MUSIC AND MOVEMENT: THE CASE FOR A KINAESTHETIC STRATEGY IN PROMOTING MUSICAL MEMORY.

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ABSTRACT

This research study focuses on the role of kinaesthesis and motor response in promoting musical memory. The main questions addressed are:

> What is the nature of musical memory?
>
> How is it promoted?
>
> Is a kinaesthetic or muscular strategy a particularly effective means of promoting musical memory?

The investigation which follows is mainly conceptual, yet reinforced by some empirical work. It falls into three parts:

1) Cognitive processes;
2) The potential role of kinaesthesis and movement as imagery strategies;
3) Empirical investigation.

In part one a framework for the investigation is established. The study of general aspects of memory is linked to research in music cognition and memory. A chapter on representation and imagery is concerned with those techniques and strategies by which musical memory is developed.

Part two examines the nature of kinaesthesis and its role in cognitive processes and musical cognition. Rhythmic experience is considered in relation to kinaesthesis and its overt manifestation in physical movement.The major contribution of Emile Jaques-Dalcroze is presented, as a study of kinaesthetic strategy in practice. The close correspondence between music and expressive movement is examined, before a chapter in which a conceptual framework is proposed.

The third and final part presents the empirical work undertaken in testing the kinaesthetic principle:

> 'The stronger the muscular sensations, the clearer and more precise the images' (Jaques-Dalcroze)

A replication experiment is described which forms the basis for an experiment on kinaesthetic strategy, the success of which lends support to the theoretical evidence presented. Conclusions are drawn and Dalcroze practice reviewed in the light of these findings and the preceding theoretical work.

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INTRODUCTION

A young pianist and national prizewinner is in the middle of a recital. His playing is characterised by a strangely unmusical 'rubato', interrupting the onward flow of the music. The effect of this is to cause feelings of tension and annoyance in the listener and also an inhibited, withdrawn posture similar to that of the performer. He looks cramped, arms held tightly into the body, tending to jerk his head spasmodically, irrespective of the nature of the music. Unnecessarily distracting leg movements result in loud, stamping noises on the sustaining pedal.

In contrast, the photograph overleaf depicts a performer at one with his instrument, helped by the fact that it is one of the smaller brass instruments. The still image, paradoxically, conveys a feeling of movement or fluency and evokes the belief that, if music could be conjured from the page, the performance would be sufficiently powerful as to envelope both audience and performer in a unified musical experience.

IMAGE REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

In using these contrasting examples, the researcher's aim is to focus on the overt manifestation of 'kinaesthesis' or 'kinaesthesia'. This is translated as 'the perception of muscular movement' from the Greek: kinesis - movement, exemplified in this case in musical performance. As some of the worst excesses of showmanship demonstrate, movement is not something to be added as a form of decoration but is essentially an expression of inward feelings of movement. This appears to arise from a communicated understanding of how the music flows, from a general shaping of ebb and flow to the most detailed nuance. One would expect it to be affected, too, by personality and temperament.

The resulting movement must be unobtrusive, seem 'right' or else it is superfluous.

It should be pointed out that these perceptions of listening and observing as an audience member developed after many years of teaching in which the use of physical movement, both in free and in restricted space, formed an almost intuitive part of the researcher's teaching strategies. However, it was the realisation of the complexity of cognitive, psychomotor and affective elements, which constitute the particular area of musical activity- performance, which proved sufficiently disturbing to prompt this study.

To take this further, how much is known about the complex neurological processes which make possible not only the performance of music but all aspects of listening and perceiving? Somehow, the researcher believed, the very 'obviousness' of physical movement evident in human behaviour, might cause us to neglect the potential role in these activities of kinaesthesis and its overt manifestation, motor response. It seemed that there were implications here for the work of music educators operating with different age levels and in diverse situations.

Consequently it seemed desirable to study the area of music and movement not only through the literature but also through first hand experience of a respected approach to teaching music through physical movement, known as Dalcroze Eurhythmics (from the Greek: en - well, rhythmos - rhythm).

It was Emile Jaques-Dalcroze (Martin et al. 1965) who, at the turn of the century, revealed the importance of the kinaesthetic sense through his theoretical and empirical investigations. In particular, he was concerned to develop feeling for music through exercises and activities designed to promote a 'better coordination of mind and body' (Sadler 1912, p.16). In describing the aims of his exercises Dalcroze showed concern for translating muscular activity into what he referred to as mental pictures or thought 'images' (fr.):

> '...each of them is conceived in the form which can most quickly present a thought picture of the movement studied' (Sadler 1912, p.16)

It would appear to follow that, by emphasising mental processes, Dalcroze was implicitly acknowledging the importance of developing memory for music and that the kind of imagery or picturing necessary to this process was, he implied, kinaesthetic imagery.

Believing, too, that an acute memory for musical patterns is central to every area of musical activity, the researcher felt that music educators bear a particular responsibility in seeking effective ways for its promotion. This study, therefore, is concerned with those processes by which musical experience is encoded and, in particular, focuses on kinaesthesis and motor response as a potential strategy or teaching principle.

At the outset, in an investigation of this kind, dealing with generalised as well as subject specific concepts, the initial trawl of the literature proved wide-ranging: arts education, music, dance education, methodologies, aesthetics, music psychology, psychoanalytical studies of personality and expressive movement; these were all explored.

It appeared that the notion of action or movement was so generalised that terminology presented some difficulty. 'Movement'or 'movement behaviour' is a comprehensive term which covers action in all its forms, either internal or external. The term embraces every kind of 'motor' behaviour, from the generated response of the whole organism to both the gross and fine motor skills required to perform a highly coordinated task. Whatever the terminology employed, the following pages demonstrate some of the areas and ideas explored before the researcher began to home in on the central concerns of the investigation.

Initially, it was necessary to trace the development of the teaching of music and movement from its introduction in the early years of this century. The work of Dalcroze in the years leading up to World War I took place in a climate of experimentation and fertility in the arts which conjures up names such as Kandinsky and his 'Blaue Reiter' group, the dancers Mary Wigman and Isadora Duncan, Carl Orff and Rudolf Laban. There was nostalgia and much interest at this time in the renewal of the Greek ideal in educational thought- the perfect harmonisation of mind and body.

The influence of his work was to carry through into the mainstream of educational practice to the extent that, in this country, some fifty years ago music and movement appeared to hold an acknowledged place in the general music curriculum of primary school children (see Taylor 1979). Evidence of this is seen in such publications as the <u>Cambridgeshire Report</u> (1933) and in the firm foothold of the BBC Schools Radio <u>Music and Movement</u> broadcasts devised and conducted by Ann Driver.

During the post-war period, there was seen to be an expansion of instrumental schemes and a broadening of the school curriculum. A counter influence came from Rudolf Laban's ideas as they became incorporated into the work of physical educators and from increased competition for space on the timetable. 'Movement' experience, in the general music class, tended either to disappear or to be seen as a luxury requiring both specialised accommodation and greater time allowance on an already crowded timetable.

Yet traces of the approach live on, particularly in the number of music teaching methods that, in varying degrees, incorporate movement. This is most notable in the philosophy and approaches of music educators such as Shinichi Suzuki (1969) in instrumental teaching, Carl Orff, Zoltan Kodály, Justine Ward (Simpson, 1976) and Edgar Willems (Chapuis, undated).

Although doubt exist in the music teaching profession about the depth of understanding which underpins work in primary schools, it is almost axiomatic for movement experience to be considered valuable in introducing musical experiences to young children. For those who are conversant with the approach, Dalcroze work is particularly acknowledged for its emphasis on aural skills, specifically for fostering an understanding of musical elements such as rhythm, pitch and form, and for introducing musical notation arising from physical movements.

A prominent, yet less well known, feature of Dalcroze teaching was his central concern for the use of movement as a vehicle for expressive response to music. He believed that, through movement, it was possible to respond to, explore and gain understanding of, the expressive character of music. That is the way in which it flows or may appear to hang in suspense, focussing on those qualities which are difficult to put into words precisely because music is music. This would appear to be the quintissential heart of musical experience, sometimes referred to as the 'micro' as opposed to the 'macro' structure (see Joseph 1982, p.5) Joseph emphasises the point (Joseph 1982, p.2):

> 'the Dalcroze method stresses the awareness of relationships and organisation within and between the two aspects of music ..... structural and expressive /interpretive'.

From both observation of current British practice and the examination of recent literature, despite the influences already described, it seemed that only lip-service was being paid to the nature and role of physical movement in early childhood and primary music teaching and very little regard in secondary and higher education.

Although responses to questionnaire surveys (AMMA, 1984) indicated that movement work was being practised in primary music classes, there was no indication of either its quality or whether or not the principles employed were both pedagogically and musically valid. For example, pupils might be invited to move in response to music, be given ideas and associations, perhaps in a dramatic context, yet receive little guidance relating to the expressive matching of musical with movement elements. Perhaps this is understandable given the paucity of time allotted within undergraduate B.Ed. primary courses and in-service work to music and the arts in terms of subject areas or curriculum content, let alone teaching methods (Cleave and Sharp 1986). It could also indicate that the dissemination of knowledge and expertise on this particular aspect of music education has not been particularly effective.

Of the importance attached in the past to Dalcroze work by the authors of the <u>Cambridgeshire Report</u> (1933) and later by the Inspectorate (Ministry of Education 1956), only the tattered remains appeared in a later document <u>Music in Scottish Schools: Curriculum</u>

Paper 16 (Scottish Education Department 1978). A more recent publication, Music 5 - 16 (H.M.S.O. undated), makes no reference to movement activity at all, whilst the currently more influential Curriculum Matters 4: Music from 5 to 16 (H.M.S.O. 1985) gives but scant or token reference, providing neither supporting rationale nor allusion to the potential relationship of movement to musical elements.

Next, in reviewing the literature on music psychology, references to the nature and role of the kinaesthetic sense appeared to have been more the concern of psychologists in the early part of the century when introspective subject reporting was fashionable (see Ruckmick 1913 and Mainwaring 1933). Seashore, too, made reference to it:

> 'It is not necessary for us to quarrel about the relation of kinaesthetic imagery to kinaesthetic sensation, but we can agree upon this: the motor tendency to image the tone or execute it in inceptive movements is highly developed in the musical mind' (Seashore 1938, p.6).

and hinted at possible future investigatory case-studies:

> 'Although this has not been investigated thoroughly, case-study of motor imagery will probably show that this is the outstanding characteristic of a musical

> temperament responsive to the musical situation' (Seashore 1938, p.169)

To judge by these extracts and their context Seashore's concern was primarily related to the 'execution' of music, i.e. performance, and its required manipulative and co-ordinative skills, rather than with the expressive gestures inherent to musical understanding. Yet it is of relevance to this study for one can only speculate about possible relationships between high level executive skills and expressive interpretation.

In reviewing psychological studies, connections did appear to exist between kinaesthesis, motor response and rhythm. Allusions were found to the 'motor theory' of rhythm, ascribed to Stetson and Bingham (described by Ruckmick 1913), whereby rhythmic perception was viewed as being essentially kinaesthetic in origin.This theory was also referred to in the literature on rhythm (Mursell 1931, Sachs 1953, Cooper and Meyer 1960 and Thackray 1972).

Following up these connections, Thackray's work proved interesting. In testing children on rhythmic performance, Thackray found the most successful children to be those who made preparatory movements of the head or feet and perceptible bodily movements in performance:

> '...there appeared to be a close parallel between the rhythmic qualities in fine body movement such as instrumental performance and gross body movements such as dance' (Thackray 1972, p.80).

Helpful, too, was Morrison's overview of research into the development of musical perception (Morrison 1982). Here, reference was made to empirical work (Van Zee 1976) which demonstrated that body movements are useful to children in developing concepts in music.

These examples of relatively isolated, yet recurring statements, suggested a possible lack of communication between music psychologists and those music educators involved in the practice of Dalcroze Eurhythmics, despite the work carried out in the United Kingdom, continental Europe and probably more substantively in the U.S.A.(see Joseph 1982, Stone 1985). Although Dalcroze's own writings in the French language were not so easily accessible or translatable into immediate present day curriculum practice, the writings of the Driver sisters (Driver A. 1936 and Driver E. 1951), Vanderspar (undated), Aronoff (1979) and Findlay (1971), had all been concerned with the translation of Dalcroze principles into effective classroom practice.

It also appeared that there was a gulf between the pragmatic approach linked to the name of a famous educator, propogated through a tradition of pupil apprenticeship, and the relatively recent tradition of research in music psychology which demands empirical investigation under carefully controlled laboratory conditions. Another possible reason for the apparent neglect of movement study seemed to be that any approach named after its originator, in being seen as a 'method', tended to appear closed-ended, esoteric and selective in application.

It appeared to the researcher that, if one accepted the premise that in teaching music one's goal is to teach for musical understanding, then the teaching task was to assist children in ways of grasping and holding on to what is essentially a transitory acoustical phenomenon. It followed that one should be developing a capacity to represent music, to picture it in some way. Pertinent questions were then raised: does muscular sensation (tension and release), using large and small muscles involved in bodily movement and dance, have a central part to play in this image forming, on learning and achievement? How much information is conveyed by this activity in the understanding of the structural and expressive characteristics of music? How does movement affect musical performance or interpretation?

The theories of Jean Piaget (Flavell 1963), Jerome Bruner (1966) and others who have influenced educational theory and practice were examined.Their investigations of ways in which children represent the world, it was hoped, would clarify those mental processes concerned with imaging and representing information.

By examining the thinking behind Piaget's outline of developmental stages it became apparent that the notion of movement or action ran through like a continuous thread. 'Schemas of action' appeared to be present from the earliest stage of sensory motor behaviour through to the final stage of formal operations (Beard 1969).

Criticising Piaget's (1953) particular emphasis on the directive function of language, Beard (1969), Donaldson (1978) and others advocated greater exploration of other methods of representation in advancing formal operations as well as means to help pupils to translate from one form of representation to another. There were implications for the teaching of children in the early years of secondary school, in that teaching methods should be more suited to thinking in concrete terms and the recognition that, for new material, this was particularly necessary.

These findings seemed to carry implications for music teaching which pointed in the right direction. Surely a form of representation involving physical movement would be valuable precisely on account of its visibility or 'concreteness' and for its multisensorial nature. The latter is evident when kinaesthesis is expressed, for the movements are both seen and felt.

Again Piaget's work has been criticised for his apparent neglect of the various processes by which information is perceived and of individual differences in perceiving the world (see Beard 1969, ch.11). For example, some people have a fairly developed reliance on the tactile sense, others are strongly visual and some considerably influenced by colour. One could perceive the value of incorporating movement principles into teaching which, through utilising different senses, would allow for individual perceptual preferences (see Vernon 1962 and Seashore 1938).

In viewing physical movement as a way of representing a musical idea, kinaesthetically, tactilely, and visually, the work of Jerome Bruner then proved highly relevant. His Theory of Instruction (1966) focused on three modes of representation: the enactive, where an idea or event is represented through an appropriate motor response; the iconic, based upon internal imagery of a set of summary images or graphics; and the symbolic, where verbalisation takes place in oral and written form, conveying in mathematical symbols, scientific symbols or musical notation, the translation or expression of an idea, thought or process. When viewed in the context of Brunerian modes, the use of physical movement in music teaching, according to Aronoff (1983) provided a link between enactive and iconic modes. This was done within each musical encounter from the initial stimulus of the enactive to the working through of the iconic, drawing upon internal imagery.

Bruner stressed variation in ways of representing or imaging and emphasised the responsibility of the teacher to work towards this:

> 'it would seem ... that principal emphasis in education should be placed upon skills - skills in handling, in seeing and imaging' (Bruner 1966, p.34).

After this it appeared necessary to examine the literature on human movement behaviour and motor learning from several perspectives, including the functional aspect relating to psycho-motor skills and to the correspondence between movement and music. The fact that movement behaviourists (Cratty 1973, Staton 1981) identified force, spatial accuracy and temporal factors (speed and/or rhythm) as vital components of motor activity assisted this study in that these factors correspond to the three parameters of music: energy, space and time.

In the area of aesthetics Swanwick (1971, p.186) implied this correspondence as he examined the basis of art forms:

> 'music presents the patterns, schemata or traces of felt experience to us by means of precise, yet plastic concepts of weight, space, movement, size and so on'.

and went on to say (Swanwick 1971, p.198-199):

> 'it would seem likely that overt bodily movement has a part to play in music education in assisting the development of postural schemata and the identification of these schemata in music'.

In exploring the relationship between expressive movement and music, the expressive/interpretive element of human movement formed the focus of work by Cratty (1973), Lange (1975) and Laban (1948) and also figured prominently in the field of dynamic psychology represented by such writers as Wolff (1945), Allport and Vernon (1933) and Allport (1963).

By venturing into these areas and into the terrain of ethnomusicology it became clear that there could be so many potentially interesting aspects to this investigation that it might become too diffuse, lack focus and risk superficiality. At this point it was necessary to narrow the field and be more selective of the literature concerned with kinaesthesis and action, cognitive and developmental psychology and music, movement and the arts. These were selected in relation to what was to become a study of mental processes in music cognition or, more discretely, 'musical memory'. It seemed that one could only begin to scratch at the surface of the questions posed on page 21.

More and more it appeared that imagery and representation had become the central concerns of the researcher. As a result the main questions of the work could now be stated as:

What is the nature of musical memory?

How is it promoted?

> Is a kinaesthetic or muscular strategy a particularly effective means of promoting musical memory.?

The study would be viewed primarily in relation to general music education, yet with implications for all forms of specialised musical education.

The investigation which follows is mainly conceptual. This is reinforced by empirical work, culminating in a crucial and novel experiment, which lacks statistical pretention. It falls into three parts: 1) cognitive processes; 2) the potential role of kinaesthesis and movement as imagery strategies; and 3) empirical investigation.

In more detail, part one begins with two chapters on general aspects of memory and musical memory. This is followed by a consideration of representation and imagery, that is a closer look at the techniques or strategies by which memory in its widest sense, is developed.

Part two focusses on the potential role of kinaesthesis and movement as imagery strategies. The place of kinaesthesis and motor response in general and musical cognition is investigated before looking more closely at its overt manifestion in rhythmic experience. A chapter is concerned with the particular contribution of Emile Jaques-Dalcroze as a study of kinaesthetic strategy in practice. It is followed by one which, in investigating the nature of expressive movement and the degree of correspondence between the two arts, moves towards a proposed conceptual framework.

The third and final part is concerned to test the kinaesthetic principle empirically. There is a description of the replications and investigations carried out, before drawing out implications for practice in the light of these findings.

PART ONE

COGNITIVE PROCESSES

CHAPTER 1: MEMORY

Gagne (1977) outlines the broad sequence of learning and remembering according to the following phases:

1) **apprehending** phase (attending, perceiving, coding);
2) **acquisition** phase (acquiring the new capacity);
3) **storage** phase (retention, memory storage);
4) **retrieval** phase (recognition, recall of motor and intellectual skills, reinstatement/transfer of skills.

Although these phases are instantly recognisable to educators as the general underpinning to classroom teaching sequence, as yet there is speculation about the nature and role of the mental processes involved. Clearly memory processes appear crucial to all these phases and it is on memory that this chapter focuses.

The term 'memory'. like the term 'mind', is an awkward one. According to dictionary definition:

> 'Memory is either the faculty by which things are recalled to or kept in the mind, or the recovery of one's knowledge by mental effort' (Concise Oxford Dictionary)

Here is seen the dual nature of the concept: memory. In the first instance there is a stress on the natural aspect of memory, that quality of mind concerned with retaining, recognising and recalling information. In the second the focus moves from one of faculty to one of strategy or technique, what the ancient Greeks termed 'artificial' memory (see Yates 1966).

Cohen et al (1986) describe two kinds of memory, the one highly specific, a kind of strategic memory as used in recognition and recall, the other more comprehensive encompassing learning, remembering and forgetting. All experience is in some way encoded, stored and retrieved. Memory is not only central to remembering but also involved in every area of cognition.

The reliance of musical cognition upon memory seems obvious. One could take, as an example, the Aural Tests of the Associated Board, where the candidate reproduces a melodic or rhythmic phrase played twice by the examiner. In this case, a relatively short span of memory is being tested through immediate recall. At the same time, this act would be difficult without prior stored units of experiential knowledge. In contrast, the testing of long term memory is seen in what Sloboda (1985) describes as 'conditioning theory' and Davies (1978) more colourfully as the 'darling, they're playing our tune' syndrome. Here is the recognition of a particular musical experience, associated with a specific person, mood, time, place and context. This is more akin to the 'flashbulb' phenomenon, the famous example being President Kennedy's assassination, where everyone one of a certain age remembers exactly what he or she was doing when his death was announced.

These examples are obvious ones and do not represent the only aspects of what might constitute the nature of musical memory. It must be stated at this point, however, despite the published research, that there appears to be no comprehensive theory which would account for either memory in general or musical memory in particular. This chapter, accordingly, is an account of the available research on memory and highlights the implications of such evidence in preparation for a chapter focussing on memory for music.

It appears that psychologists working in this field are the inheritors of several traditions. The 'associationist', stemming from early Greek philosophy, emphasises mental experience and introspection, the content of the mind being images resulting from past sensations. In the early part of this century Watson (1914), in reaction, spearheaded the tradition of 'behaviourism'. This, with its stimulus-response approach, completely opposed 'introspection' and introduced the kind of experimentation which relies on observable responses for its measurable data. Later, the cognitive approach adopted an intermediate position, often referred to as an information processing model which mediates between stimulus and response (see Claxton 1980).

