with the Tavistock Institute in London, used object relations theory to study the dynamics of classroom groups and re-evaluate traditional classroom practices and recognised that children's interest in academic subjects were generated and sustained by the human qualities and attitudes of teachers, rather than their professional competencies. They then proposed that schools should assimilate the basic principles of sociometry and psychology in order to promote the active learning of pupils in small groups so as to reduce tensions in teacher-pupil relationships.

At about the same time, Redl and his research team at Wayne State University in the United States (Redl and Wattenberg, 1951, pp.51-70) identified various emotional blocks to learning, ranging from sibling rivalry to "free-floating" anxiety which was liable to attach itself to classroom activities for no apparent reason, and formulated a taxonomy of 'mechanisms' that inhibit learning, including 'denial', 'escape' and 'shift and substitution'. They subsequently challenged many of the psychiatric concepts that had governed the treatment of troubled youngsters and pioneered a new approach to teaching and learning in mainstream schools that recognised the role of feelings and emotions in the development of teacher-pupil relationships and the instigation of disruptive classroom phenomena. By 1976, the training of US special educational needs teachers was dominated by an emphasis on the psychodynamic perspectives on education that were encapsulated in the publication of the fifth edition of *Conflict in the Classroom* (Long et al, 1965).

In the 1980s and 1990s, interest in psychoanalytically-informed methods of ameliorating pupil engagement and attainment waned dramatically as policy makers embraced behavioural and cognitive approaches to pupil behaviour management. However, Kohut (1971) and others continued to debate the feasibility of giving teachers an understanding of transference, countertransference and resistance so that they could address the unconscious aspects of their teaching practices, and a small number of projects were undertaken to assess the efficacy of merging educational practices with psychoanalytic principles. For example, the one-roomed Studio School was founded in New York City in 1970 to promote the incorporation of psychoanalytic concepts by changing pupil groupings according to activity and scheduling frequent discussions in which teachers and pupils assessed teaching and learning in terms of ongoing unconscious operations; Welber (1983) later found that pupils at the Studio School had higher self-esteem and were more obedient than pupils in either traditional or randomised classroom settings.

Over the last 25 years, the escalation of emotions research and the creation of the Collaborative for Academic, Social and Emotional Learning (CASEL) in 1994 (Cohen, 2006) have stimulated a resurgence in projects which seek to integrate psychoanalytic approaches into mainstream education. In North London, the Caspari Institute was set up in 2000 to provide teachers, pupils and parents with one-to-one and group support in addressing children's emotional blocks to learning through psychological insights. More recently, the nearby Anna Freud Centre has developed the Reflective Network Schools programme, which applies child-analytic observation techniques in middle and secondary school classrooms by working with small social networks in ways that are intended to enable all members of a school to develop a rich understanding of the unconscious operations which mediate teacher-pupil interactions and perspectives (Ansari and Kliman, 2015). The programme is led by RNS therapists who make initial observations

and then coordinate a timetable of briefings, debriefings and discussions with teachers, pupils and parents to discuss their different perspectives on their classroom experiences. Once teachers are familiarised with the concepts of transference and countertransference, they are supported in undertaking psychoanalytically-informed reflection of their practices.

6.4 Implications of the findings with respect to current developments in research on affect and mathematical thinking

In a systematic review of the current developments that are taking place in mathematics education research across Europe, Hannula et al (2018) report that, although mathematics education researchers have been hesitant in recognising the relevancy of affect, its characterisation has proceeded within three distinct categorisations. While McLeod's (1992) categorisation of beliefs, attitudes and emotions, continues to serve as the predominant theoretical framework, it has been extended by Op't Eynde et al (2007), who recognised motivation as an important concept and identified different levels of social context, and Hannula et al (2011, 2012), who described three dimensions that can be used to identify and define affective theoretical constructs (ibid, p.129). A quantitative analysis of the terminology for affect employed in 134 CERME papers confirms that affect, belief, attitude, motivation and goal are the key concepts under investigation and that beliefs linked specifically to affect are still considered separately from those linked to foundation theories, self-efficacy and teacher beliefs (ibid, p.131).

The research on affect highlighted at ERME congresses has proceeded along three main lines: the characterisation of affect and the relationship between affective variables and achievement; the role of affect in mathematical problem solving and pattern posing; and

changes in students' affect. The findings concerning the first line of research appear to support McLeod's (1992) categorisation and confirm the role of social variables such as school context, gender and grade in engendering students' beliefs. While several different scales have been used to measure beliefs, many studies indicate that positive beliefs and self-efficacy are correlated with high performance in mathematics (Gagatis et al, 2010; Sorlie Street et al, 2017).

In the investigation of attitudes, positive correlations have been confirmed between students' attitudes and mathematics achievement, and three distinct dispositions have emerged: the emotional, the affective and another correlated with the idea of success in mathematics. In the investigation of emotions, Pekrun's (2007) framework of academic emotions, which is based upon an appraisal theory of emotion (Section 2.2.2.1, p.37), has been used as a dimensional taxonomy that covers activity versus outcome emotions, positive or negative valence and degree of activation. Op't Eynde et al's (2007) framework has also been used to investigate the intensity of emotion and how teaching influences the development of certain emotions and students' emotional regulation. Other studies (Pantziara and Philippou, 2010, 2011) have concentrated on the construct of motivation using achievement goal theory and have found that mastery goals are related to positive affective variables, including self-efficacy, interest and behaviour (ibid, pp.132-133).

The relationship of mathematical affect and problem solving has continued to be investigated in studies which characterise students' emotions during problem solving. Antognazza et al (2015) found that, within the context of specific tasks, students' positive and negative emotions derived from an assessment of the difficulty of the task and that

successful problem solving involved an appreciation of the aesthetic aspects of a problem and the degree of freedom students felt while facing the problem.

An analysis of the papers concerning changes in students' affect suggested that the dynamics of change has emerged as an additional characterising feature of the research (ibid, pp.134-135). On the micro level, the dynamics of change has been investigated as changes in aspects of state and trait emotions, resistance to emotional changes and the relative stability of emotions in relation to the presence of others; on a macro level, it has been investigated as the detrimental changes in affect which are caused by transition, the classroom micro-culture and stipulated teaching interventions. It is now recognised that students' affect is influenced by many aspects of the learning context and that students in a single class may have diverse affective experiences.

Hannula et al's (2018) systematic review of the research undertaken within the last twenty years reveals two recurring themes. First, Schlogliman (2004) and others have recognised that the characterisation of affect is contingent upon the methodology that is used; they advocate the development of new methodologies that have the capacity to establish a distinction between conceptualisations of affective constructs and their operation in research settings. Currently, there are two schools of thought regarding inferences of affect (ibid, p.136): one group of researchers regard affective constructs as deriving from an individual's inner awareness or interpretation of events on either a conscious or unconscious level, rather than from an overt behaviour; consequently, they cannot be directly observable (Panaoura and Philippou, 2006). Another group sees affective constructs, such as attitudes and beliefs, not as qualities of individuals but as researchers' models for describing and understanding mathematical behaviour (Zan and De Martino, 2004).

Second, while some researchers continue to search causal relationships between affective variables and mathematical performance and behaviour, often using quantitative methods to isolate, identify and interpret variables according to statistical results, many more employ social scientific interpretive paradigms which abandon the goals of explaining behaviour through measurement and determining general rules between affective and cognitive constructs (p.137). One new trend is to balance quantitative and qualitative approaches in order to shift the focus from examining disruptions in a phenomenon to the interpretation of the phenomenon itself, or to use one of the new qualitative methodologies, such as Kaasila et al's (2006) autobiographical narratives, which reconstruct participants' mathematical identities. Hannula et al (ibid, p.138) conclude that three of the most promising possibilities for the investigation of the dynamics of mathematics-related affect include the study of group-level processes, physiological measures of affect, such as heart rate monitoring, and comparative research on mathematics-related affect that links findings on different educational systems, linguistic groups and sociocultural contexts.

A deep examination of the relationship between mathematics-related affect and problem-solving processes was beyond the remit of my study, but my thesis possesses a broad contiguity with current developments and trends in mathematically-related affect research. First, its methodology incorporates an analytical method that derives from the clinical methodology of object relations psychoanalysis and that has the capacity to distinguish conscious from unconscious expressions of affect at individual, subset and whole class levels and investigate connections between mathematically-related affect and various aspects of pupils' performance in mathematics lessons. Second, by conceptualising expressions of affect as defence mechanisms, it enables characterisations of unconscious aspects of affect that have not been highlighted in current frameworks.

Finally, its findings demonstrate that object relations methodology is effective for investigating all aspects of the dynamic changes in classrooms noted by Hannula et al (2018), including transformations in a group's 'energy', the focal point for a group's excitement and fluctuations in a classroom's climate (p.138).

6.5 Evaluation of the research design

6.5.1 Open vs closed

Although my research design enabled a broad inductive approach to the investigation of unconscious classroom phenomena, at times its incremental development confounded my efforts to ensure the validity of my data collection and analysis. In retrospect, I would have preferred to explore my states of mind and countertransference reactions within a generous period of preliminary psychoanalytically-informed reflection before implementing a design which enabled the investigation of all the research questions with a single participant sample over the course one academic year.

6.5.2 The role of autoethnography

When I first thought of undertaking PhD research, I did not imagine that I would write an account informed by autoethnographic research. My primary objective was to investigate unpredictable classroom phenomena so that I could provide insights to colleagues who were constantly struggling to maintain 'behaviour for learning' and achieve expected learning outcomes for performance management purposes. Although I was not planning to engage in action research, I envisioned that a psychoanalytically-informed methodology would serve as the sort of critical paradigm (Taylor et al, 2013, p.7) that

would serve the interests of teachers in the face of government policies and the current support for corporate models of teaching.

I discovered that, in order to engage fully with object relations methodology, it was imperative for me to carry out serious and ongoing psychoanalytically-informed reflection. Freud had carried out 'self-analysis' in order to acquire his working knowledge of the principles of therapeutic analysis and by 1910 he had adopted the view that practising analysts could manage their countertransference reactions during therapeutic sessions only if they undertook 'self-analysis' to recognise and overcome their own defence manifestations (Laplanche and Pontalis, 1973). In 1922, two years after the foundation of the Berlin Institute of Psycho-Analysis, his recommendations concerning self-analysis were superseded by the institution of an obligatory 'training' analysis for all new entrants which was almost identical to a typical therapeutic analysis. As I was to learn over the three years of my data collection, however, any type of psychoanalytically-informed 'self-analysis' does not end neatly on a prescribed date; in my own case, it is still ongoing and will probably never stop.

In the first instance, my experience of psychoanalytically-informed reflection has enabled me to manage the expression of many of my defence mechanisms, with the result that I am now a more integrated and happier person. However, the act of voicing this internalised experience in a study informed by autoethnography has perturbed my self awareness on a conscious level. While Belbase et al (2008) have observed that a researcher's examination of her ontological awareness can prompt highly acute formulations of epistemological and methodological frameworks, I found that my engagement with autoethnography (Sparkes, 2000; Ellis, 2004; Walford, 2004; Tolich, 2010) prompted an amplification in my ontological perceptions of my presence in a

classroom and my cognisance of pupils' inner thoughts and feelings on a range of levels during lesson deliveries (LeCornu and Collins, 2004). Admittedly, at various points I struggled with the ethical issues that are inherent in autoethnography (Section 4.2.1) but ultimately I believe that it helped me to highlight the "gaps between what [was] going on and what [needed] to change" (Belbase et al, 2008, p.94) and greatly enhanced my teaching and researching skills.

6.5.3 The breadth of the theoretical framework

As one of my main research objectives was to characterise pupils' utterances and classroom behaviours in terms of expressions of defence mechanisms and defensive manifestations of group mentalities, I initially formulated a theoretical framework based on Klein's delineation of the constellations of defences and anxieties emanating from the paranoid-schizoid and depressive states of mind and Bion's observations of defensive group mentalities. After carrying out a preliminary study (Section 3.4) in which I perceived that pupils' manifestation of defence did not always conform strictly to these categorisations, I extended the framework to include the characterisations of defence mechanisms posited by Freud, Kohut and other schools of psychoanalysis.

In order to complete much of the data collection and analysis, however, I had to develop a working knowledge of several types of identification, projective identification and transference. Although I have provided information and references whenever I have introduced these constructs into the text, I would recommend that they be reviewed in depth in any further psychoanalytically-informed investigation of classroom-based teaching and learning.

6.5.4 Research question 1

The validity of my data collection and analysis was impacted negatively by my decision simultaneously to observe and characterise my countertransference reactions and the development of my relationship with the participant sample. Ideally, a preliminary investigation of my states of mind and countertransference reactions should have been completed before I embarked formally on an investigation into the feelings and emotions underlying classroom interactions, the existence of what I later termed the ‘pairing subset’ and the emergence of a class ‘bible’ (Bion, 1961). This would ideally have been augmented with individual pupil interviews and regular assessments of how the gradual emergence of pupils’ positive attitudes correlated with changes in their behaviour and participation in lessons as well as changes in their attainment levels.

Many psychoanalysts would also point out that the psychoanalytically-informed reflection I carried out was not an analysis in the genuine psychoanalytic sense because it lacked the participation of a second individual to act as a focal point for transference (Section 6.2.2). Although I believe that I eventually succeeded in understanding and overcoming some of my defence mechanisms, I must concur that, at this early stage in my research, I was experiencing a great deal of emotional turmoil and was unable to comprehensively characterise the genesis or the ongoing operations of my unconscious operations.

6.5.5 Research question 2

My inferences of defence manifestation would have been validated to a far greater extent had I been able to video-record lessons and carry out unscheduled interviews with the

participants as classroom episodes unfolded. My sequential analyses of classroom episodes and individual and small group interviews would have been extended considerably had I given the participants the opportunity to read and comment on interim versions of my data analysis. However, I believe that such disclosures would have breached ethical considerations by inducing further manifestations of defences throughout the participant sample (Section 4.2.3.5).

In places, the poor quality of the audio files and consequent gaps in the capture of the *verbatim* discourse sometimes prevented me from identifying the precise nodes of defence manifestation which instigated episodes of splitting and projection and other unconscious operations. It would have been helpful, therefore, if I had carried out additional pupil interviews to verify my transcriptions of the audio files in order to more accurately characterise the dyadic structures which underlay pupil interactions and the emergence of group mentalities.

6.5.6 Research question 3

The methodology involved in this stage of my research was virtually identical to that used in the first stage and was therefore subject to the same limitations.

6.5.7 Additional comments

In retrospect, the validity of my research design would have been bolstered considerably had I incorporated the following features. First, prior to the collection of data, I might have undertaken an ample period of psychoanalytically-informed reflection under the supervision of a psychoanalytically-knowledgeable colleague who was willing to observe

lessons and act as a reliable point of reference. Second, it would have been helpful if I had obtained consent for unscheduled interviews with participants, their family members and other subject teachers in order to obtain the extensive amounts of supplementary data needed to formulate comprehensive psychoanalytically-informed interpretations of episodes.

6.6 The impact of the research on the participants and myself

At no point during my research did a pupil inform me of experiencing distress and/or discomfort during an interview (Section 4.2.3.3). However, as I was struggling to complete the first draft of my data analysis during the summer of 2015, I experienced what Bion once described as a ‘catastrophic conversion’, a psychic event in which a person’s epistemological knowledge about herself “spills into” her ontological knowledge about herself (Bion, 1970, pp.106-125; Britton, 2005, p.185): after sensing one afternoon that the ‘space’ inside my mind was in the process of altering completely, I was devastated by feelings of mourning and despair which persisted for weeks. I found it difficult to either return to teaching or work further on my data analysis in September 2014 and my psychic equanimity was only restored only at the end of October that year, when I began to tutor a pupil who helped me to regain a positive professional outlook and sense of purpose.

Consequently, I feel that I must issue a ‘health hazard’ warning against the dangers of undertaking any type of psychoanalytic research in the form of a reflexive self-study. I would recommend that anyone who intends to implement a psychoanalytically-informed research design should either organise professional psychoanalytic supervision or, at the very least, pair themselves with another psychoanalytically-knowledgeable researcher

who is available at regular intervals to support the psychoanalytically-informed reflection which must accompany data collection (Mintz, 2014). As it has been shown (Jervis, 2012) that even research supervisory meetings are susceptible to the infiltration of ‘parallel processing’, in which PhD students and their supervisors unconsciously ‘act out’ the aspects of the data that they are unable to verbalise, anyone who is involved in a psychoanalytically-informed research design must be aware that it may adversely affect their psychic equilibrium.

6.7 The limitations of the study

After carrying out a review of the literature, I ascertained that I needed to generate new knowledge regarding the unconscious determinants of affect on the individual level, their relationship to mathematical self-concept and attainment, and the role of the social context in the instigation of the group mentalities which pervaded unpredictable and disruptive classroom episodes. I then decided to develop a theoretical framework and methodological approach deriving from the clinical methodology of object relations psychoanalysis that would enable me to characterise pupils’ utterances and behaviours as expressions of defence mechanisms and manifestations of defensive group mentalities and explore the ways these manifestations of defence mediated pupils’ participation in mathematics lessons and their relationships with mathematics.

In retrospect, my reports and analyses of the unconscious knowledge, beliefs and anxiety determinants which instigated my pupils’ unconscious operations and manifestations of group mentalities were considerably less comprehensive than those I compiled for myself, partly because my research design did not support a sufficiently broad collection of data relating to the internalised thoughts and feelings of pupils and classroom visitors

(Section 6.5), but also because my methodological approach was too wide-ranging to be implemented by a sole participant observer. My findings would have been validated and extended significantly had I been able to assemble a team of researchers to support the data collection and analysis by engaging either in the infant observation method (Section 4.1: Bick, 1964; Ruston, 2006, 2009) or the type of flexible, open-ended observation promoted by the Reflective Network Schools programme developed by the Anna Freud Centre (Section 6.3: Ansari and Kliman, 2015), which incorporates *ad hoc* briefings, debriefings and discussions with teachers, parents and pupils.

As I noted in Section 6.2.3, I was only able to establish tenuous links between Ruby's classroom performance, her unconscious anxiety determinants and her mathematical self concept and attainment. I now realise that, in order to explore self concept and track attainment more fully, I would have needed to augment my research design with semi-structured and structured self-report questionnaires and interviews as well, perhaps, as a range of quantitative methods.

6.8 Suggestions for future research

Notwithstanding the existential difficulties associated with psychoanalytically-informed investigation, an extended use of object relations psychoanalysis in its form derived from clinical methodology has considerable capacity to assist policymakers and schools in enhancing the efficacy of initial teacher education and the implementation of more effective behaviour management systems in schools. If the government were to revive the Tavistock model with regards to the development of educational policies and curriculum structures that recognise teachers' own needs and desires for positive containment and

positive relationships, it could help reinvent teaching as a highly-valued career choice and tackle the present and persistent recruitment crisis.

Within the domain of mathematics education research, four issues pertaining to pupil learning and attainment might be investigated drawing on the extended use of psychoanalysis. In the first instance, a more detailed examination of the age-related development of anxiety determinants and associated defence mechanisms that are provided by the object relations perspective of personality development could be used to probe the decline in pupil performance on standardised tests that often accompanies the transition from primary to secondary school (Evangelou et al, 2008). While many school managers and researchers have suggested that this phenomenon is linked to a variety of factors, including changes in learning styles, few studies have assessed the suitability of introducing ‘independent’ modes of learning in Year 7, just as pupils are encountering the resurgence of sexual impulses and increase in splitting and projection ushered in by adolescence. The data analysis presented in Chapter 5 indicates that latency modes of thinking and learning tend to extend far beyond the biological transition point between latency and adolescence and that a notable minority of highly defensive pupils may regress to the pre-Oedipal and personality stage.

In a similar vein, an extended psychoanalytically-informed investigation of the emergence of subset and whole group mentalities, based upon a deeper understanding of the ways in which projective identification and other unconscious operations are manifested in classrooms, might facilitate the development of more effective strategies for learning in groups, a policy which continues to be encouraged in many schools. While group work is intended to aid the “wholehearted engagement” of pupils and the development of pupil dispositions which seek to help everyone around them to flourish

(Reiss and White, 2013, p.16), pupils who are prone to violent splitting and projection find it difficult, and sometimes impossible, to assimilate new material and ideas amid frequent interactions with their peers. In order to structure classes so that they enable all pupils to participate constructively in the discourse and learning, it may be useful to use object relations theory to reassess many of the prevailing social constructivist paradigms, some of which go far beyond Vygotsky in the extent to which they predicate pupils' acquisition of new subject knowledge on self-generated pupil discourse.

Psychoanalytically-informed research perspectives might also enhance the study of identity within mathematics education. Many studies characterise pupils' participation in mathematics lessons and their relationships with mathematics by focusing on nuances and varieties of contradiction that are evinced in face value examinations of narratives and dominant discourses and the changes in positionings that are observed in classroom situations. However, as I noted in Section 2.3, further knowledge could be generated if such analyses were submitted to a secondary level of analysis that derived from the clinical methodology of object relations psychoanalysis. While researchers might not wish to go as far as Cobb et al (2009) in characterising identity as a bipartite construct, they could differentiate between 'conscious' and 'unconscious' aspects of identity and explore how the negotiation of a functional learner identity in mathematics is mediated by unconscious anxiety determinants, pupils' valencies for basic assumption mentalities and the unconscious identifications they establish with teachers and peers.

Finally, although a psychoanalytically-informed examination of gender differences in teaching and learning lay outside the scope of this study, I believe that investigations which draw upon an extended use of object relations psychoanalysis might contribute to a better understanding of a wide range of gender-related issues, including the

discrepancies in the attainment between girls and boys at secondary level and the lower participation rates of women in STEM programmes at university. Although it is likely that the roots of many of these discrepancies can be traced back to earlier stages of personality development, teachers and school managers in secondary schools might be able to alleviate them with initiatives that consider the psychodynamic aspects of gender differences and the variations in anxiety determinants facing girls and boys.

Crucially, the introduction of psychoanalytically-informed methodologies for investigating educational issues on any level does not have to be dependent upon an 'all or nothing' approach. Since the 1970s there have been a series of developments in the areas of emotions research, neuroscience and genetics which have nullified the historical reasons for the isolated study and uptake of psychoanalysis (Knox, 2003). Within the realm of education, therefore, it may be time for policymakers, teachers and researchers to focus their efforts in gaining a deeper understanding of the unconscious dimensions of the educational system, not in a bid to overturn it, but rather in the attempt to improve it.

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Appendices

Appendix 5.1 Ruby's interview transcript (first draft)

File No: 811 0034

Duration: 19M26S

Location: M6

Ruby abruptly walked out of the lesson that was taught immediately before this interview was due to take place and only appeared after the rest of the class had been dismissed for at least five minutes. As her return was totally unexpected, the beginning of the interview was not as carefully constructed as it might have been, although I was careful to explain the structure of a free association narrative interview and review the confidentiality rules before the tape recorder was turned on.

JS: OK it's Tuesday, it's the 28th of January, and I am sitting here with Robin from my Year 8 class and we are going to do a free association narrative interview; which means that I am going to ask her a question and she can say whatever she wants. All my subsequent questions will come from what she will say. (To Robin) Ok? So my question to you is: what happens in maths classes?

R: We learn maths?

JS: (Low laugh) What else?

R: Well, we talk and, like ... other stuff.

JS: Yeah? *Lots of noise coming from corridor, a pause.* So what else happens in maths?

R: Well, you get into trouble, and you get parked and stuff, and...like, sometimes, like they'll be throwing stuff and like—*outside noise obscures Robin's subsequent comment*—we have fun.

JS: *More noise.* So you said "We have fun." What kinds of things are fun?

R: Uhm, when we're throwing stuff, and whenever I get in trouble, and (*terribly loud noise obscures next comments*) when you are getting rid of the ones getting into trouble...

JS: Ok....and what's not so fun?

R: When we have to learn stuff....it's like, fun to learn stuff, but....it's just like, boring....actually there's no child that likes to learn stuff, youjust have to....learn stuff....