During the last two decades interest has increased into aspects of everyday memory. This has been underpinned by 'schema' theory (see chapter 3) which emphasises the fact that what we already know influences what we remember or are asked to remember. Yet there is, in this field, considerable complexity of theory and terminology. What is evident, however, is that memory research continues to be dominated by empirical work on the recognition and recall of words and verbal language.

The first systematic theory of memory is one which Claxton (1980, p.199) describes as the 'associative' metaphor. This is not to be confused with 'associationist' but refers to those psychologists who model the memory process in chunks or storage units which, although connected with each other, are viewed as independent rather than interdependent. Atkinson and Shiffrin (1968,1971, described in Cohen et al (1986 p.60) are credited with making the first systematic attempt to incorporate the idea of a short-term memory store within a general theory.

Three types of memory units are proposed:

> **the sensory register** - in which a stimulus produces a short lived trace (a second or two) resulting from visual, auditory, tactile and kinaesthetic sensory impressions.
>
> **short term store** - in which a small fraction of the information is selected for active processing (typically by rehearsal).
>
> **long term store** - into which information may be transferred during the rehearsal process.

Whereas the act of forgetting from the sensory register is considered to be caused by decay, from the short term it is assumed to occur through displacement. Problems of retrieval, from the long term store, appear to be due to interference or confusion.

Subsequently, following work by Baddeley and Hitch (1974, 1976), the essentially passive notion of a short term store has been replaced by that of an active working memory system. It is shown here in adapted form from the model to be found in Cohen et al (1986 p.67).

```
                SENSORY REGISTER (auditory, visual etc)
                        |
                CENTRAL EXECUTIVE (an attentional system)
                        |
 ---------------------------------------------------
Articulatory          Primary Acoustic    Visuo-spatial
Loop<--------------->     Store            scratch pad
```

Figure 1   source: Cohen et al (1986 p.67)

The central executive allocates attention and directs the operation of the other components. It can process information in any sensory modality in a variety of different ways.

The articulatory loop is concerned with verbal rehearsal or phonemic processing (**the inner voice**).

The visuo-spatial scratch pad, as it suggests, rehearses visual and/or spatial information (**the inner eye**).

The primary acoustic store receives auditory input directly. Visual input can also reach it after being converted to phonological form in the articulatory loop (**the inner ear**).

Yet, in contrast Claxton (1980 p.160) voices a general disenchantment with this concept of separate box type stores for memory where content and process are separated. He describes an increasingly preferred theory, the 'integrative' , where memory traces become a by-product of perceptual analyses of data. This has developed from the 'levels of processing' theory, first put forward by Craik and Lockhart (1972). Being a 'qualitative' theory, it rests upon the premise that :

> 'trace persistence is a function of depth of analysis with deeper levels of analysis associated with more elaborate, longer lasting and stronger traces' (Cohen et al. 1986, p.87)

An attentional system which resembles the central executive is believed to process a stimulus in a number of different ways. The persistence of a memory trace over time (i.e. retention) depends here on the depth of the level of processing seen as:

levels

1 SENSORY

2 PHONEMIC (speech related) short-term

3 SEMANTIC (unit of meaning or structure) long-term

Figure 2 levels of processing

in comparison with the previously described box storage systems:

```
CENTRAL------>  SHORT TERM ------>   LONG TERM
REGISTER        MEMORY OR            MEMORY
                WORKING MEMORY
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Figure 3 Memory as storage systems

According to this integrative theory, within these levels of processing, the greater effort a human being puts in to constructing an effective context or meaning, the deeper will be the memory trace:

> 'precise and distinctive elaborations are more effective than imprecise and non-distinctive ones' (Cohen et al.1986, p.94)

As stated earlier, much of the empirical work into memory has been concerned with verbal/linguistic processing. This is exemplified in the work on retrieval strategies, three of which are now described:

The first, Tulving's 'Encoding Specificity Principle' or ESP (Tulving and Thomson 1973), states that:

> 'the cue will succeed at retrieving a memory trace if, and only if, the information contained by that cue is encoded on the memory trace' (Cohen 1986, p.109)

As an example, if the target word to be remembered is 'chair' and the cue 'table', the cue word will only succeed if it has been encoded as part of the memory trace concerned with the word 'chair'. If not, the word 'chair' will not be retrieved.

Information, according to this principle, is retrieved by direct access. The alternative, 'Generate-recognise' theory is based on the principle that memory traces do not have such elaborate encoding structures but are simply copies of the original item. Here, retrieval is treated as a very active process rather than the more passive act of comparing cues with traces until a match is found. Recall may involve the creation or generation of alternative words by a process of association until one is found and recognised.

Perhaps the most interesting model of memory processing to emerge is one which has been respected for many years (see Neisser 1967, D.A.Allport 1980). Founded on Information Processing Theory, Oliver Selfridge's 'Pandemonium' model (Selfridge 1956, 1959) is one where information for retention is stored in the form of a recurrent pattern to be recognised. Each pattern has its own special detector (or cognitive 'demon') which searches for the presence of its own particular pattern, served, in turn, by lower level feature demons. There is also 'ideo-motor' compatibility. The motor programme needed to produce, for example, a particular sound pattern, is directly cued by the auditory pattern which that programme, if executed, would produce.

The premise is that, in cognition, everything is content dependent, a view in harmony with social cognitivists and the findings of researchers such as Margaret Donaldson (1978). Memory, and its means of representation, is bounded by the patterns to which it can resonate. Remembering, according to this model, is inseparable from the processing stage. D. A. Allport (1980) has pointed out that, until recently, there has been scant acknowledgement of the role of action in perception. The 'Pandemonium' theory is helpful in bringing this into focus.

As a cognitive psychologist Neisser's work (1967) has influenced much of the more recent empirical studies. He regards Selfridge's Pandemonium model as being highly supportive of his own and other research findings.

> 'all of these data tend to support the view that pattern recognition involves some kind of hierarchy of feature-analysers' (Neisser 1967, p.85)

However, as he points out, none of the theories concerned with memory processes can do justice to human pattern recognition unless supplemented by some notion of attention which is more sophisticated than the commonly assumed belief that attention is a single process, allocation of energy:

> 'it seems to me therefore that attention is not a mysterious concentration of psychic energy, it is simply an allotment of analysing mechanisms to a limited region of the field' (Neisser 1967, p.88)

In line with James (1890) theory that perception is a constructive act, Neisser sub-divides attention into two stages:

1) **preattentive processes** (a constructive act), an holistic operation in which units are constructed by the perceiver in order for attention to be directed towards them. These can directly control simple motor behaviour; and

2) **focal attention**, again constructive, where a more sophisticated analysis takes place.

Neisser's central assertion (1967,p.10) is:

> 'seeing, hearing and remembering are all acts of construction ....

and refers frequently to:

> ....'the continously creative processes by which the world of experience is constructed'

The point he makes is that in recognition what seems familiar is not the stimulus object itself but the perceived object:

> 'perhaps we experience familiarity to the extent that the final act of visual synthesis is identical to an earlier one' (Neisser 1967, p.98)

It is the identical act of construction which is the point at issue; the process of activity is recognised rather than the product or object for attention. Information is considered as being stored not in the form of any kind of images but carried unconsciously in ways in which we can hardly imagine. It is the constructive act on this invisible, unconsciously stored information which produces images, visual, auditory, etc. in a constantly active, process of creative reconstruction.

In essence Neisser's thesis is one where stored information consists of traces of previous constructive mental or overt actions.It is a dual-process theory where the pre-attentive or primary process is fast, crude and holistic, rather analogous to parallel processing in a computer which constructs crudely formed thoughts or ideas on the basis of this stored information. These products are fleetingly conscious unless they undergo elaboration by the focal attentive or secondary process,which is deliberate, attentive, detailed and sequential. Directed thought and deliberate recall is now serial in character, where ideas and images are constructed by organisation of the primary processes. He considers the executive control of this secondary process to be comparable to the executive routine of a computer programme.

According to Neisser, failure to recall stored information is similar to failure either to notice something in the visual field or to hear something that has been said. For example, the executive process may be directed elsewhere deliberately, misguidedly or through lack of constructive ability.

Neisser (1967, p.235) also postulates a rhythm theory as an organiser for memory:

> ' a rhythmic pattern is a structure which serves as a support, an integrator.....such a structure is a whole, greater than the sum of its part. The parts get their meaning (relative position) from the whole, even though that whole does not exist at any moment of time. It exists in the subjects mind, as a chart, a Gestalt, a plan'.

In other words the perceiver creates a structure, normally a rhythmic one, as he rehearses and reformulates the information presented to him. His subsequent recall is based on that structure. Clearly punctuation marks in verbal communication and, one might presume, phrase marking in music notation, serve to assist this rhythmicising process and 'resemble rhythms in many respects' (Neisser 1967 p.262)

Cohen et al (1986) reinforce this focus on the attentive stage and cite a much quoted theory. The limitations of short-term memory are described in the classic article:'The Magical Number Seven, plus or minus two' (Miller, 1956). The reason for these limitations is now believed to be not so much a problem of capacity or structure but more a limitation of the attentional system. Cohen et al (1986) go further to suggest that short-term or working memory is synonymous with the allocation of attention. In fact, the whole of their working memory model is concerned with this initial, yet crucial, act of cognition.

In reviewing the chapter so far, it appears that the way in which the senses relate to each other in the attentional stage is complex and only tentatively explained, as the work on verbal language proceeds. From the levels of processing, outlined as a flow chart on page 35, it is suggested that the quality or strength of level 3 is increasingly determined by the quality and strength of level 1 (the sensory level).

The notion of quality of the memory trace appears to be coupled with that of 'concreteness'. Cohen et al's working memory model is premised on the theory that the richness of the processing which occurs is dependent upon the sensory modalities shown as the inner ear, the inner voice, the inner eye, (the muscle?). The extract on pages 35 to 36 refers to trace persistence. to strength, length and elaboration. Again, reference was made to the effectiveness of precise and distinctive elaboration. Claxton (1980) reinforces this notion, reminding us of Barlett's (1932) elegant description of the human being who makes an 'effort after meaning', attempting to reduce abstractness and capture substance or concreteness (Claxton 1980, p.154).

In the same way, Neisser's rhythm theory demonstrates that the human tendency to impose a structure as a way of organising memory, seems, again, to be consistent with the notion of concreteness. The pattern appears tangible as rhythmic structure makes possible stress and release, strength and weakness, features that stand out in relief; one could say laden with character.

The term 'trace' is used consistently throughout the literature to describe something which is, according to some theorists, simply stored and to others, including Neisser, the complex product of one or more constructive acts. Yet, if the implications of the diverse theories are taken to a logical conclusion it would appear that the term is synonymous with some form of image or representation, a theme which will be taken up in chapter 3. First, chapter 2 provides an account of the current state of knowledge on musical memory to discover to what extent there is congruence.

CHAPTER 2: MUSIC AND MEMORY.

In general, the term 'musical memory' has tended to be used in relation to the testing of certain abilities or aptitudes. In Shuter-Dyson and Gabriel's (1981) descriptions of tests 'tonal memory' figures in the batteries of Seashore (1919), Kwalwasser-Dykema (1930), Bentley (1966), Stankov-Horn (1980), and Colwell (1969). Mainwaring (1933) includes tests of immediate and deferred recall, Gaston (1958): melodic memory, Wing (1968): memory, Bridges (1978): aural imagery and memory; and Bentley (1966): rhythmic memory. Despite the fact that test batteries, by their very nature, are implicitly testing every aspect of memory as described in the last chapter, the centrality of memory to musical cognition has tended to be disregarded.

To take an example, the music committee of the Joint Council for 16+ in its National Criteria for Music (1985), sees no need to define the term. Instead, it appears to view it as something distinctly 'musical', running alongside what are described as skills of a more general nature:

> 'Aim 2.8: to encourage the development of memory and the acquisition of skills of a more general nature such as analysis, inventiveness and co-ordination'

Deutsch (1982) and Davies (1978), on the other hand, view it, like William James (1890), as the 'psychological' or 'musical present'. Davies states (1978, p.47):

> 'We can only make judgements about music by comparing recent memories with less recent memories, all concerning events which have taken place in the past'.

while Zimmerman's definition reflects a Piagetian viewpoint:

> 'Memory can be viewed as that store of information encoded by assimilation and which in turn becomes the raw material for building and incorporating new knowledge' (Zimmerman 1984, p.10)

Of its importance Davies has no doubt:

> '...note that the word 'memory' is used by some workers in connection with particular abilities (i.e. melodic memory) but not always with others (i.e. pitch discrimination). In fact, memory is of central concern for all the tests discussed since some form of memory or storage is a prerequisite for all the tasks involved. It would be erroneous to infer that memory was specific to certain types of tests and not required for the others (Davies 1978, p.129)

Sloboda, using the term 'memory' as a synonym for storage, like Davies criticises current psychological research stating:

> 'Most research evades the crucial issue of perception, attention and memory ... how to tap into the moment to moment history of mental involvement (Sloboda 1985, p.152)

The majority of musical ability tests, focussing on memory and pioneered by such figures as Seashore, Wing and Bentley, aim to test the ability to remember a melody through detecting changes in pitch. These have been straightforward tests and measures. Latterly, concern appears to have switched from measuring outcomes, in this way, to the devising of experiments concerned with how people come to make such judgements. For example, from reading Deutsch's review (1982), it would appear that experimental work is becoming increasingly focussed on investigating how people process elements such as pitch, melody, interval size or waveform data.

Like Dalcroze, Seashore (1938) regarded memory as a crucial partner to imagination. In contributing to the musicians 'mind's ear', as he termed it, ... 'his memory and imagination are rich and strong' (Seashore 1938, p.5)

Seashore makes explicit the importance to musical activity of what he terms 'conscious' memory, the making available of stored information and experience and 'subconscious' memory, plans or habits, particularly evident in performance. He acknowledges the place of both aptitude and ability, the latter being highly responsive to training (Seashore 1938, p.149).

Although predating considerably the work of those psychologists cited in the previous chapter, the first six of his twelve rules for efficient learning (pp.150-156), appear to have much in common with their theories (researcher's comments in parentheses):

Rules 1: Select field of interest (pre-attentive process-Neisser)

2: Intend to learn (" ")

3. Trust the first impression (allocation of attention) and make this deeper and deeper (levels of processing theory) by practising recall instead of reimpression. Linger on the details and character of meaning (make concrete)

4. Classify and relate deliberately with great precision and with as full a meaning as

possible (structure, chunking and making concrete)

5. Cultivate concrete imagery (concreteness)

6. Build larger and larger units (create a structural framework)

Sloboda (1985) devotes considerable space to the consideration of memory, stating that musical memory is an abstraction from the physical stimulus. He reminds us frequently of the fact that many aspects of the ability to deal with music are crucially dependent on musical experience:

> 'Thus musical experience allows the learning of characteristics of common structuring principles in music and mechanisms for detecting this' (Sloboda 1985, p.188)

Like Neisser, Sloboda emphasises the constructive nature of perception.The general picture that he proposes is one where the listener is engaged in constructing a multi- dimensional representation of the music heard. Depending on the experience and learning style of the individual, memory for music will be selective of different dimensions from the 'many available ones' (Sloboda 1985, p.191). These memories, he states, will not necessarily be composed of isolated episodes in the music but quite global information, such as metrical construction, harmonic framework and emotional argument will have been extracted. In this way some dimensions of the overall structure of the music will be provided.

Davies (1978) views are similar, as exemplified in an extract on listening:

> 'Listening to a tune is not a passive process of mere reception but one of active construction' (Davies 1978, p.82)

One finds too that Deutsch supports Neisser's two stage attentional process:

> 'Once a set of groupings is established, voluntary attention focussing plays a prominent role in determining which of these is attended to' (Deutsch 1982, p.129)

In a section on 'listening', Sloboda (1985, p.169) comes to similar conclusions:

> 'In music we propose that only one melodic line can be treated as figure at any one time - this is called focal attention and it notices relationships within to allow for recognition'

Other lines from the background are registered but not processed focally. They appear to be fragmented into series of individual notes. All things being equal it is the line with the highest pitched part which tends to be focally processed. Melodic, rhythmic and harmonic processing contribute to the building up of a unified structural representation of the whole piece.

In familiar music, the mind's ear can dart around between the parts; in unfamiliar music this does not happen. For example, in a relatively unfamiliar piece a conductor can not be sure in which part a mistake is made. In other words this represents more an attentional problem for the conductor at this stage rather than any assumed lack of musicianship.

In common with Neisser's findings, there seems to be agreement on the presence of Gestalt organisation in auditory perception. This is supported by Vernon (1934), described in Davies (1978), and by successive investigators. Davies states:

> 'people seek to organise tonal sequences into Gestalt patterns and their ability to do this depends on the complexity of the materials' (Davies 1978, p.96)

Sloboda is in agreement:

> 'Gestalt grouping mechanisms underlie our ability to 'parse' the acoustic environment effortlessly'
> (Sloboda 1985,p.155)

McLaughlin, in stressing the physiological aspects of the brain in musical communication, also concentrates on the perception of patterns:

> 'Music can be analysed into patterns of tensions and resolutions which can be as short as a two-note phrase or more complex units up to the complete length of a work such as a symphony or opera. These patterns have no meaning for us in themselves but they can be perceived to be analogous to patterns of tension and resolution which arise from bodily and mental activities. (McLaughlin 1970, p.100)

Pattern construction would seem to be important in two senses. The first appears to be the subjective act of the perceiver in shaping sounds into patterns:

> 'Music uses patterning to achieve structural goals. These relate to propensities of listeners to infer particular underlying structures rather than to the generative processes of composers. (Sloboda, 1985, p.66)

and

> 'the basic idea is that our experience of concepts, objects and events is represented by a pattern of activity in a kind of neural network (West, Cross and Howell 1987, p.20)

The second is concerned with the recognition of the stylistic patterns or note groupings which characterise every musical genre. For example, in jazz improvisation (see Sloboda 1985) there are procedures to follow which bring into play learned stylistic patterns, what Sloboda terms 'formulae', with which the improviser is familiar. Practising musicians may use different terminology but in essence they are describing the same concept. Similarly, in workshop presentations Gerry Farrell, guitarist and sitar player, refers to 'practice patterns', while Eddie Harvey pianist and trombonist, speaks of the jazz musician's 'dynamic library'.

McLaughlin (1970) believes that patterns operate at three levels, the first in which music appears as patterns of tensions and resolutions, the second where patterns correspond to those of activities in the brain carried by mental and bodily events, and the third where patterns correspond to several different mental and bodily activities. The listener is made simultaneously aware of all these activities in a synthesis or fusion:

> 'Music and the other arts appeal simultaneously to different levels of our personality so that we are made aware, at one and the same time, of intellectual, emotional and bodily patterns, and we are also shown that many of these patterns have the same

> basic 'shape' (McLaughlin 1970, p.102)

In the perception of musical patterns Sloboda sees a striking similarity between music and language. The generative approach of Chomsky (1968), where there are a set of language rules to be learned, also appears to hold for music. In fact, in discussing music, language and meaning, he sees a distinct similarity between Chomsky and Schenker (1935) in the way in which they differentiate between surface and deep structure.

Sloboda states:

> 'Pausal and stress patterns in speech and music can be generated by a grammar along with the word ordering'(Sloboda 1985, p.36)

Shuter-Dyson and Gabriel agree:

> 'A possible model for melody perception is that of a system of hierarchical rules similar to current models of language' (Shuter-Dyson and Gabriel 1981, p.247).

Memory capacity may also be extended by the degree to which one is aware of structures i.e. knowing the vocabulary. Ausubel (1973) contends that 'cognitive structure' arises from perceptions which grow and become organised into structures only when they are catalogued and labelled.

There is growing evidence, according to Sloboda (1985), of abstract high level structures governing all aspects of skilled performance and that the same is true of improvisation and composition.

A parallel can be seen between the organisation of these different hierarchical levels, as they relate to deep and surface structure, and the levels of processing theory described in the previous chapter. Sloboda (1985, p.5) refers to the difference between novices and experts, citing the example of Mozart as the supreme expert. It is believed that Mozart's phenomenal ability to write out scores from memory was not a case of photographic memory at work but his adeptness, through experience, at identifying patterns in the material, remembering groups as single units or chunks.

Expanding on this point, with regard to listening and performing, Sloboda marks the difference between novices and experts in this way. The novice reduces the number and complexity of structural features, attending more to surface characteristics. The expert overlaps a basic structure with higher order grouping processes.The musical situation is likened to chess players, again noting that the expert player does not mentally represent chess positions in the form of a photographic copy. It is rather that he has, like Mozart,the ability to make a more abstract structural description of meaningful relationships between groups of chess pieces. In musical thought, people do not remember precise pitches when asked to sing a well known melody. They have a structure which enables them to sing back in differing keys and registers. It is a structure concerned with relationships.

Deutsch (1982, p.291), in refering to Craik and Lockharts' depth of processing theory, states:

> 'This may indeed be true of music. It is clear from general experience that memory for melodic and harmonic intervals persists for considerably longer than memory for absolute pitch values'

and again (p.311)

> 'Listeners perceive hierarchical structures that are present in tonal sequences and can utilise these structures in recall'

In memorising melodies, like Sloboda, Oura and Hatano (1988) found that it is the experience of performing music which appears to prove more important than general cognitive development or age. They postulate that three types of process contribute to a memory for melody: 1) ordering rules (concerned with pattern and structure; 2) melodic prototypes (formulae or stylistic features) and 3) melodic memory strategies, concerned with characterisation, the creation of meaning.

This theory seems quite close to that of West, Cross and Howell (1987) who propose two representational systems. These operate in the perception of musical sounds in the following way. The first, an input-output model, depends on mapping out inputs of sound objectively into an output or subjective representation. The second, termed a process or associative model, depends on some kind of pattern matching, in the sense of formulae or stylistic features.

Memory for contour is considered by Shuter-Dyson and Gabriel to be a very important aspect of memory for melody. They describe Dowling's (1978) work where he concludes that scale and contour are two separate components in the memorising of a melody. Dowling refers to this as the 'overlearned' scale which acts as a ladder or framework on which the contour is hung.

Across different musical cultures, Shephard (1982) also found greater similarities than differences:

> '..what is more significant about the scales used in different cultures may be their deep structural similarities rather than their superficial differences'. (Shephard 1982, p.379)

This conclusion stemmed from the fact that virtually all scalic systems are based on the octave; nearly all give a central role to the so-called perfect intervals, the fifth and the fourth; most select a subset of either 5 or 7 notes from each octave as the principal or focal tones.

Much of the evidence which supports what has been presented in this chapter has been based on research undertaken primarily into pitch and melody perception. In comparison, rhythm has received far less attention (see Davies 1978, chapter 12). This may be due to the fact that, first, there is no generally accepted definition of rhythm and, second, to its plurisensorial character:

> 'there is probably more than one perceptual system involved in the processing of temporal and rhythmic information'(Dowling and Harwood, 1986, p.178)

Indeed, Dowling and Harwood believe that this deficit has been particularly unfortunate for the progress of psychological research:

> 'because rhythmic information is, if anything, more fundamental to music cognition than pitch information' (Dowling and Harwood 1986, p.179)

Davies (1978) sees rhythm as an order which the listener imposes upon sequences of events, solely on the basis of their relative intensities and times of onset i.e. a human tendency which he classifies as neither a generalised capability nor a musical one.

Consistent with research work on pitch and melody, principles of pattern making also appear to underlie the rhythmical organisation of sounds. In the perception of musical rhythm Fraisse (1982, p.151) points out that it is first dependent on tempo, organising musical sounds into patterns according to the Gestalt law of proximity. It is also reliant on regularity, not of response but of anticipation, what has been termed a system of 'temporal anticipations' (see Davies 1978, p.177). Individuals, in their pattern making, tend to group equally spaced out or isochronous sounds into twos or threes. This is termed subjective rhythmisation as opposed to the objective rhythmisation experienced when a performer produces a marked dynamic shaping.

Fraisse describes the perceptual process of grouping from two to six sounds.When listening it is possible to perceive groups of from two to six sounds within short-term memory. More complex groupings of sounds are then 'chunked' into subgroups. For example, twenty-five sounds may be perceived as a unity if they form five subgroups of five sounds following each other at a rapid frequency. It has been pointed out (Davies, 1978 p.197) that accents act as cues for physical groupings. However, whereas accents can be of two kinds - perceptual (subjective) or physical (objective), groups or 'chunks' are always perceptual.

Fraisse (1982) goes into detail about the factors involved in grouping. The highest sound is often perceived as the most intense and often as the beginning of a grouping. Motor reactions tend to accompany the periodic repetition of accents and reinforce the prominence of the repeated patterns.

Hierarchically, the first perceived pattern tends to impose its structure on later patterns, thus confirming the importance of predictability as the basis of rhythmic perception.

Human beings exhibit a desire or tendency to be rhythmical. A feeling for good form appears to be not only spontaneous but a dynamic organisation imposing itself in production or reproduction. In experimental work subjects tend to wish to produce rhythmic sequences, demonstrating a principle of pattern making which reinforces what has been stated earlier.

It should be pointed out that most of the research into music has been based on western musical traditions. However, despite that fact that in detail there are differences from culture to culture, as with pitch, certain general principles seem to apply (see Dowling and Harwood 1986, chapter seven). Essentially, the tendency for rhythmic structure to be organised in layers involving beat, tempo and rhythmic pattern is apparent in cultures ranging from Africa, to India and Indonesia.

In speaking of the advanced rhythmical nature of certain musical cultures, Davies (1978) makes the point that it may be inappropriate to make any distinction between rhythm and metre, where rhythm is seen as a pattern or group superimposed on a basic beat or metre. Compared with the metric simplicity of European classical music, a tal (or measure) in Indian music presents a far more complex temporal cycle consisting of anything from 3 to 128 beats.

In terms of rhythmic organisation Dowling and Harwood (1986) conclude that the same type of mental representation appears to operate with rhythm as for tonal organisation. There is a solid framework of beats on which more elaborate patterns of rhythm are overlaid. The development of these mental representations appears to follow a closely parallel course for both pitch material and rhythm (see also Monahan (1984). In their work with children Dowling and Harwood (1986, p.186) suggest that the dual structure of underlying beat and superimposed rhythm is fundamental to the cognitive organisation of music from very early ages.