JS: What happened today?

R: Uhm, we were learning about the con ... gru ... ent thing ... the shapes ... and it was about how shapes fit on top of each other? And kind of like the way they are?

And – I walked out...and then I went to the teacher down in M1 ... and then I walked out of his room ... and then I came back in.

JS: Why did you walk out?

R: Uh ... because I ... because a girl, she didn't want to take off her hoodie, and it wasn't school policy.

JS: (Pause) What was so bad about that?

R: Cause ... if she was allowed to wear a hoodie, then I should be allowed to wear a hoodie. If I wore my hoodie, then I would get in trouble.

JS: Ok. (Pause). When you asked about her, what was the explanation?

R: Uhm, you said "Don't worry about it because she is by the window."

JS: Ok, and why did you not think that was a good explanation?

R: She had a blazer, she could have worn her blazer, but no, she tried to wear her hoodie.

JS: What sorts of things do you see? (*incoherent words*) ... Where did it all start?

R: It...it started in dance, and she was wearing a hoodie in dance, and I said "It's not raining indoors, so you don't have to put your hood up and wear a hoodie." And then she said "Ok" and she took the hoodie off. And then she put it back on and I was like "It's still not (*incoherent words*) you don't have to wear a hoodie, like watch it, your hoodie might get confiscated." And then she came here and she was wearing a hoodie. And like, she has a blazer, she doesn't have to wear a hoodie.

JS: And so ... that really upset you?

R: Yeah.

JS: Ok...so when that upset you ... what did you start saying to her, I forget?

R: Uhm, I told her that ... uhm, that's what a blazer's for...and she could buy a jumper.

JS: Ok, so what happened when you started saying something to her and ... then what happened?

R: I asked her (*inchoerent words*)

JS: Ok, like ... who started ... ?

R: I started it then Nancy joined in and then other people joined in.

JS: How do you think she felt?

R: I don't really know.

JS: Did you expect anything to happen?

R: No.

JS: Ok ... after you said it, how did you feel?

R: I felt bad.

JS: Then after you said it, you—

R: Walked out.

JS: You just walked out. So how were you feeling when you walked out?

R: I felt kind of like, fine.

JS: You felt fine but why couldn't you stay?

R: I just didn't know what to say. I don't know why, I just didn't...I just walked out. I didn't really want to say anything.

JS: Ok ... ok ... what sorts of things ... sometimes you work very hard and sometimes you don't work ... and sometimes ... I'm really confused, like when this happens ... What makes—what gets you to work? (*Pause*) What gets you to work?

R: When I sit up, on the desk, and I have no one really to talk to, when I'm not really distracted ... and there's not really people close to me, so ... when I'm on my own.

JS: OK ... today ... when you sat here, you were working ... but you weren't really working from the board ... were you?

R: Yeah, I done the starter ...

JS: You did the whole starter?

R: Yeah, after I finished the work in the book.

JS: Why did you work in the book first?

R: Uhm, because the starter looked really easy and the ones which really have challenge are in the book.

JS: OK ... ok ... so, do you think ... so, if there wasn't that incident with Annie ... with Annie and her hoodie ...

R: Yes ...

JS: --would you have worked today? (*Robin nods yes*). Ok, so what happens in other lessons when ...because sometimes you are working and then other things....can you remember what other things happen?

R: Yeah...in English, usually Danny....in PE Penny and other people....in music I get set off by Lew and Wills and Tim.....uhm, in French I get set off by the teacher.....uhm, in RE, it's Lew again...and geography, it's Sal.....so, yeah.....

JS: So it's specific people in specific lessons? (*Robin nods.*) Wow—why do you think that is? How does that develop?

R: Because, uhm...I think it's because I can't control that—my -- (*incoherent word*) stuff and what I say, so when I do get angry, it will come out and stuff... It's just like that and I get in trouble for it.

JS: And it's only certain people....you just mentioned you know the people in the lessons it's going to happen with....

R: Uhm, Lew is racist and uhm, my teacher just doesn't like me....uhm, Danny I haven't like since Year 7 and uhm....

JS: So Danny is in maths with us....so what can he do...like, what can he do to set you off?

R: Like if he talks to me...like, if he says something rude.

JS: Wait a minute....you said he talks to you. How---

R: I've told him loads of times "Don't talk to me when I'm trying to work" cause I will get set off easily and like he will talk to me and then he will carry on talking to me and then, like, he will get rude to somebody else and get rude to me and I'll just....I don't know....

JS: Have you tried...have you, I don't know, have you tried to—ignore-- him? Danny or any of the others? (*Pause*). Have you ever even tried? (*Robin says no*). Why? How come?

R: Because I don't try.

JS: So you would rather just ...I don't know...disrupt your work? Or get consequences, or whatever?

R: Yeah.

JS: Do you wantdo you thinkwhy do you think they're trying to set you off?

R: Yeah, Danny has been trying to set me off since Year 7 cause he used to be in my class, and then (*JS: In this school?*)

R: Yeah-

JS: So you really didn't know each other before at all—

R: Yeah. And then, ever since then, he's always trying to set me off. He's always getting rude and he will just try to set me off and stuff.

JS: (*Pause*) Ok....but the other things that happen in here sometimes with people, like when they misbehave, you said....do you think it's fun sometimes? What, is it the same sort of thing?

R: I guess....I think it is.....

JS: So do you think, do you think people...have certain people that

R: Yeah...I know that Annie doesn't like Jo and Cate doesn't like, really, most people, and uhm, Connor doesn't like Phil, and Nancy doesn't like Alan, and....yeah....

JS:....what could teachers do to make this better?

R: I don't think teachers could do anything, cause it's the child's behaviour, and it's not really the teacher telling them to "Oh, go do this" or "Go do that." And like, when teachers tell the children to stop and stuff, that makes them, like, more angry and makes them want to (hurt) the children harder....

JS: Really? So...like, if a teacher comes and tells you off, what is your immediate reaction?

R: Like, if someone comes and tells us to stop (*incoherent words*) then the student will get angry at the teacher and, like, all the anger will just convert to the teacher.....

JS: Really?! How do you mean--

R: Like, if I am angry at Annie and stuff, and like, if someone tells me to stop, then I would get rude to them. Like today, when Danny was getting rude to me, I got rude back to Danny and then Wills tried to intervene and then I got rude to Wills and Wills got rude to me and Danny got rude to Wills and Wills got rude to me and I got rude to Danny and Wills.

JS: Oh, so it's like these feelings and angerit keeps switching? (*Robin nods.*) Wow. So what makes anger.....how does anger go away?

R: When you just stop talking to them.

JS: So if you just.....it's that immediate.... (*Robin nods yes*).....really?

R: Yeah, for me it is. Like, if I was sitting away from them, they would just stop immediately.

JS: When you walked into this room today, did you.....were you angry at Alex? Were you thinking about her?

R: When I walked in I was thinking that uhm, like, that I really (didn't like that) she wore a hoodie and (*incoherent words*) that she has a blazer on the back of her chair and I don't see why she doesn't have to wear her blazer when she everyone else was wearing their blazer, you know? And then when I walked out I gave her time to calm down and I got to do that (*incoherent words*) ...in the other lesson. *Check 10.50 onwards.*

JS: Ok...ok....well...alright.....do you think that things that happen in class....well, how do they relate to the learning that takes place?

R: I don't really think it relates at all.

JS: Really?

R: No.

JS: Is the learning, like..separate...for you? (*Robin nods her head yes*). But when you came in, funnily enough, today, you looked at the starter and ...what did you think?

R: Too easy.

JS: Ok, it was too easy....so you went immediately to the book and you did the veryyou actually did everything on the page. And then did you came back –

R: Yeah, I did the starter—

JS: Did you know all the answers to the starter?

R: Yeah (showing me her book) the answers are right here.

JS: Really? So you know—do you know all the vocabulary too? (*Robin nods her head yes*). Ok, what kinds ofdo you think that, if we changed the activities, maybe, maybe.....if the maths changed a bit, do you think anything else in the room would change a bit?

R: If the maths became harder, like, for me, then everyone else would find it harder as well, and if it's harder, then people won't try to do it because it's too hard and they would just wait for the answers to come.

JS: So they won't do it. (*Pause*). Do you think that, looking at the levels here, how would you rate yourself, as to level?

R: Like a Level 4.

JS: Well, I think you're more than a – you're definitely more than a Level 4. But say relative to everyone else

R: Uhm, Jo is smart and Cate, and Tim I would put them at the top of the class.... And then, people like me, Connor, Nancy and Ron, I would put

JS: And where do you put yourself?

R: At the bottom.

JS: You put yourself at the bottom

R: Because I'm not (*incoherent words*) special? (13.03)

JS: Yeah, but -- wait....you do all the work, and then you find the starters too easy sometimes... so how can you put yourself at the bottom, when some people can't do the starters?

R: Cause a lot of the time I ain't in the class actually, in the lesson, because I'm getting parked and stuff, so then uhm, (*incoherent words*) because I don't really know that much about some stuff now. Cause I wasn't really interested in learning.

JS: Are you parked in other lessons? Are you parked a lot or do you walk out a lot?

R: Uhm, I walk out a lot in English and I get parked a lot in French.

JS: Ok, so now you're kind ofyou don't knowyou're losing track of what's going on? Is that you?

R: No, because I'm a fast learner so I can do a page of work and then I just catch on.

JS What do you think is going to happen later on? Do you have any goals or anything? Like, are you just going to continue on like this?

R: Nooo.... I think....I wanna, like, fix up, because I don't really know how I'm going to end up cause like, in other lessons, they aren't as easy as this one and so I got to try to give my hardest....

JS: Which subjects do you find the hardest?

R: Uhm, I think the hardest is French, because I don't understand the language.

JS: Ok...ok...And which are the easiest ones?

R: I think it's music. I like music a lot and....I enjoy music....

JS: Ok.....so what do you think about maths?

R: I put maths near the top but like, not at the very, very top, because uhm, like in science we're doing practicals and stuff.... But like when we do origami, it's really fun.

JS: I'm hoping to do one on Friday actually, maybe a movable part one. Yeah...ok, so you're kind of mathematically – you like maths? Yeah? (*Robin nods her head*). Ok, so what things would you like to do more of in the classroom, what kinds of activities?

R: Uhm, when I was in the other class I was doing ratios and I wasn't really good at ratio so I want to try to do ratios again. To just help me on that.

JS: But....how do you prefer learning? Like, we do, like, starters off the board....today we actually had a – you missed it –they had a shape and they had to cut it....it was, like, one of those activities which you like, a practical activity.....do you like them?

R: I like practical activities but then, like, I like working out of the book as well. It's like....I don't mind which one.

JS: Uhm...do you know what I notice sometimes? You go to the book anddo you ever, like....why do you go to the book?

R: Cause uhm.....the title is usually (*incoherent words*) what you can find on the index page and --

JS: Ok...

R: So like the book usually tells you how to do it as well, on the opposite side of the page....

JS: Ok...when you go into the book and everyone else is talking or doing the starter....sometimes you come in very quickly and zoom, you are right into the

book....and everyone else is doing ---they're settling in, they're writing the title, doing the starter....what do you feel like when you go right to the book?

R: I don't really notice any difference.

JS: Ok. So, is it a good feeling just getting into the book?

R: I don't know, cause, uhm, I'm just learning off the book and you don't really notice everyone around you. (*Very loud noise in the corridor*).

JS: Do you read –do you try the exercises or do you always read the information page?

R: I always check the exercises, and then if I need help, I go to the information page.

JS: So you do read the information page.

R: Yeah.

JS: Ok. Alright...I won't keep you too much longer, and I hope to meet with you a few more times, but for now, can you remember any episodes in class that----

R: Oh yeah...

JS: What can you remember?

R: When the blind fell down. Uhm, when was it...when me and Al got parked....when I got parked Wednesday....whenever I get parked....and stuff....and when Jo dropped off his chair....when me and Danny had a fight in class...when Wills dropped off his chair....when Ron dropped off his chair....whenever anyone drops off their chair...

JS: Can you remember a lesson when you were learning very well? Can you remember?

R: When we were doing angles in quadrilaterals and angles in triangles.

JS: Ok....do you...ok, do you remember like a really bad lesson, when you were just having negative thoughts --?

R: Uhm, ratios...

JS: Ok.....

R: I can't do ratios.

JS: Now listen, we did a little bit of ratio...now wait a minute, remember we had that competition....you solved some problems with ratio! You were –

R: But they were hard...

JS: But you did it!

R: But I couldn't remember it, like today they were splitting money between a ratio, and I couldn't do it. I just find it too hard and stuff. And they were Set 3 as well....no, not Set 3, Set 4. It's just hard.

JS: Ok, but you know – you did it. Do you remember just before Christmas we had that –do you remember...

R: Yeah, that ...

JS: And we had to come up in pairs and we had...

R: Yeah...

JS: Those questions and uhmok.....ok, maybe I will help you go over those at some point. So...do you think...do you want to tell me anything else?

R: Not really, that's it. I can't really think of anything else.

JS: Ok, will you come and see me in...I don't know....in about two weeks? Is that ok? (*Robin nods*). Robin, thanks a lot, I really appreciate it.

R: Ok.

JS: Ok. And maybe next time I will have more pointed questions for you. Ok? Thank you very, very much.

R: Ok, Miss.

JS: Goodbye.

Appendix 5.2 Nimier's typography of mathematics-specific defence mechanisms

Phobic Defenses	Examples of indicative statements
Avoidance	<ul style="list-style-type: none"> -I feel there is something that keeps me from getting at the problem, a barrier I can't get across. -Doing maths is doing something which seems impossible.
Repression	<ul style="list-style-type: none"> -Doing maths, it represents nothing, it's absurd. -It is something that you are told to do and which you repeat, a bit like a machine.
Projection	<ul style="list-style-type: none"> -Doing maths oversimplifies everything, it takes the poetry out of things. -In maths there is no place for personality, you've done it all before, everything has been seen already.

Manic Defenses	Examples of indicative statements
Reparation	<ul style="list-style-type: none"> -I have the impression I am creating something when I am solving a problem. -It is constantly discovering something new.
	<ul style="list-style-type: none"> -Doing maths is a way of training my mind.

Introjection	<ul style="list-style-type: none">-Mathematics is a way of getting a strong character.-It is trying to find connections between different things.
Reversal	<ul style="list-style-type: none">-If I can't find the solution, I feel defeated.-When I work something out, I feel a void is being filled.-If I find a solution straightaway, I feel really at peace.

Adapted from Nimier (1993)

Appendix 5.3 Textbook extract for four-lesson sequence

Rayner, D (1998) *Essential Mathematics 8. Welwyn Garden City: Elmwood Education Limited, pp. 53 – 58.*

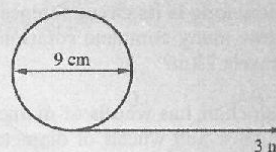
53

A circular tin of diameter 9 cm rolls along the floor for a distance of 3 m. How many times does it rotate completely?

$$\begin{aligned} \text{circumference} &= \pi \times 9 \\ &= 28.274334 \text{ cm} \\ 3 \text{ m} &= 300 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Number of rotations} &= \frac{300}{28.274334} \\ &= 10.61 \end{aligned}$$

The tin makes 10 complete rotations.



Exercise 2

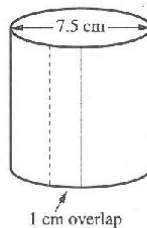
Give your answers correct to 1 decimal place unless told otherwise.

- The tip of the minute hand of a clock is 8 cm from the centre of the clock face. Calculate the distance moved by the tip of the minute hand in one hour.



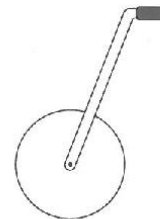
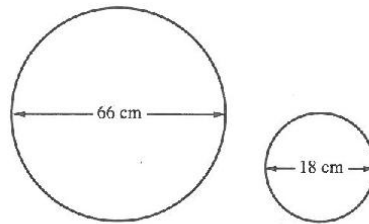
- A bicycle wheel of diameter 80 cm makes 20 complete rotations as the bicycle moves forward in a straight line. Find the circumference of the wheel and work out how far the bicycle moves forward. Give your answers in metres.
- A tennis ball of diameter 7 cm and a golf ball of diameter 4.25 cm roll in a straight line so that each ball makes 10 complete revolutions. Which ball will go further and by how much? Give your answer to the nearest cm.
- Which has the longer perimeter and by how much: an equilateral triangle of side 10 cm or a circle of diameter 10 cm?

- A tin of tomatoes has diameter 7.5 cm. The tin is wrapped in a paper cover which is long enough to allow 1 cm overlap for fixing. How long is the cover?



- The wheels on Gill's bike have a diameter of 62 cm. Gill rolls forward a distance of 1200 cm. Calculate how many times the wheels go round completely.
- In a coin rolling competition Gemma rolls a one pound coin on its edge a distance of 4.2 m. A one pound coin has diameter 2.2 cm. How many times did the coin rotate completely?

8. A car tyre has a radius of 37 cm.
 (a) How long is its circumference in cm?
 (b) How many complete rotations will the tyre make if the car travels 2 km?
9. A push chair has wheels of diameter 66 cm at the back and wheels of diameter 18 cm at the front. The pushchair travels in a straight line and the rear wheels rotate completely 84 times.
 (a) How far in metres does the chair travel?
 (b) How many complete rotations do the front wheels make?
10. A newt walks around the edge of a circular pond at a speed of 2 cm/s. How long will it take to walk all the way round if the radius of the pond is 1.3 m?
11. A trundle wheel can be used for measuring distances along roads or pavements. A wheel of circumference one metre is pushed along and distance is measured by counting the number of rotations of the wheel.
 Calculate the diameter of the wheel to the nearest mm.
12. The perimeter of a circular pond is 11.7 m. Calculate the diameter of the pond to the nearest cm.
13. The tip of the minute hand of Big Ben is 4.6 m from the centre of the clock face. Calculate the distance, in km, moved by the end of the minute hand in one year (365 days).



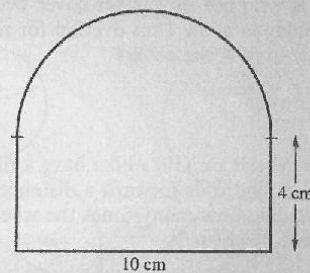
Perimeters

Calculate the perimeter of the shape.

The perimeter consists of a semi-circle and 3 straight lines.

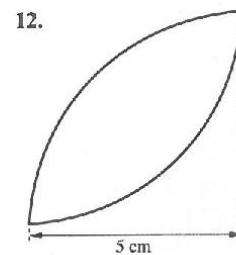
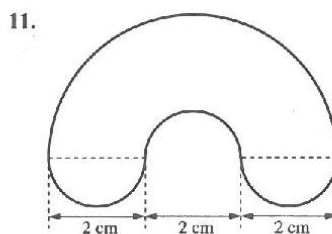
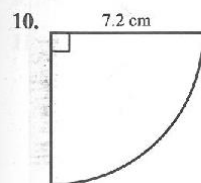
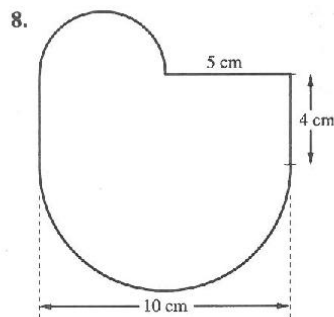
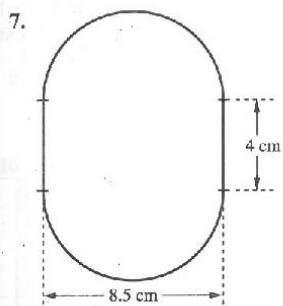
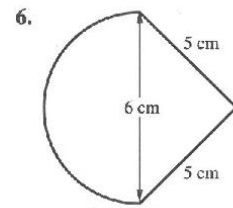
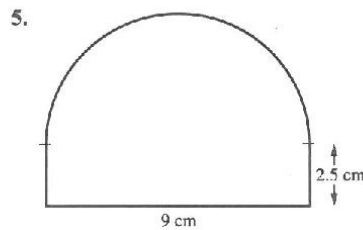
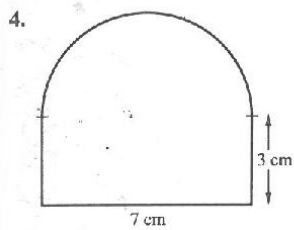
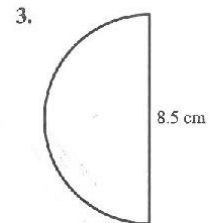
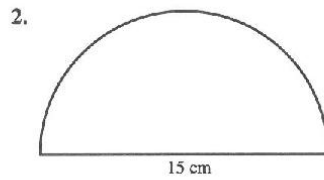
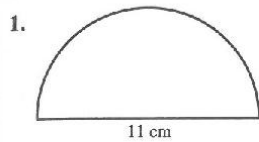
$$\begin{aligned} \text{Length of semi-circle} &= \frac{\pi \times 10}{2} \\ &= \pi \times 5 \text{ cm} \end{aligned}$$

$$\begin{aligned} \therefore \text{Perimeter of shape} &= (\pi \times 5) + 4 + 10 + 4 \\ &= 33.7 \text{ cm (to 1 d.p.)} \end{aligned}$$



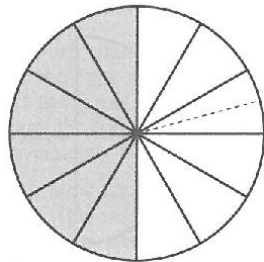
Exercise 3

Calculate the perimeter of each shape. All arcs are either semi-circles or quarter circles. Give answers correct to 1 d.p.

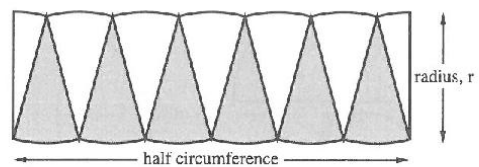


Area of a circle

- (a) The circle below is divided into 12 equal sectors



- (b) The sectors are cut and arranged to make a shape which is nearly a rectangle. (one sector is cut in half).



- (c) The approximate area can be found as follows:
length of rectangle \approx half circumference of circle

$$\approx \frac{\pi \times 2r}{2}$$

$$\approx \pi r$$

width of rectangle $\approx r$

$$\therefore \text{area of rectangle} \approx \pi r \times r$$

$$\approx \pi r^2$$

If larger and larger numbers of sectors were used, this approximation would become more and more accurate.

This is a demonstration of an important result.

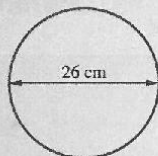
Area of a circle = πr^2

Learn this formula.

Note: πr^2 means $\pi(r^2)$.

Find the area of each shape.

(a)

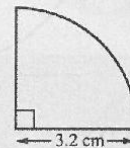


$$\begin{aligned} \text{radius} &= 13 \text{ cm} \\ \text{area} &= \pi r^2 \\ &= 530.9 \text{ cm}^2 \text{ (1 d.p.)} \end{aligned}$$

On a calculator, press:

$$13 \times 13 \times \pi =$$

(b)



The shape is a quarter circle

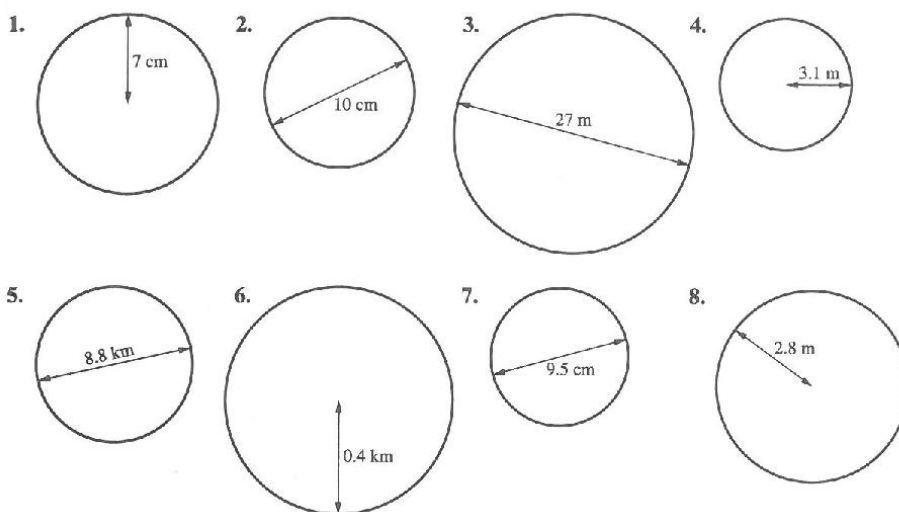
$$\begin{aligned} \text{area} &= \frac{\pi(3.2)^2}{4} \\ &= 8.0 \text{ cm}^2 \text{ (1 d.p.)} \end{aligned}$$

On a calculator, press:

$$3.2 \times 3.2 \times \pi \div 4 =$$

Exercise 4

In Questions 1 to 8 calculate the area of each circle correct to 1 d.p.

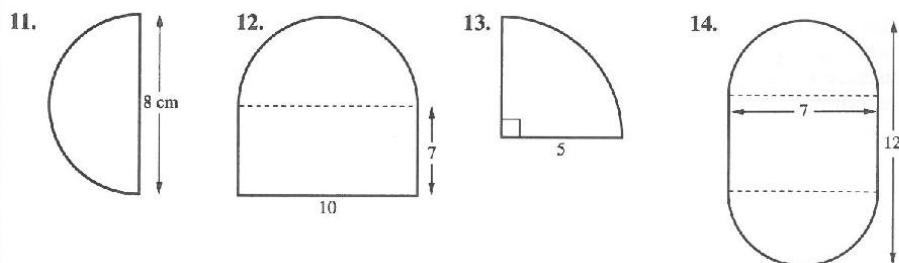


In Questions 9 to 22 give your answers correct to 1 d.p., where necessary.

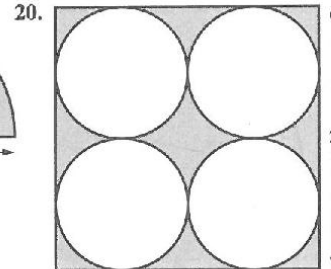
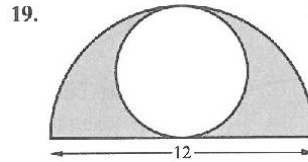
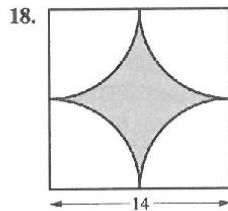
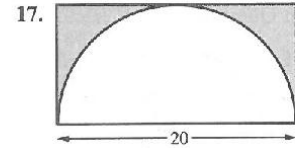
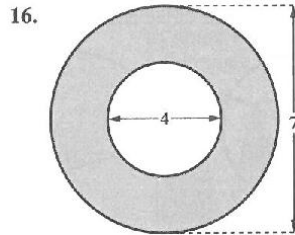
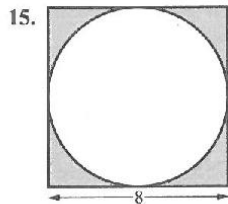
9. When hunting for food, an eagle flies over a circular region of radius 3.5 km. What is the area of this region in km^2 ?
10. A carton of 'Verdone' weedkiller contains enough weedkiller to treat an area of 100 m^2 . A circular lawn at Hampton Court has a radius of 16.5 m. How many cartons of weedkiller are needed to treat this lawn?



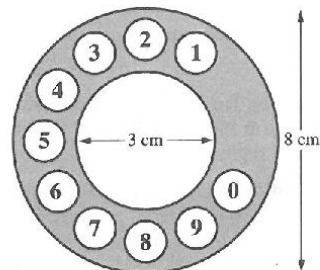
In Questions 11 to 14 find the area of each shape. All arcs are either semi-circles or quarter circles and the units are cm.



In Questions 15 to 20 find the shaded area. Lengths are in cm.



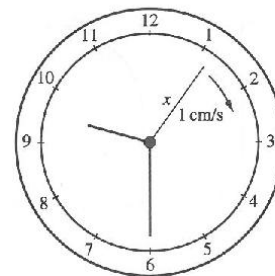
21. An old fashioned telephone dial has the dimensions shown. The diameter of each finger hole is 1 cm. Calculate the shaded area.



22. A circular pond of radius 3.6 m is surrounded by a concrete path 70 cm wide. Calculate the area of the surface of the path.

23. A cycling track is a circle of diameter 150 m. The wheels of a bicycle have a diameter 82 cm. How many times will the wheels of the bicycle rotate completely when the bicycle travels ten times around the track?

24. The tip of the second hand of an electric clock moves at a speed of 1 cm/s. Calculate the distance x , from the tip of the second hand to the centre of the clock.



Appendix 5.4 Lesson 1: plan, transcripts of lesson and group interview

Seeing Circumference Part 1 Date: 4th July 2013

Lesson Objectives: Pupils were expected to solve a variety of word problems using the formula for circumference of a circle and to calculate the perimeters of compound shapes incorporating parts of circles (Levels 6/7).

Starter Exercise: Following on from the previous lesson on irrational numbers, pupils were asked to find links between irrational numbers and circles. During the ensuing discussion, pupils were presented with a results table from the investigation they had undertaken to measure the circumferences and diameters of various circles and calculate π .

First Stage: Pupils were presented with a word problem depicting a diagram of a circular tin and were guided in a whole class format to calculate the number of rotations it made over a certain distance (Textbook p. 53). After working individually on Exercise 2, progress was checked on the board using problem No 5 in Exercise 2.

Second Stage/Plenary: Pupils were presented with diagrams of a semicircle and quarter circle and were guided in calculating perimeters. Pupils then worked individually or in pairs on problems 1 – 8 in Exercise 3 (Textbook p. 55). The final progress check exercise focused on the possible traps and pitfalls that befall pupils when they attempt to solve problem No. 8 in Exercise 3.

Seeing Circumference Part 1 Skeleton Audio Transcript (First Draft)

Date: 4th July 2013 Venue: M6 File Folder: E File Number: 811 0024 Duration: 1h 04m

The recorder was turned on five minutes before the official start of the lesson as pupils were passing in the corridors and entering the room.

00 00 Corridor noise

00 15 Pupil: Miss, I've come in early.

01 16 JS: (To pupil in the corridor): M, just go to class....go on to class!

04 00 Bell for start of lesson (Noise level in room begins to drop).

04 15 JS: Hi everyone. Time to start.....time to start.

04 22 JS: Please make a start and open your books, please.

- 05 07 JS: Ok, can we make a start everyone. (Latecomers are still arriving).
- 05 17 JS: XX, can you sit over there please?
- 05 45 JS: MXX (looking at work from previous lesson) you were certainly firing on all cylinders!
- 05 49 JS: LXX, did you bring in your form?
- 06 22 JS: (Checking starter solution): We may need to try this!
- 06 30 JS: Ok guys, I don't know when the others are going to be in or if they are going to be in, but-- (*to individual pupil*) thank you—but let's have a think about this. We have a list of things to do before we wind up this year. One of them is basically looking at interesting shapes and calculating their perimeter and area. And it's a challenge. And then we're need to look at circle theorems.
- 07 03 JS: (Pointing to the board): Ok, you have two minutes to do this and then I'm going to ask someone to show us what they can put on paper. (Proceeds to help individuals).
- 07 22 JS: It's about a mathematics project.
- 07 29 Pupil: It's about emotions.
- 07 43 As: Okay, I will take the form, I just want to read about it to see...
- 08 12 JS: (To one pupil) Actually, we're getting ready to start.
- 08 52 JS: Ok guys, one more minute....
- 09 02 JS: Ok, guys (after looking at various pupils' solutions): You can make it as hard as you want or as easy as you want.....there's more than one solution.
- 09 15 Step-by-step analysis of problem with individual pupil
- 10 13 JS questions another pupil in order to initiate a solution.
- 10 52 JS: (To individual pupil) How do we find the circumference of a circle?
- 11 36 JS: Alright, we are going to make a start. So that means that everyone has to stop talking. (Pause as background noise dies down). Ok, An and La, we are going to start; and the same goes for Ed, As and Vi. Now, before we do this, I am going to ask one more time about numbers: what is the difference between a rational and an irrational number? Don't shout out.....think about it. People have it on the tips of their tongues and then they can't think.....ok, As?
- 12 09 As: A rational number is a number which can be made into an exact fraction.
- 12 11 JS: Well done, a rational number is a number than can be made into an exact fraction. So what then is an irrational number?
- 12 18 Re: One that can't be.

- JS: Ok, an irrational number is one that can't be made into an exact fraction.
- 12 24 JS: When you think of irrational numbers, what do you think of?
- 12 26: Two pupils: Opposites! Weird numbers.
- 12 30 JS: Opposites! Weird numbers!
- 12 36 Another pupil: A recurring decimal.
- 12 39 JS: Good! Someone tell me about another well known type of irrational number.
- 12 48 Another pupil: Pi!
- 12 49 JS: Good! Pi is definitely an irrational number and
- 12 57 Another pupil: The golden ratio!
- 12 59 JS: Wow! Good.
- 13 04 Another pupil: Sin, tan and cos
- 13 06 JS: Yes, sometimes, depending on the actual numbers in the ratios....
- 13 13 Other pupils: Oh.....square roots.....
- 13 20 JS: Ok (above increasing sounds of argumentative discussion) Someone said square root and sometimes they can be irrational but what have we been working with for the last couple of days?
- 13 29 Other pupils: Surds.
- JS: Yes, surds.....these are the square roots that are irrational.
- 13 31 JS: (Turning to the starter on the board) So how do irrational numbers link up with problems about circles? (Pause). I am going to ask Cha. (No response).
- 13 46 JS: So how does pi relate to circles?
- 13 48 Pupil: Pi is an irrational number.
- JS Without shouting out! People can't think when there is shouting out.
- 13 56 Cha: Isn't the circumference πr^2 ?
- JS: Ok.....that is a formula but it isn't for the circumference --- what for a circle is πr^2 ?
- 14 04 Pupil (after some inaudible contributions): It's the area!
- JS: Ok, so the area is πr^2 , what is the circumference?
- Lots of shouting out.....
- JS: That's very nearly there....(More inputs, mild arguments).

14 20 JS: That's it, I heard someone say it. (Spends some time writing it on the board in two versions, one with radius and the other with diameter. Indistinct comments relating to the relationship of radius and diameter).

14 37 JS: It's amazing how we study things as topics all year and then we finally start putting them together....Now, I want to show you something you did a year and a half ago. Really, most of you in this class did it. First you had to draw circles...if I was teaching you I would have said eight of them but another teacher might have said six or ten.... Now, do you remember that you had to take a piece of string and measure the circumference? And (some indistinct words) what is the circumference of a circle? (*A wrong answer is shouted out*). No---think.....no the answer is not on that sheet.....how do we define circumference? (*Another incorrect statement, then someone states the formula using diameter*). Now, if I drew a circle, where would the circumference be? Yes---it's the line that we draw to make the circle. So An, what do we have to do then? To get the circumference, we have to measure what? (*An was not listening*). An, what do you measure? Come on, I'm serious. (*Another pupil says diameter*). Do you remember the experiment? You had to take this ratio, the circumference divided by diameter...(points to the table in the flip chart) and in his first attempt, this person got 3.25. But if they had pulled the string just the right way, and read the measurement on their ruler just the right way, what should they have gotten?

16 37: Other pupil: Pi!

16 38 JS: Yes, pi! Thank you, Lo. So in fact after many trials, these (points to board) should average 3.14. So how did the Greeks discover pi? They took lots of circular objects and they looked at the relationship between circumference and diameter and that was pi. Ok, you're going to do some interesting things today and I wish everyone was here as we haven't done this before. You are going to look at some problems where you have to visualise circumference. The title of our lesson is "Seeing Circumference" but today we really want to see circumference in our mind. Now, you might have to visualise from a word problem or you might have to look at a shape and visualise a circumference that is not immediately apparent....(*two pupils walk in the door*). (To the latecomers): I am going to wait for you to get settled, but not for long.....(To rest of class): and once you visualise a circumference, you can calculate it as well as the perimeters of other shapes in the problem.

17 56 JS: Ok, we're going to look at our first problem which is a word problem involving a circle. (*Points out location on handout then calls attention to board*). I'll read this in case you can't see it (sun rays obscuring the board): A tin with a diameter of 9 cm—what is a tin in this country? When I first read this, I wasn't sure what a tin was.

Pupil: It's something made from tin.

Other pupils: muted contributions.

JS: It's actually a can.

(*One pupil refers to a cake tin, other pupils argue that you never say a "tin of cake", still others refer to tins in supermarkets*).

18 41 JS: Yes, that's what Americans say.Ok, it could be a can of drink or a cake tin, but with a diameter of 9cm, it would not be a very big cake tin. Now the problem says that the tin rolls along the floor for a distance of 3m. How many times does it rotate completely? I am going to ask you to do two things to solve the problem: number 1, draw a diagram, because you need to visualise the situation; and secondly, you're going to show your working in two steps. Can someone think---put up your hand---what two steps do you need to carry out to solve this problem?

19 35 Pupil: Area?

JS: Do we need the area to solve this problem?

Pupil: No, the circumference (*other pupils look at the board and discuss possibilities with their partners*).

JS: Ok, so what is the formula for circumference? (*Many pupils reply $2\pi r$ or πd*). And now you've got to use that formula and show your working out to solve the problem. You've got five minutes. No, no.....(walking around) you must start with a diagram. (*To various pupils*) Where's your diagram? (*JS counts down as 'half-minutes' pass and offers suggestions as they are needed*).

21 33 JS: So what are your calculations in, meters or centimeters?

21 50 JS: Ok! (Calls out to class) Someone's got the correct answer already!

22 13 Some pupils are going on to second problem. I: Remember, always start with a diagram....

22 35 Pupil: Miss, I can't get this.

JS: Ok, what's happening? A tin is rolling around, like this....So what's going to be your diagram? Mark the diagram so you can see. (*Checks the work of other pupils*). Ok, you did it---(to class) two people got the right answer!

Pupil: I did it, miss!

JS: Yes you did!

JS: One and a half minutes left now.....(to pupil) nearly...nearly....(one pupil says something about another's ability) No! I wouldn't say anything about anybody else's ability!

Pupil: But I'm not saying *he's* dumb I'm just saying ---

JS: I wouldn't say anything at all!

24 38 JS: Half a minute left!

25 10 JS: Ok, I'm going to ask Lo to do this problem on the board. (*Lo comes up and begins to draw a diagram*). Now many people thought "I won't bother drawing a diagram" but really this was the fastest way to get to the heart of the problem. (*JS continues to give a commentary as Lo writes his calculations on the board*).

JS: Lo just did something really important without really thinking about it. What did he do? Yes—he converted it here from meters to centimetres. Now someone else come up---I'm going to call on people today—and explain what else is going on.

William: Basically.....(covers substitutions, rounding and division of total distance rolled by circumference of tin)....*Pupils discuss slight differences in final answers due to rounding of interim answer).*

27 48 JS: That's great. What I'd like you to do now is to try the next few word problems. We are going to work on this section for about 10 minutes. Actually, everyone should get to—even finish-- No. 5 at least. Draw a diagram if there's no diagram and then show your working out. Once you have the drawing you have a model; once you have a model you can think out the maths. I am going to come around to help. *(To individual pupil).* No...draw the diagram.

29 14 Pupil explains his work and rationale for next problem.

29 26 JS: (to same pupil): So how does the tip of a minute hand move? How far around the circle will it move in one hour? *(As JS clarifies the meaning of rotation the noise level increases slightly and stray comments are heard).*

31 17: JS: Ap, come on! *(JS walks around the room and helps other pupils, mainly by reminding many how traditional clocks work. Noise level is approximately the same as it was during the starter; some pupils are arguing with neighbours).*

32 00 JS: Sorry, I'll pass out calculators. *(JS continues to walk around room and assists pupils, nearly all of whom are working—no disciplinary comments recorded).*

36 10 *Loud laughter heard in one corner of the room; it dies out quickly.*

37 59 JS: Ja, why aren't you working? Turn around.

38 56 *Noise level is increasing. William's voice is heard across the room.*

39 50 JS: Ro----William....William, just keep your voice down! I can hear you. I am going to come and check your work in a minute so---*(Continues to help individual pupils).*

41 28 *William and pupils sitting near him become slightly louder again.*

42 31 JS: Thirty seconds....thirty seconds left to go....

42 53 Lo: Hey, Miss, come here, Miss...I done 5 x 60 here and

43 08 *Further discussion about the workings of an analogue clock.*

43 22 JS (To class): Alright, guys, I want to try another type of exercise. (Noise does not decrease quickly). Guys, we need to stop now. *(One pupil begins to hum in an operatic manner in the back of the room and lots of pupils laugh sharply).* William....William.....Ja.....William.....We are going to stop now, William. (Noise decreases precipitously). We are going to try another type of problem (a

few sharp laughs are heard). Have a look at the board. (To Lo) Try not to break that, Lo, we don't have anymore. William! Have a look at this. We want to calculate the perimeter of this shape. (*Further disruption involving William and Mo; both pupils are admonished to look at the board*). Remember the perimeter is the length of the line that goes all the way around a shape. Ok, so someone explain in words, what is the perimeter of this shape. Actually, I'm going to choose somebody. Buk—how can I find the perimeter of this shape? Have a go. (Pause).

45 43 Asc: It's two times (gives a calculation with numbers)

JS: But can you explain in words?

Asc: (Repeats calculation)

JS: But...in words....can you explain what you're doing in words...ok, Mi....

Mi: It's adding up some straight lines and then the circumference of a semi-circle.....

William: A circumference!

JS: Yeah but (pointing to the board) we've got this and this.....so there are some lines *and* a semi-circle....a semi – circle..... so I'd better write a formula and how am I going to write it?

Various pupils shout out contributions.

47 31 JS: Good, let's try another one. (Noise level decreases noticeably). What can someone say about this one? Someone please try to explain what we've got here. Mo, what do you see here?

Mo: A rectangle and a circle.

JS: Is it a whole rectangle?

48 05 **Missing pupils enter the room.**

48 13 JS: Da....sit down now or go out. (The class continues to analyse the second problem as the new arrivals go to their seats and unpack; noise level has increased noticeably).Is there a whole rectangle here? Mica?

Other pupils: (Give mixed replies over some personal conversations that are taking place as new arrivals settle in).

48 59 JS: (Finishing an observation). But be careful—in this one, many people see a whole rectangle that just isn't there. So the perimeter is going to be what? We need to write a formula....Mi?

Mi: (Gives a run down of the formula while the noise level increases again; a few other pupils, including Da, who has just arrived, override his contribution with their own calculations).

JS: But there is no line there!

- 49 42 JS: Da, just sit down! (Continues to write calculation of perimeter on the board, several pupils join in). Ok (looking at final answer) why do people often get this wrong? (Indistinct words). Yes.....they forget to add in this line. Alright, you are now going to try Nos. 5 – 8 on the second page. We've got approximately eleven minutes, start with No. 5(as JS begins to walk around the room noise level increases).
- 52 06 *Noise level decreases without any obvious prompts.*
- 52 07 JS: Da, come on, start with No. 5!
- 52 35 *JS speaks to two pupils, As and Sa, who are sitting at the front of the room and not engaging with the work. A few of the new arrivals need extra help and guidance.*
- 53 39 *Noise level increases again in the vicinity of Da.*
- 54 04 *Noise level drops back down.*
- 54 31 JS: Ok, we've got seven minutes left....
- 54 40 Pupil: Miss, I think I got this wrong....
- JS: But this one you got right.....good, good...(Hooting in the background)
- 55 00 JS: Ap, come on, let's go.
- Ap: But there's only a few minutes left—
- JS: Yeah, but can you do one before the bell? (Continues to monitor others' work).
- 55 37 *Noise level again rises. It appears that group of boys on right-hand side of room are having their own discussion again.*
- 55 52 Pupil: Miss, I didn't like this lesson.....
- 57 04 *Argument in one part of the room about passing some supplies.*
- 58 03 JS (to individual pupil): I'm sorry but —they're talking across the room and-(noise level increases again so that it is difficult to hear)
- 59 15 *Quality of noise changes: it is now apparent that several pupils have disengaged completely, many of whom are the latecomers, but not all*
- 59 25 JS: We've only got two minutes now (noise level drops abruptly)
- 59 57 *JS checks a few answers as she walks around the room.*
- 60 24 Pupil: How do you work out these brackets, Miss?
- 60 47 *Noise increases sharply again as JS guides one pupil through a series of calculations.*

62 59 JS: Ok guys....(noise level drops but not enough)Right, guys.....
(waits) ... Two things: first, I think we are going to revisit this tomorrow, and as the second part of the lesson seemed to be more successful than the first, we're going to work a lot more on word problems. Now, I would appreciate it if a few people stayed after; they were the first people who gave me their forms. It will only be for ten to fifteen minutes—say fifteen minutes—and (names are called, with one pupil declining and another asking to be included). For tomorrow, please, would the rest of you bring in your forms and now please bring up your.....

Free Association Narrative Group Interview 1 (First Draft)

Date: 4th July 2013 Venue: M6 Folder No: D File No: 811 0025 Duration: 17m 02s

Participants (See code): William, James, George and Robert (George, who has recently arrived from Portugal, speaks very little English but performs strongly in class and is keen to participate; in fact, he understands a great deal of spoken English and James has offered to translate).

The interview took place approximately six or seven minutes after the end of the lesson entitled "Seeing Circumference 1"; there was an inevitable delay while I ushered out the rest of the class out of the room, seated the participants at a table by the window and distributed refreshments.

JS: Ok....I am not going to ask you a lot of questions in this interview, which is going to take up to twenty minutes. I am going to ask you one question and you can say what you want....and I, uh, might ask you for some details, but that will be all. Ok? It is called a free association narrative interview and it is led by you. Ok? (Silence). So my question is: what happened in this lesson?

The pupils look at each other and appear somewhat surprised and at a loss as to where to begin. William and James are looking at each other intently as they initially begin to speak at once.

William and James (alternatively, with stutters): We learned about.... We learned....

JS: (somewhat stridently): What *happened* in this lesson?

William: We learned about irrational numbers..... (stop)

JS: Ok, we learned about irrational numbers, someone else

James: We learned how to figure out the circumference of a semi-circle and a circle.

JS: Ok, what else? (*Indistinct statement*).

James: Maths-wise or actually the lesson?

JS: Any-wise, the lesson.

James: Loads of people were missing because of a trip.

JS: Yes, that's true. Loads of people were missing who I expected to come in. But what else? How did the lesson go?

James: It went calmly and it was quite quiet-

William: But when the rest of the people came back it was quite loud –

James: Yeah, it got louder when people started to come back.

William: You know what I want to know, why do you need to learn about circumference and (pause) like...

James: For, like, business and stuff. So, like, if you are building a house with a rounded window or something like that.... Kind of like constructions and stuff

William: Yeah, we learned about some new rules involving word problems using circumference.....

JS: So how were the two halves of the lesson different? Robert, what did you feel?

A great deal of background noise is heard as the classroom door is opened temporarily. Robert declines to give an answer as James and William urge him to do so.

William: You had to use your head more in the second part.

James: Yeah, the beginning was slightly easier –

William: Because it was about perimeter—

James: Yeah, but the second bit was slightly harder –

William: Because you had to work harder.....you were basically using all the things you learned in the first part.....

JS: Ok....you said something about the second half of the lesson being different because people were coming in. How did that change things?

James: Well, uhm

William: Everyone was –

James: It changed everyone's attention –

William: Everyone was –

George: It was more confused

James: Yeah, everyone was getting distracted seeing other people, they started talking to them already, and then they aren't concentrating on the work –

William and George are nodding their heads and agree with James; Joe nods his head too but is still very quiet.