Much earlier, Dowling (1973) made the point that rhythmic grouping functions in memory for tonal sequences in much the same way as in memory for verbal materials. It is an interesting point, for later he and his colleague allude to the more general, as opposed to musical characteristics of rhythmic perception, in that more than the auditory sense is believed to be involved. As noted earlier, Davies, implies that rhythmic experience is a generalised as opposed to a musical capacity. He is not alone for Serafine (1970), as a result of her conservation tasks with children, suggests that there is a strong link between rhythmic capacity and more general intellectual abilities. And Dowling and Harwood go so far as to say:

> 'the child's increased rhythmic ability serves as an organising factor not only in musical production but also in a broader range of intellectual tasks' (Dowling and Harwood 1986. p.196)

These statements, when linked to evidence provided earlier, that to rhythmicise is part of general memory strategy, are particularly important. They lead to the conclusion that rhythmic ability and its cultivation is crucial to the creation of a broad structural framework, for cognitive processes in general and for musical processes in particular. By implication, it would appear that melodic ability is the more musically specific ability yet one which rests and depends on the structural framework of rhythmic ability.

It is time, now, to recapitulate some of the major points to emerge from this chapter.

'Memory', it seems, is not simply concerned with the strategic act of remembering or of storage but is infinitely more complex, intricately bound up with attention, perception and all aspects of musical cognition.

As before, the constructive nature of musical perception has been emphasised. It appears to be an attempt to focus first on differentiating figure from ground, picking out surface characteristics before, with greater acquaintance, beginning to assemble more complex structural layers.

Human beings attempt to create patterns when perceiving music, generally operating according to 'gestalt' theory. They 'chunk', 'group' and 'shape' according to a general rhythmic capacity. Unless markedly emphasised by a performer, the listener creates his or her own rhythmic groupings as patterns of tension and resolution. These patterns are overlaid with characteristic figural groupings or stylistic features.

Irrespective of musical cultures the development of musical representations appears to follow a parallel course for both pitch material and rhythm. Melody appears to be conceived as melodic contour set against a scale framework, while rhythm patterns are overlaid on a solid beat framework.

Musical cognition is concerned with creating structures and relationships. Here, a similarity is acknowledged between music learning and the acquiring of language. With experience and training these structures become increasingly hierarchical and complex, possibly sharing the same rule system for deep and surface structure proposed by Chomsky (1968 and Schenker (1935).

To rhythmicise appears to be part of general memory strategy, crucial to creating broad structural frameworks for general and musical cognitive processes.

The crucial role of the teacher, in employing strategies to assist this structuring process, is implied in much of the research work. Strategies which help to focus attention, to impose character or meaning to musical information, are advocated. It is also thought that learners should be encouraged to articulate their understandings, in an attempt to show awareness of the structural relationships which they are creating.

In several places the term 'representation' has been used to label the mental product of the processes discussed. The term may also be used in a general sense to describe an overt process.

Sloboda considers the nature of internal representation to be the central subject matter of the cognitive psychology of music (Sloboda 1985, p.3). Davies (1978) too recognises its importance as a template or internal map of the subject matter. It is in the following chapter that the notion of representation and imagery will be examined further, in particular from the perspectives of developmental and psychological theory.

CHAPTER 3: REPRESENTATION AND IMAGERY

Bartlett (1932) is credited with the theory that knowledge is stored in the memory through the organisation of schema or mental representations*. These range from those derived from the simplest motor action to an ideology.

Perhaps the most comprehensive examination of how children build effective schema is that of Jean Piaget, supported by Barbel Inhelder. (Flavell 1963). As an epistemologist, Piaget's interest was essentially in the nature of knowledge rather than in learning theory as such. Nevertheless, his highly detailed analyses of developmental processes, as they relate to representation, have and continue to have considerable influence on psychological research.

According to Piaget, two essential principles appear to underpin all learning: the first, adaptation to the environment, and the second, the organisation of

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*Schema: a well defined sequence of physical or mental actions.

Representational schema: a schema in which one thing is used to represent another (Beard 1969, glossary).

experience by means of action, memory, perception and other kinds of mental activities (Beard 1969).

As soon as they are developed 'schemes of action' or 'schemata' are applied to every new object or situation. At play children incorporate new experiences into their existing schema, a process known as **assimilation.** In encountering the new or in imitating, existing schema are modified to incorporate the new by **accommodation.**

The young infant's schemata are of actions and perception:.

> Thinking, including its memory aspects, grows gradually through the interiorisation of action' (Beard 1969, p.7).

In time, the growing child shows an ability to represent one thing by another. This he does by constructing 'representational' schemata through imagery, language or symbols. Finally, in adolescence, thinking can be carried out entirely in imagination without recourse to overt actions.

Rather than viewing development as a simplistic hierarchical staged process, the sequence of development, which is summarised here, implies an invariant process which may be as applicable to an adult as to a young child in approaching any new learning experience.

Piaget's developmental outline:

SENSORI-MOTOR (0 to 18 months)

The period begins with basic reflexes such as breathing, swallowing and sucking, and ends when language and other symbolic forms of representation first appear.

In adapting to the environment, a baby soon develops and coordinates actions and perceptions into organised schemas of action or sensori-motor schemas. Piaget identifies what are termed six sub-stages proceeding from basic action schema to head nodding, hand clasping, movement centred on a result, to experimentation and the active seeking out of new situations. Eventually the young child begins to replace sensori-motor groupings by mental combinations:

> 'He begins to be able to represent the external world mentally in images, memories and symbols which he can combine without making further physical actions'(Beard 1969, p.32)

PRE-OPERATIONAL (18 months to 7 years)

(1)Pre-conceptual (18 months to 4 years)

During this period, although thinking is still mainly tied to action, representation is increasingly taking place as the child begins to use language, to draw, to play with constructional games and eventually to begin reading and writing. As the child expresses his thoughts aloud, verbal schema form a link between sensori-motor and conceptual schema. Spatial relationships, as yet, tend to be unformed.

(2)Intuitive (4 to 7 years)

Concepts begin to form, although thinking is still dominated by immediate perceptions rather than by mental representations. However, Piaget considers that it is from imitations of actions that developing images spring.:

> 'They build up appreciation of relationships within a shape, as in space, through memories of their active exploration of it ...' (Beard 1969, p.71)

CONCRETE OPERATIONAL (7 years to 12 years)

Physical actions begin to be internalised as mental actions or operations. According to Piaget, this appears to be the period during which mastery of conservation is prevalent: the ability to decentre, to reverse internally, to consider more than one feature at a time and to appreciate transformation. Operations begin to be grasped and hierarchies or classes formed. There is an appreciation of symmetrical relationships and multiplication of classes. Progression is evident in understanding properties such as quantity, volume, weight and velocity.

FORMAL OPERATIONS (12 years to 15 years)

Now children begin to think in symbolic* terms, able to go beyond the tangible and the finite. Thinking becomes hypothetic, deductive and propositional (McNally 1973). Even the emphasis placed on representational thought, through the advance of verbal over sensori-motor skills, is seen as an

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* symbol: an image evoked mentally, or a material object chosen to represent a class of actions or objects.

emphasis on symbolic function as a whole, rather than something specific to verbal language. Therefore, the uttering of a musical statement, the representation of music in movement, the graphic representation of music, the notation of music by means of symbols, all need to be considered in terms of increasingly evident symbolic function, a matter of degree rather than of kind. Here, too, are the first indications that musical expression consists of representational schemata in its actual process. Furthermore, as the product of such a process, it is itself a representational form in musical sound of the inner life of 'feeling'.

Gardner (1973) is critical of too rigidly applying Piagetian theory to the arts domain, believing that the development of formal operational thought is not a vital part of aesthetic development. Rather, he puts forward a theory of aesthetic development which has two stages: a pre-symbolic period and a period of symbolic use. Important to these two stages are three developing systems: a 'making', a 'perceiving' and a 'feeling' system.

Among the points Gardner makes to reinforce his view that artistic development differs from Piaget's staged view, are:

1) that each art form or symbol system is presented in a sensory medium (auditory, visual, etc.).

2) that a child's life of feeling, even as it comes under the influence of symbols, still demonstrates the continuing ability to be somatically involved

> '..the potential capacity of symbols to activate sensory feelings ... seems powerful indeed.' . and again ....'the possibility that this bodily reaction to symbols may at first be universal underlies the extent to which integration of feeling life and symbol use may have an important adaptive function in human perception and performance ' (Gardner 1973, p.153).

Here Gardner appears to stress not only the place of action but also the reciprocity between action-symbol, symbol-action.

3) that the use of symbols and symbol systems is the major developmental event in the early years of childhood and one which is decisive for the evolution of the artistic process.

4) that the major shift or reorganisation, involving a transition from direct actions to the use of symbols, occurs earlier than most cognitive theorists believe, and that is between the ages of 2 to 7.

Gardner's use of the word 'symbol' appears to be analogous with representation. The term is used in a very broad sense, for whereas Piaget's child of seven plus is reaching the stage of 'concrete' operations, Gardner's child of the same age is viewed as a maker and creator, functioning on the symbolic level:

> 'symbols remake our world, and colour even those interactions and perceptions that might previously have been judged as 'direct' or 'mediated'. (Gardner 1973, p.129)

Similar to Gardner, who emphasises the artistic process as both ends and means, the prime goal of artistic experience, for Eisner, is perception:

> 'What artistic perception is after is more perception and the sense of life that it generates'(Eisner 1985, p.8)

Eisner points out that perception is guided by the human ability to skilfully use a form of representation, the process flowing back and forth from representation to conception.

He suggests three ways in which a form of representation, once selected, becomes equivalent to the conception:

a) mimetically: efforts to imitate the surface features of perceived or conceptualised forms,within material constraints;

b) expressively : what is conveyed is what the object, event or conception expresses, not what it looks like;

c) conventionally: where an arbitrary sign is used, on whose meaning society has agreed, for example, anthems, wedding marches and graduation processionals; what one categorizes as functional music.

The major thrust of Eisner's work appears to be concerned, first, with the inter-connectedness of the senses and cognition i.e. the inter-modality of the sensory systems:

> 'We see with more than our eyes, our ears help us see' (Eisner 1985, p.8)

Second, is stressed the mutually strengthening interaction of the senses and cognition, which suggest that sensation leads to inner schemata or image (covert). This leads to conception and transformation into representational schema (overt), to symbolic representation (public form) which, in turn, comes full circle back to enhanced sensation.

Perhaps the statement which appears most relevant to musical thinking processes, as for thinking processes in general, is that of Jerome Bruner (1966). Bruner's work is essentially psychological, focussing on the nature of instruction and the means by which educators may assist intellectual growth.

The important representational process for Jerome Bruner is achieved through three distinctive modes, the first two being rich in sensation, which represent three ways of translating experience into a model of the world.

BRUNER'S MODES OF REPRESENTATION.

1) THE ENACTIVE MODE - sensori-motor, through action, consists of response learning and forms of habituation;

2) THE ICONIC MODE - operating on objects no longer there, through visual or other sensory organisation and upon the use of summarising images (visual, auditory, muscular, etc.)

3) THE SYMBOLIC MODE - representation in words or language, which brings compactability and efficiency, would appear to be the form of representation which is

going beyond the personal to public expression. Conventional notation is an agreed public form of representation which could be viewed, possibly, as a sub-set of a larger system of symbolic utterance such as tonality or modality. The latter is an agreed system within a particular musical culture.

Bruner's theory is one where the young child develops autonomous images which become summarisers of action. Further, in the creation of these images, the visual memory is highly concrete and specific.

He is speculative in discussing how the transition is made from one mode to another, when little is yet known about how the nervous system converts a sequence of responses into an image or schema:

> '.... it would seem as if some sort of image formation or schema formation ... renders it into an immediate representation - comes rather automatically as an accompaniment of response stabilisation'(Bruner 1966, p.14)

In partial answer Bruner believes that, on the one hand, pure stimulus-response theory may be a fairly adequate account of the way learning takes place when the learner is operating with enactive representation. On the other, Gestalt theory provides a better system for analysing the iconic mode.

Notational systems in general are given prominence, (Bruner 1966, p.19) for he believes that recoding in new forms helps to make increasingly powerful representational systems:

> 'It is this that leads me to think that the heart of the educational process consists of providing aids and dialogue for translating experience into more powerful systems of notation and ordering' (Bruner 1966, p.210).

His comments have meaning for anyone who has attempted renotation, the writing out of an already notated song or score. The very act of copying out a Kodaly two-part folk song, for example, is not a mere mechanical exercise. In actively reproducing one is immediately drawn into the mental re-processing of the music. Through inwardly hearing and reliving the music, attention is increasingly drawn to the finer points of the structure and sensitivity is increased to the composer's process of thought.

In contrast to Piaget, it should be emphasised that Bruner deliberately does not class these modes of representation 'stages'. Instead he uses the term 'emphases'. They are emphases in processing and representing first, manipulation and action, second, perceptual organisation and imagery and, third, symbolic apparatus. Any domain of knowledge can be represented in any of these three modes (enactive, iconic, symbolic) and many subject fields, as he suggests, have alternative modes of representation.

It may be that the perceptual process, described by Eisner (p.9) in three stages, corresponds in some ways with Bruner's three emphases. The 'mimetic' corresponds to the sensori-motor, in that it is imitative of initially perceived features. The 'expressive', although not quite so obvious, is, like the iconic, a form of personal, summarising image. Through visual or other sensory organisation. e.g. kinaesthetic, tactile, it holds for the perceiver the expressive nature of the object. And the conventional is symbolic in the sense that it involves the use of arbitrary signs, on whose meaning society has agreed, i.e. a generally agreed form of representation.

Bruner stresses perceptual-imaginal capacity, advocating that in teaching one should be training for subtle, spatial imagery. Thus the principal emphasis in education should be placed upon skills, skills in handling, seeing, imaging and symbolic operational functioning.

Although differing in their emphases, it seems evident that Eisner, Gardner, and Bruner would not disagree with Piaget that, in a complex way, mental activity takes place to transform a sensation into an image or representation. According to Piaget this basic unit of thought is qualitatively different at each stage of an individual's general development. Bruner's emphasis is on three modes of representation. These images or representations become conceptual schema which can be translated eventually into symbolic and verbal terms. The promotion of rich imagery is beginning to emerge as an important area, as this chapter leads to focus more specifically on the attentional stage of learning.

The earliest systematic study of imagery was made by Galton (1893) described by Richardson (1977) in a review article. Richardson makes the point that large individual differences in vividness of imagery and its controllability were discovered.

Piaget and Inhelder (1971) place considerable emphasis on imagery in the development of thought processes, using the term 'imaginal memories' or 'imaginal representation'. They stress the dynamic aspect of perception:

> '... a motor image is much more than a faded perception ... it consists of an internalised imitation ... now the same is true of visual images' (Piaget and Inhelder 1971, p.xvii)

In agreement with Neisser (1967), the constructive nature of perception is carried through to conceptualisation. They argue that an image is the fundamentally symbolic product of the attempt to produce a concrete copy of the object. Apparently, this is even more evident in language processing. Although the phonemic and syntactic aspects can be isolated, meaning, the semantic aspect, is infinitely bound up with the whole process of conceptualisation.

Piaget and Inhelder classify images in terms of content: auditory, visual, motor etc. and in terms of structure. Reproductive images evoke objects or events already known and anticipatory images, by figural imagination, represent events not previously perceived. There are static and kinetic images. According to this view, a mental image is an active and internalised imitation, resulting from a graphic image (a visible product) and the imitative gesture, the motor factor which produces a graphic image.

What Piaget and Inhelder take pains to stress is that images must not be credited with powers that they do not possess:

> '...the role of images is not to cognise but to concretise symbolically' (Piaget and Inhelder 1971, p.350)

and

> '.. we shall find that the evolution of the images is of a kind intermediate between that of perceptions and that of the intelligence' (p.357)

Two main periods of image development are proposed: the pre-operational (before 7 or 8 years), where images are essentially static, and the operational level, where images can be anticipatory and can reconstitute kinetic or transformational processes.

The figurative mechanisms involved in cognitive functions are three in number: perception, imitation, image. The image is symbolic in that it constitutes the necessary semiotic instrument to evoke and think what has been perceived. The importance of this symbolic role is underlined by Piaget and Inhelder, as it contributes to the functioning of the very dynamism of thought.

Turning to musical representational processes, the importance of imagery to musical thinking is, demonstrably, at the heart of Seashore's writings, produced more than fifty years ago (1938). As he states:

> 'Musical imagery is necessary in all forms of musical memory. In vivid musical memory we relive the music'(Seashore 1938, p.169)

and

> 'Development of musical imagery is, perhaps, analogous to the development of memory'(p.171)

before stressing two types in particular:

> 'It is clear that the mental image and particularly the auditory and motor image, operates in music in the following three ways: (1) in the hearing of music; (2) in the recall of music; and (3) in the creation of music' (p.169)

Similarly, Dalcroze refers to' motor images' (Jaques-Dalcroze 1921, p.190), and Gordon, 'imagery for rhythm', through kinaesthetic response, and 'tonal imagery.....'(Gordon 1971, p.28)

This line of thought, where imagery is a revived sense experience, appears to correspond with Piagetian theory, where imagery is also viewed as a revived sense experience and an internal imitation of an outward, audible gesture.

During the last two decades research interest has been gradual but accelerating into how children outwardly represent music through drawing. The studies of Goodnow (1971) and Bamberger (1982) are concerned with how children of different ages represent musical perceptions. Analyses of these drawings have led to a tentative typology which distinguishes between figural and metric modes of representation (Hargreaves 1986). The youngest children produce action drawings analogous to the musical gestures, described as figural mode, whereas older children differentiate sound from sound, until metric, spatial relationships are shown (metric mode).

Recent research studies into musical memory demonstrate a gradual, developing interest in the nature of mental imagery. This may have grown as the use of classical Greek techniques, for promoting memory through imagery, has been rescued from disrepute by Yates (1966) and Paivio (1969, 1971).

Halpern (1984) proposes the existence of an associative memory system for all musical materials. Similarly, the work of Serafine et al (1986), where songs and words were investigated for their effect on memory, supports the notion of what is here termed an' integrated memory representation'. Melody is perceived to be a different melody if the song words are changed in any way. In a sense the presence of the words ensures that it is more than ever the same melody. These studies would appear to support the ESP theory, described in the previous chapter. If it were the case, quality, strength or vividness of sensory impression and resulting images would appear to be of crucial importance to music learning.

Bergan's (1967) research on musical memory, conducted earlier, is also supportive of these theories, where he highlights the auditory image in directing motor behaviours. He points to the danger of relying on undirected memory, be it visual or motor. Bergan's concern is that there should be the closest correlation between the sound of the music and the memory strategy involved.

The purposive promotion of images is now well established as a technique for enhancing memory (Paivio 1971). If, as it is implied, imagery is synonymous with memory, the truism that results, that memory is promoted by memorising, raises questions about the quality of imagery evoked and the degree of correspondence between the imaging strategy and the art form. Is it a primary isomorphism, for example, where, in music, the parameters of time, space and energy define the art form? Or is it a secondary isomorphism, where the perceiver translates the nature of the medium into his or her own preferred experiential terms?. As Zalanowski found (1978), no single type of programme or instruction works for all people. As a result of her research she found that naive musical subjects gained the greatest enjoyment and success in being given imagery instructions for memory, whether pictorial or descriptive. Even though people appeared to perceive equally well, they tended to code differently and sensory preference figured strongly in this process.

It could be said, at this stage, that effective imagery is essential to building representational schemata. Working back from this, it is the sensory system upon which this imaging process relies. Again, we are reminded that music and other art forms are representational systems. As both Reid and Gardner have pointed out, they are dependent on the senses and are expressed through sensory media:.

> 'All the arts first impinge upon the senses' (Reid 1986, p.127)

Eisner describes the place of sensory experiences in internally and externally representing the world (Eisner 1985, p.150):

> '... our knowledge of the world takes shape in different sensory modalities and that these modalities provide the content from which transformation or symbolic representation is made'

Meaning, he maintains, is enriched by the interaction of the senses. Sensory information, according to Eisner, is involved in an organic relationship within the living system, which must be regarded as part of cognition. Its richness and differentiation, both qualitatively and quantitatively, affect the quality of concept formation:

> 'The importance of the senses in concept formation is that: i) no concepts can be formed without sensory information; ii) the degree to which the particular senses are differentiated has a large effect on the kind and subtlety of the concepts that are formed; and iii) without concepts formed as images (whether visual, auditory or some other sensory form) image surrogates, words, for example, are meaningless' (Eisner 1985, p.206)

Ross (1978), discussing the nature of imagery states:

> 'the source of all imagery is the world of sensuous experience - of sensing and seeing (Ross 1978, p.36).

It is interesting to note that the same word 'feeling' is used for physical sensations as for feelings, in the sense of emotions. The thesis, in Ross' <u>The Creative Arts</u>, is one in which the senses, forming the basis of aesthetic experience, are to be educated (Ross 1978, p.64). There is a parallel in a DES guidelines document for physical education (DES 1972, p.119) where one of the aims of movement training is to 'quicken the senses and cause them to register experience more vividly'.

Gerhardt, too, speaks of training the senses (Gerhardt 1973) in order to intensify perception and the ability to give form to these perceptions. Here she stresses the quality of impression, in the same way as the authors of the guidelines refer to vivid registering of experience.

Perception, as has been noted, does not operate solely through single modalities. Butterworth (1987) reveals that there is considerable sensitivity to intersensory information in infancy, with vision and audition innately linked. In the music education literature, several writers emphasise the multi-sensory nature of their approach. Vanderspar suggests that, in teaching eurhythmics, teachers are assisting children in storing up for recall sensual images: visual, aural, tactile and muscular (kinaesthetic). She goes on to prescribe the building of musical images in the mind's eye, mind's ear, mind's muscles and mind's sense of touch (Vanderspar, undated).

The titles of texts in the same field demonstrate a similar philosophy and pedagogical aim: <u>Seeing,</u>

Listening, Thinking and Moving (Steinitz 1981) and A Sensory-Motor Approach to Music Learning (Carabo-Cone 1977). And again, Zimmerman (1984), advocates a multi-sensory approach in aiding concept formation. She found that the presence of visual aids in one experiment made a significant difference to the results relating to how children conceptually organise musical sounds.

In this chapter it has been seen that the field of cognitive psychology, although complex, yields much of relevance to the study of musical development. Despite the reservations of Gardner, Piagetian theory appears sufficiently detailed and comprehensive to act as a framework for cognitive development, against which other theories of general and artistic development may be overlaid. This is particularly the case where music and the arts, by the nature of their presentational media, may well differ in emphasis. It is, however, Bruner's broad outline of modes of representation, although not a detailed theory, which is most helpful to the thesis and one which appears more appropriate to the needs of music educators.

Piaget and Inhelder's work, along with the views of others, has reinforced the importance of imagery and representation in musical and other forms of learning.

It would appear that sensations become perceptions when we form images or representational schemata. In turn, these help to 'concretise' or provide the necessary tangibility to assist conceptualisation.

The importance of rich sensory experience to the perceptual/attentional area of memory has been stressed. Research studies are emerging which stress the value of correspondence between sensory impression and resulting image.