JS: How does that happen?

James: They see people—

William: It's not because they—

James: They are looking somewhere and they see something happen so they naturally look—

William: Yeah, the attention span is quite short in this class because as soon as you give them work where they don't know what to do, their reaction is "Just let's talk" or something, or when they finish work they talk.

JS: Is that the only time?

William: No, when they're settling down they talk....

James: Yeah, right at the beginning when there is a lot of people around, like when everyone is in the class and it takes ten minutes maybe to settle—

William: Yeah—

James: Just cause everyone comes up from outside and starts talking, talking, talking, talking and then that's when they realise "Oh, we have to do work". But by then lots of the lesson has already passed.

JS: Ok. What happens to stop that? To get into the lesson proper, what happens?

James: Lots of behavioural (*indistinct words*)

William: We have to go through the process of everyone getting their warnings, doing everything, when everyone has gone through that process, then we start to learn our work, because it's like a process. Like the class don't come in straight away and settle down –

James: Then they want to go around the class—

William: Then they sit down:

James: Then they sit down but they still talk; then they mess about—

William: Then they do the work-

James: Then you give them C1, C2, C3, then they realise "Oh, we'll get sent out so we'd better be quiet", then that's when you're allowed to speak and stuff and everyone starts working.

JS: When you start working, what happens?

William: Everyone ---well actually no one in this class is *not* up to a high standard, no one in this class is lower than a Level 6 but, the thing is, people just don't – they've not been listening, when they haven't been listening for a long time they start to lose it, like I know before that Dylan (see code) , in maths, was very good at it, he was really working, really good at it, but because he just started to talk a lot, he stopped learning, now he's lost it and he can't get it back.

JS: No chance of getting it back?

James: Well, he can---

William: Yeah, there is a chance he can get it back_

James: He can but it's not how he would be if he just kept—

William: If had continued as he did before, if he had listened as before, he would be doing much better.

James: It's just that people are more interested in the surroundings than in the actual lesson. So, if like, something happened, or someone-- if I have to tell this to that person—then that person says I have to tell this to the other person, that's how the talking starts and people start talking.

JS: What kind of things then? (Stop) Without getting personal.

A few indistinct statements as James and William attempt to speak at the same time.

James: Ok, say someone had a fight outside. “Oh, so what happened outside?”

William: Yeah, what happened outside? Or, say something like—I'm not being rude, but say someone made a joke about (*indistinct description*), then X would tell me outside and then XX will ask me, then start laughing, then yeah....

James: Then everyone would want to hear it, like what happened, and so....

William: There would be a big discussion—

James: So everyone would want to get it out of the way, just --

William: “What happened?”

James: Yeah, “What happened”?

JS: Is there no way of short-circuiting that?

William: Yeah, there is.

James: Yeah, there is, it's just standing in front of a classroom and telling everyone....but that's just....

William: I think the way you should-

James: *Indistinct words*

William: I think it's the way you put everyone into seats 'cause if you spread them out more they will have less of a chance to talk together, across, across....

James: Even though they're spread out and there's less chance of talking, even though.... same way, it's going to be distractive, because basically even though they're spread out, they're going to have to talk. My friend's down there and I'm going to have to talk to him, so I am going to talk a bit louder and see if he hears....but then again, if we are all together, they are just going to make noise and not focus, they are not going to focus-

William: Do you know what I think you should do? What you want to do is to enforce the law on them.....

James: The law! (Laughter) Consequences!

William: Yeah, consequences, you've got to put the consequences first, and say if they don't want to listen to (*indistinct word*), you say "Do you want me to call your parents if you continue like this?" and no one wants to get a phone call home, so to my mind they should automatically change. I know that-

James: You should've done it, like, in the lesson itself-

William: No, no like....

James: You can pick up the phone, call their parents and put it on loud speaker so everyone could hear and they could feel humiliated and now don't want this to happen again

William: Not even that-

JS: Has this ever happened to you?

James and William attempt to speak together.

William: Yeah, in other classes --

James: Yeah, it was a class I was in, basically it was, uhm Ms Francis, she called a student's mum during work, and put it on loudspeaker so everyone could hear, and then basically he actually was really, really-

William: XXX?

James: Yeah...actually he was really, really upset, not upset, but, like, he knew he was in deep, deep trouble and from then he hasn't misbehaved in that lesson ever again. He does the normal, ok, talking and stuff, but Miss allows that anyway. Like, when we're working and stuff, she don't want complete silence, she says "You're allowed to talk, but you can't go louder" and he just follows the instructions and behaves.

JS: What are the things that get you to learn?

James: Also, in English, there's like, not only prizes, but the fact that there's competition in the air-

William: Yeah-

James: And they want to beat that team-

William: Yeah, everyone wants to beat-

James: Everyone wants to beat that team-

William: Everyone wants the prize. Everyone is focused and they actually do work, and if you want the prize really, you're like, "Yes, I really need to get this done. I am going to listen and take notes, yeah, yeah..."

JS: What are the prizes?

James: (*Indistinct words*) lots of sweets'

William: Yeah, sweets-

James: So, like, for example, in English, Sir says "Whoever wins this (*indistinct word*), gets a pack of Haribo...each..." Out of everyone, on that day, everyone did- contributed to work 'cause all words, everyone had to say something when presenting.

William: Or you could say, you could set a standard for maths, like say, everyone has to do at least six equations and

James: Each!

William: Yeah, each, different ones to get this and ones to get....yeah...

James: And then you compare them to the other groups and which group—but not all the time, just once in a while, 'cause basically they will think that every single time they're going to get something, then (*pause*)

William: Yeah, just once in a while...

James: Yeah, just once in a while it's good-

William: Yeah, like every Friday or something

James: Every two weeks maybe....

JS: If there are no prizes, then what?

James: If there are no prizes, then maybe a good phone call home, it's a fact that maybe a good phone call home, it's not like, it doesn't have to be physical sweets or something, just the fact that a phone call home or a blue card or something, just –preferably a phone call home- your parents are going to be happy with you, they might get something for your good behaviour, because I know when teachers call my Dad, even though it can be just, like say, "He had a good lesson", he gets all happy, and even when he gets one of those sheets which says "exceptional", he gets all happy over that, so...It's just small things that make parents happy. (Laughter).

JS: Robert, what do you think?

Robert: (*Pause*) About what?

JS: About anything?

William: He doesn't know what to say. (*Kind laughter*).

JS: George?

James speaks to George in Portuguese.

George: I agree with what you said. It's good to work in groups because people like to work together.

James: Yeah, if they are in a group of friends,

George: No, not friend-

James: No, not friend groups but, like, mixed- like they're still

William: Like one or two together-

James: Like one or two friends but not too many 'cause they'll start talking and stuff-

George: Yes-

James: But if it's more or less one or two friends, it's like "We'll do your work, but we can still talk, but we will do your work and we have to contribute---."

William: Yes.

James: And we have to contribute to get (*indistinct words, George is speaking Portuguese to James*) oh, to get people to help other people. So, like, people who know more can help people who don't know.

JS: Is that what happens in most of your other classes? Do you work in groups most of the other time?

James and William attempt to speak at the same time. (Indistinct statement).

James: We have to! We work a lot in groups, it sort of helps.

William: I think more people, like as I said before, that when sometimes, when I don't get the work, and I know XXXX gets it, I'm just going to ask XXXX "Do you know what to do—"

James: Can you help me?

William: Can you help me on what to do?" And XXXX is like, uh, "This is how you work it out, this is what you do, blah, blah, blah" and if he can't do it, then XXXXX can do it and explain to me how to work it out, which is very encouraging, when someone.... like the more people who is helping you out gives you more (*indistinct words*)

JS: What happens in tests then?

James: In tests, basically—

William: Everyone panics-

James: Not—yeah, everyone sort of panics, when it comes to a test like (*indistinct word*), am I going to do bad or am I going to do good, but the thing is-

William: We know the answers but- (*continues to speak as James begins speaking but words indistinct*)

James: We know the answers but, like, because you're sort of trying to remember everything all at once, you end up forgetting things at the same time, so you sort of just stop trying to remember, and when it does come to you, you probably already wasted a minute trying to remember how to do it. And then you're gonna waste another minute, or two minutes, just trying to figure it out.

William: Yeah! So what did you just tell me, that if you stopped the (*indistinct word*), it would - the test would be easier for you, cause you got through the hard questions and took your time, you could go through the easier questions like, more quicklyyou can quickly finish those questions.....

JS: Ok, we're coming up to the end. What can you remember from this lesson today?

William: I think this lesson- I can't remember everything we actually learned....(*stop*)

JS: Oh; no, you won't.

William: No, I can't:

JS: But what can you remember?

James: We found out the semi-circle equations-

William: Well, if I really enjoyed it, they would stick in my mind, like if I really enjoyed it, it would stay in my memory, like the other one, the one of the simultaneous equations, I still remember that, the one with the, the uhm, the one we did last week, the square roots, I still remember that one, yeah..... (*stop*)

JS: Do you remember anything else?

William: Yeah, I remember the one how to work out the circumference-

James: Yeah! The circumference—I missed it.

William: And reading and finding clues.... (*stop*)

JS: Do you remember anything else?

James: How the class is quieter when--

JS: (To Joe) Do you remember anything? (To the others) Are you going to remember how people came in in the middle, what people said?

William: Yeah, that stays in your head more.

James and George: Yeah!

William: Say if someone says something ... say if XXXXXX took something, for now it would kind of stick in my head longer than the work 'cause sometimes I just get dozed off with work, but -yeah....

James: Oh, before a lesson, how we talked there, I can sort of , we can still remember, and we probably will remember, for a long time. So, if someone told me something that happened, I'm going to remember more than I will probably forget it.

JS: Ok. Does anybody want to add anything? (*Stop*). Ok, so what I am going to do soon is invite you for individual interviews. Is that ok? It will be on a rolling basis. The next three lessons I will have people in afterwards and then I will ask you in for the individual ones, say for fifteen to twenty minutes, all by yourselves. (*Murmurs of assent*). Please take some cake...yes, take whatever you want.....(*Students push in chairs and hand over used paper cups and plates*). George, thank you. (*Further sounds of clearing up*).

Appendix 5.5 Lesson 2: plan, transcripts of lesson and group interview

Seeing Circumference Part 2 Date: 5th July 2013

Lesson Objectives: Pupils were expected to solve a wider variety of word problems using the formula for circumference of a circle and to calculate the perimeters of more complex compound shapes incorporating parts of circles.

Starter Exercise: Pupils who were present for the whole of the previous lesson were directed to first show the others the best practice solution to problem No. 2 in Exercise 2 (Textbook pg. 53) and then to solve Exercise 6, both of which were subsequently analysed on the board.

First Part: Pupils were asked to work in pairs or small groups to produce diagrams and comprehensive solutions to at least three problems in the second half of Exercise 2 and to create one or two problems of their own if any time remained. Pupil progress was then checked as pupils solved problem No. 11 on the board and two pupils volunteered new problems.

Second Part/Plenary: In a follow-on the part of the previous lesson, pupils were presented with additional diagrams of compound shapes and asked to calculate their perimeters in a whole class format. Pupils then worked on four problems of their choice in Exercise 3. The final progress check exercise focused on the solution to problem No. 12 in Exercise 3 and pupils' perceptions of the difficulties involved in visualising shapes.

Seeing Circumference Part 2 Skeleton Transcript (First Draft)

Date: 5th July 2013 Venue: M6 Folder No: A File No: 811 0026 Duration: 1hr06m17s

The recorder was turned on approximately five minutes before the formal start of lesson as pupils were passing in the corridor and entering the lesson to unpack and sit down.

01 04 Pupil: Sorry, Sir!

02 07 JS (to individual pupil, after some kind of explanation): Are you ok? Are you sure?

03 40 JS: Thank you, thank you very much.

04 45 *Bell rings but noise does not abate.*

05 09 Sam: Miss, I've got the papers in my bag.

05 46 JS (To William, apparently with reference to his behaviour in the previous lesson): You crossed the line yesterday. Don't do it today or I will take action. Now sit down and have a good lesson.

William (good-naturedly): Yes, Miss.

06 24 JS (to William, who has come back up to the front of the room while other pupils are still arriving): No, go back to your seat.*very loud noise continues to be heard from corridor.*

07 10 JS: Guys (*noise decreases noticeably but not completely*)....especially for those of you who were not here yesterday (*noise decreases considerably*)what two steps do you need to use to solve these problems (pointing to the board)? What two steps do you need to use to solve these problems?

Pupil: *Says something about drawing*

JS: Yes, if you don't have a diagram, you need to draw one. Luckily—(Las throws a book at another pupil) La, settle down now!

William: Miss, did you just see him throw a book at me? (One or two other pupils are attempting to get involved in the exchange).

JS: Ja, you're not helpful! The first thing you need to do is to draw the diagram. The second thing you need to do is to (pause) know the formula for circumference, which....Ap, is what?

Ap: (Thinks while looking at the board) Um....

08 08 *More pupils arrive late to lesson but go more or less directly to their seats.*
JS: Ok, so what is the formula for circumference of a circle so you can do this? (Pause). Yes, pid. Then you need to think about it and use circumference of a circle in some way. Now, I didn't put a time limit on this (pointing to the starter) but I am actually going to give you seven minutes. You've got seven minutes from now. Read the question carefully to pick up the little tricks. This is one of the problems I've taken from scholarship exams (Walks around to help individual pupils).

09 30 JS (to a few pupils in succession): Sorry, we have now totally run out of paper. (Arranges with one to take pages from an exercise book).

09 45 JS: Ok, Mickey, can you try this?

10 02 JS: Ok, Louis, where are you up to? (An altercation erupts in the front of the room involving Derrick).

10 32 JS (near Derrick and Da) Well, guys, you just have to break it up.....(Derrick continues to argue with another pupil about paper).....Derrick, stop it....I will get another sheet.....come on, calm.....

11 30 JS: Derrick, we're going to focus.

11 54 JS (to Las) So stop talking and go to work....

Las: What do you mean, you can see me doing my work.

JS: Ok, so do it then....

Las: So, so, what----(JS cuts off the argument by purposely beginning a conversation with another pupil nearby) Yea, what happens when they're fighting, huh? I was just doing my work.....

12 24 JS (back to La) Just stop with the negative comments now.

12 39 JS (to class): Several people have the answer to the first one now. We're now looking for the second one. (*Argument spearheaded by Derrick is beginning to erupt in the front of the room*).

13 10 *A pupil calls for help with the maths after JS has again returned to the front of the room to contain Derrick.*

13 36 JS (back to Derrick): We're going to stop the comments now, we're just going to stop.

13 42 JS (to class): Several people have the first one, we're looking at the second one.

13 58 *JS checks the results of a few people; William's voice can be heard behind her.*

14 36 *Lengthy interchange between JS and pupil regarding calculations.*

15 09 JS: Mickey, you really need to start.

15 48 JS(to class): Ok, there's one and a half minutes left. Several people without calculators actually estimated their answers, so if you don't have a calculator—we're going to go over it in a minute—estimate! I am going to ask someone to

16 01 JS: Ok, well done! (Works through problem with individual pupil).

16 49 JS: Ok, Mic, I go around to everyone—

Mic: Miss! I wasn't going to say anything!

17 29 *Indistinct disruption by boys on left-hand side of room.*

18 07 JS (to individual pupil, looking at a problem): What do you mean by an overlap? ... Ok guys (to class) we're going to make a start. We are going to make a start. (Noise levels decrease rapidly). Don't run (to someone sharpening a pencil). Only a few people are still talking. (Pause)....alright, I saw a lot of good work. I saw a lot of ingenuity. Can someone explain the meaning of ingenuity? They use the word all the time in the States and not so much here....does anyone know what it means?

Pupil begins but then admits he doesn't know; others laugh and shake their heads.

JS: Ingenuity is when you use your own head, your own intelligence. It's when people don't have to tell you what to do. William (talking to friend)- there was a

little bit of maths I just reminded you of- but some people-- and they didn't all have a calculator-- read the problem, estimated and then just figured it out. These are great skills to have. Now I am going to ask....I know several people got the answer to the first one, but I won't have time for everyone....I am going to ask Cha to start us off. (Cha shakes her head. I calls attention to diagram on board which features a tin can with an overlapping label around it). First, what do we exactly do we mean by an overlap?

Derrick (Shouting out): *Indistinct but correct explanation.*

JS: That's right. (Goes on to explain mechanical process of gluing a label). So whatever the circumference is, you're going to need another centimetre for the overlap. Ok? So, we've got the diagram, what do we need to do first? Go on....Ja! (Pause)....You started—you did this—so tell us, what do we need to do?

Ja almost inaudibly explains how he looked at the diagram and wrote out the formula. Other pupils assist him with the substitutions.

JS (to several pupils in the class who say Ja never really did it): Yes, he did write this! (*I writes what pupils have said on the board and ask someone to estimate it, then give the exact answer. I explains that the difference between the two can cost companies millions of pounds in raw materials per year*). Now the overlap is just a centimetre more. What is that operation mathematically—more? (A few pupils shout out). Yes, it's plus, so the final answer is

22 12 JS: It doesn't say in this problem but most exams ask you to round to 1dp. Derrick! (He stops talking to neighbour). So 22.55 becomes 22.6. So if you're going for an A* grade the answer is 22.6; all your GCSE papers will ask you to round. Now, what about the second one? We need a diagram and what should the diagram look like? I am going to ask....Abby. (Pause). We've got nothing there (pointing to board) so what do we need to draw first?

Abby: Circle.

JS: Good—circle (drawing it). We are asked about circumference so what do I need to draw inside the circle? I am going to ask Mo....

Mo and others: The diameter.

JS: Okay, I'm going to go around and ask different people. What's the diameter? (Pupils: 62). This is rolling forward, I assume it's on the floor. So Viv, what am I going to draw as well? I assume it's on the floor. (*Indistinct words*). Ok, I'm going to draw the line, in GCSE exams you can get a mark for this, but I've got to label the line to show how long it is. I need to know something about it—do we have a distance? (*One pupil checks and I writes the distance on the board*).Ok, I saw a couple of people do this—I can't remember exactly who—but I'm going to ask Robert to continue..... (*Rest of problem is solved in a step-wise fashion without various contributions and no disruptions*).

27 11 JS: So what's the difference between a B grade and an A* grade? The English! Read the problem carefully! Now we're going to continue on with this. We're going to do slightly harder problems and then at the end we're going to look at a very interesting diagram and we'll see if you can solve it.You know the strategy for solving a word problem: you draw a diagram, you work out

circumference and then you have to answer a particular question. If you were here yesterday you may have already looked at this.... we are now going to go directly to No.7 on the worksheet. You may work with a partner today but talk reasonably. You will have approximately 18 minutes to work with checks (To individual pupil). You are going to start with No.7 but then they go on to the next page. (To another) Yes, there are quite a few but see where you can get up to. (*I walks around to start pupils off*).

28 32 *Derrick's voice is heard at the front of the room.*

29 25 JS (to As): What's wrong?

29 36 Derrick (loudly to I): Hey, are we doing the same thing here as we done here?

29 46 JS (to Mickey): What do you think you're doing here? ... You told me last time that you were going to work.....

29 57 JS: Jo, come on.....(to a neighbouring pupil) watch that calculation.....

30 08 JS (to class): Ok guys, there's 16 minutes now...

30 12 JS (to Mickey): Mickey...Mickey.....which one are you starting on, Mickey?

Mickey: Well, which one should I start on?

JS: I know you weren't here yesterday but I think you can start on 7.....

31 33 *Noise level is increasing in room as one pupil laughs hysterically.*

31 50 *Lengthy conversation with Derrick about a solution to one problem. Noise is heard from the clique of louder boys on the other side of the room.*

34 14 Derrick: Hey, Miss, come here.....

34 19 JS (to Mickey): Why don't you let George explain to you?

Mickey goes over a problem in part with JS and appears to understand the necessary concepts.

JS: Come on.....you've got to get a grip on this.

35 21 *Noise level drops.*

36 00 *Lengthy analysis of a problem with one pupil.*

37 04 *Derrick can be heard discussing the answer to a problem with someone across the room.*

38 30 *while JS checks the work of various pupils a small group of pupils can be heard laughing.*

38 45 JS (to one or more pupils): You knew I heard you.....

- 40 19 *Position of recorder changes causing a screech and an apparent change in the noise level in the room.*
- 40 23 JS (to class): Ok, we've got about three more minutes. Three more minutes before we do some different exercises.
- 40 48 JS (to individual pupil): Well look at these....they're different size wheels so....*lengthy analysis of one of the most difficult problems with Lo and Ap*
- 43 11 JS: Oh right! You've got it!
- 44 02 JS (to class): One more minute!
- 44 00 JS: Mickey! (*Indistinct words*). Actually this is not on *MyMaths*. These are scholarship problems..... and (*indistinct words*) they aren't really much different than the one we did on the board....*end of conversation cannot be heard; I apparently walks away to help another pupil analyse a problem.*
- 45 28 JS: Half a minute now! (*Further in-depth problem solving with two pupils; it appears that several pupils are anxious to check their problems*).
- 48 20: Derrick (loudly) Hey, Miss, is this alright?
- 48 30 JS (to class): Ok....alright, guys, sorry but....(Derrick: I can do that, Miss!) Very quickly.....Mickey, George.....we are going on to the second part of the lesson. Yus! Just lookingno, we didn't get to No.11 yet....does anyone know what a trundle wheel is? (*Pupils offer various explanations, JS stops the class to quiet them and then confirms the definition*). And what operation did you need to use in Problem 11? We are not going to solve it but just tell me: what operation do you need to use?
- Various pupils: Times!
- Other pupils: No, no the other.....
- JS: Yeah....(pause)....it's division. (Pause). What's the other thing that can help you with word problems? (Pause). You draw a diagram, show your working out in two steps.....Buk, Yus, no! (Pause). You can also read the problem and try to decide which mathematical operations matche important words in the problem. Some people like doing that. Ok, we're going to go on and look at some diagrams. In Tuesday's and Wednesday's lesson you are going to see some very interesting diagrams but today we're just going to begin to look at shapes which involve circles or parts of circles and we're going to calculate perimeters.
- As (pointing to the one that has been put on the board): Those are two semi-circles!
- 51 16 JS: Mickey, turn around, this is not on *MyMaths*. What do you see? (Mickey is silent). What you see when you look at a shape is actually much harder than you think, a lot of people can't see shapes. (*Pupils are silent*). They're really mathematically brilliant but they just can't see shapes. (*Lots of pupils are looking at the board and have their hands up*). Michael's got his hand up. Ok, so what do you see, Michael?

Michael: *Attempts to answer but is drowned out by several other pupils, who attempt to give the answer first.*

JS: Alright, alright---we're going to try to share. It's two semicircles and a (*indistinct words*) and you(quickly rattles off some calculations with numbers)

Other pupils voices can be heard arguing about the problem.

JS: Ok (turning to board with marker) we've got one semicircle here and another semicircle here and.....(pause—pupils voices can be heard indistinctly continuing the description) and something—

Pupil: A rectangle!

JS: --which does not belong to the semicircles! ... But do we really have a rectangle here? It looks as if there are two sides of a rectangle but we really don't have the rectangle line here! (Pupils voices can be heard arguing about possibilities). Ok—someone tell me what we need to start doing....ok, La, how do we start this off?

52 27 *La attempts to answer but again other voices drown him out.*

JS: Ok, I am going to go around.....ok, La, how do we start this off? La?

La explains in a low voice; noise level in class is low as pupils are listening.

JS: Ok, what is the diameter of the semicircles? (Pupils discuss). What is the diameter....I am going to ask....(various pupils shout it out).

The problem-solving continues in this fashion.

53 34 JS: There's a semicircle here and a semicircle here. Are they the same size semicircles, Sam?

Sam: Yes!

JS: It is! So do we need to figure out the circumference of two semi? (Several pupils shout out do to the whole). Yes, so why don't we-

Sam: You can just do the whole.

JS: Yes. (*Interactive problem-solving continues in this fashion; at least four different pupils are involved*).

55 38 JS: I think you're right Yus (a pupil who caught a mistake in the approximation). Now, in Exercise 3, I want you to work on either 9, 10 or 11 before we go. (*I congratulate one pupil near the front of room and moves towards the back to ensure that another pupil can start a problem; noise level of room increases perceptibly but not uncomfortably*).

56 45 JS checks through one pupil's solution.

57 39 JS helps another pupil to visualise a shape.

- 58 35 *Boys on the left-hand side of the room begin to talk loudly.*
- 59 55 JS (to class): Three more minutes! (To small group of pupils sitting in the sun in the back of the classroom) Yes, I know it's getting very hot.....
- 1 00 17 Pupil (shouting across room): Hey, Lo! (*Room goes silent immediately afterwards without special intervention on I's part*).
- 1 00 33 *Derrick and a few other pupils engage in a very loud argument over a problem.*
- 1 00 39 JS (to unknown pupil): Are you finished already? Where's your work? ...
Ok, I'll check it.....
- 1 00 55 Derrick: Nooooooo.....I'm not doing it.....oh God, no, no, no, I'm not doing it.Look, it's too hard.....(*I's reply inaudible*).
- 1 01 16 *Apparently JS has gone on to check the work of another pupil.*
- 1 01 33 *Noise level increases as Ja and other boys argue—words indistinct.*
- 1 02 14 *William's voice is heard at the back of the room as he involves himself in the argument; however, noise levels have decreased).*
- 1 02 30 William: Miss, when can people start to (do tests)?
- JS: Like GCSE tests? Here? At some time between Year 10 and 11.
- William and JS continue to speak about exams inaudibly (JS appears to reassure William that he will be prepared at the time. Another pupil appears to enter the conversation. Surrounding noise level decreases.)*
- 1 03 17 JS *checks the answer of another pupil. Continues to walk around room checking.*
- 1 04 01 JS (to class): Ok guys.....Mickey! (Pause). Some really good work. We're running a little bit over time but just before we go.....just before we go, when you look at this shape on the board (flipchart is revealed), what do you see? (Pause). I remember the first time I looked at this shape and I couldn't see---
- Various pupils shout out, nothing distinct can be heard. A pupil standing in the corridor pokes his head into the room and a pupil shouts out his name. Other pupils, however, are intent on describing the shape.*
- One pupil: Wait, no....it's a quarter....
- Another pupil: No, it's two quarters, you can see it.....
- JS: Is it one or two?
- Many pupils shout out two, which is the correct answer but there are many other comments which are indistinct.*
- JS (to one pupil): Are you sure? (Further discussion).

1 05 02 JS: Right, ok, think about that. I would like to see Abby, Mickey and Sam at the end of the lesson. Everyone else please bring your books and worksheets to the front of the room.....(*sounds of packing up and movement*).

Derrick can be heard speaking to a few pupils but the words are indistinct.

JS: Thank you, thank you.....(*Interviewees are directed to the table near the balcony while I continues to collect in books and sheets in separate piles*).

Free Association Narrative Group Interview 2 (First Draft)

Date: 5th July 2013 Venue: M6 Folder No: A File No: 811 0027-28 Duration:14m 27s

Participants: (See code) Mickey, Sam and Abby

This interview was carried out directly after the lesson "Seeing Circumference 2". After the rest of the class had left the room, the participants were invited to sit at a table near the balcony door and help themselves to a drink and refreshments.

JS: (*tape begins in the middle of a sentence*): ... ok, I'm not going to ask you a lot of questions, I am just going to ask you one question and you can say what you want, and then I might ask you for some details. Ok? I don't imagine that we will stay more than fifteen minutes' maybe less than that. Is that ok? (*Murmurs of assent*). So, what do you think happened in this lesson?

Mickey (after a pause): Well, the usual...we done a starter...as usual...and the starter is usually about what we're going to do today.... (*pause/ I: Ok.....*) ... Today was about the circumference and diameter stuff...and I'm a little bit slow 'cause I wasn't here in the last lesson...but, yeah, and then we...in the next part of the lesson you taught us how to do it in an easier fashion and, oh, we had to put it into a fraction, and practice...

Sam: And it got harder, and we had to learn how to do it the quicker ways....I'm not sure, but...(*pause, the door opens and loud noise is heard from the corridor*)

JS: Ok..... Abby, what happened with you?

Abby: (*pause*) I didn't understand it....

JS: Oh....from when?

Abby: From today.

JS: Ok....from the beginning?

Abby: No. I understood some stuff, the stuff we learned the other day (*very loud noise from corridor again*), but stuff that we learned today I don't understand.

JS: Ok- (*Noise from the corridor continues, interviewers tells those pupils not to interrupt, then tape is temporarily shut off*)....so what about the maths?

Mickey: No you also told us how...the difference between a B and an A* is writing to kind of focused (*indistinct words*) and the writing side –

Sam: Because most of the people do mistakes on the language, the language---they know how to do it, but the language they don't understand....

Mickey: Also, you told us that shapes are a really hard part of maths and you could understand numbers and find them very easy but when you see shapes it changes completely (*stop*).

JS: Ok, so what else went on?

Mickey: Well....that's about it....there was a plenary...

JS: Ok, great, that was all about the maths, but what else went on?

Sam: You mean about the English?

JS: When you go out and remember this lesson, what are you going to remember?

Sam: Well, I don't know...I think the separate questions, when we come up to the GCSEs(*stop*)

JS: Anything else?

Remick: I..I will always remember something you said, how far...how the writing is an important side of maths, 'cause I will remember the writing and try to read and understand what the writing says and then I can get higher in maths, I'll put it away from this lesson.

JS: Ok. I said that I wasn't going to ask a lot of questions, but I am going to ask one now: when were you working in this lesson?

Mickey: Well.....(*stop*)

JS: Were you working throughout?

Mickey: No (*stop*)

JS: (To Sam): Were you working throughout?

Sam: I tried....butnot all the time.....(*full stop*)

JS: (To Abby): Were you working throughout?

Abby: Kind of....

Mickey: Personally?

JS: (To Mickey) Were *you* working throughout?

Mickey: Oh, no.

JS: Were people working throughout?

Abby: Some people were.

JS: When were people working and when weren't they?

Abby: Some were told to work.

JS: Were *told* to work?

Sam: Some people did like, just one question to start with.

JS: How come?

Sam: Because they didn't, they weren't bothered....it was too much, or too hard, or it was both.

JS: Why do you think they weren't bothered?

Abby: Because it was too hard, and long.

Mickey: (*Indistinct word*)...because they didn't understand what was happening in the lesson, so they thought – they didn't know what to do, they just sat and talked til they *blacked out* the lesson.

JS: So, when people were working, why do you think they were working?

Mickey: Huh?

JS: So when people were working, why do you think they were working then?

Mickey: They knew what they were doing, as it was getting harder they were understanding it more.

JS: Ok, so what was happening when people weren't understanding it?

Sam: Just talking out loud....

Mickey: Who were distracting the rest of the people who were trying to understand.

JS: Ok, so what were *you* doing? (*Mickey and Sam look at each other and laugh*). Seriously!

What was happening with you in lots of the lesson?

Mickey: I didn't understand 'cause of – I didn't think I was here yesterday and I didn't really get it and because we started straight from No. 7 today, so that in the middle of it, I didn't really get what was happening, so I kind of zoned out for the rest....

JS: Ok, when you zoned out, what happened?

Mickey: I just spoke. (*Full stop*)

JS: You just spoke?

Mickey: *Nods*

JS: Ok, so what was happening....*(to Abby)* what were you doing during the lesson?
Kind of what happened during the lesson?

Abby: I done some work, I *(pause)* ...I talked. And I *(slept)*.

JS: Ok, just talking about you guys, do you go “in” and “out” during a lesson?

Mickey: Personally, I do. There are times I am in the lesson and times I just *(indistinct words)*.

JS: *(To Sam)* Does that happen to you, Sam?

Sam: Especially when it is hard. I don't understand it, I can't do it, I would like to try but I can't do it.

JS: Really? Ok.... *(to Abby)* Would you say it was the same for you? *(Abby nods)*.
So, look, if you don't understand something, what....what has to happen for you to get working again?

Abby: To understand it.

Sam: Ask for help?

JS: But you guys weren't asking for a lot of help....in actual fact, I was walking around the room....some people were asking for help, like, “Can you check an answer? Can you come here, Miss?” Ok? Oh yes---

Mickey: I got mad, I couldn't catch up with where the class was and so *(indistinct words)* with where the class was. *(Memory: refers to reading on the internet at home)*.

JS: So is that what you do? Do you do that after every lesson?

Sam: Well, there's a possibility that he can't understand.

Mickey: Yeah.

JS: So if you don't understand something-

Mickey: If I don't understand something, I just go on *MyMaths*, just scroll down through it-

Sam: And check how you do it. Do it once, check how it's done.

JS: Is that easier than working in class?

Mickey: Not really...I really only do it when I don't understand, 'cause sometimes, 'cause they're a lot of kids in here, and then if they're getting it, and I'm not getting it, you can't really come to me all the time and try to help me when there are other kids in the classroom. So I try to go on *MyMaths* and then understand it in *(indistinct word)*.

JS: Ok....if you don't understand something, how do you feel in the room?

Sam: Embarrassed? 'Cause any other people might not (*indistinct words*) show us how to do it. **Check 5m50s**

JS: Really?

Mickey: I just don't feel involved, I'm not involved....

JS: What do feel, Abby?

Abby: The same.

JS: So you just don't feel involved...tell me, like because I'm teaching in here and I have to do other things in here....tell me about part of the lesson today, at which point did you start feeling uninvolved? (*To Abby*) Can you tell me when that happened?

Abby: When you were saying stuff that I don't understand.

JS: Ok. Do you remember when that was?

Abby: No.

JS: Ok. So when people are working, how would you say they feel? (*Silence*). What's going on in their heads when they're working?

Mickey: They're focused on their work. (*Stop*).

JS: They're focused on their work.

Sam: They're prepared.

JS: They're prepared.

JS: Do they know the maths?

Sam: Depending.

JS: Ok, so when people start talking in here, what is happening in their heads then?

Sam: They're –

Mickey: It's...it's like, they're trying to focus on this, but this is come, there's another thing coming and it's....hard to juggle both.

JS: Can you tell me about when that other thing comes in? Can you give me an example? (*Silence*). Sometimes I look at the class and I kind of see when it is happening but can you me(*turns to Abby*) like, when did you start drawing on that sheet of paper?

Abby: When 'cause we (*indistinct words*) and I didn't know what to do....just...we didn't understand.....

JS: Ok. But you would not raise your hand?

Abby: No, because you were still teaching.

JS: Ok, so if I am still teaching-

Abby: We didn't understand one step and then we just – yeah....

JS: Ok, when I am teaching on the board and you don't understand one step – you mean just one step, like when I've already gone through ten steps and I get to the eleventh step and then you don't understand—

Abby: No, it's just at the beginning of showing something new...

Sam: It's like, if it's like at the end, that's ok, but if it's at the beginning, you will just not understand the rest and you'll be stuck on that question (*indistinct words*) because you won't know how to do the early steps.

JS: Ok

Sam: If you don't know how to do the early steps you won't know how to do the main steps.

JS: Ok, so if you don't understand what you do.....what starts happening in the room, do you start hearing things? What happens really?

Mickey: (*Indistinct words 8m30s*).

JS: What do you do? When you don't understand, do you start talking first?

Sam: It depends.

JS: Tell me about a couple of instances. You don't have to name, and I won't keep you too much longer, but can you remember an episode or an example?

Mickey: Can we use other people's names?

JS: Oh yes... of course I look at you guys all the time.

Mickey: An example today.....I didn't know what I was doing and I was away with X yesterday, and the conversation just built up, me and X. That's basically what happened with me today. And then I just kept talking to X and that's pretty much – there was also....usually XX used to help me but since XX moved and XXX is there and XXX and me and XXX doesn't really speak English it's hard for him to help me, he really don't know how to communicate. And it (*indistinct words*) it just doesn't go well. (*indistinct words*).

JS: How did you get speaking to X? X is like here, and you are over there. How did you pick up on each other?

Mickey: When you are not involved in the class you just look around.

JS: (*To Abby*) When you are not involved do you look around or is it just with Laura?

Abby: Just with Laura.

Sam: I look around to occupy my mind with something else, not just around my own table.

JS: Ok, so in actual fact, when you're in this room, do you need to be involved with something?

Mickey: You must be involved with maths. (*Stop*)

JS Ok. But if you're not involved with maths, if something happens, if you can't be involved with the maths.....

Mickey: You're disrupted.

JS: Ok. So then you get involved with other things? (*Participants nod their heads*). Are you ever in a classroom and you're totally not involved? (*Stop*).

Mickey: No.....I always try at the beginningtoday's starter, I was looking, trying to understand what was happening, and then, when I got to a point where I didn't know what was happening, you asked to see the work—and that's when I zoned out. I didn't do anything at the beginning...it was after the starter and me not understanding.....

JS: Ok. What one thing –and I realise that as there are three people here there might be three different suggestions—what one thing would you do to prevent that zoning out, or-- I don't know to prevent getting to the point where you don't understand and you can't--

Abby: Make it more interesting, instead of just maths.....

Mickey: For me personally, I think that----

JS: (*To Abby*) How would you do that?

Abby: I don't know.

JS: *Any ideas? (Pause)*. Think about it over the weekend, and if you can think of another way for me to teach this one, I'll listen.

Sam: Make it more active....make it more interesting instead of just taking the basic stuff....because that gets boring...we start to be....wanting to leave it 'cause it's not interesting, it's too boring. And like all the people start talking about like what they did---you get distracted and side-tracked to their conversations and you don't pay attention to what you're doing.....

JS: But if it was easy though you would have done it?

Mickey: Not necessarily easy, but understandable.....

Abby: Yeah, understandable.

JS: Ok. Is there a difference between understandable and interesting? (*Silence*). If you understand something, does it interest you?

Mickey: Yeah.

Abby: Yeah.

Sam: Yeah, because you found out something. You know you can do something.

JS: Ok. I learned something today. Thank you. Is it ok if I ask you for individual interviews? Sometime before the end of school?

Mickey: Yes, but.....(*looks at clock*)

JS: Not today! Just fifteen minutes, on your own....

Abby: Today?

JS: No, not today, but sometime in the next two and a half weeks before we break up....Would that be alright? (*Murmurs of assent*). Ok, thank you very much for staying, I really, really appreciate it.

Appendix 5.6 Lesson 3: plan, transcripts of lesson and group interview

Visualising Area Part 1 Date: 9th July 2013

Lesson Objectives: Pupils were expected to calculate the areas of whole circles in diagrams and word problems as well as the areas of compound shapes incorporating circles and parts of circles.

Starter Exercise: Pupils were asked to review the final progress check exercise from the last lesson (No. 12 on pg.55) and to formalise a best practice approach for solving this problem and others like it. The ensuing discussion reviewed two or three different approaches to identifying parts of circles and tracking perimeter.

First Part: Pupils were asked to remember how the formula for the calculation of a circle's area differed from the formula for its circumference and then shown how the area formula can be derived by dividing a circle into twelve sectors and then rearranging the sectors to form a near rectangle. After a progress check, in which pupils calculated the areas of a full circle and quarter circle, pupils worked individually on Exercise 4, progress was checked again on the board using problem No 10 in Exercise 4.

Second Part/Plenary: Pupils were presented with diagrams of a compound shape formed by a combination of a semicircle and rectangle (modelled on problem No. 12 in Exercise 4) and asked to calculate its area. Pupils were then directed to work individually or in pairs on three compound shape exercises in the second part of Exercise 4. The final progress check exercise focused on the solution to problem No. 14 in Exercise 4 and various short-cuts that could be taken to facilitate the solution.

Visualising Area Part 1 Skeleton Transcript (First Draft)

Date: 9th July 2013 Venue: M6 Folder: A File Number: 811 0029 Duration: 58m35s

The audiotape begins approximately one minute and a half prior to the formal start of lesson as pupils are passing in the corridors and entering the classroom. An inspector has arranged to observe this lesson and sits in a chair in the very back of the room sometime before the bell.

00 35 JS: *speaks to Sandy although no part of the conversation becomes audible.*

00 45 JS *checks Michael's availability for focus group interview on the next day.*

01 20 *Deputy head questions pupil in corridor.*

01 24 *Bell rings.*

01 30 JS: Ok, hi everyone. (Pupils are quiet and turning to look at the inspector). (*Indistinct question and reply with Sandy*). Ok, have a go with the starter. (*Two latecomers arrive*). We started to look at this yesterday but we didn't quite finish...(*a few more latecomers*) ...Now before we start writing, can someone remind me of the formula for circumference of a circle? Circumference of a circle? Mica (one of the latecomers) put that away now. Thank you. Circumference of a circle—Las? (*Indistinct reply*).

Michael interrupts to explain how the shape can be dissected to solve the problem.

JS: No, think to yourself and let everybody think by themselves. But we need to know the formula for circumference of a circle. Derrick? Quickly.

Derrick(who continues to unpack and prevaricate although he's raised his hand): *Indistinct reply*.....oh, crap (*very quietly as Mickey arrives late*).

JS: Sandy? Quickly—circumference of a circle.

Sandy: Uhhhhhh.....*the voices of individual pupils can be heard speaking to each other across the room as Mickey and perhaps others seat themselves*).

JS: Ok, we've started the lesson now. We have started the lesson. I know that PE must have run over but we started. (Pause). Ok, in order to start this problem, the very least you need to know is the formula for circumference of a circle. Can someone just remind us, circumference of a circle, what is the formula?

Several pupils: pi r squared!!!!

JS: Is it pi r squared?

Other pupils: No! (Some shouting out). 2pir!

JS: Yes, 2pir. (Door opens to the classroom and noise from the corridors interjects). We've got four minutes left now.....*Derrick can be heard in background*....

JS (to Derrick): Your time is running out, let's go.....

As JS walks over to other pupils, Derrick is heard checking the formula for circumference with pupils who do not sit next to him. His voice is unusually strained.

04 10 Derrick (across the room): So circumference is 3.14.....*Other pupils talk across the room to contribute to the problem-solving process.*

04 22 JS returns to Derrick and assists him with his calculations. Derrick insists that I goes through every step. They argue about πd versus $2\pi r$.

- 05 15 JS (to class): Two minutes and counting down.
- 05 20 JS: Hey, Robert. Do you know what you are looking at there? (*Proceeds to help him and a few others*).
- 05 30 JS (to unidentified pupil): Do you know what you're looking at?
- Lo (from a desk at the back): What's a half of circle? (Groans from surrounding pupils).
- JS (to Mica and Sandy): Hey, you'd better make a start. What do you see in that picture? (A few other listen in).
- Sandy: I see an American football.
- JS: So you see an American football! So what does that have to do with circles? We want the perimeter of that shape so we need to work that out in terms of circles. What else do you see? Asc, what do you see?
- Derrick: We did this yesterday!
- JS: We started but we didn't—we just had a quick look.
- The following exchange is indistinct but Sandy is tracing the curves and trying to work out parts of a circle. Derrick is arguing with JS, who is encouraging him to try a solution on his own.*
- JS (to pupil who may or may not be Sandy): Ok, that's right! (Probably to Derrick: Please....we'll talk when you stay behind (at the end of the lesson)).Yus.....ok, Yus....what do you see? What do you see in the diagram? (To class): One and a half minutes! (To Yus): What do you see? (No response—other pupils in nearby vicinity are laughing, Sandy can be heard having a private conversation). *I's conversation with Yus cannot be heard.*
- 07 50 JS(to Sandy): You need to be looking at the start now. (*Sandy continues private conversation as I attempts to engage his attention*).
- 08 03 JS: Ok, Char? What are you looking at here? ... *Continues to go around*. Rosa? You need to complete your calculation there. (Rosa runs through her calculation verbally). Good, ok...I'll call on you when I get to the board.
- 08 40 JS *approaches Abby. Conversation is barely audible but JS reminds her that she is scheduled to speak to her mother that week and that she must work more consistently. She and her neighbour laugh initially but then attempt to dissect the shape.*
- 09 00 JS (back in front of room): Derrick...Sandy.....Sandy! We're going to start now. (*Indistinct words to the effect that they must participate effectively*).
- 09 06 JS: Guys, time to start. Derrick! Sandy! (Pause to enable noise level to recede). Right, just....just before we start....right, we're going to wait for

everyone....Char, can you turn around....could everyone ensure they're facing the board. I know it's really, really hot in here but if I put the lights out you really can't see the board....(adjusts something in the room)...I hope you can all see the board now. When you have to do work in your book, I will turn the other light on. The title today is *Visualising Area* but we're still working with the circumferences of circles and parts of circles. We will make the transition from circumference to area and then in the last few lessons next week we will cover some circle theorems. (Turning to the board). The first thing for this is for you to decide what you are looking at. (Pause). And you can't look at this and talk at the same time. Ok, Ro, what do you think?

Another pupil overrides a pause and appears to explain a lot of the solution.

10 40 JS: So...Mica...if I traced this one (tracing on board), what have I drawn? Mica? Ok, I'm going to ask someone else....if you are having trouble visualising, it's good to draw.....Michael?

Michael: Quarter of a circle.

JS: Yes, it's a quarter of a circle. (To another pupil). Now you did say half of a semi and a half of a semi is a quarter. But there's another thing: look at this one..what is this?

Pupil: More of the same.

Pupil: Yeah, the same.

JS: Yes, it's another quarter of the same circle. (Silence). Yeah, the first time I looked at this, I got very, very nervous because I really didn't know what I was seeing. The only way I could see it was actually to draw it out and then I 'saw' it was two quarters of a circle. Now we need to calculate the perimeter. What are we going to use? What is the formula for circumference of a circle? (Extremely quiet in room). *One pupil says it again and then I prompts other pupils to state the alternate version.* But what is r here? What is the radius here?

Pupil: *Indistinct statement.*

JS: Yes. If you would continue this circle (drawing on board) it would come around here and you would see that this is the midpoint of the circle. So Ja, where is the radius of this circle?

Derrick: The radius is half of that line that goes across there-

Ja: XX cm.....no, 5 cm.

JS: Yes, the *radius* is 5. We've got two corners (pointing to board)...how can we use this to calculate---Sandy!! What am I going to do now?

Sandy: Well, you know the radius.....but couldn't you just do diameter times pi?

JS: How much of a circle do we have here then? (Several pupils: A quarter).

Right. But the shape goes all the way around. (A few more pupils: Half). Yes—half. (*Continues in a stepwise fashion to write and solve the problem on the board*).

14 30 JS: So the answer is approximately 15. Now, for the rest of the lesson, we're going to be dealing with area. You need to beMica! ... again, you need to be able to 'see' the shape before you can actually calculate. (Pause). We're dealing with Level 7 to 8 exercises.....ordinary shape calculations are Level 7 but visualising and calculating the shapes I am going to give you afterwards are Level 8. (*Interruption—apparently someone arrives to distribute some sheets but it is impossible to ascertain exactly when s/he leaves*). ...Alright, guys, I need your full attention. Look up, William! (*Derrick makes a whining noise*). Your full attention! Mickey! (*Someone make another whining sound, this time higher-pitched*). No! (Pause). Look up here! (*A different pupil makes a whining sound; before I can intervene, two other pupils make similar sounds*). Just look up here. (Pause). At the beginning of the lesson some people had trouble remembering the circumference formula and the area formula. But this is one way you can always derive the area formula. Can you look up at the board and tell me what I am trying to do here (pointing to the diagram)....

16 47 *Microphone is shaken.*

Several pupils appear to be speaking at once.

JS: Derrick? (*Other pupils are making indistinct statements about the board problem*).

16 54 JS: Sandy? (*Other stray indistinct comments*). Year 9! (Pause with the exception of Sandy).