Music and the arts operate in sensory media through, for example, sound, vision, touch, movement. As 'presentational' forms (Langer 1942) they are also forms of representation themselves. Human perception of these representational systems, whether in audience, as creators or performers, may involve not just one sensory medium but others in interaction. One could suggest that the theoretical studies described support the more intuitive or pragmatic approaches of the individual music educators. This is to say that the quality and quantity of sensory involvement could be generally enriched by a multi-sensory learning approach within such sensory systems.

In short, memory, and musical memory in particular, is reliant on specific ways of representing and internalising, abstractly and symbolically, what one is alert to in the music. These forms of representation depend on imagery and this imagery, as has been stressed, is derived from sensations which may be auditory, visual, motor and tactile.

PART TWO

THE POTENTIAL ROLE OF KINAESTHESIS AND MOVEMENT AS IMAGERY STRATEGIES

INTRODUCTION

The concern of the researcher for the neglected role of kinaesthesis and movement in music teaching strategies was voiced in the introduction to Part I. In the chapters that followed, the evidence suggested that the promotion of imagery strategies is of fundamental importance to the development of memory, crucial to the learning process. As kinaesthesis, in its overt manifestation, is pluri-sensorial, it would appear worthy of examination for its potential value to this process.

Through part I the inevitability of physical and imagined action has run like a continuous thread. It runs from the constructive nature of perception and the rhythmic nature of pattern construction, as viewed by the cognitive psychologists, to the schemata of action which Piagetian theory demonstrates to be present from the earliest stage of sensori- motor behaviour through to the final stage of formal operations. Bruner's enactive and iconic modes of representation refer both to the sensori-motor and the summarising images of that which has been acted upon. Gardner refers to the way in which action and symbol work reciprocally 'the need to be' somatically' involved'. Seashore, and later Piaget and Inhelder, use almost the same words to describe how imagery is an internal imitation of an outward gesture, be it auditory, visual, tactile, etc.

One might, then, assume that this action on material and experience is natural or inevitable and is, therefore, serving its purpose, without the need for any enhancement. Yet, as has been noted in the introductory chapter, too often is teaching carried out at a symbolic level, depriving children of the many opportunities to handle and act upon new material which leads to inner imitation and imagery. Therefore, the premise, for the rest of the investigation, is one where sensory experience is deemed to be actively promoted and the nature of kinaesthesis and movement examined as potentially effective imagery strategies.

CHAPTER 4: KINAESTHESIS AND MOTOR RESPONSE

The term 'kinaesthesis' or 'kinaesthesia' is no longer a fashionable one. Yet it once was, particularly at the turn of the century, when introspection' was regarded as a valid tool in psychological experimental work. Whereas fifty years ago it could still be found in dictionary definitions:

> 'Kinaesthesis' (kinaesthesia): the perception of muscular movement, from the Greek kineo (move) aisthesis - perception' (New Standard Dictionary 1946)

one would now need to search for it under the word 'sense':

> 'sense' n. & v.t. 1. any of the special bodily faculties by which sensation is roused (the five senses, sight, hearing, smell, taste, and touch; sixth or muscular sense, producing sensation of muscular effort'(The Concise Oxford Dictionary 1960).

Initially, the term seems relatively easy to define, yet kinaesthesis is abstruse for the reason that, to a great extent, one is unaware of the complexity of the mechanisms involved. One is reliant on the overt manifestations of muscular effort, resulting in a wide range of physical and mental behaviours.

Various terms have been used which require definition before going further. Movement, or movement behaviour, is a comprehensive term, which covers action in all its forms, whether covert or overt. Subsumed is every kind of 'motor' behaviour, from the generated response of the whole organism in the performance of a task, to the gross and fine skills required, for example, in instrumental performance or in dance. Kinaesthesis or kinaesthesia, the two terms are used interchangeably, as an inner state (a feeling of movement) and a 'subject-feeling' state, is the sensory state in its pure form. In overt movement response, in the expression of a feeling of movement, a person feels, enacts and sees both the process of response and the result or product of the response. More than the one sense is involved, including the visual and the tactile. The response involves pluri-sensorial interaction.

In the field of motor development, Laszlo and Bairstow (1985) have recognised the crucial part which kinaesthesis plays in motor programming and control. In order to execute a skilled motor act, a number of perceptual and cognitive processes occur before any motor response takes place. A plan of action is formed, based on prevailing conditions. It is based on the nature of the task, the manner in which it should be carried out, memories recalled of previous attempts or related tasks and the envisaging of the intended goal. Taking into account spatial, temporal and force demands, the movements can be produced only after an appropriate motor programme has been set in motion and selected motor units activated. It appears that certain motor commands are stored for recall whenever repetition is required.

Throughout the performance of these movements, sensory information is generated. There is continuous monitoring of kinaesthetic information about position and movement of the body and limbs, along with visual, auditory and tactile information through a sensory feedback loop. In addition to motor commands, sensory feedback is stored about the position of the body or limbs in space and time. Kinaesthesis is always present and, according to Laszlo and Bairstow:

> '...is possibly the most important source of feedback information. There is an intimate, almost unique relationship betwen movement and kinaesthesis. While one can move in silence, in the dark, without touching any objects, kinaesthesis is always present, conveying

> information about position and movement to the 'standard' (Laszlo and Bairstow 1985, p.22)

It was found that children skilled in ballet or gymnastics exhibited a high level of general kinaesthetic ability. Furthermore they found blind adults to be considerably reliant on kinaesthesis, in the absence of visual information.

Information, about posture and tension of the body and limbs, appears vital to the execution of an action throughout the whole process. From the beginning to the end, constant adjustments are made. Without minimising the place of visual information in this process, it is the kinaesthetic modality which provides detailed and sensitive information. Position, direction, extent and velocity of movements, combined with varying degrees of tension, are provided from the integrated information issuing from the kinaesthetic receptors such as muscle spindles, tendon organs, joint receptors.

The work of Richard Held (1965) conducted earlier is helpful here, in his investigations of perceptual adaptation. Many scientists have been intrigued by the finding that accurate action in space involves more than the visual perception of space alone. Held's experiments have been concerned with the deliberate distortion of visual and auditory signals. He finds that humans and animals adapt to them fairly quickly as long as they are allowed to make voluntary use of their muscles. Most well known is his experiment with kittens where one kitten, suspended in a harness, is unable to move but can see the movement of another kitten and is propelled by the other animal. The immobile animal, despite being able to see the other animal, is retarded in his learning as long as physical restraint is imposed.

There are two important points here. One, that the importance of voluntary movements, i.e. response to kinaesthesis, was discovered in these perceptual judgements. Two, the discovery of the importance of 'reafference' in cognitive processing. Re-afference is defined as 'neural excitation following sensory stimulation that is systematically dependent on voluntary movements of the animal or human' (Held 1965). The two-way feedback involves both sensory-motor and motor-sensory behaviour. This finding is, therefore, particularly important, as it recognises the prominent function of physical movement in cognition.

In the area of childrens' motor skill acquisition, Kay (1975) stresses the importance of what he believes to be a complex and challenging area of study. The issue of

> ' how a child builds up his idea of the body schema and how this accords with his spatial environment is fundamental. The senses interact and the feedback from responses correlates with our perceptions of the external environment' (Kay 1975, p.113)

A diagram, although simplified, would clarify this:

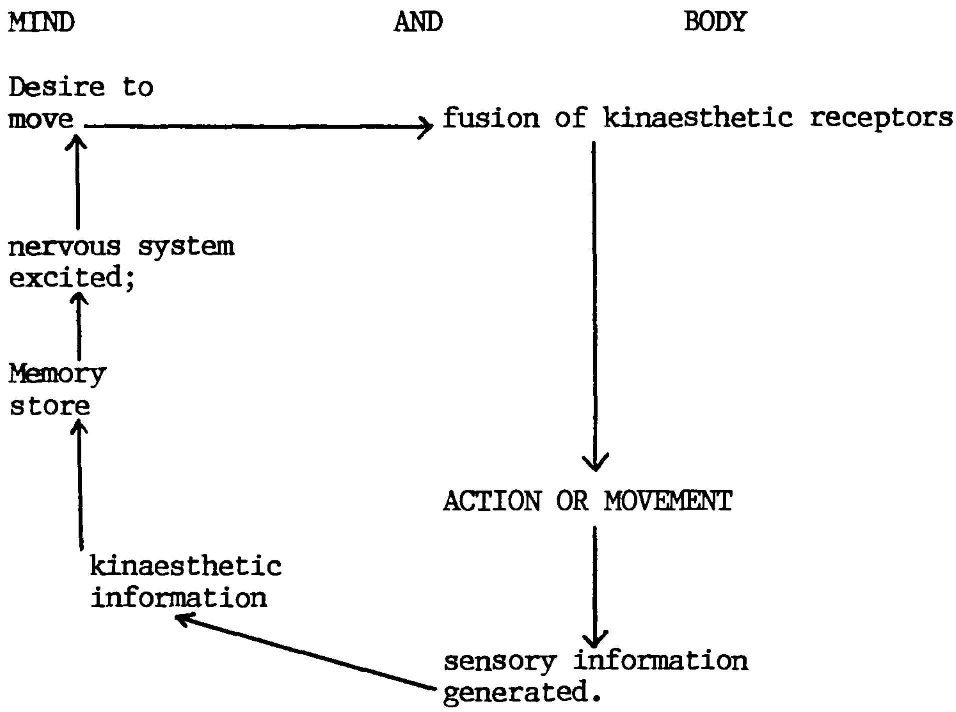

Figure 4: Motor-sensory feedback

The mind-body sense organ has a desire or feeling to act; a plan of action is formulated and received by the kinaesthetic receptors, located as nerve endings embedded in muscular fibres all over the body. Physical action takes place, sensory information is generated, particularly kinaesthetic information about the position of the movement in time and space, with differing degrees of tension or energy. This information is transmitted to the memory store and the nervous system is excited and re-sensitised by the sensory stimulation generated through the action.

The investigations described could be said to be about movement function generally and its development, particularly in the field of clinical studies. In curriculum studies, work by Gerhardt (1973) is particularly relevant, as it is concerned with the relationship between bodily movement and conceptualisation. Criticised is the accepted notion of a value for physical education's which rests solely on its contribution to physical well being. She states:

> 'Movement and physical exercise have long been recognized as crucial to the development of physical well being. This approach tends to minimise the importance of movement in the child's development of a body image and a sense of self. It also minimises the role of body movement in the development of conceptual abilities' (Gerhardt 1973, p.6).

Gerhardt describes how the child, in learning to move, moves to learn. In developing coping stragies, the young child moves and as he moves, sensory perception changes. There is a complex and invisible internal network of interacting systems, built upon sensory-motor and motor-sensory responses. She relates how impressions from the body travel through the central nervous system, to be structured and restructured by every action into images.

> 'That which connects builds a relationship, relationships define patterns, patterns become tools for understanding'
>
> and
>
> '..this body movement - sensory perception - imaging relationship serves as the seed of thought.......thinking is the next step after image forming' (Gerhardt 1973, p.6)

In the past, philosophers have paid particular attention to kinaesthesis for its fundamental role in thought processes. At one time Ribot's (1889, 1906) ideo-motor theory was very influential. He believed that:

> '...thought is a word or an act in a nascent state, that is to say, the beginning of a muscular activity'. (Ribot 1889, p.20)

In a later essay, concerned with invention and imagination, his theory is reinforced:

> '...to prove that the basis of invention must be sought in motor manifestations' (Ribot 1906, p.9).
>
> 'Imagination, in the intellectual order, is the equivalent of will in the realm of movements' (p.9)
>
> 'In like manner, the creative imagination does not rise completely armed. Its raw materials are images, which here correspond to muscular movements' (p.9)

For Ribot it was clear that the raw materials of imagination were of a muscular nature.

Many years later, Charlotte Wolff expanded on his work. In the classic text: A Psychology of Gesture (1945) she reasserts the place of kinaesthesis in relation to self awareness and personal expression and to its links with mental processes.

Wolff states (1945, p.50):

> 'the first autistic gestures are the result of a kinaesthetic feeling (awareness of the body proper)'

The theme of the earlier work of philosophers and psychologists, such as Theodore Ribot, Wallon and

William James, is developed into a thesis where kinaesthesis is seen to be the root of mental development:

> 'kinaesthesia is constantly changing throughout life. It is the basis of consciousness of self ...'(Wolff 1945, p.50)

She describes how concrete thought contains a motor potential which tends to discharge itself in movements:

> 'stereotyped gestures .... give expression to a postural sensitivity, which goes with a highly developed kinaesthetic consciousness, and this period of development represents, ... the first link between the purely emotional and the mental phase'(Wolff 1945, p.56)

The idea that kinaesthetic consciousness develops the 'motor imagination', a term coined by William James, is reiterated by the importance placed on the role of kinaesthesis in the arts:

> 'all the arts, except literature, which to a great extent makes use of abstract thoughts, are based on ideo-motor thought'(Wolff 1945, p.55)

Fundamentally there appears to be agreement between the views of the movements specialists and those of the earlier philosophers.Thought derives from movement, thought determines movement and there is movement in thought. Even language exemplifies the use of metaphors for action. For example, we move towards a solution, we seek evidence, we focus on a problem.

Studies around the turn of the last century, by music psychologists interested primarily in how metrical rhythm is perceived, brought out the emerging prominence of kinaesthesis. Ruckmick (1913), in reviewing the literature, singled it out as a special factor.

> ' kinaesthesis of one sort or another, or motor expression consciously represented in the form of imagery or perceptual complex,is regarded by most investigators in this field as essential to rhythmic grouping and accentuation' (Ruckmick 1913, p.306)

The investigators, whose work he described, ranged from a group (Wundt, Stumpf,Ebhardt) who considered kinaesthesis to be only one factor among others essential to the perception of rhythm*, to the far greater number (Bolton, Stetson, Bingham, Krueger) who emphasised the primary importance of kinaesthesis in rhythmical perception. The majority of researchers used

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*It was Wundt who gave a genetic explanation for rhythm in terms of the movements of locomotion. Consciousness is rhythmically disposed, because the whole organism is rhythmically disposed.

the term motor response, whether overt or covert, as an equivalent for 'kinaesthesis'.

It appeared (Bolton 1894) that most subjects seemed compelled to make some sort of muscular movement to accompany rhythmic patterns. Any attempt to restrain these movements had the effect of making them appear elsewhere. He was of the opinion, in sympathy with Ribot, that these muscular movements and associations controlled the rhythmical grouping rather than resulted from them.

Perhaps it was in Stetson's (1903) motor theory for rhythm that a relationship between kinaesthesis and rhythm began to be more firmly acknowledged:

> 'If the basis of rhythm is to be found in muscular sensations, rather than in the supposed activity of some special 'mental' function, the nature of the movement cycle involved is of greatest interest'

Bingham (1910) and Krueger (1910) both supported this theory and took it further, assuming a motor theory for both rhythm and melody.

On the strength of evidence presented, Ruckmick decided that kinaesthesis, of one kind or another, played the most prominent part in rhythm perception. Ruckmick then undertook his own investigation into what he called 'rhythmic consciousness'. The fact that kinaesthesis seems very intricately bound up with rhythm is evident in that the very word 'kineseotaxis' (Greek) translates as 'the order of movement'.

Data was collected by a method which relied on subject introspection, later to be rejected by Watson (1914) and the 'behaviourists' and now regaining currency in memory research (Cohen et al. 1986). Subjects were asked to analyse their perceptive processes, revealed as quite complex kinaesthetic sensations and muscular responses.

Ruckmick found kinaesthesis to be a prominent feature, from his observations of movements of limbs, heads, of the whole body, of respiration, of vague disturbances in the chest and abdomen and of articulation. From the reports collected, he found that, in many instances, kinaesthesis was accompanied or sometimes entirely replaced by a series of visual images of movement. Very rarely was a purely auditory rhythm without visual or kinaesthetic accompaniment reported.

There were also accounts of differing degrees of kinaesthetic sensation:

> 'kinaesthetic sensation (or image) of slight nod of head on accent ... may be only a change in breathing'
>
> and
>
> 'with inspiration came the accent, kinaesthetic sensations in throat more intense and sometimes higher in pitch for accent'. (Ruckmick 1913, p.335)

Findings from extensive experiments led Ruckmick to conclude that kinaesthesis was clearly present in the earliest stage of perception. Indeed, that it was concerned with the initial perception, the making sense of the rhythmic pattern. After this had been accomplished it appeared to give way to purely auditory patterns. Throat kinaesthesis seemed to play a major part in judgement and performance, as well as general sensations of strain felt in various parts of the body.

Going further, he came to several main conclusions. There appeared to be a decided change in the kinaesthetic processes present in a subject's awareness, from the time that the first auditory impressions were experienced to the end of the period of the experiment. They varied in content, in clearness, in intensity and in meaning.

Usually there was a marked change in the emotional state of the subject, throughout a typical period of observation, from slight unpleasantness before the rhythmic model was grasped, through pleasantness when thoroughly perceived, to unpleasantness when it continued without change.

There was evidence of individual variation in the quantity of kinaesthesis and in the degree of its prominence. If there was perception without accompanying kinaesthesis it appeared to be accompanied, instead, by visual or auditory processes.

Summing up his main conclusions as to how rhythm was perceived:

> 'Under the conditions of these experiments,it proved that, whatever was the material presented for rhythmisation, ...kinaesthesis was essential for the establishment of a rhythmical perception'
> (Ruckmick 1913, p.359)

Once that percept was established, however, the rhythmic content, in the absence of any sort of kinaesthesis, might be consciously carried by auditory or visual processes.

Some years later, Ruckmick (1927) was to consolidate and reiterate his earlier findings. Reference once more was made to the interest which had centred around the function of kinaesthetic sensations in rhythmical experience '.....the motor factor is an almost omnipresent one in rhythms of all sorts of sense material presented ...' (Ruckmick 1927, p.359)

He went on to state that, as the process became more and more abstracted and rhythm experienced as an idea rather than as a perception (i.e. a concept), the kinaesthetic factor gradually disappeared. As in many other types of learning, the amount of motor energy, expressed in mastering a situation, is gradually reduced in actual performance.

Whereas the earlier studies of Ruckmick were concerned with the perception of music and of rhythmic experience in particular, Mainwaring's (1933) studies centred around the role of kinaesthesis in relation to the total musical entity - how music is recalled. He states:

> 'the act of reproducing a memorised musical work be it vocal or instrumental consists essentially in the acquisition of a 'mechanised' kinaesthetic habit sequence, and that any reliance on purely auditory experiences would be so

> restricted as to be almost negligible in practice'
> (Mainwaring 1933, p.291)

Kinaesthetic association was his second concern, that is, the extent to which ability to recall musical experience is influenced by the recurrence of previous kinaesthetic experience, in producing similar sounds or sound relationships.

Bearing in mind that Mainwaring's work was essentially concerned with the role of kinaesthesis in performing music, his conclusions from experiments suggested that:

1. some form of associated kinaesthetic recurrence, either vocal, manual, or of the feet (pedal), is an essential factor in the adequate recall of auditory musical experience. Not only does the sound tend to stimulate the appropriate motor association but the process of thinking in terms of sound is essentially thinking in recurred kinaesthetic experience;

2. auditory imagery is a relatively negligible element in the recall of musical experience;

3. the memorisation of music, for the purpose of instrumental or vocal reproduction, seems mainly to consist of the formation of a motor habit sequence;

4. thinking in music, especially in the recall of harmony, tends generally to include the recurrence of associated kinaesthetic experience and frequently seems to consist almost entirely of the recurrence of such motor associations. Probably these are what Shuter and Gabriel refer to as 'kinaesthetic cues' (see Shuter and Gabriel 1981, p.64)

To the writer's knowledge, apart from an illuminating study by Stone (1985), into how students in a Dalcroze class examine their own learning process,there has been nothing comparable to the empirical work described. However, there have been other investigations which reveal a perceived central role for kinaesthesis.

In a study, relating to the musical abilities of junior school children, Whellams (1971) identified a kinaesthetic factor (kp) as a primary aural musical ability. This he viewed as an ' important central ability influencing the development of various kinds of overt musical behaviours' (p.239). Interestingly he suggests that kinaesthesis might exert a considerable influence on the development of higher level aural imagery required for success in harmonising. As we have seen, this observation is compatible with Mainwaring's findings relating to musical recall.

Whellams decided that kp was a factor more closely connected with attainment in music dictation than in sight singing and concludes that 'it seems therefore to be a factor for the development of perception' (Whellams 1971, p.239).The skill of notating music from dictation is complex, involving the perception of sounds without visual aid, encoding this information, retaining in 'working' memory, retrieving and committing to paper.

Kinaesthesis, therefore, is seen by Whellams to be concerned with the development of high level perceptual ability and the point is made that it seems related to those two aspects of musicianship - harmony and dictation which prove notoriously difficult to teach.

Shuter-Dyson, in a section on kinaesthetic perception contributed to Deutsch (1982, pp.403-404), refers, in the very first instance, to Whellams' findings.To her they suggest the kind of overall musical talent envisaged by Wing (1948). She notes that this attention to the muscular component in auditory perception is in line with contemporary feedback models of skilled behaviour (see Sloboda, 1985 and Claxton, 1980).

In a section devoted to the kinaesthetic factor (kp), Shuter-Dyson and Gabriel (1981) refer to an interesting experiment concerned with pitch perception and kinaesthesis. Ward and Burns (1978) discovered two different kinds of kinaesthesis: 1) absolute kinaesthesis - involved in successfully pitching the voice at the beginning of a phrase; and 2) relative kinaesthesis - awareness of change in kinaesthetic cues, as one pitches one sound in relation to the next.

Deutsch states (1982, p.398) that, at least in the early stages of learning, auditory imagery seems to need the support of kinaesthetic imagery, a point also made by Gordon (1977). Seashore, many years earlier, demonstrated his conviction of the value of kinaesthesis to the development of musical imagery:

> 'It is not necessary for us to quarrel about the relation of kinaesthetic imagery to kinaesthetic sensation, but we can agree upon this: the motor tendency to image the tone or execute it in inceptive movements is highly developed in the musical mind' (Seashore 1938, p.6).

and hinted at possible future investigatory case-studies:

> 'Although this has not been investigated thoroughly, case-study of motor imagery will

> probably show that this is the
> outstanding characteristic of
> a musical temperament
> responsive to the musical
> situation' (Seashore 1938,
> p.169)

Mursell (1931), in the same period, was also influential in encouraging 'kinaesthetic response' and this has been propogated by such figures as Dalcroze and the teachings of his students, in other words by practising teachers rather than through the music psychological literature. Latterly, the kinaesthetic sense has been acknowledged by Gardner as one form of intelligence in his theory of multiple intelligences (1983) and supported by Swanwick (see chapter 1) and Kemp (1984).

In the music psychological literature, contrary to Seashore's forecast, actual references to kinaesthesis remain relatively slight, despite the by no means isolated references to

a) the role of kinaesthesis in the initial stages of perception;

b) its potential in high level perceptual ability;

and

c) its possible centrality to the development of musical imagery as an overall musical ability.

On the other hand, the connections which Ruckmick so conscientiously explored between kinaesthesis and rhythm have been followed up by more recent studies with students and children where the effectiveness of bodily movements in rhythmic perception and performance has been examined through actively promoting bodily movements as a treatment condition. This is the subject of discussion in the next chapter.

CHAPTER 5: RHYTHMIC EXPERIENCE AND PHYSICAL MOVEMENTS

Despite the disparity in empirical investigations between research in pitch compared with rhythmic perception, there have been various studies carried out into the effectiveness of bodily movements in relation to rhythmic perception and performance.

Thackray's (1969) empirical studies, conducted with students and children, examined the relationship between rhythmic perception, rhythmic performance and rhythmic movement. A positive, though not especially high correlation, was found between all three forms of what he termed rhythmic ability, namely rhythmic perception, rhythmic performance and rhythmic movement.

Results from the battery of rhythmic performance tests, showed that the most successful subjects demonstrated sympathetic movements of the hand and limbs, often preparatory to the test performance.

The rhythmic performance battery consisted of three sub-tests:synchronisation of rhythms, repetition of rhythms, beating time.

He observed the subjects' general approach e.g. confident, impetuous, etc., the degree of physical tension exhibited, the size and variety of movements shown, the state of preparedness, method of preparation and use of other sympathetic movements.

Several factors emerged which had a bearing on success. These were the use of: a) preparatory hand or arm movements; b) sympathetic movements of foot, head and lips; c) variation of direction or position; d) degree of tension, control and its variation.

In a cross cultural study, Igaga and Versey (1977) found that Ugandan children performed significantly better on rhythmic tasks than a British sample, a fact which was attributed to the all pervading role of rhythm and dance in Ugandan culture.

Joseph (1982), in a study which involved kindergarten children, demonstrated that movement-based strategies increased the ability to recognise rhythm patterns. Improvements in rhythmic performance, dynamics and meter discrimination have also been reported by Douglass (1977), Rowen (1967) and Cheek (1979) respectively.

Moog (1978) produced evidence of the role of gross bodily movements on rhythmic perception in children suffering from differing degrees of handicap. He found that limitation of movements, from early childhood, reduces rhythmic perception almost as much as does low general intelligence.

In tests of rhythmic performance with junior high school children, Boyle (described in Shuter-Dyson and Gabriel 1981) studied the effectiveness of using bodily movement, as a teaching aid for band instrumentalists in reading rhythm patterns. Those who used movements for an experimental semester made significantly greater increases in rhythm reading scores.

Yet, as Lewis reports (1988), there are contradictory studies indicating that movement activities do not improve performance on such tasks (Douglass 1977, Fardig 1966, Sinns 1976 and Taebel 1974). She suggests that the mixed results may be due to differences in the age level of subjects, the instrumentation and the length and type of treatment.

Research in this area appears to be so diverse that categorisation is difficult. From the more common research emphasis on movement strategies as they affect rhythmic perception or performance, recent work has been developing in several directions: for example, listening skills (Lewis 1988) comprising melodic direction, meter, rhythm, patterns, dynamics, and tempo; musical style and character (Sims 1988), and the effect of different cognitive styles (field dependent/field independent) on musical tasks (Schmidt and Lewis 1987).

Again, the results are mixed across the numerous conceptual areas. It would appear that where Gardner's (1973 p.170) criticism of earlier studies related to investigations of children's rhythmic capacities in which rather atomistic tests prevailed:

> '....usually deal with rhythms as an isolated aspect rather than with rhythms as embodied in artistic works'.

criticism now appears to hinge on the nature of the treatments and the assessment tasks employed.

In reviewing Rainbow and Owen's (1979) investigation of the rhythmic ability of pre-school children, it is, perhaps, not surprising to learn that 65% of pre-school children found it extremely difficult to march and clap at the same time. From the results achieved, the investigators conclude: 'It is possible that tasks requiring the use of large muscles may not be appropriate for the very young child'. Here, the validity of the set task needs questioning. This question of task appropriateness recurs in the empirical work of Schmidt and Lewis (1987). On this occasion nine to ten year old subjects were required to play ostinato patterns on a percussion instrument to accompany music while walking to the beat. Again, this is a complex and demanding task, requiring dissociation but one which is required by marching bands. More in keeping with this age group would be the requirement to tap or patsch the ostinato pattern while walking to the beat.

Another problem occurs when there appears to be insufficient regard to the musical correspondence between music and movement in treatment conditions. In the same study, subjects were required to interpret duple meter by performing a series of step-hop movements and triple meter by executing the pattern step-hop-hop. A change of one meter to another invariably involves a change of musical mood and characteristics. Here, one would expect the change to be accompanied by a movement which is noticeably different and reflective of this change of character. It would appear that insufficient regard is being paid to the nature of the physical movement required of the subject, too often quantity appears to be the criterion rather than the qualitative nature of the associated music and movement task.

In addition to these issues, it would appear difficult to devise valid control and experimental treatments when overt movement, of one kind or another, is involved in every performance task. Hence, in Lewis (1988, p.132) one discovers 'An activity approach .....which involved **all** students in playing accompaniments, singing, ...'.

With regard to developmental aspects, David Hargreaves (1986), reviews rhythm studies and the musical development of pre-school children. He describes the research which shows that rhythmic skills are probably first to emerge in the young child. Movements, such as rocking and nodding, are matched to the rhythm of music for increasingly longer periods of time. A plateau is reached where there seems to be no noticeable improvement in coordination between music and movement between the third and fourth years of life.

Hargreaves is of the opinion that, for children of this age, other developments, particularly those involving imagination as distinct from imitation, become more important. Moog's results are cited with the suggestion that these early rhythmic imitations tend to occur before any equivalent imitations of pitches or contour, perhaps explained by the primitive characteristics of rhythm (e.g.mother's heart beat) and described by Hargreaves as the 'rhythmicity of sounds' (Hargreaves 1986, p.62)

Like Gardener, he voices concern that most studies of rhythmic development have investigated childrens' ability to produce regular patterns by tapping or clapping in time and to reproduce short given patterns.Thus children have been asked to reproduce tasks outside a natural or musical context, with a restricted range of performing media. This opinion is reinforced by Shuter-Dyson and Gabriel (1981) who, contrary to Moog, point out that differing views are held about whether or not rhythmic skills develop before melodic skills, reasoning that different authors have worked on different levels of analysis.

However, developmental improvements in the tasks described, particularly tapping in time to clicks, are shown in the studies of Rainbow (1977), Rainbow and Owen (1979), Petzold (1966) and Thackray (1972). Rainbow and Owen found that performance varies considerably according to the nature of the task.

Three year olds performed best when given duplicate speech rhythms and were better at tapping with sticks than with clapping. Similar developmental improvement was shown in studies of the latter type, where short rhythmic patterns were reproduced. There appears to be a steady development in this ability between the ages of six to eleven. Also proved is the instructional effect of the task itself. Gardner (1971) found that children significantly improved their ability even over the short half hour period of the experimental session itself.

In reviewing Hargreaves' descriptions of rhythmic development studies,the researcher supports his point that the more natural and musical the task context, the more valid the investigation. Clapping or tapping is not necessarily an appropriate musical activity for a young child. Speech rhythms, on the other hand, are more closely allied to song production and tapping with claves a simpler, co-ordinative task than precisely judged or synchronised clapping. It seems evident that most of the studies in this area relate to instructional tasks which focus on metric rhythm, often isolated patterns or phrases. They appear to be only partially addressing the question of what constitutes a feeling for rhythm in the broadest sense as it pervades every musical gesture.

More in sympathy is the work of Haselbach (1971), who places great emphasis on children's observable need for expressive and rhythmic movements. She makes the point that a child's genuine expression arises, in the first instance, from different kinds of tension, be they physical, emotional or intellectual. This tension is released through rhythmically stressed or flowing swinging movements; movements which are intensified through language, song and instrumental accompaniment. Young children link these movements with vocal sounds as anyone observing children playing hopscotch, swinging or rocking will confirm.

For perhaps obvious reasons, music educators have been primarily concerned with the importance of motor learning, in relation to rhythmic **performance**. As Sidnell (1986 p.7) points out:

> 'Music educators believe in motor learning as a means to the end of rhythmic achievement but somehow have avoided any careful inquiry into its nature. We simply know it is important'.

Believing that, as a profession, we tend to treat the subject lightly and without any systematic inquisitiveness, leads Sidnell to ask pertinent questions such as:

> 'Can we expect motor performance abilities to enhance or ensure

affective and cognitive outcomes'?

and

'What are the relationships between motor learning and other types of music learning'? (Sidnell 1986, p.13)

In keeping with this study, Sidnell clearly regards these as key issues for music educators aiming to develop awareness and sensitivity in the learner to the expressive as well as structural features of music.

Despite the research studies reviewed, as was noted in chapter 2, rhythm has received comparatively little attention in relation to the study of melodic perception and pitch acquisition. Indeed, Davies (1978) devotes a complete chapter to rhythm with the arresting title: rhythm: tonality's poor relation, which is indicative of its neglect. As has been noted already, the underlying difficulty in studying rhythm, as a concept, is that there is no generally accepted precise definition and, consequently, no consensus to guide empirical work in this area.

Aronoff (1979) describes two generally current usages:

'One, the more limited, is concerned with organisation of beats and organisation of durations, the other, more inclusive definition,

> approaches the definition of music itself' (Aronoff 1979, p.34)

A range of derivations is offered by Sachs (1953): 'flow' from the Greek word' rhythmos'; movement and moderation; flux and dam; order of movement (from Plato) 'organisation of time in parts accessible to the senses' (from Heusler). Like Sachs (1953), who prefers the term 'organised fluency'(kineseostaxis-order of movement) Fraisse, (1982) adopts Plato's definition, that rhythm is the 'order in the movement'.

Sachs, in the following statement, expresses sentiments in accord with Davies' (1978) emphasis on innate capabilities.

> 'Rooted deep in physiological grounds as a function of our bodies, rhythm permeates melody, form and harmony, it becomes the driving and shaping force, indeed the very breath of music ...(Sachs 1953, p.11)

Cooper and Meyer take rhythm to be an undisputed 'raison d'etre':

> 'Every musician, whether composer, performer or theorist will agree that in the beginning was Rhythm' (Cooper and Meyer 1960, p.v)

In the widest sense we can perceive rhythm in the natural world or in human behaviour and describe it as a perceived order of event succeeding event. Involvement in the arts causes us to perceive the 'order in the movement' of song, instrumental music, poetry, dance, drama, fine arts, sculpture, etc. In Ancient Greece, theorists refered to 'arsis' and 'thesis' and spoke of' high times' and' low times'. Here one sees the link with natural life cycles of ebb and flow, tension and release.

In speaking of rhythmic movement in poetry, drama and dance, Sachs describes the way in which the observer's perception retraces the artist's creative process:

> 'the observer perceives the lines of the artist as live and moving forces: to him they rise and fall, converge,diverge, intersect and draw the viewer's eyes to the fore and back. No work of art can simply BE; it always stirs and acts and forces the spectator to follow with his senses the many directions that it suggests' (Sachs 1953, p.14)

In chapter two reference was made to the way in which representation for rhythm is believed to follow a parallel course as for pitch and melodic relationships. One aspect, which was not brought out earlier, was that of any valid definition which refers to rhythm as 'flow'. That is to say, a definition which relates to the wholeness of music, the absolute sum of all its parts and one which would relate to rhythm as a broad, structural framework underlying all the other musical processes.

Based on the evidence so far presented, the writer tends to the view that there are three aspects to any definition that would hold across cultures:

1) where rhythm is 'ground', concerned with the experience of tempo, general framework, which gives structure and scale to events;

2) where rhythm is 'figure' i.e. groupings or chunks, interplay of patterns.

and, just as important,

3) where rhythm is 'flow' which approaches the definition of music itself - the 'in the beginning was rhythm' variety;

By nature of the fact that music is an art which takes place in time, there is 'momentum' in music. There is movement in the order which the composer and the perceiver impose on musical events. There is also, as Sachs has pointed out, the empathetic way in which the perceiver, whether in audience or as performer, and the composer follow the movement in the music.

There is another aspect to take into account. When a performer interprets music, not only is he empathetically following the music but is also making voluntary or programmed movements. It is these two aspects, the motor programming required to perform, and the consequent motor response, which have led to rhythmic perception being viewed as a pluri-sensorial perception (see chapter two). This is why some psychologists (Fraisse and Ruckmick included) prefer to use the more generalised term 'rhythmic experience', a term which, similarly, the researcher has adopted.

Gabrielsson (1973) identifies three dimensions to rhythmic experience in which movement features:

1. the structural properties of rhythm, i.e. the relationship between perceived rhythms and the bar, place of accents, etc.

2. movement properties such as rapidity and tempo, forward movement, different aspects of experienced movements, such as dancing, walking, floating and swinging.

3. affective or emotional aspects, characterised by the expressive dimensions of vital, dull, excited, calm, rigid, flexible.

In later work, Gabrielsson (1981) reinforces the importance of movement:

> 'on the whole much remains to be done with regard to the motor aspects of the rhythm response, both regarding overt responses (such as synchronisation of movements with certain elements in the sound sequence), various movements in different parts of the body, etc. and experienced/imagined motion characteristics for various rhythms'(Gabrielsson 1981, p.28-29)

Although not discussed in detail, this statement takes into account the importance of affective or emotional aspects of rhythmic experience. In describing musical expression as 'calm', 'vital', 'excited', etc. the idea of motion is embedded in these affective stages. It relates to Seashore's statement (1938), that emotion is built up from the motor image:

> 'the motor image, like the experience of action, is the raw material from which emotion is built up' (Seashore 1938, p.168).

A question arises as to whether or not the perceptual structuring of rhythm is always accompanied by motor responses and/or by emotional reactions. Could it be that motor programming induces emotional reactions?.

If account is taken of Held's reafference theory (see page 99), it may be that in responding to music physically, movement itself induces further affective reactions which then contribute to rhythmic experience. There is even an ambiguity in our term 'feeling' which may refer either to physical sensation itself or to affect.

Gardner makes a relevant point with regard to emotion and movement:

> 'rather the arts draw on the general forms, rhythms and combinations that characterise feeling life as a whole... less the emotion itself than the dynamic quality of emotion' (Gardner 1973, p.111)

It is not only the aesthetic aspect of rhythm and any relationship to emotion which is relevant here. The affective aspect is all the more important, as the anticipation of successive patterns enables individuals to synchronise with each other. This is most obviously exhibited in dancing and marching. All social behaviour of this kind reinforces affective impact.

It is becoming clear that rhythmical experience is a very complex area and one in which much remains to be discovered. It appears that Ruckmick's findings, with

with regard to kinaesthesis and rhythmic experience have influenced the direction of subsequent studies. From the exmphasis placed, in empirical work, on perceiving and reproducing metrical rhythm, rhythmic patterns and later to other musical concepts such as dynamics, melodic contour, etc., the issue still tends to be complicated by heavy concentration on atomistic elements of musical experiencing. It would appear that the potential of movement experience in relation to rhythmic experience as overall musical gesture has not yet been sufficiently acknowledged or explored by music psychologists and educators. The possible connection between rhythm, bodily movement and affect, is another area which merits further investigation.

Bachmann (1986) points out that by a 'rhythmical sense' most people mean either a 'sense of pulse' or the ability for realizing different time duration sequences . 'For Dalcroze it means 'the right feeling of the relations between movements in space and movements in time'.... and '<u>all</u> defects in musical performance are defects in rhythm'.

Like Sachs, Gardner and Gabrielsson, Dalcroze had a view of rhythmic experience which stems from feeling, gesture and movement. For this reason, the next chapter will be concerned with his work and ideas, as an example of kinaesthetic strategy in action, with a view to finding out the range and nature of rhythmic experience which Dalcroze principles encompass.

CHAPTER 6: THE DALCROZE APPROACH TO MUSIC EDUCATION

> 'Movement is instinctive in man and therefore primary' (Jaques-Dalcroze 1909)

Emile Jaques-Dalcroze, or Monsieur Jaques as he is still, affectionately, known by his few remaining pupils, was evidently a charismatic character. He was recognised as brilliant musician, improviser, composer and teacher.

Dalcroze' early background was colourful and cosmopolitan. Born in Austria, of Swiss parentage, his first musical studies were conventionally undertaken at the Geneva Conservatoire, before studying in Paris with Delibes and Fauré. In 1886 he took up a conductor's post in Algiers, at the Théatre des Nouveautés, an experience which made a considerable impact upon him.

Later, Dalcroze referred to this period as one where his curiosity for rhythmic expression was first aroused:

> 'Ah, oui! l'origine de ma rhythmique ... Je dirigeais un orchestre indigène. Ce qui me frappa étrangement fut le sens de l'harmonie de mes musiciens!' (Martin, 1965, p.40)

> ('Ah, yes, the origins of my 'rhythmics' ... I directed a native orchestra. What struck me so forcibly was · my musicians' sense of harmony').

Returning to Paris in 1889, he came across the theories of Mathis Lussy (1874), perhaps the first musician to concern himself with the underlying principles of expression and rhythm. This discovery, apparently, gave him the basis for his own studies in this field. But the practical circumstances, which prompted him to devise a new approach to music education, began after his appointment, in 1892, to a professorship at the Geneva Conservatoire.

Dalcroze soon perceived that many of his students had no inner sensation of the music that they were attempting to write or perform. The latter tended to be mechanical, with technique exhibited as an end in itself, and the former a mathematical exercise, mere paper music divorced from the vital mental image of sound. Inevitably he saw the absurdity of studying music at this level without the 'a priori' acquirement and practice of 'inner hearing'. Dalcroze cites, as an example, the student who protests for not being allowed to use the piano for working out harmonisation exercises:

> 'But please sir, why mayn't I use the piano? How am I to hear anything otherwise?' In that moment light descended on me. I saw that any rule not forged by necessity and from direct observation of nature, must be arbitrary and false, and that the prohibition of the use of the piano' was meaningless when addressed to young people lacking the capacity of 'inner hearing' (Jaques-Dalcroze 1921, p.1)

By concentrating first on vocal work, Dalcroze proceeded to train the aural acuity of his students, in the belief that, once the ear had been systematically trained to a sequence of sounds and chords, there would be no difficulty in reading and writing music. During the course of this 'training' he noticed that students tended to sing far more expressively when they beat time to their own singing (a practice seen in the Justine Ward method described in Simpson 1976). He also found that there was a group who lacked the ability to accurately express variations of time and rhythmic grouping:

> 'The mind perceived the variations, but the vocal apparatus was unable to give effect to them. I came to the conclusion that the motive (motivic) and dynamic element in music depends not only on the hearing but also on another sense' (Jaques-Dalcroze 1921, p.viii)

At first Dalcroze believed this other sense to be that of touch: the 'tactile' sense. However, he observed the reactions produced by piano playing on parts of the body other than the hands and arms - foot movements, swaying of the body, trunk and head oscillations. This led him to the discovery that:

> 'musical sensations of a rhythmical nature call for the muscular and nervous response of the whole organism' (Jaques-Dalcroze 1921, p.viii)

Up to this point, in the conducting exercises, movement had only been used as an accompaniment to music, not as a means of expressing it. These conventional conducting movements were extended into a series of arm movements, to mark all metres from two to twelve beats in a bar, including more unfamiliar metres such as 5/4 and 7/4. He then set out to test his theories by working out a system of body and limb movements to represent note values, derived from any subdivision of the beat to durations of up to twelve beats.

Students were taught to step and halt movement, to react physically to their perception of durations and rhythmic grouping. This co-ordination of movement and music formed the basis of the system of musical education which he termed 'gymnastique rhythmique'.

This, however, was to form one part (despite its central position) of a total method and proved too restrictive a term to describe properly the underlying principles of Dalcroze' work. Subsequently, it was John Harvey (Sadler 1912) who is accredited with coining the name 'Eurhythmics' (harmony of bodily movement) from the Greek 'eurythmia' - good rhythm, by which the system became internationally known.

Despite the enthusiasm of his students, the Conservatoire directorate disapproved of Dalcroze's activities. No doubt the very appearance of bare-foot young people, moving around so freely in space, would have appeared quite 'abandoned', as it might still do within a conservatoire environment. He soon found independent premises, for his early pioneering efforts, which were now directed towards working with young children. There were problems in refining the approach. Having identified the importance of a sense of space and movement, in practice it appeared to him to be as rare as 'absolute pitch'. Some children responded too slowly,others too precipitously. Often the steps did not coincide with the beat.

This lack of rhythmic feeling or 'a-rhythm', as Dalcroze termed it, reinforced his belief in the importance of a 'sixth' sense - the kinaesthetic or movement feeling sense:

> '.... should it not be possible to create new reflexes, to undertake a systematic education of nerve centres, to subdue the activities of too excitable temperaments, to regulate and harmonise muscular synergies and conflicts, to establish more direct communications between the feeling and understanding, between sensations which inform the mind and those which recreate sensorial means of expression?' (Jaques-Dalcroze 1921, p. 4)

After considerable study and experimentation Dalcroze concluded that, of the three basic elements: sound, rhythm, dynamics, it was rhythm and dynamics which were dependent on movement and had their counterpart in our muscular systems. Changes of tempo, and of dynamics could be naturally expressed by the body and intensity of musical feeling directly related to intensity of physical sensations.

Awareness of sound, he believed, could only be acquired by reiterated experience of the ear and voice, and awareness of rhythm by the movement of the whole body. The ear, voice, muscular system, were regarded as musical media. Of these, by a process of eliminating movement of a secondary order,he chose the muscular system as the first medium to be trained.

Dalcroze summarised his conclusions in this way:
(Jaques-Dalcroze 1921, p.39 - 40)

> rhythm is movement;
>
> rhythm is essentially physical;
>
> every movement involves time and space;
>
> musical consciousness is the result of physical exercise;
>
> the perfecting of movement in time (consciousness of musical rhythm) and space (consciousness of plastic* rhythm) can only be accomplished by exercises in rhythmic movement;
>
> rhythm is the basis of all art

Rhythmic movement formed a substantial part of an approach to music education which consisted of three broad elements:

1) Rhythmic Movement - to develop a feeling for bodily rhythm and aural perception of rhythm;

2) Solfège - to develop a sense of pitch, of pitch relationships and the ability to distinguish tone qualities;

---

*plastique- being interpreted as expressive movement or dance as opposed to technical exercises (Tingey,in interview 1982)

3) Piano improvisation- combining the principles of rhythm and pitch to develop motor- tactile awareness and to assist interpretation.

RHYTHMIC MOVEMENT

As this was the fundamental and main part of his approach it is described in some detail.

1. Muscular relaxation and breathing exercises

The student learned to reduce to a minimum the muscular activity of each limb, then gradually to increase it again. Lying on his back, he relaxed his whole body and concentrated attention on breathing, then on the contraction of a single limb, then two or more limbs, before combining the contraction of one with the relaxation of another.

2. Metrical Division (bar time) and Accentuation

Different metres were distinguished by marching to the music, showing the grasping of the bar time by accentuating the first beat with a stamp of the foot. Corresponding arm movements were added, with a contraction of the arm muscles to match the accentuation of the first beat. At the command 'hopp', the student might be asked to vary these movements in different ways, by stopping suddenly, omitting the accentuation of either arms or legs, of one arm or one leg, or of substituting an arm movement for a foot movement.

3. Realisation of note values and rhythmic phrasing

As previously stated, metrical time was shown by movements of the arms, and note values or durations by movements of the feet and body. Thus a crotchet would be expressed by taking a step forward, a minim by a step followed by a knee bend. Sounds of longer duration were treated similarly i.e. one step (progression in space) while the sound was analysed into crotchets by small movements made while standing in position. When this kind of durational analysis had been mastered, the pupil need only take the initial forward step, a mental image replacing the place of the minor divisional movements. Notes of shorter duration than the basic beat were expressed by correspondingly shorter sub-dividing steps.

Subdivision of beat into parts of varying number also came under this heading. At the signal -'hopp'- the beat would be divided into 2's, 3's, 4's etc.

A series of movements which together form a rhythmic phrase were learned, first taking each unit individually, then in succession until the complete phrase could be expressively performed. This was developed until a complete rhythmic phrase, either played on the piano or demonstrated by another person, could be expressed in movement.

4. Realisation of Rhythm or Memory Training

Fluency was the object of this exercise, through the instantaneous interpretation of phrases. Once a rhythmic phrase had been performed and mastered, the student was encouraged to absorb a new phrase while peforming the first.The resulting movement canon appeared analogous to the act of reading music or prose where, in grasping the meaning of the first phrase, the eye prepares the next.

5. Development of Attention and Response

To develop a feeling for rhythm and a sense of timing, exercises were given to arrest movement either suddenly or slowly, to move alternately forwards and backwards, to spring up at a given signal, to lie down or stand up in the exact time of a bar of music without losing the feeling of the musical metre.

6. <u>Dissociation (Independent Control of Limbs)</u>

Requiring maximum powers of concentration and practice, these exercises developed independence of effort and movement between different limbs. Characteristic of them was one where a given time unit was analysed into various fractions simultaneously, e.g. in 6/8 time one arm beating two to the bar,the other three, while the feet were executing six.

Again both arms might beat the same bar time but in canon with each other. Taken to an advanced stage, a student might be asked to beat 3/4 and 4/4 with respective arms, as the feet moved in 5/4 time.

The relevance of these types of dissociation exercises becomes apparent, particularly to keyboard players, who are confronted with 'twos' against 'threes', sometimes at a relatively elementary stage. But the value of the exercise is not only confined to pianists,orchestral players and conductors. Dalcroze aimed to develop powers of concentration, in order to eliminate all but the most essential muscular movements, so that a kind of automatic technique was achieved. Once these techniques were mastered, he envisaged that the intellect and imagination could be liberated so as to be fully expressive.

This theory and the exercises based upon it can be seen to bear relevance to life skills generally. Many examples could be quoted, from learning to drive a car, to performing an effective golf drive. The most obvious example, in the world of theatre, would be the ice skaters Jayne Torvill and Christopher Dean, in whose work skills and techniques have become so sublimated as to liberate them to ever increasing heights of artistic expression.

7. Compositional Techniques and Form

Activities involved acute listening to the way in which phrases were balanced, the recognition of simple forms and their interpretation in movement sequences. These were matched by exercises in counterpoint, polyrhythms, augmentation and diminution, anacrusis-crusis-metacrusis (preparation, action, release). As an example of diminution, working in pairs, one student would perform a movement phrase, taking three beats for each movement, while the other performed it over one.

8. Muscular Sensation; Memorisation; Mental Imaging; Balance and Flow

Many exercises, including several of the foregoing, were aimed at developing what might be described as more generalised human capabilities such as:

development of muscular sensation- estimating duration according to the feeling of tension and extension of the muscles, the degrees of tension and the sensation of controlling or regulating the size of the movement in space.

memorisation - after a sequence of distinct movements had been executed, students were required to recall these movements in the correct order, without being prompted. In this way, a 'movement' memory was being built up, which reinforced 'sound' memory. After initially executing each element of the movement sequence, the student was able to analyse and explain what had been subconsciously absorbed. This would appear to correlate with the capacity of a dancer to recall the music of a dance, through a reliance on a strong memory for the movements involved.