17 05 JS: Sandy....Sandy....you're going to get a C2. (*A pupil, perhaps William, talks inaudibly across the room with Sandy, who is commenting provocatively*). Alright Sandy, you have a C2 now. Just stop now.Derrick! We're on the board now. (Pause). You will need to go--(*Derrick stops talking*). You need to look at this picture. This picture might help (*some low background disruption*) you to remember the area formula for a pt circle. (Pointing to the board) What has someone done to a circle? (*Several pupils attempt to answer*). I am going to ask Lo, who has his hand up...

Lo begins to explain but then stops and shakes his head.

JS: Ok, I am going to ask....Da.

Da: It's been cut into twelve.

JS: Right, it's been cut into twelve pieces. And then what happens here (pointing to the next part of the sequence of diagrams)?

Door opens and noise is heard in the corridor as someone is explaining. Derrick, Sandy and Ja begin to talk across the room; probably one or two other pupils are speaking as well. Derrick then shrieks.

18 32 JS: Derrick, you're going to have to settle down. Alright, I'm going to count down....this should take two minutes and then we are going to get started with some work.

18 43 Derrick (screams): Alright, man!

JS: Alright, both of you---

Unidentified pupil: So why do I get a C1?

JS: I am really sick of this—

Derrick: You told me, you told me....

18 54 JS: Both of you (one of them screams out indistinctly) stop it! (Silence).

19 01 *A lesser hoot is heard.*

JS: Right—someone said that the circle was cut up. It has been cut up into twelve pieces. What has been formed here?

Pupil: A rectangle.

JS: Good—a rectangle. If we have a rectangle we can get an area. You might not be able to see it from the back of the room but how long is this dimension? How long is this dimension—Mickey, I want you to look. (Pause). Look at the picture here and look at the picture here. How long is this? (*Some indistinct replies*).

Pupil: Hey, that's the radius!

JS: That is the radius! It is the radius. So how long do you think this one would be?

Pupil: Half the circumference.

JS: And how do you know?

Various pupils interject to explain in an unstructured and yet constructive manner.

19 59 JS: Ok, because we can actually fit one of them into the other, we've actually halved the width so we've halved the circumference. And what is the formula for half the circumference? Mel? (*Some pupils begin to answer*). No; wait—Mel?

Mel: *Inaudible reply.*

JS: Ok....yes, ok, $2\pi r$ then divided by 2. And what happens when you halve the circumference formula?

Pupil: Do you halve the half?

JS: You actually cancel out the 2's and you get πr . What happens with the area of a rectangle? What is the area of a rectangle? Derrick?

Another pupil: Base times height.

JS: (Pointing to diagram); Base times height or length times width.

At least two pupils attempt to calculate the area of the rectangle.

JS: Derrick! So what's the area of this then?

Derrick: πr

JS: πr times what? ... Yea, πr times r ! So how do you simplify that?

Another pupil: πr squared.

JS: πr squared! Ok, if you can remember this cut-up task, you will always remember the area formula. Alright, two minute task: you know that the area is πr squared, so try this (a board problem). Have a go at figuring it out and write it in your books because I'm going to call on two people to help solve it on the board. Ok, two minutes, I'm timing it. (I begins to walk around the room).

22 15 JS (to Derrick): Now turn around and help him....

JS (to Ja): *Inaudible exchange*.....Mica, I might call on you! La, now try this...you have to work quickly...(Continues to walk around room).

23 30 JS (to class): Ok, less than a minute to go!

Derrick is speaking loudly in background but words indistinct.

JS: Mickey, you were way, way too late today. There's absolutely no excuse. (Speaks to a few more pupils).

23 49 Derrick (as I attempts to look at his exercise book): I will do it!

JS: Come on, I want to check your answer. Come on, I want to see you start it.

Derrick: How do you work it out?

JS: Start with the area. What is the area of a circle?

Derrick: πr .

JS: No.

Derrick: Oh, area?

JS: Yes.

Derrick: *Indistinct words.*

JS: Ok, in step one you have to...*indistinct exchange between JS and Derrick which ends with Derrick saying angrily "Ok, I'm going to do it."* JS then continues to walk around the room checking other pupils' solutions.

25 08 JS: Ok, Da---

Da: I'm doing the work! I'm doing the work!

JS has a few unsatisfactory exchanges with pupils on the left-hand side of the room.

25 34 JS (to class): Ok guys, eyes on the board! *Noise level recedes but not to satisfactory extent.* Eyes on the board! (Pause). Very quickly, give me the steps you have worked out. (Pause). I really need people to concentrate. Vi! (Da's voice is still heard but noise level drops). Ok, Vi, the first step? (Noise level drops and Vi does not answer). Have a go. Have a go.

Another pupil interjects indistinct words.

JS: The first thing we write is the formula. Right, La, formula for the first one?

La: Pi r squared.

JS: Great. (A few pupils are laughing loudly at something La has done or the way he has stated the formula). So, pi r squared? Now what—Daniel?

Derrick(shouting out): I said pi r squared but you said no!

One or two pupils make indistinct comments with reference to Derrick's outburst.

Daniel now continues to solve the problem.

26 47 JS: But we need to divide this by two.

Daniel: Oh, yeah, yeah (*As Daniel is speaking the noise level in the class rises slightly*).

JS: So halve it, as we really want the area—

JS: Ok, Sandy, that's really going to be it if you don't stop talking now. Derrick—

Sandy: I'm not talking now.

JS: You are.

JS: Ok, we're trying to quickly fill this in. If we have a whole circle, do I need to do anything to this formula? (Pupils say yes or no alternatively).

So...Cha....pi r squared, how can we substitute? (Pause) How can we substitute?

Cha undertakes the substitution.

JS: Now who has a calculator? (Several pupils volunteer). Did someone get an answer?

Pupil: Yeah, I did....(*Indistinct exchange against a quiet background*).

JS: Mica?

Mica's response is indistinct but she says something about the solution.

27 55 JS: Alright, so what about this? Robert? What are we seeing here? (Inaudible response). So how am I going to write the formula? (*Someone hums*). I can't hear people. (Pause, a few pupils begin to speak among themselves about the board problem). It's a quarter, what are we going to do? ... Mickey.....Mickey.....if it's a quarter of a circle, how are we going to write the formula? (Another pupil begins to explain)....No, Mickey!

Mickey repeats the formula for a whole circle and then stops, oblivious to neighbour's attempts to help him.

JS: Do we have a whole circle here?

Mickey: No.

JS: So how do we need to change the formula?

Mickey: Divide it by two.

JS: Divide it by two?

Mickey: Nooooo.....divide it by four.

JS: Yes, divide by four. Ok; Can you substitute?

Mickey carries out the substitution correctly but only as I prompts him in a step-by-step fashion.

JS: Good. I know Cheryl has the answer, but does anyone else? (Some other pupil confirms the answer). Ok. You are now going to(checks page).....you now have eleven minutes to complete Exercise 4. Listen carefully! If you feel that this is easy—and a few people have told me that this is easy—start on Nos. 6 and 7 and go on.....If you don't find it that easy, start on No.1 and continue from there. When you finish, in about ten and a half minutes now, we are going to look at some more interesting shapes. (Begins to walk around room to ensure that pupils are starting at appropriate points).

30 15 JS: Ok, Sandy,I'll be sending you out. I'm really sick of this. Start on one, turn around ---(*interrupted by Derrick, who will not start work independently*). (*To Derrick*): You need to start work now. (*Derrick*

argues and then refuses help; he apparently seeks to hurt JS in a series of emotionally charged, hard to follow statements; as JS walks off, he calls her back).

Derrick: Ok, I'm going to calm down now.

JS: I know, Derrick, but I don't want to sit with you now.

JS: No, you're not.....if you want to be in Set 1.....you can't do this.....

Derrick: You're threatening me now! (*Inaudible response by JS*). Ok, just let me go!!!

JS: No, you can't get your own way all the time.

JS: Ok, lots of people are (*indistinct word*) stuff

Derrick: What are you talking about man?

JS: Man?

Derrick: Noooooooooo!!! I want to go use the toilet.

JS:I'm going to let you go, Derrick, but things happen—

Derrick: Things happen? What?

JS: Well, you need to do what everyone else does.

Derrick: Yeah, but no one else is asking (*as Derrick's noise level rises so does the surrounding noise level*)

JS: But they wouldn't ask—

Derrick: Yes they would! They would! (*Argument continues for three or four exchanges but is not completely audible due to increasing noise level in room*).

31 50 JS: Ok, Asc, where are you starting? (*Derrick leaves and slams the door and JS walks around the class to speak to other pupils. Several solutions are analysed on an individual basis*).

35 27 JS: Michael and William! William and Michael! ... You're not going to get where I want you to get if you keep on talking. (They go to work).

35 56 Derrick (coming back to seat and shouting out): I want a book! (I, who was near Mickey on the left-hand side of the room, moves to Derrick).

JS: You've got the sheets.Don't do this---if you don't feel comfortable, start with one or two. If you feel comfortable, start with five or six. If you do that, I want you to get to nine or ten.....

Indistinct argumentative exchange ensues with Sandy.

Sandy: No, no, no, no, no.....it's because that lady's here that you want to (*indistinct word*).

JS: Oh, no.....(*further words with Sandy are indistinct, other pupils are commenting inaudibly in the background*)

36 50 Sandy: You come up to me while I'm trying to do my work.....(*Getting angry*)....I'm trying to do my work.....

JS: Sandy---La, sit down please....I was just asking you to stop talking--

Sandy: No, you just came---I was working well and—

JS: No, you—

Sandy: You came (*Indistinct exchange*).

JS: La, what should you be doing there?What is this about? It's about maths, don't get involved. (*La and JS have an indistinct exchange*).

37 46 JS: No, it's only about the maths. (*Derrick appears to be calling for JS's attention, claiming there's only three minutes to go*).

38 20 Derrick: Just let me do it then!

JS: ...You've got to do it.

Derrick: What do you mean? You help...(*indistinct words*)

JS: Write some steps down on your sheet and ...

38 42 Sandy (angrily): *First words indistinct*then you come up to me and
Several pupils make a whooping sound which normally signals a fight in the playground.

JS: Sandy, this is not going to help matters.....

Sandy: You just won't.....*keeps on speaking indistinctly against a background of braying sounds from some surrounding pupils.*

38 56 JS: We'll have a word afterwards outside. I am not going to do this in the lesson. Ok? Stop this now.

Sandy: Yeah, cool. (*Exchange ends*).

39 19 JS (to class): We've got two more minutes. Two more minutes. (*JS checks on Mickey and then continues to walk around the class Derrick's laugh can be heard just above the noise level of the class*).

39 53 *Analysis of one pupil's solution. Noise level in room increases slightly.*

40 32 JS: Derrick, turn around.....Ja, I want to see a couple of examples—you should at least do.....

41 17 JS: Alright, guys.....I want you to.....(*Noise abates only slightly*)....Stop talking, stop what you're doing.....(*Derrick's voice can be heard above the din*)...Derrick, we're going to start the lesson again. Alright, I want to review one of the problems on the board. And then I want to go on and start on a series of very interesting diagrams. Tomorrow I will show you the (*indistinct word*) of old scholarship exams.

Derrick: Why are you showing us those?

JS: Derrick—(*indistinct words*)....So how do we start this off (turning to the board)?

A pupil begins talking and Derrick shouts at him to put his hand up. Some kind of argument ensues between the pupil and Derrick; only a bit of a 'scuffle' can be heard.

JS: Stop it now! Right, Yus, we're just going to start this now.

Derrick: Hey wait! What's he doing it for?

JS: Now, William..... (to some pupil, probably Derrick), you will go when they come.

42 32 JS: Ok, look up here. Let's stay on the maths. This question is a two step question. What do you need to do first? (Several pupils raise their hands). What do we need to do first? Uhm.....Asc, what do we need to do?

Derrick: He doesn't know. (Pointing to the class). Just show them.

JS: Ok, Rosa?

Rosa: *Very quietly reads out a calculation.*

JS: Right! If you are having trouble doing this, what should you always do? With a word problem?

Pupil: Make sure you get out all the important information.

Derrick shouts out angrily, to the effect that JS is allowing a pupil to speak without raising his hand. An argument ensues between the pupil who gave the answer and Derrick and perhaps one other person, probably Mickey. Then, suddenly, three or four more angry voices are heard but no complete statements are distinct.

JS (above din): Mickey, my patience is going down! *It takes thirty seconds for I to calm the class down, mainly by calling individuals' names in succession.*

43 54 JS: Well, I can draw a diagram. That's a really good way to*further arguing, which is spreading to George, James and other pupils were up*

to now were uninvolved. Ok. Some people have done all of this, some people have done some of this and some people have not done this at all but can we all respect each other? (Pause). *As room quiets considerably, some other interaction begins in the vicinity of Sandy and Derrick.*

44 15 *The Head of Year 10 arrives to collect Derrick. Hoots are heard around the class, the type that usually signal some sort of fight.*

JS: Ok, Sandy.....and (to Head of Year) we've got some even worse ones. *More hoots.* Yes, we have even worse ones.

44 28 HOY: Guys, I've had enough. Your reactions, gentlemen, are not helping. Settle down please. (To IJS. Where are we heading? (To pupil) Why are you turning around laughing?

JS: Right, no comments. *But pupils continue to yell out as Derrick collects his things and then is taken out.* Alright, stick with the maths. (Absolute silence). One good way*someone attempts to speak to the class....*sorry, I have been around the room and I know that----Yus---Well--

Pupil standing in corridor: Well, she is the teacher who let's us out. Oh my God!

Pupil in class: You shut up, man!

A second exchange between the pupil in the corridor and someone in the class ensues before the pupil in the corridor disappears. La gets up to shut the door.

JS (to La): Thank you. (Pause). Ok, how should I label this circle? We've got a circular (*indistinct word*) at Hampton Court and ..what's the radius?

Pupil: Sixteen point five.

JS: Sca, what's the radius?

Sca: Sixteen point five.

JS: Where do we put it?

Lots of pupils point and raise their hands.

JS: Ok! So what is the area of the lawn? Da? Turn around.....Da?

Da (talking to pupils behind him): No, I don't care.

JS: Right. Does someone have an area for this? I know several people do. I know that several people have an area for this lawn.

Pupil: The diameter is 33!

JS: Right, we know that. George?

George: 854 (*Some pupils start laughing heartily for some unknown reason*).

JS: Right, we've got an area of 854. So what do we have to do know? ... William?

William: Divide!

JS: Divide by what? (*Attention seems to be dissipating*). Right---how many cartons are needed?

Pupil: Nine.

JS: Yes. Nine—good. Ok, we're going to get into these now (changing flipchart). *One pupil hoots incrementally and several others imitate him*. No, we don't need that. Look at the board. (*Further interruption*). Right, Yus—let's try not to---*further hooting ensues*. Da.....Right, Yus.....*Several pupils are now talking across the room. In trying to bring order to the class, I says the names of the pupils who have been routinely the most disruptive—Da, Yus, Ja.....One pupil who cannot be identified keeps hooting*.

47 43 JS: Alright—I've got to get that back. Yus... William, I'm going to have to give that back.

Pupil (probably Yus, screaming): Why did I get a C3? He just got a tick and a C3 there.

JS: So stop.

Pupil above: Why? *Several pupils begin to laugh*.

JS: Right, stick to the maths. (Noise abates). What do you see here?

Pupil: A rectangle and a semicircle. *Noise begins to come from the back of the room. One pupil mentions Yus and Da*.

48 19 Lo: There's a rectangle and a semicircle.

Another pupil: I just said that.

JS: Ok, what's the area then? *A pupil starts to answer then does not finish*. Ok, someone else.

Pupil: 17 meters squared. (*Class becomes quiet*).

JS: Ok, we need two areas here. Ja, have a go. (*One pupil complains*.) I'm going to pick on everyone! Ok, Ja? What's the area of the rectangle? *Ja begins but is then interrupted by another pupil*. Wait, he's going to figure this out.

Ja: (*After a false start*) 20. *A few pupils laugh and start to correct him*.

JS: 7 times times 10 equals 70.

Ja: I'm not wearing my glasses, I can't see, that's why.

JS: Ok, what about the area of the semicircle....Lau? (She declines to speak). Ok, what is the formula for area of a semicircle?

Da: Base times height divided by two.

JS: When were we saying base and height divided by two? (*Laughing*). Guys, what is the area for a *circle*?

Lots of pupils make mistakes but finally someone states the correct formula for a semicircle. People begin to laugh again; Derrick has re-entered the room. Attention dissipates once again.

JS: So what is the radius of this? (*Laughter*). Da, what is the radius of this? George, what's the radius of this?

George: 5

JS: Good. Three point one four times five squared divided by two. Does someone have the answer? Or can someone estimate this? (*Indistinct words*). Mica?

A few pupils give the correct answer with rounding. Derrick is heard to shout across the class.

JS: What is squared here? ... It's just the five.

Derrick is heard sounding out the answer while a few other pupils are trying to contribute. Derrick will not let anyone have the final answer; he is the loudest and keeps talking over everyone else.

50 56 JS: So altogether it'swhat's the total? *Several pupils calculate vocally.*

Pupil: 39

JS: But we have the rest of this.

Derrick: So you have 39.70, I think.

JS: And so--- that would be about what?

Derrick and others: About 110. (*Derrick continues to justify his initial mistake in addition, other pupils chat back to him*).

51 21 JS: Ok, we're going to try to----(*several pupils are speaking*)

Derrick: Also (to I) you just (*indistinct word*) me wrong.

JS: Please...I didn't hear...

Derrick: Yes you did—

JS: Right. (Silence). You're going to try some of these type of problems. If you are feeling that you are not quite sure of...you start with 13 or 14. But if you want a bit of a challenge you turn the page and there's some very interesting ones there. Now, I'm going to warn you, everyone says this is easy. (Absolute silence). Everyone says it's easy and then suddenly ...it's not that easy. Ok? So pace yourself. I'll come around and check answers and then we'll do a plenary in about ten minutes. We will continue with this tomorrow but for now everyone will try to do at least two. At least two. (*Begins to walk around the room*). Asc?

Initially many pupils go to work and noise level is normal but within a minute pupils are talking across the room, with Derrick being one of the loudest.

Derrick (shouting): Oh Mickey man, why are you saying that?

JS approaches Da. Derrick can be heard making animal sounds in the background but many pupils are working diligently and I checks the beginnings of various solutions.

54 41 JS: So how would you get a shaded area? How do you get one in that? *Derrick continues to make strange noises. Pretend you have a piece of paper and scissors....Derrick now talks loudly across the room but only random words can be heard.*

55 12 JS: William—William.....*Derrick continues to speak loudly while I continues assisting a pupil to visualise a shaded region.*

Derrick: I've done nothing! No, actually, that's a lie.....

56 40 JS: Alright, guys....some people are working but some people are not.

Derrick begins talking over I but his words are indistinct.

56 51 Derrick: Oh, no, no,no,noooooo.....

JS: Derrick—you are going to have to leave the room.

JS continues to help a pupil while Derrick's voice can be heard.

Tape stops suddenly and fails to record the disturbing incident which happens approximately five-six minutes before the end of the lesson, as JS is attempting to quiet the class in order to begin the plenary. A pupil sitting in the front of the room suddenly notices that JS is taping the lesson and various pupils, including Ja, Yus, Sandy and Derrick, erupt in anger—Ja gets out of his seat and stamps around; Yus shouts out that he hasn't given his consent; Sandy mimics Ja and Da throws himself into the fray laughing; other pupils stand up, scream and shout. JS manages to quiet the class down and then reminds them that she had warned them the week before that four lessons were to be recorded and that the consent forms were necessary for participation in the interviews only. Some pupils support JS openly but other pupils continue to voice anger. The observer (who has remained in her seat throughout the lesson and who has only looked at the exercise books

of the pupils sitting near her), is obviously shocked by the uncontrolled emotion in the class; she stands up in the back of the room, asks the class to listen to her and tells everyone that she was impressed to see that so many pupils had done such impressive work. Something in her delivery irritates Derrick, who loudly accuses her of watching him and writing bad things about him in her notebook. She insists she hasn't but Derrick proceeds to shout and become abusive. The bell rings before the plenary even starts. As pupils bring their books to the front of the room and depart, JS directs Rosa and Derrick to stay back for the focus group interview and to discuss what happened in class. The inspector lingers behind to try to make peace with Derrick but despite the intervention of JS, who tells Derrick that the inspector has stayed behind because she cares about him, he stubbornly maintains that she was targeting him.

Free Association Narrative Group Interview 3 (First Draft)

Date: 9th July 2013 Venue: M6 File No: 811 0030 Duration: 10m 21s

Participants (see code) Rosa and Derrick

This interview was carried out after a lesson entitled "Visualising Area 1" which was observed by an advisor who visits the department on a monthly basis. The interviewer and the participants had been deliberating about the disruptive ending of this lesson immediately prior to the start of the tape and were hot and unsettled as the interview began.

JS: Now this is a free association narrative interview where you guys direct it. I am going to ask one question and then you can say whatever you like. And depending upon what you say, I might ask you for some details. Ok?

Derrick: Yeah...how loudly do we have to speak?

JS: Just the way you're doing now. (*Derrick nods his head*). Ok, my question is: what happened in this lesson?

Rosa and Derrick look at each other slyly and grin almost imperceptibly.(Stop).

JS: What happened in this lesson?

Derrick: What...what you taught us?

JS: Just-what happened?

Derrick: Well, we came in-

Rosa: Yeah-

Derrick: Sat down, learned....

Rosa: Pupils had their own conversations.....(Stop)

JS: What else?

Derrick: Then a woman

Rosa: I don't know what her name is- (*stop --- Rosa looks at Derrick*).

JS: (*To Derrick*) Do you want to add something to this?

Derrick: (*Indistinct nonsense rhyming phrase*).

JS: Ok.....alright, you said a couple of things. You came in, you learned something – what did you learn?

Rosa: About (*indistinct words, laughs*).

Derrick: We learned about circumference

Rosa: And area-

Derrick:of a circle and.... uhm..... (*stop*)

JS: What do you remember from the content now?

Derrick: Uhm....(*looks around smiling*)

JS: Just be truthful....

Rosa: You can work out the area--

Derrick: Uhm, there's two shapes in one, I'll show you (*looks around for paper*)

April: And there some shading...and hey, I found the area of a shape, part of the circle....I don't know.....(*looks at page from notebook, stops*)

JS: Ok, you said people had their own conversations. What was all that about?

(*Rosa and Derrick attempt to speak together*).

Derrick: Varied talk, it can be about anything.

JS: Like what?

Derrick: Like, what was I talking about?

JS: Yeah, people just talk, tell me about it.

Derrick: (*Sighs*). Just about life.

Rosa: And other goings-on in school. (*Indistinct words*).

Derrick: And about their knowledge.....of what.....just everything. (*Stop*).

JS: You mean their knowledge of other subjects?

Derrick: Well, even other subjects, but just –everything, (*indistinct word*)

JS: How does that start?

Derrick: I don't know....just someone will just say, he'll just

Rosa: Someone will start off a conversation, innit?

Derrick: Yeah, but...then I don't know—it just comes—

Rosa: Yeah, it just comes.....

JS: Tell me more about it, really...that's the kind of thing I'm interested in.

Derrick: Well, I don't know...we'd just be sitting there and, uhm, someone would be like, "Uhm," I don't know, it's like- they'll bring up a thing, like, whatever

Rosa: Like a-

Derrick: Or something like, like African—like, no; just to give you an example, just say something like Africa, and then people start talking about Africa or something, uhm....or; I don't know...

JS: What's the connection between maths and Africa?

Rosa: There isn't one.

Derrick: There isn't one but—

JS: So what happens?

Rosa: Everyone dares think about something and then they bring up because people in the room---

Derrick: I don't think they're ---'cause we can't discuss, we wouldn't talk about maths...just, we wouldn't. It's not a thing we would do.*(Stop)*

JS: No?

Derrick: No.....I was going to say we don't care, butit's more that we're not really bothered about ...we are bothered, but like, it's not likewe just won't talk about maths. We just won't think about the maths 'cause maths is not boring, but like, there are better things to talk about, or

Rosa: Like we talk about something social.

Derrick: Yeah.

Rosa: Yeah.

JS: So even when you're doing the maths?

Derrick: Yeah. Well, sometimes we just –

Rosa: Some people they can work and still get the answers, it's very easy for them. Like, you'll be working, and then you'll bring up a conversation or something-

Derrick: Yeah! Some subject...

Rosa: *(Indistinct words, full stop).*

JS: So how do you feel when that happens? (*Silence*) How did you feel in this lesson?

Derrick: Well, how did I feel?

JS: Yeah –

Derrick: About what? About you?

JS: About the lesson.....actually it's a long time, the lesson is sixty minutes....

Derrick: It's not engaging.....it's quite *boring*not boring; butit's like we see the same thing every day. It's not the same thing but it's justoh, maths.

JS: So is it only just maths?

Derrick: Well, it's just other things.....we walk into English, we done this yesterday, or it's justgetting a bit too much.

Rosa: As it is, like, the last two weeks or –yeah, of school, everyone's not really thinking about –yeah-

Derrick: We finished our assessments and we really not bothered about what happens! (*Laughs sharply*).

JS: Was that it? (*Referring to incident involving Derrick at the end of the lesson; silence*). So what were the assessments like?

Derrick: Lots of pressure.

Rosa: Yeah!

JS: Where was the pressure coming from?

Derrick: Just everything, to do well!

JS: Okay, so now you just ----you did a lot of work though today (*turning to Rosa*).

Rosa: Yeah.

JS: So it was just-

Derrick: People do work so you-

Rosa: You work because when you speak to peopleit's easier to do work when you're speaking to someone than (*indistinct words*).... like in computer science....

Derrick: No, people just do the work so that you don't get annoyed with them orlike, they just do the work without really

JS: So what happens in the lesson that – did anything surprise you today about the lesson?

Derrick: It was a bit hyper but that's always the way it is when it comes after PE.

JS: You have PE how many times a week before this?

Derrick: Twice....I mean once-

Rosa: Twice.

Derrick: Once before maths.

Rosa: Yeah, but I got it twice-

Derrick: Oh.

Rosa: I got mine this morning and yesterday.

Derrick: Yeah, yesterday's Monday, we don't have maths.

Rosa: Oh yeah, once. (*To me*). We have one lesson.

JS: What about the interactions near the end? (*Silence*). What about what happened, what about what people were saying and stuff? What happened there?

Derrick: What, with—(*Derrick and Rosa talk at once; some indistinct words*).

Rosa: Like about the teacher?

Derrick: Like about (*indistinct word*)

JS: Well, there was a lot of talking, you (*turning to Derrick*) were saying a lot of— what was all that about?

Derrick: 'Cause....you know, you don't understand, yeah...Miss, also miss....you used to teach us before...you taught us before...and then she was like...."no, I wasn't talking to you" and then the whole class...like, thought it was kind of rude, so like there was a "Aahhhhhh!", making noise and stuff....

JS: So was there a feeling that ---did you see her at the beginning of the class?

Derrick: No-

Rosa: Yeah. I did.

Derrick: I didn't.

JS: So did that change things?

Derrick: It changes things when they're in there, cause-

Rosa: Yeah

Derrick: Because they expect you to work. She's just, like, watching you and writing things-

Rosa: Yeah!

JS: Alright...how could we have avoided what happened at the end? (*Silence*).

Derrick: I don't know.....things happen. Things happen.

JS: Do you think that the content—anything about the maths---do you feel anything about any of the content? (*Silence*). Is it just like another part of the lesson, like we've done this, we've done this, like we did a word problem.....is it just all the same?

Rosa and Derrick speak together with some indistinct words.

Derrick: It's not...it's not.....like before, maths used to be about, like, not numbers and stuff, this is getting, like,

Rosa: Harder!

Derrick: Well, harder, yeah, but it's getting....it feels a bit like it's not maths anymore.

JS: Really!

Derrick: Now.... it feels like maths, but not as much as before. Where we'd be doing things this is starting to get a bit annoying.....

JS: What do you say, Rosa?

Rosa: Yeah, it's just different. Like you're used to ... like before, when you actually, like, like when you did algebra you did lots of work in your books, and now it's sort of like....different (*indistinct words*)

JS: What do you have to do now that you didn't have to do before?

Rosa: Know your

Derrick: It's just more like ...not really....

Rosa: You're using your creativity, sort of--

Derrick: That's the word. What makes it longer as well, you have to draw!

JS: Didn't you have to draw before?

Derrick: Yeah, but like, you'd only be working with numbers,

Rosa: Yeah, like algebra...

Derrick: With shapes it's getting more, like(*Stop*).

JS: Complicated?

Derrick: Not complicated, justoff – subject!

JS: (*Laughs*) Off – subject?

Rosa: It is more like English!

JS: Is it more like English?

Rosa and Derrick: Yessss!

Rosa: It's all about words. It's supposed to be about numbers! Well, in contents way.

JS: Ok. But actually maths is only about numbers. It is actually a lot more like English than you think. (*Pause*). Is there anything more about this lesson you wish to add?

Rosa: No.

JS: Does *anything* spring to mind?

Derrick: Like what though?

JS: Anything.....I'm listening.

Derrick: What do you mean though? Like what?

JS: Anything. Anything good, anything bad, anything you want to comment on. I am conscious of the fact that you might want to go now.....but anything that happened in the lesson that you had a feeling about. (*Silence*). Anything that you want me to know? Even if it is bad, it's not going to matter—you can tell me, it's not going to impact on your maths grade or anything.

Derrick: Nothing really...

JS: (*To Rosa*) Nothing?

Rosa: No.

JS: Ok, I really, really appreciate this. I really do. I know it's hot today and you've spent a lot of time here. Is it ok if I contact you for individual interviews ---? (*Tape switched off*).

Appendix 5.7 Lesson 4: plan, transcripts of lesson and group interview

Visualising Area Part 2 **Date: 10th July 2013**

Lesson Objectives: Pupils were expected to calculate the areas for a wide variety of compound shapes incorporating parts of circles and diagrams incorporating shaded regions.

Starter Exercise: Pupils were asked to summarise the most effective ways to remember the difference between the formulae for the circumference and area of a circle and demonstrate their approaches on the board using numbers, words and diagrams.

First Part: Pupils were presented with problem No. 15 in Exercise 4 and asked to write a solution in words before arriving at a formal solution using their calculators. After the solution was thoroughly analysed on the board, pupil progress were asked to work on three problems in the second half of Exercise 4 (pg. 58). Progress was checked by asking pupils to solve problem No. 18 in a whole-class format.

Second Part/Plenary: Pupils were asked to formulate flowcharts for solving word and shaded region problems involving the areas of a circles. The final progress check focused on a shaded region problem taken from a scholarship paper for entry to a well known independent school.

Visualising Area Part 2 Skeleton Transcript (First Draft)

Date: 10th July 2013 Venue: M6 Folder: A Folder No: 811 0031 Duration: 1hr08m14s

The audiotape begins approximately five and a half minutes before the formal start of lesson while pupils are returning to the corridors after the lunch break.

00 37 Bell rings but apparently few pupils are in the classroom: there is a great deal of noise in the corridor.

01 20 Pupils begin to enter and individual conversations are slightly audible.

02 45 Incoming pupil asks something about circumference and area.

03 07 Pupil: What do you mean “to remember” (reading starter)?

05 02 As pupils have been arriving, noise in the corridor has increased.

05 37 Second bell rings. Some sort of commotion has erupted in the corridor.

06 23 JS (shutting door): Guys! (Door opens again to admit a few more pupils). Sorry (to latecomers), you need to quiet down. (Several more pupils now arrive in class and the noise level increases considerably). Derrick, just sit down....sit down please...one or two pupils in class shout at those who are arriving to be quiet.

07 14 JS (shuts door once again): Ok, we need you to sort yourselves out today as this is the last lesson on visualising shapes. (Noise decreases rapidly). Tomorrow and Friday we have two lessons on circle theorems and on Tuesday you’re going to get your Paper 2s back—and you can work on

- that. The last lesson...I think you're going to be constructing something or be looking at models....I'm not quite sure what it will be, I'm considering it now. It might involve a competition. All right (pointing to the board), have a look at this. We are not a science class, obviously, but sometimes in maths people discover things by doing experiments and I actually showed you two experiments to substantiate the circumference and area formulas. I didn't call them experiments but they were actually two experiments. See if you can remember them. You have four minutes and thirty seconds. (Classroom is extremely quiet as most pupils go directly to work).
- 08 35 JS: Mickey....Mickey....take out a pencil now....
- 08 57 JS: Yus, you're going to participate in the lesson today. (JS checks another pupil and reminds him to participate constructively. Normal noise level in classroom is re-instating itself slowly).
- 10 05 JS:....Ok, so Da, I'm not going to keep you here today if you're not going to work....
Da: Okay, yeah....
Da, Yus and Buk do not begin work and JS puts at least one of their names on the board but no one responds angrily.
- 11 09 Da is out of his seat, claiming that he needed a ruler. When admonished by JS, returns quietly to seat.
- 11 54 JS (to Mo): And what did they do?
Mo: They found—they found the diameter (JS: That's right) and then they timesed the diameter....they timesed it by pi because they....the diameter is about three times.....no, they timesed it I think by three because....
JS: They discovered pi... (Mo continues but does not relate pi and circumference. JS moves on to other pupils.)
- 13 18 JS: Da, you're going to stop talking! ... Derrick, stop talking....(to class) one minute left.....think: can you tell a story? (JS again walks around the room).
- 14 17 IJS(to class): Okay!Alright, guys.....right, Year 9! (Counts down until noise level decreases sufficiently). I want you to start thinking about maths as something more than numbers, because if you think of it as only numbers and formulas, it probably won't be that interesting and you're going to have trouble remembering it. Now, just before I show you something that can help you remember this (pointing to board), if you are asked, and I might now ask Mica and Michael, can you give the formulas for circumference and area off the top of your head? (Lots of pupils say yes). Well it's amazing—most people in top sets keep forgetting. The higher they go in maths, the more they forget and the more they make mistakes. The bottom sets remember, top sets like you never do. ...So, what is the formula for circumference? (JS starts writing a C on the board and various pupils state the formula using diameter and radius.)
JS: So what about the area?
Da: Base times height.
JS: Isn't that arectangle?
Da: Ah, no.....
Derrick: No, it's length times width.
JS: Wait, we're talking about circles. (Various pupils state the correct formula without any laughter).
JS: So why do people get them mixed up?
Pupils across classroom offer sensible reasons for this phenomenon.

JS: Yes, they are so similar thatJS writes them on the board.....see, they both have a 2 in it, they both have pi in it and both have an r in it. And, actually, I never memorised it. Ever. In American exams they always used to be on the paper so you never had to memorise it. You guys are going to have to memorise it. So you're---

Pupil: So how do you find the area?

JS: Well, I'm going to show you in a minute. (Pause). You need to be able to do an experiment in your head, or tell yourself a story about it so you will remember. Now, for circumference, we actually did what the Greeks did—one day last year, and maybe not everybody was here, I gave you different sized circles and someone told me, you measured two things. You had to measure with a string—what would you measure with a string on a circle? Mel, if I gave you a piece of string, what would you be measuring probably?

JS: Yeah, the circumference—

Pupil: Diameter

JS: And using a ruler, the diameter. And Viv—

Derrick: The radius!

JS: Actually, the diameter. And this is the table you were asked to compile (turning to new flipchart). You did this in Year 8 the way the Greeks did, and we had this again the other day.....you take a tin of tuna or anything circular, you measure the circumference, you measure the diameter and you divide (pointing to third column in table). What do you get? You don't get 3.25 if you're accurate, what do you get?

Various pupils: Pi!

JS: Yes! You get pi! Of course you should get 3.14. And how did the Greeks discover this? They did experiment after experiment. They measured lots of circles and someone observed that you always, whatever you do, whenever you divide circumference by diameter you always get pi. And in fact, how many decimal places does pi have?

Pupil: Lots.

JS: Lots! Computer now calculate it to a million places and in future computers will do it to millions of places because pi is what kind of number?

Pupil: Infinite.

JS: Not infinite—(pause)—not infinite but it begins with an “i”

Various pupils try out various words beginning with “I”.

JS: Something that's not sane....

Pupil: Something that you can't put into an exact fraction—

Another pupil: Improper!

JS: Not improper....

Two or three pupils say “irrational” together.

18 30 JS: Yes...irrational. Ok! So if you remember the experiment you can always derive the circumference formula. Now, yesterday I showed you something—and a lot of you were not taking any notice---but—how did people discover the area formula for circles? They did not do it off the top of their heads. Someone had a scissors and they were mucking about one day with a circle and what did they do?

Pupil: They cut it into pieces.

JS: How did they cut it? How do little kids like to cut circles?What do you call those things.....they're like orange segments.....

Various guesses from pupils. No extraneous laughter.

Pupil: Pac man!

JS: No, not pac man.

Other indistinct guesses.

JS: The arc is the outside.....the inside is the ..(pause)....sector. So in fact (flipping to a new diagram) when you cut a circle upsee, someone did twelve of these and rearranged them as a rectangleeveryone knows the area of a rectangle so---this was how they derived the area of a circle.

Ok. Mathematics isn't just numbers. It's not just playing around with codesit often involves physical experiments. Which you haven't gotten to do so much lately....but maybe you will do one next week. (New flipchart). What are you going to do today? Actually, you're going to work on those diagrams we started yesterday. Some people said they were easy, some people didn't think they were easy. It's not all about the maths but actually seeing shapes.

20 09 JS: I do have other tasks today if you get through all those, so don't panic, but first thing I want to do iscan someone tell me.....what is a shaded region? I am going to call on someone....look at the board.....I am going to call on someone who probably doesn't expect it at the moment.....ok, Mo! What is a shaded region? Looking on the board?
Indistinct reply.

JS: Well first, what colour is it? Is it the white or the grey?

Pupils talk amongst themselves and give alternative answers.

JS: Ok, it's the grey. Mica, how do you make that shaded region? Ok, Da....focus! (Noise level rises perceptibly). How do you make that shaded region—(to individual pupil, probably Da)—yes, I'll bet you know..... Various pupils are talking aloud about shaded regions and staring at the board.

JS: Ja, how do you make that shaded region?

Ja says something but it is indistinct.

JS: Well, if we want the area of a shaded region.....

Several pupils are contributing ideas in a chaotic fashion, no distinct statements.

JS: William, focus! George, focus! ... SShhh.....I may ask La or Abby or maybe even Vi.....how do you make that shaded region? When you look at that grey area, it doesn't look like anything....but if you had some scissors and some paper, you could make it. How?

Pupil: By cutting something else—

JS: Yes, you need to cut something.....what do you need to start off with?

William: You cut the circle at the sides.

21 46 JS: Ok, but you need to start off with—La, listen! Rosa? (Rosa says something indistinct). Yes, you need a square. (I draws a square on the board). And I am going to (indistinct words) as they only give one dimension. So to get the shaded region you are actually going to cut out the white circle (does this on board) and then you're going to be left with that weird grey shape. Now, some of you did do this, and some of you didn't do this....what should you do, especially if you're having trouble with this? (Absolute silence). Actually, every time I do one of these, I get a little panic-stricken. What should you do? (Pause). Should you go directly to numbers?

Lots of pupils say no.

JS: No. Do something in words.

Pupil: Yeah, look at the shape-

- JS: Yeah, look at the shape and say something about the shape. So the shaded region is....I'm going to write a sentence about the shaded region.....The shaded region is a square minus the circle. (Writing on board). So what's the area of the square? Now we can start putting in numbers. Sha, what's the area of—
- Sha: Ah...(other pupils are calculating with her).....64.
- 23 03 JS: Yes, 8 times 8....we know that's 64. And what is the area of the circle—La? What do we know about the circle to get the area?
- La: We need to know the diameter.
- JS: The diameter or the radius. So what is the diameter? (Two or three pupils, including La, give the correct answer). Yes, the diameter is 8....
- Pupil: The radius is 4!
- JS: Yes! The radius is 4 and the diameter is 8. So what is the area of that circle? (Various pupils begin to calculate, some with calculators, others by estimation). Let's substitute: pi -four-squared. What is pi-four-squared? Vi? In terms of pi?
- Viv and others try to calculate sum using 3.14 as the value of pi.
- JS: Just calculate this: four squared pi. (Silence). Ok—what is four squared?
- Viv: (Laughs and makes a gesture indicating she can't think)
- Another pupil: 16
- JS: 16. So it's 16 times pi which is 16pi (writing on board) or 16 times pi...and all of this is about.....Da?
- Another pupil: 19
- JS: Mmmmm....64 minus
- Several pupils contribute in step-wise fashion to obtain final answer.
- 24 54 Pupil: Hey, how do you find the area again?
- JS: The area of the circle is pi r squared so it's pi 4 squared, isn't it?
- Pupil: And that's how much?
- JS: It's about 50, isn't it?
- Pupil: 50?
- JS: Well, 3 times 16 is 48. And then 0.14 times 16. Not really 50 but 48 plus 2.24. So really 50.24. And 64 take away 50.24 is 13.76, or about 14.
- Pupil: Ok;
- JS: Ok! You're going to try some of these now. (Pause). I think it's Exercise 3—if you turn the page you will see that we've done the first problem..... You're going to go on---
- Derrick: Which one? Which one do I start with? (I reviews the entire problem on the board with a group of pupils sitting near Derrick, who is listening avidly and repeating some of what I says.
- 25 54 Another pupil: What's the diameter here?
- JS: Ooh, I'm not going to tell you that because I know you can think and I know you can do it.
- Derrick: This one! (Pointing to diagram).
- JS: Is that the diameter or the radius in the white circle?
- Derrick: The diameter.
- JS: Ok. (Continues to walk around the classroom). Ok, guys? (To James and George). I've got some others for you, if you need them.
- JS notices that Abby is not working and tries to persuade her to work.
- 27 33 JS: La...La, there's no need to get up and get a pencil. (No angry reaction).

- 27 44 A burst of laughter erupts in a corner of the room but then dies down of its own accord. Derrick's voice can be heard intermittently as I checks pupils' solutions—he appears to be talking to Ja.
- 29 19 JS: Ok, Ja? Ja? ... Da! (Probably to Da). I'm not going to give you another warning—it's a C2 the next time you get up. (Back to Ja).
- Ja: No, no....I know.....
- JS: I know you know but why don't I start you off—
- 30 30 Classroom is becoming slightly noisier, to the extent where the atmosphere has returned to “normal”.
- 31 08 JS: Derrick, I don't want to have to park you.Derrick--
Derrick: What do you mean, park you? I never even done anything. I've been waiting for you to help me! I've been waiting! I've got all the times and—
JS: I've been around to everyone.
Derrick: Now what? I got all the times and (indistinct word) and the radius, what about—(I is looking at his work and reads some numbers)no, no, no, I haven't got the answer butlook, I've done that bit. Look! I've done the 64 minus(I works through several steps with Derrick in a patient manner. It is apparent that Derrick did not understand the problem that was solved on the board and was attempting a new problem by rote).
- 32 09 Derrick: I can't work out the big circle!
JS: But we need the big circle. We can't do this without it.....I don't know how to do it any other way. Ok, you need a big circle and you need to cut it like this...(JS prompts Derrick to calculate the area of the big circle).
- 33 07 A loud squeal is heard from the other side of the room but Derrick remains engrossed in the calculations.
- 33 25 JS (to Derrick): I know you can do it. (Walks around to another table).
Another pupil: Do you have anything harder?
JS: Actually there is one very challenging one at the end of that sheet. If you can do that one....(continues walking). (Lots of laughter is heard in another part of the room and Derrick's voice can be heard).
- 34 47 Pupil (calling out): Miss!
JS: Ok, I will be right there, I just want to finish this....
- 35 48 As I checks answers in the back of the room, Da and surrounding pupils are become louder at the front. Da can heard briefly and then Derrick. A burst of shrieking ensues
- 36 55 JS (to Derrick): Turn around, I want to check your work. (However, JS does not go directly to Derrick but continues to check work as she proceeds to front of room).
- 38 29 JS (across room): Da and Ja, you're too loud.
- 38 32 JS: Da! (Continues to go through solution with another pupil).
- 39 30 JS discusses a solution with Rosa. The noise in the front of the room increases gradually along with Derrick's voice. A group of pupils, including William, are talking across the room.
- 41 15 JS (to unknown pupil): What did you get for No. x? (Noise stops for a moment but then begins again as soon as JS and pupil attempt to find for a rationale for her incorrect answer).
- 41 59 JS (to Da): Ok, Da, show me your work!
Da: I haven't done much---

JS: I know.....you're wasting a lot of your time.Where are you? (As JS assists Da, Derrick begins to make loud moaning noises; as JS leaves Da to walk around classroom she admonishes a few pupils to quiet down and work).

42 27 JS: Well, I can't hear....

42 48 JS: I am sorry but....turn around, Derrick!
Derrick: I am!
JS: Show me your work!
Derrick: Victor!
JS walks away when she cannot get Derrick's attention and helps a neighbour who is finding it impossible to solve even one problem. Derrick continues to speak across room but in a lower voice.

43 44 JS: Derrick! (Continues to help neighbour).

44 05 JS: Derrick, you're too loud. (Da is interacting with Derrick but words are indistinct).

45 41 Pupil from back of room: Miss, I think I need you!
JS: One minute....

45 47 JS: Ja, look at the white circle.....

46 14 JS: Ok, I'm coming.....

46 20 Someone yells.

46 24 JS (to class): One more minute and we're going to have a progress check!

46 32 Pupil: Miss, you know the first one, is it 4.71?
JS: Which one? 16.....No, 3.875.....I checks through a series of calculations.
As JS walks around to check other pupils, Derrick's voice can be heard again talking across the room.

47 23 JS (to class): Too loud now! (JS continues to help one pupil).

48 14 JS (to class): Guys....(Noise declines a little). Guys.....I'm going to do a problem on the board. (Derrick and others continue to talk).

48 44 JS (to class): Ok, guys, stop what you're doing. (Noise abates abruptly). Stop what you're doing for a moment. Mickey, stop! I'm going to repeat what I said at the beginning of the lesson: this is not just about maths. These maths problems are not about numbers....or doing experiments....but it's about seeing shapes. Can we look at the board? (Some stray sounds). Can we just look at the board? Can someone tell me—if I want to get the area of the shaded region—Derrick, can you turn around—
Derrick: Maybe once....
JS: Derrick....Thank you. So how can I get the area of the shaded region? What do I need to start with? What do I need to cut out? (Pupil starts to speak). Now, be careful: there's a quick way to do this and there's a slow way.....either way is ok. What shape do I start out? If someone gave me a piece of paper, Derrick, what would I start out with? ... Michael?
Michael: I'd start with a square.
JS: Ok, that's what we're going to write down. We're going to do a shaded region (JS writes on the board).....ok, starting with a square (one pupil reads out the dimensions and I writes that too) ... what are we going to take away? I know someone knows this—Lo! Lo! (Indistinct reply). Right, Lo! (Various pupils try to get Lo's attention). To get the shaded region, Lo, what do I have to do?
Lo: Cut out the white part of the circle.