mental imaging (inner hearing) - the inner performance of mental images; the stronger the muscular sensations the clearer and more precise the images. By this, a feeling for time and rhythm was developed, for Dalcroze repeatedly stressed his conviction that 'feeling is born of sensation' (1921 p.67). In practice, an exercise consisted of marching, running or similar movements depicting metrical rhythm or rhythmic phrasing, until the sound 'hopp' was heard. At this, all overt movement ceased, yet was continued in thought, often with closed eyes. The signal to resume was given and similarly interrupted, thereby alternating periods of sound and movement with periods of silence. Here there should be a vivid re-experiencing of what had gone before. Regarding silence in music, it was Dalcroze's belief that:

> 'the study of repressions of steps prepares us for rests in music. These, if devoid of movement, are by no means devoid of life. The study of periods intercepted by rests teaches the pupil the laws of musical phrasing' (Jaques-Dalcroze 1921, p.67)

balance and flow- there were many exercises for developing balance upon which ease of movement, poise, control and stability depend. Slow tempi, lyrical passages and movements extending over long-held notes were employed. These demanded considerable control of the body, and a sensitivity to degrees of muscular energy and timing to foster that continuity of movement or flow, which Dalcroze considered to be the essence of a fully developed rhythmic sense. At the same time control was needed to interrupt this continuity at will, constantly returning to the flow and acutely sensed tempo of the musical passage being performed.

Regarding flow and continuity, Dalcroze often expressed his concern at the way in which dancers of his period lacked this very 'continuity of movement'. When speaking of a dance performance of Debussy's L'après-midi d'un Faune' he remarked:

> '.... a procession of nymphs slowly moved on to the stage, pausing every eight or twelve steps to show the admiring spectators beautiful attitudes copied from Greek vases. Continuing their walk in the last attitude assumed, they attacked the next attitude - at the moment of the fresh pause in walking- without any preparatory movement, thus giving the jagged impression that would be given in the cinema by a series of movements in which essential films had been suppressed. Then I understood that what shocked me was the lack of connexion, of sequence in the attitude, the absence of that continued movement which should be noticeable in every expression of life animated by continued thought' (Jaques-Dalcroze 1921, p.23)

9. <u>Musical Expression through the Body (imaginative and expressive response)</u>

All the preceding exercises were concerned with, what might be termed, the 'vocabulary' of movement and the development of motor skills and techniques in controlled movement exercises, hence the original, more constrictive term 'gymnastique rhythmique'. This did not detract from the ultimate aim, the artistic aspect of Dalcroze's work. His system included many ideas for developing an individual's imaginative response and powers of personal expression.

A student would be asked to coordinate movements, not only with the metrical rhythm of the music, but in harmony with its feeling or expressive character. Due regard was paid to musical phrasing, dynamics, transitions from shades of expression, with an emphasis on feeling and due regard to 'agogic'* as well as 'dynamic' accent.

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* 'agogic' - accent of movement, that which is called for by the nature of the phrase, not bound up with regular pulsation;
'dynamic' - accent of force, implying normal and regular rhythmic accentuation of a composition.

Improvisation,conducting others in movement by using expressive gestures, working as an ensemblé to express the spirit and structure of a piece of music, all these had the effect of producing a human musical score. This could take the form of a Bach fugue or invention where the strict interpretation of each sound duration was abandoned in favour of phrases. Freer movements would be used to express the structure and expressive character of the work. This was what Dalcroze described as 'plastic expression'.

Yet, as Dalcroze was at pains to point out:

> 'it must be understood that these exercises do not profess to constitute the whole artistic training of the student but they must, in due course, inevitably develop his self knowledge revealing to him his numerous motor faculties, and augmenting the sum of his vital sensations. Art can not dispense with knowledge of life. Only by familiarising the student with life can we develop in him a love for art and the desire to pursue it'. (Jaques-Dalcroze 1921,p.71)

There is an awareness that,in interpreting Dalcroze's writings, translated statements inevitably lack the precision of the original French, yet a commitment to the development of the whole person comes through several statements of this nature and from interviews with former students.

After one year of concentration on rhythmic movement students proceeded to the next stage:

SOLFÈGE (EAR TRAINING)

Although this stage concentrated on all aspects of pitch, based on the 'fixed do' principle (where 'do' is C), the activities related and were applied to all the rhythmic work which had preceded it. The emphasis now was on aural training, production of vocal sound, the study of notation and sight reading.

As an example, students would be asked to sing the first part of a canon, clap the second and march for the third. They might sing a melody while executing different bodily rhythms, sing 'fortissimo' while expressing a 'pianissimo' with their bodies, or sing 'pianissimo' while making one limb express a'diminuendo' and another a 'crescendo'.

Scales were sung in different rhythms; scales and melodies were begun audibly, then continued mentally. Vocal improvisation consisted of improvising a melody to a given rhythmic structure. Conversely, a series of pitches would be given to which the student provided rhythmic interest.

Dalcroze aimed to inculcate a sense of absolute pitch, to know the 'c'ness of 'c', by using certain exercises. A student would sing up and down a scale each time starting on C with C being the first, second, third, etc. degree of the major scale, later to be known as the 'Dalcrozian' scale:

C 1 2 3 4 5 6 7 8 C major
C 2 3 4 5 6 7 8 2 Bb major
C 3 4 5 6 7 8 2 3 Ab major

Although the following is a brief summary of the course, at the end of this stage (approximately a year) a student would be a) able to name notes in an exercise sung by another, as well as to sing them himself, and b) identify the key in which another sang, then name and write the melody.

PIANO IMPROVISATION

The final stage, piano' improvisation, was intended to develop the capacity for spontaneity and imagination. It was not compulsory for all students, yet considered essential for intending teachers of eurhythmics. Therefore, in Dalcroze's time and in any course of Dalcroze study leading to certification, it was a compulsory subject.

Again, there was a synthesising of this work with all the previous elements of the course. Exercises in muscular contraction and decontraction were followed by scales and arpeggios, played in different rhythms. Chord successions were played with regular accentuation and then irregular. There was two- piano work, with the student imitating or responding to the teacher. Rhythmic accompaniments were improvised for vocal melodies and series of pitched sounds provided with rhythmic interest to accompany successions of chords. This led to free improvisation or to two students playing alternating phrases.

A considerable amount of time was also spent on the practical application of this aspect of the course, for the improvisation necessary for all the work to be covered in stage I - Rhythmic Movement.

Dalcroze's approach was by no means rigid, being described as a 'principle' rather than a method (Sadler 1912). In describing the work,Sadler speaks of a parallel development in the visual arts (Sadler 1912,p.63) with 'der blaue Reiter' group, led by the Russian artist Kandinsky. It is clear that the period, from the beginning of this century up to the start of the First World War, was an exciting phase of European history, ripe for experimentation and fertility in the arts. The time marked a regeneration of interest in Greek philosophy and ideals, harking back to Plato:

> 'the whole of a man's life stands in need of a right rhythm' (Plato)

and this was seen too in Dalcroze's theatrical work. In partnership with stage designer Adolphe Appia, he created gigantic festivals in which a Greek chorus commented on the action as in Greek tragedy.

In 1910 Hellerau College was built for him, near Dresden, by the Dohrn brothers, where his ideas could be put into action. Here he worked until 1914, visited by eminent artists, dancers, writers and teachers such as Diaghilev, Nijinsky, Pavlova, G.B.Shaw, Bloch, Mary Wigman, Upton Sinclair, Laban. His teachings influenced many dancers and schools of dance at that time. Marie Rambert founder of the ballet company was a Dalcroze student, brought to Russia by Diaghilev to work with the Russian ballet in mastering the complex rhythms of Stravinsky's Rite of Spring.

Despite the emphasis in this chapter on music education, it should be stated that the Hellerau College provided an education for stage producers and teachers in general education as well as for those wishing to become music teaching specialists. In interview, Ann Driver, one of his famous students, spoke of the way in which Dalcroze education freed people to become whatever they desired to be-artists, dancers, composers, conductors, pianists, theatre producers, a kind of clearing house, as it were. As Dalcroze was to describe (Dutoit 1971), his working principles applied to five different areas: music, movement, theatre, arts in education and therapy.

His work was demonstrated and made an impact in England, this being brought about in 1912 by Percy Ingham, a school teacher, who had been totally captivated by the approach when visiting Hellerau.Only a year after his visit, the London School of Dalcroze Eurhythmics was established by the Ingham family, soon to be followed by similar initiatives in other capital cities. It has been acknowledged that the London School made a considerable contribution to disseminating the approach throughout the world (see Martin 1965).

Certainly its influence was quickly felt in Britain, from the opening days of the London School in Store Street,the formation of the Dalcroze Society (1915) and the visits which Dalcroze made to the Store Street

School from 1915 to 1937. During this period he presided over examinations, taught on the training course and inspected classes. The staff in 1915 consisted of Annie Bech, Ethel Driver, Simone Kunz, Jaqueline Mellor, Miriam Rambert (to become Dame Marie) and Douglas van Schnell. By 1916 the School was in line with other professional training schools, broadening its curriculum as Percy Ingham added specialist lecturers such as Stewart Macpherson to his staff. It adjusted to specific British needs without, apparently, deviating from Dalcroze's principles (Tingey 1974, p.15). Sir Henry Wood was an enthusiastic supporter of the approach and, by 1922, the Society had secured Sir Henry Hadow as its President.

Tingey (1974) provides a full account of the progress of the school and the Dalcroze Society through the period 1913 to 1973. It is evident that, by 1931, Eurhythmics was formally acknowledged by the Board of Education and that this specialist work could form part of the Elementary Certificate in Teaching required by teachers in the state system. That it had been assimilated into the school timetable was made evident in the Cambridgeshire Report (1933), which referred to its value in both the elementary and the secondary school. Soon after, Ann Driver was to popularise the approach further when, in 1934, she began her long running series of 'music and movement' schools radio broadcasts.

Assisted by such figures as Ann and Ethel Driver (1936,1951), Winifred Houghton (1940) and Desirée Martin (1950), music and movement continued to be influential, particularly in the teaching of young children, until the late 1950's. It was then, as the writer has described earlier (Taylor 1979), that the Dalcroze approach appeared to wane (he died in 1950) and the influence of Rudolf Laban, the movement educator,to increase. Laban's principles of movement education appeared to be eagerly grasped by physical education and dance teachers and his teaching rapidly gained a foothold in training colleges and schools.

The diverse routes through which music educators come to be trained and the general lack of music specialists in the primary sector inevitably had the effect of making Eurhythmics, in this country, 'just another method' among a plethora of methodologies. It has been largely through the belief of individuals such as Sir Keith Faulkner, in his time as Principal of the Royal College of Music, that Eurhythmics formed an optional course for music students there from 1963 to 1981.

Through the efforts of Elizabeth Vanderspar, who taught at the Royal College, and later, with Ruth Stewart at the Roehampton Institute of Higher Education, Dalcroze work has continued. Pockets of influence exist in music centres, particularly in Hertfordshire, in therapeutic work and in recreational classes for people of all ages. More recently, Dalcroze movement has been developed at the Guildhall School of Music (begun by Elizabeth Vanderspar before her retirement) by Karen Greenhead and Gwen Rabinowitz. Although there is no longer a London School of Dalcroze Eurhythmics, the Dalcroze Society continues to validate courses and conduct examinations leading to the Licentiate Certificate. Advanced qualifications may be sought from the International Federation of Rhythmics Teachers (FIER) in Geneva.

The FIER assisted the researcher in seeking information about the international development of this work. Response indicated that professional training courses are run in eleven countries, the U.K., Belgium,Netherlands, Poland, Austria, Sweden, Canada, U.S.A., Australia, West Germany and Switzerland. As might be expected, the majority of courses are to be found in Switzerland and West Germany. Other centres are located in Argentina, Denmark, Israel and Japan. In correspondence with

Dalcroze practitioners, it appeared that, in some countries, 'eurhythmics' is considered a legitimate and compulsory part of an intending music teacher's training. The growth area appears to be in its application to special education, music therapy and movement therapy. This development was stressed and accords with those aspects of the Dalcroze Approach which emphasise the individuality of the human being and the immediacy of its effect on physical and mental response, on balance, control and coordination and integration with aspects of musicality.

A Dalcroze Easter Vacation Course for Teachers

In the 1980's, however, what kind of activities would be experienced in a course designed for people with generally little or no experience of Eurhythmics? This is a description of a typical three day Easter course showing how Dalcroze work has developed and been updated.

The course began with ice-breaking games , passing imaginary objects across a circle, moving and vocalising in a way which was characteristic of the object transported. Many qualities, associated with music making, were exhibited: a dynamic range from extremely soft to very loud; tempi change, qualities of weight from light to heavy, etc. Games of a rhythmically metric nature followed, including one known to Wishart devotees, a 'pass a clap' game where people clap in turn clockwise round a circle and pass a whispered 'hiss' anti-clockwise. Several variations followed: alternating claps with rests , introducing quavers to make rhythmic units e.g. the last not easy as far as exact timing and immediate response is concerned for each individual has scant warning as to which element to perform. Co-ordination, timing, reflex, all these were evident.

After this cooperative group experience, individual work followed in interpreting geometric shapes in movement. In practice, the teacher provided a continuous four beats of time (the first beat played on the edge of a cymbal), in which to express the shape of a circle, square, triangle, etc. This was all performed continuously with an unexpected but satisfying feeling of flow. The idea was extended to include tall shapes, small, spiky and twisted shapes, exploring the dimensions of space in order to use the floor surface directionally. Different levels were explored - low, medium and high. Balance and control were required to stretch out and away and then retract back towards the centre of balance. This idea was repeated in small groups, each working out its own sequence, before being required to observe and describe precisely the sequence enacted by other groups.

The results were informative, for it made individuals more acutely aware of the need to judge whether a shape was to be made individually, contributing to a group of circles, or whether there would be greater definition in a group shape where each individual contributed to an overall circular form. All this seemed very far from any lingering thoughts that 'music through movement' could be a rigid set of routines giving few opportunities to be imaginative or constructive in the process of learning.

The pattern of the four days was a mixture of activities of a metrical nature in which tempo, pulse, metre, rhythm pattern, were felt and expressed. And there were those of an imaginative nature where choreography predominated: individual interpretation of the music's expressive and structural character - expressing mood, style, weight, touch - feeling the phrase shape, hearing repetition and contrasts, experiencing the whole shape, working out through movement how each phrase followed another and then performing the complete piece of music.

Elisabeth Vanderspar, in conversation, contrasted the Dalcroze approach with typical dance workshops. Whereas dancers refer to a vocabulary of movement, in Eurhythmics there is no vocabulary of movement. Music is the vocabulary and the source of inspiration for movement. This precept was experienced by the participants. To the extent that all were musicians and untrained in dance, apart from occasional overbalancing or mis-judgement,techniques for movement and dance appeared to be entirely subordinated.

The power of the music and the functional use of the body to express as precisely as possible what was inherent to the music appeared to yield two evident outcomes. One, was the way in which expressive sound or music raises or lowers the quality of movement in accordance with its own inherent quality. The second, the acute way in which active listening is vital to carry out the task. Listening results in direct action through the most immediate instrument, the body, coming to know the music - a knowing 'through the bones'.

There were three main elements to the course: 1) 'Eurhythmics' or 'rhythmics'; 2) demonstration sessions with children, showing how the approach was used with children of differing age groups and 3) improvisation at the keyboard, the prerequisite for every Eurhythmics specialist. In addition, for non-pianists, there was also a group devoted to improvisation with percussion instruments. As already demonstrated, there are times when it is easier and more appropriate to use a cymbal, a tambour or a set of claves. Use of these instruments, as with tapes and records, gives an even wider range of timbre. The teacher can often observe, more keenly, what is going on and is, physically, more central to the activity.

In demonstrations with young children (six and seven year olds), it was interesting to see how eagerly they responded to musical signals. One to sit down, another to stand up. Music for walking changed to striding, running and skipping. Occasionally this was punctuated by previously learned signals in a very game-like atmosphere. New ones were then added for running on the spot and turning round. Again, a vocabulary of sound patterns was being built up. At the same time they were musically expressive and the movement asked for was in keeping with the characteristics of the sound.

Another group of children showed quick response to signals played on percussion instruments, a tambour for walking (♩) , a triangle for slow walking (𝅗𝅥) , and claves for jogging (♫) Each idea was presented separately, then randomly before, finally, three groups of children were formed, each group moving only to the signal of their assigned instrument.

Another objective with this group was to encourage controlled response and this was done by means of a ball game. Children formed a circle and a large ball was bounced rhythmically round from one child to another in duple time to the music $\frac{2}{4}$ ♩ ♩ | ♩ ♩ so that it hit the ground on the accented first beat and was caught on the second. As soon as this was working successfully a new element was introduced. Every time a minim was played, during the next two beats the child who caught the ball was required to respond by throwing it up and catching before passing it on. The next new element was ♫ ♩ which required the ball to be bounced in front of the individual before being passed on. The last element meant 'bounce the ball in the opposite direction around the circle ': ♫ ♫

The greatest difficulty in this activity appeared to be that of not waiting until the complete figure had been played before responding. Here, the principles of cultivating auditory perception, while performing a task and of fostering musical memory for what has just been heard, were Dalcroze principles cast in a stimulating and novel form.

As in the adult classes, responding to music was done in two ways. The first was metrically, where children established and moved to the pulse with changes of speed, showing an increasing ability to maintain a steady beat, despite the introduction of silences and off-putting rhythms. Different durations were expressed, gradually accelerating changes from one to the next. The children clapped and stepped simple rhythm patterns, in a circle, following a leader. They recognised metre - duple, triple and quadruple time, by marking the first beat with a stamp.

The second focussed on the imaginative expression of the music showing a response to pitch, line (detached, legato) and dynamics, in this case by interpreting 'The Gnome' from Mussorgsky's Pictures at an Exhibition.

Phrasing was learned quite early through singing and moving to simple songs. The idea of 'mirroring' an action, with a partner or a group was seen as a way of developing a sense of pattern, for repetition and contrast. This was reinforced by the visual use of shapes on a blackboard or by other visual aids to show the form of a song or piece. One example, which remains a vivid impression, is the way in which 'Hot Cross Buns' was recalled, sung, and then performed, first with hand gestures, standing in place.

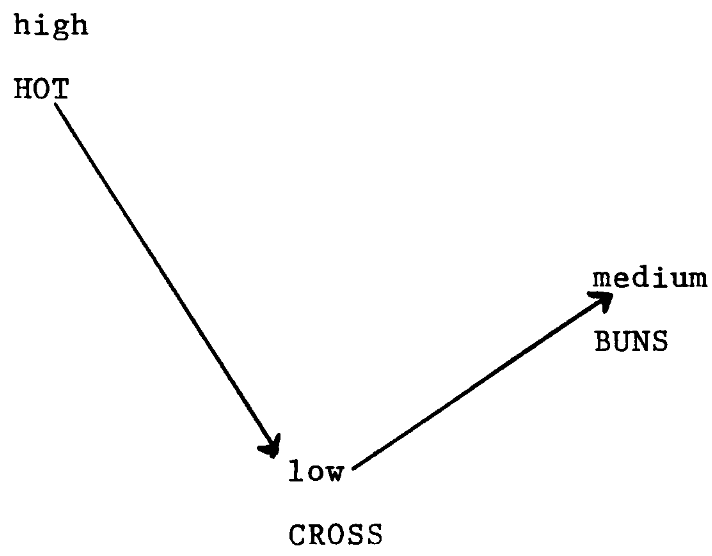

Figure 5: Tracing melodic direction with movement

Then, at 'One a penny, two etc. the children ran on the spot before standing still to retrace the final line. At its repetition, each child was given a tennis ball to throw up for 'hot', bounce down for 'cross' and catch for 'buns'. Apart from the slight concern that there was an unnecessary accentuation of the second beat by bouncing the ball on 'cross', the reinforcement of pitch contours by imaginative means and the rhythmical control, required to gauge height, velocity and timing in this way, appeared to outweigh any inconsistency.

Another item of equipment, often associated with the physical education class, was the use of hoops. So far all the exercises had been performed in free or unrestricted space. To emphasise the controlling of movement within a space, hoops were placed at equal distances and arranged in a circle. Each child stood in a hoop and was then required to move to the music - four 'walking' crotchets, before jumping into the next hoop. Another time it was two 'striding minims' or eight 'running' quavers. Progressing in difficulty, in the next exercise children were numbered 'odds' and 'evens', thus forming two groups to move in canon with each other, the 'odds' jumping into the hoops of the 'evens' at the exact moment of their departure. Both groups not only moved in canon with each other, but proceeded to move in canon with the music. This evidently popular movement sequence was later tried out by the adults, with less dexterity and control.

Enjoyment appeared as an outcome to an activity felt to be worthwhile and purposeful. There was no doubt that it gave a sense of achievement and mastery to the learner. However, the fact that there was such an evident 'after glow' made one aware of the value of game-like activities.The other feeling of exhilaration and well being would be one shared by many people indulging in healthy exercise rather than working or playing instruments in sedentary or confining conditions.

The only 'sedentary' activity for the majority of participants was either in watching the lively demonstrations or engaging in the third element of the course 'improvising for movement'. Using a teaching style which breeds success from small beginnings, individuals were asked to construct a piece for marching, solely on the interval of a 5th in the left hand and 5 note melody in the right. Pieces reminiscent of Bartok, were quickly devised by modest pianists. Modes were introduced in a directly practical way, the Dorian mode in octaves in both hands. This was re-arranged constantly until sufficiently absorbed to lead to experiments with left hand accompanying figures. No-one failed. On the contrary success was built in from the start and this bred further success. The act of working from small melodic, rather than harmonic beginnings, presented the group with a freedom to play with the medium, to manipulate sound in a convincing and unrestricted way.

And, hand in hand with this, was the pianist's brief, always a functional piece of music, a few bars to sway to, to skip or gallop to. What is the difference between a skip and a gallop? 'Show me' said the tutor. In analysing, by trying it out with the feet, checking against the musical model to see what movement the music conveyed, all this took the focus away from the pianist. The concentration was again focussed on the music, in an intensely direct and involving fashion.

This leads back to the underlying constant running throughout the course, the power of music and its constant power to engage, stimulate and speak to us. Human beings need direct experience of music in all its forms and styles. The issue for the participants was fundamentally not what their bodies could do or express through music but rather what each individual musical composition expressed to them and through them.

Dalcroze saw his work not just as musical education but as a rhythmical education which had benefits for the general well being of the individual. From the descriptions so far, the work demonstrates his belief in ways of harnessing body and mind, of affecting the whole person in ways which would establish links between feeling and understanding, between impression and expression.

He believed that rhythm and dynamic feeling was dependent upon movement; that there was a close connection between intensity of musical feeling and intensity of physical sensations. Accordingly he promoted a correspondence between rhythmic musical phrasing with rhythmic movement phrasing. Movement exercises for timing were aimed at sub-automating technique through practice, to allow the fullest expression of intellect and imagination.

Dalcroze set out to cultivate a movement memory in order to reinforce memory for music. He explicitly aimed to promote mental pictures or images of the locomotor movements used in interpreting rhythm patterns and phrases. The movement realisations experienced were like a visual score, showing the structural and expressive nature of the music. And this, it must be stressed, is what makes the Dalcroze approach so rich as a musical experience. Far from being concerned with only the metrical aspect of rhythmic experience, it covers the three identified aspects of rhythm: rhythm as ground, rhythm as figure and, particularly, rhythm as flow.

In present day work, exemplified in the vacation course described, what would be noticeable would be the adherence to these principles. Many of the activities described foster rapid reflexes, coordination and timing. Exercises in metrical response are matched by those imaginative, expressive encounters, focussing on pitch (though not on fixed 'do' principles), line, dynamics, and phrasing. The promotion of memory is seen to be as important as it was for Dalcroze. Ball games emphasise and give reinforcement to the memorising of musical patterns. As one would expect, there is much more use of instruments and technological media, Orff percussion, tapes and records apart from the still much used piano keyboard. There is abundant use of equipment, particularly of balls and hoops, to aid the imagery involved with speed, energy and size of movement.

Above all, the approach described is seen to be an approach to aural education for music, the means to a goal of musical understanding and appreciation. Acute listening is involved, what Loane (1984) describes as 'movement-listening', a marriage between listening and overt response, yet with the ultimate aim of creating an inner image or memory of the music.

This chapter has provided a description of the work of a music educator whose approach was revolutionary in its time. Its purpose has been to act as a case study of an approach, practised and emulated as a tradition through a master-apprentice model. Later, in part three a Dalcroze hypothesis will be tested. First a chapter investigates expressive movement and dance for Dalcroze promoted an artistic relationship between these two arts.

If a value is set on correspondence between sensory impression and resulting image, then the nature of expressive movement should be scrutinised. Until now, consideration of movement has been concerned with its functional or instrumental value, neglecting the fact that, as an art form in its own right, expressive movement, as dance, has its own artistic integrity.