JS: The white part! Now, you said the white part of the circle, but when you look at it first, what do you actually see?
 Lots of pupils chime in enthusiastically, no distinct replies can be heard.
 JS: Right...Sha?
 Sha: A semicircle! (Lots of murmuring from pupils across the room, including Derrick).
 JS: And what are four halves of a semicircle (pointing to diagram on board)?
 Pupil: There are four.....(doesn't finish)
 JS: What's a half of a semicircle? (Lots of murmurs and discussions in small groups). Look—what's a half of—Cris?
 Cris: Inaudible reply.
 JS: A quarter of a circle! (Lots of comments without an inordinate amount of noise but Derrick makes a loud whining sound). So the square minus the circleAsc? Do you see that the four quarters are exactly the same size? So what is the area of ---Derrick!
 Derrick make an indistinct statement which apparently is a rude remark about Asc's question.
 JS: No...(to Derrick) you don't need to comment! (Indistinct statement). Well, you did—you just about nearly did! (Classroom becomes silent). You need to stop it now..
 Derrick: Where's the C1? My name wasn't even on the board.
 JS: I kept calling your name and you didn't stop.
 Derrick: OOOOOhhhhh! Well, I got bored.
 JS: Stand outside please. Stand outside. (A few pupils guffaw). Thank you. Ok, what's the area of the square? Ok, Mickey—La? One pupil says the calculation and I writes it on the board. What's the area of the circle? What's the radius?
 Pupil: Seven.
 52 22 JS: Ok, it is seven. Ok, so what's the area of the circle?...No that's not seven, the radius is seven. Ok, so what's the area of a circle?No (to one pupil) it's not seven, the radius is seven. Ok, what's the formula for area of a circle? (Asc gives the correct answer). Ok, it's pi r squared. 14 times 14...(Da and another pupil say 196 together).....yes, and what is pi? ... Yes.....And what is 7 times 7? This is approximately what? ... La?
 La: She just put my stuff away!
 JS: Why don't you just go back to your seat? You didn't have to get up to take it away—
 La: That's my stuff!
 JS: Go sit down. You don't have to take your stuff. (An argument erupts in the room).
 JS: Just sit down. We're nearly there. (Argument does not stop and I quickly finishes the problem as a few pupils listen). Alright, (noise decreases) I want everyone to work on their own for approximately six minutes and then we are going to go over an interesting problem. It looks easy but it is actually a ten thousand pound question. (Pupils hoot. I walks around to ensure pupils choose the correct problems).
 54 01 A pupil reads through a question with JS.
 55 00 Another pupil goes through some calculations.
 56 20 Da: I am working!
 JS: Not really!
 56 27 JS: Derrick, you want to be in Set 1?

Derrick (dejectedly): Yeah.

JS: Then I don't need you calling names at (indistinct words)....

Derrick: I hate sitting at the front! ... It's hot in here!

JS: Don't you think everyone feels hot? ..Mickey! Mickey, sit down now! ...

57 08 JS: No talking, Da! Ja! ... Derrick! (JS looks at all of them in turn to show them that she is watching them.

She then has further words with Derrick in the corridor regarding his entry into Set 1 in Year 10).

58 48 JS is again circulating in the classroom helping assorted pupils.

1 01 18 Noise level is increasing but JS continues to assist pupils with calculations.

1 03 13 JS(to class): Alright, guys...right, stop doing what you're doing and look at the board. Ja, look at the board please. Da, look at the board.

Mickey....William, look at the board. Right, guys! La!(pause)....Look at the board. (pause). Right—is this really a ten thousand pound question? (Assorted noises emanate from the class). No(to individual pupil), just look at it!

Two or three pupils make indistinct comments.

1 03 55 JS: Why could this be a ten thousand pound question?

Pupil: Like maybe, if you can find out one, you can find out the rest, like all of them.

A member of staff enters the room and temporarily disrupts the flow of the lesson.

1 04 39 JS: So why is this a ten thousand pound question?

A few other comments, all indistinct, as the door is not yet closed.

JS: This problem is from an exam. The exam was for going to a quite a famous independent school where they start at 13 so people at the end of Year 8 would be taking it. The exam was about twenty one pages long and this (pointing to the board) was called the “discriminator” question. It's a question which does not really test your maths ability, it tests everything else. When I look at this question I still get panicky. Have a look at it.....does anyone have an idea of what they need to know to solve it?

1 05 40 Michael immediately gives a succinct plan for problem solving which is largely inaudible on tape due to the noise picked up from the corridor.

JS: Think about it for tomorrow. Please bring everything up as you leave.....Michael and Cheryl, why don't you go over and sit at the back table.....

Michael and Cheryl both solve the ten thousand pound question before they sit down for their free association narrative interview.

Free Association Narrative Group Interview 4 (First Draft)

Date: 10th July 2013 Venue: M6 File No: 811 0032 Duration: 15m30s

Participants: (see code): Cheryl and Michael

This interview was carried out directly after a lesson entitled 'Visualising Area 2' in which both participants completed a good amount of work; Michael contributed several interesting oral solutions in the latter part of the lesson.

JS: This is something called a free association narrative interview, and I am sure you've never heard of it, but it's basically an unstructured interview. I will start with one question, just one question, and you can say anything you want. The only other thing I will ask is for you to give more details. (*Murmurs of assent; some indistinct words*). And really, you can say whatever you want: it will have nothing to do with your levels, the class, the setting, nothing like that. Ok? (*Murmurs of assent*). So what I am going to ask you is: what do you think happened in this lesson?

Cheryl and Michael look at each intently and smile openly; there is a pause. It is apparent to the interviewer that they had been expecting this question.

Michael: Not much. (*Michael and Cheryl look at each other and laugh*). It's the usual: people talk, some people do the work....yeah, like the class was really only quiet for about ten minutes overall so ...that's what usually happens.

Cheryl: Yeah....it's basically like that every lesson, because there's just a few people who kind of distract everyone else, and so then arguments break out, and stuff like that, so...it derives from what we are supposed to be doing, so we don't actually do much. We only get like a few minutes of actual good work in, and even then, like, it'sit's not that great, because we spend like half an hour on the starter, so....like the time we actually do work is very small. People just choose not to do work, they don't do it any way....

JS: So....why is this?

Michael: I think there are just four people who always want to be louder than everyone else and want to distract...not distract everyone else, they want to, like, get away without doing work and the only way that they can talk is to talk loudly. And if they're loud, everyone else can just talk under them.

Cheryl: Yeah, because certain people will come out of a lesson and be like "Oh, I didn't do any work" and they'll be "Oh, wow, that's so cool"...."great job!"and then they just keep doing it and they People just don't know how to have a quiet, inside voice, so they just go really loud. (*Laughs*). So they just get really loud and then other people are like "Oh, well they're talking" or the people who are like shouting on a controversial issue....everyone starts chipping in and it gets worse and worse.

JS: Can you be a bit more detailed? Like, I kind of understand it, but....can you give me an example?

Michael: Like....if S cusses D then D will, like, pull in V and then S will just pull in everyone else.

Cheryl: (*Slowly*). Yeah....

JS: How does he *pull*?

Cheryl: It will happen because, like, as Michael said, S will cuss D and D will say to V, because they're both – they're all mates because of where you're from, so V will be like to D "Oh, we're both like from Africa—"

Michael: We're the (*indistinct word*)

Cheryl: Yeah, so they'll be like "Oh, we're both like from the same place, you have to back me up on this" so V will kind of like come in because S will normally say things that are quite racist, like "All black people are ugly" and like "African people are stupid" and stuff, like that, and obviously, if you're from there, you'll get offended, so more people from that area are offended and more people get into it and people who are on S's side, not necessarily because they're from the same place as him but because they are "friends" and I quote "friends" with him that they kind of chip in as well, and then it brings up other issues because like everyone will kind of back and forth go "Well, we're not as bad as that place", and then the people from that place will go "Well, we're not as bad as someone from another place". It will just keep going.

JS: Why do you think S chooses those topics? I suppose there are loads of things that he could talk about.

Michael: He loves the attention? He likes to feel smart.

Cheryl: Yeah...I suppose they're issues that can quite easily be brought up quite easily, like they're brought up in normal society like nowadays, and I actually think that S is kind of racist, like some of the things he says---

Michael: That is such an understatement!

Cheryl: (*Laughs*) Ok! He is racist, like everything he says is offensive to someone because of something. Like, it won't even be for a good reason, he'll say something and he'll say it because it's a way of cussing someone else because they have looked at his general direction or they are not speaking to him, but he's having a debate.

JS: So what else was happening? You said that very little happened—but did anything—

Michael: I don't think anything significant really happened.

Cheryl: Like, like everyone was just talking about their own personal things, like, I don't know, what they did at break, and...stuff like that.

JS: What did you do?

Cheryl: I was talking to M and doing the work.

JS: Ok. What did you do, Michael?

Michael: I was talking to V, a little bit to R, and did—just some work.

JS: Ok. (*Michael*) You gave a lot of answers to the class.... (*to Cheryl*) and you did as well.

Cheryl: Yeah.

JS: Ok.

Cheryl: It's just kind of up to you whether you get involved or not. Like sometimes it can't be helped.

JS: What can't be helped exactly?

Michael: Like, Y says something that is—someone says something that is *so* wrong and you just need to correct the—

Cheryl: Yeah, like-

JS: Give me other examples! (*Pause*). It doesn't have to be this lesson....can you think of anything this week? (*Pause*). Or even just like yesterday?

Michael: I don't want to---things just pop up as

JS: Just say it –it will be confidential! Nothing is going to be repeated or anything, my PhD supervisor may look at it, but everything is anonymised and nobody else will ever know. Seriously.

Michael: So....in our class sometimes, if we're doing RE, someone will shout out something like "There's a God" and then there's like me, T and Cheryl, who are three atheists and like, we....I don't know how to put it.....

Michael and Cheryl look at each other and laugh.

Michael: We sort of just knock them down at every point, and she gets aggressive---

Cheryl: You get aggressive! Severely! (*Laughter*).

Michael: T like ...uhm...he just, he corrects people but in a friendly sort of teacher way—

Cheryl: He comes up with a science and we come up with the moral ideas of it....Yeah, but like Michael said, someone will say something like "Oh, God will do this" or "He, She, whatever, does this " and then we'll say something and like, because, I don't know, we'll all be pitching at a point, so people who are severely religious will chip in "Well, actually guys, you are severely wrong, because we have an opinion on this" and it will get started like that. Like something is said and people who believe very strongly in it just kind of come in with their opinion of it and why they think the other person's wrong or why they think someone's right.

JS: Are you learning like that? (*Pause*). Like maybe not in maths, but in other subjects, when you argue....

Cheryl: Yeah....

Michael: Yeah, in RE it's definitely (*indistinct words*) because you can't really put out someone's opinions on like some work-

Cheryl: Yeah—the lesson's, like uhm, are quite good....like RE is obviously a good one for debate, but....in my English class it's quite good, like if there's a question up on the board, like someone will give their interpretation of it and then someone else will give their interpretation of it and it might be different and we'll debate which one we think is best or makes the most sense kind of thing, and then other people come up with their own ideas and get inspiration and stuff.

JS: Alright...when you are doing work (*Cheryl and Michael look at each other and shake their heads*)....well, I know you do some work...well, how does that work? When you're working--

Michael: It's kind of like....(*long pause*)

JS: So how do you switch on and off?

Michael: I don't know.

JS: I thought you were debating about that problem!

Cheryl: Yeah....

JS: So when you're doing your work, what's happening? How do you approach that?

Cheryl: (*Over some indistinct words from Michael*) It dependswho you're sitting with. Say like, if I were ...ahhh....when I was sitting with S-a, L was like diagonal to him, so they would have a conversation and it would be really hard to block them out, 'cause they would have a conversation, as I said, someone brings up an issue and you're like "Well, actually, I don't believe that's completely right" or they'll just keep talking and they'll just interrupt, like they interrupted me quite a lot, and I was just like "long pause it!" or it was just like really hard to focus. It depends on who you're sitting with and also what the work is and, you know, like how you feel on the day.

JS: You're kind of saying that the class is like relationships, kind of ---

Cheryl: Yeah....

Michael: Yeah....

JS:kind of like people---

Cheryl: Yeah, because like, certain people who sit together work quite well together because they don't interrupt each other, or if they do talk, it's not deriving their attention away from the work. But they can still talk and work. With some people you sit them together and they may be friends or they may hate each other and they will get into conversations and arguments, they'll be really loud and completely forget the work. So it's kind of about getting the right combination of people to sit.

JS: You said at the beginning of the year....you suggested that I should let you sit where you want, I should let you choose where to sit. Would you still say that?

Michael: Yeah. And then like, you can move who needs to be moved, like if you see a group of people who you know will talk but they will also do the work, you sort of let them be, but if you see like, two people who will obviously talk and who will obviously start an argument, you sort of separate them.

Cheryl: Yeah...and that way you see the way everyone works with each other and how everyone interacts with each other and also, even if you do do that, you have to take into consideration like people from the groups who are always talking and starting debates. Sometimes it might not be that great to put them next to people

who don't always do stuff like that because then they start bringing them down, 'cause that's happened before.

JS: Ok...just basically one last question: if someone was to ask you what starts you working, in your classes where people do talk and things happen, what would you say?

Michael: Hmmmm.....(*long pause*)

JS: Okay, say in our class, maths?

Michael: I don't know. I want to say self- conscience, 'cause if you don't do work, then that's---there's that feeling of getting caught and then you've got to do detention and stuff like that. But.....

JS: Both of you made tremendous progress this year in terms of levels—

Michael: Really?

JS: Yeah, at least two sub-levels and actually I think more. Yes, really more...there were just some silly mistakes on the test (*looking at both pupils*). Does that do anything for you? Do you ever think “Oh, if I work I'm going to make another sub-level of progress!”

Michael: Nah!!!!

Cheryl: No, I just work as much as I can or as much as I feel like and ...yeah, I just do it that way, and I actually learn better through reading, like sometimes when someone's up at the board explaining, yeah...I don't...it just doesn't click. Like, I just don't get it. But if I'm reading it from a book I'll get it and I'll kind of self-teach myself. I'll just teach myself how to do it and then I'll just move on to questions and I'll just kind of flip through the ones I want to do.

JS: Ok, Michael?

Michael: Yeah like, during a lesson I will do the work and I'll do a fair amount of work and like sometimes a lot and sometimes a little, and....but like, I never go “I really should do homework”, I never ever do –

Cheryl: He's never done homework in his life. Never, ever, apart from science.

Michael: Never, ever-that's because (*laughter, indistinct words*)

JS: Hmmmm, I know that actually.

Cheryl: No, it doesn't really cross your mind actually when you're at home and you're thinking “Ohhh, I've got the test coming up and I'm going to go and revise as much as I possibly can!”, you kind of worry about it when you're at school, trying—

Michael: No, I think the people who revise just before a test are the people who are shouty and loud and don't actually do any work—

Cheryl: They panic—

Michael: Or make up for lost time.

Cheryl: Yeah! “Oh, no, I haven’t revised at all for the past two weeks!” So they revise for the next night and a half and then come in and do the test.

JS: That’s interesting. So just one more question: when you come in to a lesson, do you know how it’s going to be? Do you have feelings about what is going to happen in lessons?

Cheryl: Yeah, depending upon what lesson it is, like who’s teaching and who’s in the class, you can kind of tell whether it’s going to run smoothly or whether there’s going to be arguments and stuff.

JS: Do you ever have other feelings about a class?

Michael: No.

JS: You haven’t really said anything about any other feelings you have in class.

Michael: Nah, I only ever have—during school I’m only ever like, enjoying it or bored....and mainly bored. (*Laughter*).

Cheryl: (*Imitating him*) Mainly bored!

JS: Really? (*More laughter*).

Michael: Yeah.

JS: You disguise it sometimes, you know. (*To Cheryl*) And you?

Cheryl: It just depends on what I’m doing in lessons, who I’m sitting next to and like, whether I’ve done anything in break or...I don’t know, it depends on my mood of the day and who I’m sitting next to and what I’m doing.

JS: Thank you, you’ve been very, very helpful. We only have another week and I know I’m not going to get to everyone but at some point, maybe in September, would it be ok if I asked you to come for individual interviews? Again, it would only be for fifteen minutes or so.

Cheryl: Yeah, that would be fine....

Michael: Yeah, sure...

JS: Would that be ok? Good. Thank you very much for helping me. Thank you.

Appendix 5.8 ‘Good’ lesson: plan and textbook extract

Lesson Plan

Lesson objectives: Pupils were expected to write and solve one and two-step algebraic equations using a balancing method.

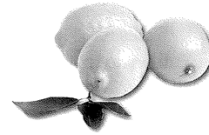
Starter Exercise: Following on from the previous lesson, pupils were asked to solve a set of differentiated problems using the inverse function method.

First Part: Pupils were invited to determine the essential qualities of a balance while viewing a demonstration. After they solved a set of balance puzzles, pupils reviewed algebraic notation and wrote equations for balance diagrams. Progress was checked on the board using Problem No. 1d on p.71.

Second Part/Plenary: Pupils solved a variety of one and two step equations. After working individually on p. 71, pupils checked their learning progress on the board by solving Problems No.3d and the Challenge on p.71

Exercise 4d

- 1 Calculate the unknown value in each of these problems.
 - a Three lemons cost 60p.
How much does one lemon cost?
 - b Four pairs of trainers cost £240.
How much does one pair cost?
 - c Ten pencils laid end to end have a length of 150 cm.
What is the length of one pencil?
 - d Two ingots of gold have a mass of 25 kg.
What is the mass of one ingot?

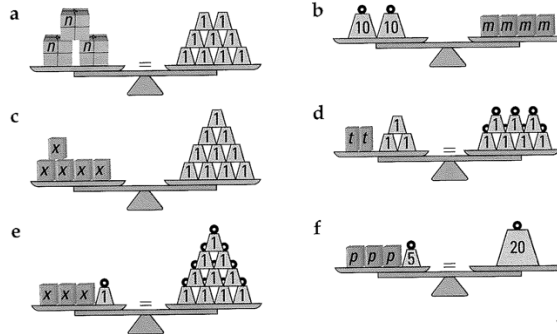


2 Solve these equations by balancing.

- a $3x = 12$ b $5n = 20$ c $10k = 70$ d $4f = 60$
 e $6t = 12$ f $7q = 21$ g $20h = 100$ h $9d = 45$

You only need one inverse operation to solve each of these equations.

3 i Write an equation for each of these scales.



ii Find the mass of one parcel on each of the scales by solving the equations.

You need two inverse operations to solve some of these equations.

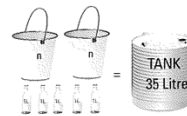
4 Solve these equations.

- a $3x + 4 = 19$ b $2m + 6 = 24$ c $5t - 4 = 11$
 d $10y - 3 = 27$ e $4g + 5 = 17$ f $3h + 7 = 22$
 g $8r + 3 = 35$ h $5n - 6 = 24$ i $2e + 20 = 40$
 j $5p + 13 = 33$ k $10d + 7 = 37$ l $7f - 5 = 9$

Remember: The inverse of add is subtract.

challenge

- a Write the equation which describes this picture.
- b Solve the equation by balancing to find how many litres a bucket holds when it is full.



4d Balancing equations 1

LEVEL 6

- Use balancing to solve simple equations

Keywords

Balance Right-hand side
 Left-hand side Solve
 Operation Unknown

You can write an equation for these scales.
 The two sides **balance**.

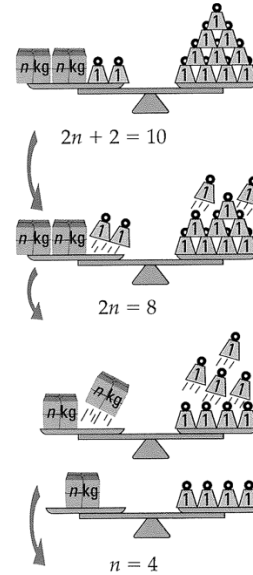
As an equation it is $n + n + 2 = 10$
 or $2n + 2 = 10$

Work out the weight of the parcels by taking 2 kg away from the **left-hand side**.

Keep the scales balanced by taking 2 kg away from the **right-hand side** as well.

There are two parcels so divide both sides by 2.

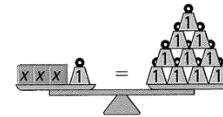
So one parcel has a weight of 4 kg or $n = 4$.



example

- a Write an equation for these scales.
 b Solve the equation by balancing.

a The equation is $3x + 1 = 10$.
 b $3x + 1 = 10$
 $3x + 1 - 1 = 10 - 1$ Subtract 1 from both sides.
 $3x = 9$
 $3x \div 3 = 9 \div 3$ Divide both sides by 3.
 $x = 3$



When you **solve** an equation you find the **unknown** value.

Appendix 5.9 ‘Unsatisfactory’ lesson: plan and textbook extract

Lesson Plan

Lesson objectives: Pupils were expected to write equations for diagonal lines by determining the slopes and y-intercepts of plotted lines and to visualise diagrams of diagonal lines based on their knowledge of slopes.

Starter Exercise: Following on from the previous lesson, pupils were asked to write equations for an assortment of horizontal and vertical lines and to write coordinate pairs for their points of intersection.

First Part: Pupils reviewed how certain function machines generate a series of coordinate pairs which can be plotted to form a diagonal line. They were then shown how to calculate the slope and y-intercept of a graph of a diagonal line and substitute these values into $y = mx + c$ in order to construct the equation of the line. After pupils worked individually on Problem No.1, progress was checked on the board by solving Problem No. 1b.

Second Part/Plenary: Pupils compared the graphs of several diagonal lines and then completed a board exercise in which equations were matched to graphs of diagonal lines. After completing Problems Nos. 2 and 3 in the textbook, pupils checked their learning progress by solving Problem Nos. 2c and 2d on the board

8e Straight-line rules

LEVEL 6

- Understand the connection between a straight graph line and its equation

Keywords
Equation
Rule

Here are three coordinate pairs for the red line
(0, 0) (1, 2) (3, 6)

The coordinates follow the **rule** in this function machine.
The points on the red line move two squares up for every one square across.

The **equation** of the line is $y = 2x$.

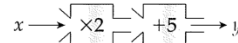
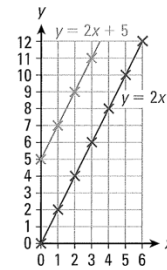
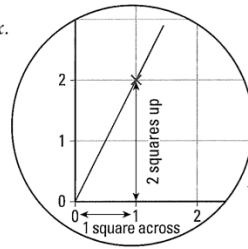
The equation of the blue line is $y = 2x + 5$.

For the same x coordinates, the y coordinates have increased by 5.

(0, 0)	(1, 2)	(3, 6)
↓	↓	↓
(0, 5)	(1, 7)	(3, 11)

The points on the blue line all start five squares higher up the y axis.

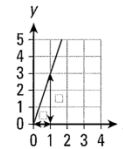
The coordinate pairs follow the rule in this function machine.



example

a Copy and complete this sentence.
'The points on the red line move squares up for every one square across.'

b Copy this function machine.
Use your sentence to write the rule linking the x and y coordinates.



c What is the equation of the line?

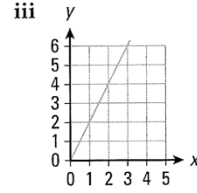
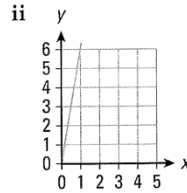
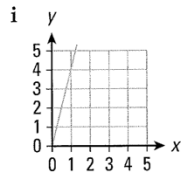
a 'The red line moves *three* squares up for every one square across.'

b

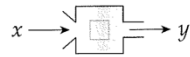
c The equation of the line is $y = 3x$.

Exercise 8e

1 a For each of these graph lines copy and complete this sentence.
 'The points on the line move squares up for every one square across.'

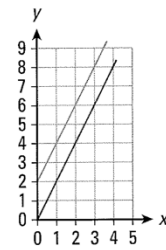
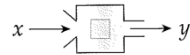


b Write the rule that links the x and y coordinates in the graphs above.



c Write the equation of each of the lines. $y = \dots\dots\dots$

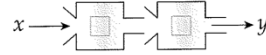
2 a Write the rule that links the x and y coordinates for the red line on this graph.



b What is the equation of the red line?

$y = \dots\dots\dots$

c Write the rule that links the x and y coordinates for the blue line.



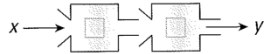
d What is the equation of the blue line?

challenge

Without plotting coordinates, draw the line of the equation $y = 3x + 1$ on a copy of this grid.

Here are some hints to help you.

– First write the rule linking the x and y coordinates.



– Copy and complete this sentence.

'The points move squares up for every one square across.'

– Start drawing the line where it crosses the y axis.