CHAPTER 7: EXPRESSIVE MOVEMENT AND MUSIC: A UNIQUE RELATIONSHIP?

> 'Dance is not a substance that can be felt, lifted or weighed... therefore it is difficult to refer to dance or the work produced as being an artifact or a thing at all. Instead we must remember that dance never exists in its totality at any one time but, rather, develops during a segment of measurable time' (Nadel and Miller 1978, p.1)

This quotation taken from <u>The Dance Experience</u> could equally serve as a valid statement about music for, as temporal art forms, music and dance constantly unfold as perpetually moving forms. As Sheets states: '(dance) .. its past has been created, its present is being created, its future awaits creation' (Sheets 1978, p.41).

This chapter begins by contrasting the organisation of musical sound with that of expressive movement. It goes on to explore similarities in the creative process and notes where there are differing processes or emphases. There is some discussion about the apparent interchangeability of the terms movement and dance, before summarising broad emerging strands and relating these to educational aims.

Sounds, one might say, are the materials of music - sounds of different pitches, timbres and durations. These materials are shaped rhythmically into a figure or identifiable unity which, through repetition, extension and contrast becomes, first, a phrase and then a section.

There are two elements to this process (described in Swanwick and Taylor 1982), namely musical structure, concerned with relationships between parts (with all those devices which come under the headings of repetition and contrast e.g. ostinato, motif, theme and variation, diminution, episode), and expressive character, concerned with ebb and flow, dynamic changes,textural quality, spatial effect, mood and atmosphere, display of feeling or emotion. All this results from a combination of aspects of pitch, register, interval, phrase shape, tempo, density of texture, accentuation, etc. influenced by the sensitivity of the interpreter. Yet these elements are not perceived separately but as a unified whole, each contributing to the uniqueness of a specific piece of music.

Nadel and Miller recount what is learned through expressive physical movement:

> '..we learn about sensible images of quality, of character and

emotion'(Nadel and Miller 1978, p.6)

The starting point is 'gesture', which becomes more shaped, extended and elaborated. The creator gives movement a pattern in time - prolonging and quickening. This is repeated, giving rhythm, and is built into phrases. 'The dynamics of movement (sharpening contrasts between tension and relaxation, strong and soft, distinctive texture) are enhanced' (Nadel and Miller 1978, p.6).

Physical movement is the material of dance, differentiated by the use of the whole body, by differing parts of the body, by small or large movements and their combination. The body is both the material and the instrument for creating dance. In musical expression, sounds are the materials and the instrument may be either the voice or some form of instrument, be it acoustical or electronic.

In the writing of Nadel and Miller one is struck by the fact that dance expression is so immediate, so accessible. Ross describes it as being very sensuously immediate, expressing the performer's process as:

> 'the awareness that one is an **articulated** system capable of **movement,** of organizing in different **time** sequences and **spatial** configurations expressive **movements**

> that one can produce through muscular actions in response to feeling impulse' (Ross 1978, p.75).

and compares it with that of the musician:

> 'the awareness that one is a **vibrating** system capable of **resonance**, or organizing in different **time** sequences (expressive) **sounds** that one can produce through one's own pneumatic or muscular actions upon other vibratory systems' (p.73)

There are recognisable similarities in the way in which the impulse to create art, resulting in an initial 'gesture', springs from a common source. As one of many educators influenced by the philosophical writings of Suzanne Langer (1942 and 1967) H'Doubler states:

> 'the emotion and the basic form are the same' (H'Doubler 1978, p.187)

It would appear, too, that the shaping process, the act of creating and organising shapes and patterns into perceivable balanced form is, broadly, the same artistic process. Patterns in time are created by a rhythmical process. There is considerable support for rhythm as the most fundamental connection between the arts in general and between these two arts in particular (see Gardner 1973, Sachs 1953, Nadel 1978):

> The idea that this object can flow in time at any energy level brings the notion of rhythm to all the arts

> whether they deal in time, space or both. Given that there must be a force or energy emanation from an object, rhythm is the most fundamental connection between the arts' (Nadel 1978, p.156).

The origin and the shaping process could be said to be common to all the arts. Not surprisingly, quite a strong case has been made for dance as the basic art, the initial art from which the others spring. Lange (1975), in common with Sachs (1953) and H'Doubler (1978), justifies this by saying that, in using the body as the sole instrument, emotions and ideas are expressed directly in the artistic act itself. Music and sculpture, requiring materials (sound and stone), are indirect arts or at least once removed from the source of energy, whereas movement is at one and the same time the means and the realisation of dance.

Dance has been seen as a fundamental human drive (Laban 1948), exemplified in the play action of children and animals. Similarly, Huizinga's theory of play forms in art highlights the playfulness of both music and dance, yet focuses on dance as the most perfect form of play that exists:

> 'Dancing is a particular and particularly perfect from of playing (Huizinga 1949, p.189)

There are also anthropological as well as historical aspects which point to the relatedness of music, dance and drama, particularly evident in root forms of cultural expression, such as childrens' traditional singing and dancing games, in social events and in religious and seasonal customs. Some African and Asian cultures use the term 'music' as an inclusive, embracing one, which highlights the fact that, in western traditions, there has been more categorisation and specialisation, leading to an inevitable abstraction from initial origins.

Traditionally, there has always been a special partnership between dance and music. Limon states:

> 'I hear music with the muscles and bones and blood and nerves: in short, with all the human faculties for movement' (Limon 1978 p.189)

Although dance remains dance, even without any form of musical accompaniment, it is rare for dance to be performed in the theatre without music. Music acts as a stimulus, an exciter to action where it dictates the dynamics and shape of the movement.It assists the execution of movement, by the way in which music operates for 'work' songs, as an indicator of action and in assisting propulsion. Music sets atmosphere or mood.

As an accompaniment H'Doubler (1978 p.188) believes that it should bring about a musical analogy to the meaning of the dance, both rhythmically and emotionally. It is a means of helping the observer to sense the dancer's thought and feeling 'for it is one more sense perception added to the visual and kinaesthetic'(H'Doubler 1978, p.188).

Although dance and music share the same roots, the same aesthetic basis and, as temporal arts, the same broad parameters: time - space - energy, there are essential differences between them.

In musical expression, the abstractness about which Ross speaks is evident by the way in which the perceiver constructs his or her own aural patterns without the support of any comparable visual aid. In live performance there is gesture, there are physical movements made by the performers and the conductor which help, in the broadest sense, to convey the rhythmical flow of the piece. Yet, unless in response to Curwen hand signs, in an educational setting, there is no direct visual correspondence to help shape or reinforce the fleeting, temporal form. The medium is sound, perceived primarily by the ear.

In dance, the medium is physical movement, perceived primarily visually, as dynamic patterns in space. At the same time, one must acknowledge the extent to which muscular movements are imagined and/or expressed empathetically, through kinaesthetic involvement, according to our different experiences and individual temperaments in the act of seeing and listening. Whereas the perceiver's response is involuntary, the performer is voluntarily creating and responding to his or her own aural, kinaesthetic and visual imagery.

Dance is expressed through the whole body, through large and small muscles, three dimensionally. It emphasises the visual in the use of personal and public space, in patterns and configurations of individual dancers and in group patterns. At the same time, it demonstrates the temporal interplay of shape and weight by individuals and groups.

In musical expression the use of the body, though expressive, is functional as a means to expressing musical communication. It emphasises the aural in acoustical and psychological space. Above all, it is concerned with the temporal and dynamic shaping of musical patterns by individuals and groups.

The terminology, which we use to speak about the elements of music or dance, reflects the differing emphases: in music - register, pitch, melody, tempo, flow, rhythm, dynamics, texture, for example; in dance -shape, spatial pattern, line, weight and strength, smoothness/roughness, elevation, tempo and flow.

In writings on dance, certainly in those of Laban, Ullman, Lange and Gerhardt, there is an almost imperceptible shift back and forth from 'movement' to 'dance'. What makes dance - dance, as opposed to movement? In one sense it might appear that movement is to dance as sound is to music. That is to say that movement and sound are the materials from which dance and music are formed (see Taylor, 1979). Yet, for either medium, this strict demarcation would be simplistic. Rather, it would seem to be a matter of function, as is seen in the categorisation of sounds into natural, mechanical and expressive sounds, etc. and the classification of movement, made in chapter four, into the more comprehensive movement behaviours and motor skills. Perhaps, more importantly, it is a matter of degree. At some point human sound becomes expressive, is musical, in the same way as movement, at some point, becomes expressive and dance-like. Nadel and Miller describe it as 'adding form to the movement and intensifying its meaning' (Nadel and Miller 1978, p.6)

Lofthouse stresses the difference to be that of rhythmicizing a bodily activity and specifically refers to the importance of flow and continuity, which results in the 'magic of dance' (Lofthouse 1970). The transformation of movement into dance has also been attributed to a sense of 'poetry' (Lange 1975), an aspect of Isadora Duncan's work which so impressed Laban (1948).

How is this 'poetry' or 'flow' of movement achieved? It can not be simply a case of rhythmically stressed movements, like so many work actions which rely on rhythmical regularity in order to be effective. According to Laban's (1948) explanation, the action motions of space, weight, time and flow are differently stressed. In work it is 'weight', in dance- 'flow' This most important flow factor determines its substance or content. Without it there is no dance.

It may well be this somewhat elusive factor which contributes to what Suzanne Langer describes as 'non-discursive symbolism' (Langer 1942, ch.4). Music, dance, poetry, she points out, do not have a vocabulary. They exist only as a 'gestalt', for any discernable elements have no independent meanings. There is no fixed meaning apart from the context. Just as one line in poetry, one phrase in dance or music may have shape, texture and a sense of cadence, without satisfactory form it does not begin to constitute poetry, dance or music.

This elusive 'flow' factor leads back to the concept of rhythm in the overall sense - the 'in the beginning' variety, where flow is the all important element. It is recognised when heard or seen, as described in the opening paragraphs of this study. Yet the 'magicness' of it so defies beyond description that it is necessary to resort to metaphor,to borrowing terms from other art forms to make the point effectively. Thus poetry may be said to have a 'musical' quality, and dance and music a 'poetic' quality.

What can be stated is that it is concerned with a feeling of beauty of form and of rhythm in the sense of flow and continuity. And, if one accepts a connection between rhythm, kinaesthesis and bodily response, that it is to do with an overall continuity of rhythmical flow and imagined movement, which constitutes the truly 'poetic', the 'musical', the 'danceable'.

Laban is the authoritative figure who established the analytical study of movement with a classification system, a vocabulary and a means of notation (Labanotation). This enabled dance to be viewed as an academic discipline and for choreology to take its place alongside the long established tradition of musicology. Laban's movement approach was termed 'Eukinetek', indicating a preoccupation with motion, in contrast with the Eurhythmics (good rhythm) of Dalcroze. The comprehensive nature of his work is in many ways comparable with that of Piaget in child development. Movement and dance educators, internationally, yet particularly in the United Kingdom, have been considerably influenced by his explanation and classification of effort and the movement principles which he postulated (Laban 1948, Foster 1977).

Laban introduced the term 'effort' for the inner impulse from which human actions spring. This is in the sense of the inner effort which springs from impulse, desire, intention or mood. Effort gives rise to actions which are shapes or patterns in space. This 'effort' action is of eight basic types: wring, press, glide, float, flick, slash, punch, dab. Each of these contains combinations of the following six movement elements: firm/light; sustained/sudden, direct/flexible. For example' wring' is considered to be firm, sustained and flexible whereas 'press' is firm, sustained yet direct. 'Slash' is firm, sudden, flexible yet 'dab' is light, sudden, direct.

A crucial element to the whole of this analysis is, again, that of 'flow', for in moving one must experience the flow of movement as either 'free' or fluent, bound or controlled. For example, in any action which is capable of being stopped and held at any moment, the flow is bound -pressing would be a case in point. Yet in one in where it is difficult to stop the movement suddenly, the flow is free, for example in 'flicking'. Some, like punching or floating, may be performed either way.

Flow is one of Laban's identified four motion factors, the others being weight (heavy to light), time (slow to fast), space (up/down, forward/backward, right/left). Here, in diagrammatic form, are the eight basic types of effort actions seen in relation to the four motion factors and the possible permutations which result:

EFFORT ACTIONS:

		Wring	Press	Glide	Float	Flick	Slash	Punch	Dab.
SPACE	Direct		X	X				X	X
	Flexible	X			X	X	X		
TIME	Sustained	X	X	X	X				
	Sudden					X	X	X	X
WEIGHT	Firm	X	X				X	X	
	Light			X	X	X			X
FLOW	Fluent				X	X	X	X	X
	Bound	X	X	X	or X			or X	

Figure 6: Laban's movement classification

The differing combinations of these effort and motion factors result in a grouping which constitutes movement quality, what might be described as the 'HOW' of movement. Should the movement be light, direct and sustained, for example, then it is of a gliding nature. It is qualitative in describing the way the body moves. There are other aspects such as bodily aspects, concerning both the anatomy and the types of action, what could be described as the

'WHAT' of movement. Anatomically, what part of the body is gliding, twisting, bending, and in which order do parts of the body move? Two basic types of movement action constitute either the 'locomotor', such as stepping or running, or the ' axial', where actions are performed in place, without locomotion.

Spatial aspects are an important aspect of Laban's classification system. Concerned here with direction, with the 'WHERE' of movement, the body moves three dimensionally within both personal space, and in its extension into general space. There are different levels: high, middle, low; different directions, pathways, shapes. Finally, there is the aspect of relationships: is the movement expression performed singly, in pairs,or in a group? What is the size and structure of these relationships?. In the final analysis,the most discernable factors common to human movement are seen as 'effort' and 'shape'.

This analysis and classification has been widely used and adapted by educators in the field of physical education and dance, exemplified in the following chart prepared by members of the Atlanta Contemporary Dance company for use in an Artists- in-Schools programme (Staton 1981). In this chart, one can see not only the influence of Laban but also the necessity for borrowing musical terms to explain durational factors and certain aspects of movement quality:

FUNDAMENTALS OF MOVEMENT

THE INSTRUMENT

A. Skeletal alignment/balance

B Isolation of body parts, initiating movement with head, elbows, etc.

ELEMENTS OF MOVEMENT

A. Space

1. Axial: In place
   . twist, turn, spiral

2. Locomotor: Through space
   . walk, run,leap, hop, jump (even rhythm patterns)
   . skip, gallop/slide (uneven rhythm patterns)

3. Variations of axial and locomotor in terms of
   . direction (forward, back, side, diagonal, turning)
   . level (high-middle-low)
   . line (straight/curved)
   . shape (symmetry/assymetry; grouping/floor pattern
   . focus (up-down; outward/inward)

B. Time

1. Durational factors
   . beat (regular or random)
   . accent (strong beat around which weak beats are grouped)
   . meter (regular or irregular - sets of 2 or 3 or combinations)
   . rhythm patterns (long/short note values; even/uneven; syncopation)

2. Tempo (rate of speed)
   . slow/moderate/fast

C. Energy (varying degrees of tension and relaxation in muscles

1. Qualities of movement
   . sustained (continuous degree of effort - legato)
   . percussive (bursts or spurts of energy - staccato)
   . swinging
   . vibratory (grows out of undulation)

2. Pull of gravity (heavy/light)

3. Muscle effort only (strong/weak)

Figure 7: Fundamentals of Movement
Source: Staton 1981, p.27

Correspondingly, charts of this nature could be extended to show the correlation with musical properties. For example, spatial aspects, such as differing levels, may correspond with differing registers in music (high-medium-low), focus:up - down with melodic direction; energy aspects such as heavy-light with musical dynamics, and qualities of movement with expressive qualities of music, adopting either Laban's effort action terms or other, appropriate, descriptive language.

In educational practice the teaching of any subject so often is the more effective when students are encouraged to create translations or metaphors. On account of the nature of the arts, it may well be that, as sensory media, this is not so often attempted.

To take, as an illustration, prelude 21 in Bb from book 1: J. S. Bach's 48 Preludes and Fugues, one might ask a group of adults -how could one describe the feeling of the music a) in visual art? b) in words or poetry? c) in movement? The results, with a small group of people, could conceivably work out along these lines:

a) **visual art**: different paintings or drawings would show individual interpretations relating to perceived qualities in the music ranging from 1) associations of the music heard in conjunction with a specific occasion or with its association with similar Bach works; 2) colour contrasts relating to changes in musical elements such as dynamics,timbre, register; to 3) a picture or abstract reflecting any of the expressive qualities perceived e.g. the liquid quality of the continual triplet figure, passed from hand to hand (see overleaf).

b) **words or poetry.** Similar to (a) this would be wide-ranging. There would probably be common vocabulary used, especially if one asked a group to list words indicative of the expressive qualities discerned in the music: running, lightly descending, neat, articulated. This would be dependent on the instrumental medium and the interpretation of the performer.

c)**in movement.** Some individuals would probably step to the perceived pulse of the music, others move to the trickling semiquavers. Perhaps some would either discern and move to what is particularly noticeable in the music, such as the upper part of the first bar:

Prelude in Bb, No.21 (book 1) J. S. Bach

or create their own pattern, consistent with the rhythmical flow of the music. If the interpretation or musical model were of the most qualitative, one would expect metrical interpretations of the movers to be fused with appropriate qualities of weight, moving lightly at the beginning, before moving with more urgency as the dynamic level increased. Gestures of the arms and expressive use of the body would also show the perceived movement characteristics of the upward and downward scale passages.

The task accomplished, each activity would help to provide translations of the musical object. But, if the question were- 'How most effectively could one produce a near translation or metaphor for the musical message of this prelude'? - one would expect the choice to fall on activity (c). Here, the close correspondence of the imagery evoked, in effect the translation of the verbal interpretation, is enriched by the enactment of the rhythmic flow of the music precisely as it happens, in a continuously moving form.

Perhaps the term which, most suitably, encapsulates the nature of movement and dance and supports it as a means to enhancing musical interpretation and understanding, is one put forward by Ullman (1963). Its vitality and tangibility is evident in the term - 'trace form'. As she states:

> 'creating, transforming and dissolving trace forms, this is the play we pursue when dancing' (Ullman 1963, p.132)

The term 'trace form' is one which immediately conjures up the most vivid image of the shapes, gestures and pathways which constitute expressive movement or dance. It is a term which is most helpful for, in both music and dance, we can see or hear patterns in sound and in visual movement as we trace them with our ears, our muscles, our eyes and sense of touch. Both art forms are in a state of constant flux.

To summarise, there is evidence that there is close correspondence between music and expressive movement or dance. They both spring from emotion or feeling states and appear as basic gestures which are formed into **rhythmically** flowing, perpetually moving, continually unfolding dynamic or 'energyful' patterns. The one is primarily creating patterns in sound, the other patterns in space.

Time, space and energy are their parameters, blending together in a unity. Bearing in mind their differing emphases, the focus in dance is on the visuo-spatial as opposed to the aural-spatial of musical expression.

Traditionally, music and dance have enjoyed a unique relationship. Dance does not require music in order to be dance, yet there are few occasions when dance is performed without it. It is believed that the aural dimension helps to enhance and to intensify meaning, particularly for the perceiver. Apart from folk traditions and the special case of opera and music theatre, the appreciation of music is not considered to require added visual dimension in the shape of dance movements. Yet it is accepted that much music is heard incidently, through the medium of television or cinema and is inevitably associated with visual images, carrying little or no temporal correspondence to the flow and dynamic range of the music heard.

The essential factors of energy and shape highlighted by Laban are fundamental to both music and dance. In engaging in their creation, musicians and dancers are engaged in enactive and iconic modes of representation, creating imagery of different kinds: aural, kinaesthetic, tactile and visuo-spatial imagery.

When music is allied to movement and dance, aural imagery is an added dimension. When movement and dance are allied to musical expression, then the limited visuo-spatial imagery, associated with the gestures and movements of conductors and of performers,is extended in large scale patterns of movement which, for potentially educational purposes, correspond more closely to the weight and size of the dynamic qualities of the music itself.

In educational work, if movement and dance were to be considered as beneficial to music as music is considered the natural partner to movement and dance, then meanings and understandings could be assisted through the enhancing and intensifying effect which results. Although there are different emphases, the broad underlying parameters of time, space and energy do relate these two arts in a direct correspondence. There are, therefore, expressive reasons for allying movement to music which lend support to the thesis and balance the previous emphasis on kinaesthesis and movement as purely instrumental means to promoting memory for music.

CHAPTER 8: TOWARDS A CONCEPTUAL FRAMEWORK

The focus of this study is the neglected potential of kinaesthesis and movement with regard to musical experiencing. In particular it is with regard to that aspect of cognitive processing which, for want of a better term, has been described throughout this study as musical 'memory'.

So far the study has been mainly theoretical, yet with some observations based on practice in this field. An interest in the work of one of the 'great' music educators, Emile Jaques-Dalcroze, centred around his belief in the promotion of thought 'images' (fr.)' through muscular activity. For him, kinaesthetic imagery was central to the development of an overall memory for music.

It is the researcher's conviction that music teachers are interested in exploring different teaching strategies in the classroom and with individual pupils. Consequently, with music educators in mind, kinaesthesis and movement has been examined as a potential teaching strategy or principle, with the aim of testing it out empirically in the final part of this thesis.

Part one was concerned with investigating general and musical cognitive processes. In the chapters on memory it was found that musical memory, and memory in general, is not simply concerned with the strategic act of remembering or of storage but is infinitely more complex, bound up with attention, perception and all aspects of cognition.

Evidence suggests that the 'attentional' stage of memory is crucial and that the senses relate to each other in this stage in a very complex and only tentatively explained way. This has resulted from empirical work which has been, primarily, in verbal langugage.

The persistence of a memory 'trace', a term which is used consistently throughout the literature, appears to depend on the strength and quality of the different levels of processing, proceeding from the sensory level through to long term memory.It is implied that the quality and strength of the long term stage (level three) is increasingly determined by that of the sensory level (level one), through the inner ear, inner voice, inner eye and, it could be inferred, the (inner) muscle.

The quality and endurance of this memory trace is linked to the idea of concreteness and elaboration. Human beings make an effort to construct meaning, to capture substance or tangibility. They work on sensory information in order to create this. Patterns are created by the perceiver, generally operating according to 'gestalt' theory. They chunk, group and shape, according to a generally applicable rhythmic capacity, for to rhythmicise appears to be part of a general memory strategy, crucial to creating broad structural frameworks for general and musical cognitive processes.

Rhythmic structure creates pattern, makes possible stress and release, strength and weakness, figure and ground. It provides characterisation. This individual shaping works in tandem with the shapings, characteristic figural groupings and stylistic features which are imposed by the interpretation of the performer.

The constructive nature of musical perception has been emphasised, where there is an attempt first to focus on differentiating figure from ground, picking out surface characteristics before, with greater acquaintance or familiarity, beginning to assemble more complex structural layers.

Irrespective of musical cultures the development of musical cognitive structures appears to follow a parallel course for both pitch and rhythm. Melody is conceived as melodic contour against a scale framework, while rhythm patterns are overlaid on a solid beat framework.

Musical cognition is concerned with creating structures and relationships, a similarity existing between this and the learning of verbal language. They possibly share the same rule system for deep and surface structure proposed by Shenker (1935) and Chomsky 1968).

A crucial role for the teacher is implied in devising strategies to assist this structuring process. Strategies to focus attention, to impose character or meaning are advocated. It is believed that learners should be encouraged to articulate their understandings, in an attempt to show an awareness of the structural relationships which they are creating.

The term 'trace' appears synonymous with some form of image or representation. The terms 'imagery' and representation are used as labels for the mental product of the cognitive processes described.Davies' expression 'internal map of the subject matter' is a most descriptive and useful one.

Representation and schema theory, as it has been developed by Piaget acts as a comprehensive framework for cognitive development against which other theories of general and artistic development may be overlaid. Yet it is acknowledged that music and the arts, by the very nature of their presentational media, may well differ in emphasis. Bruner's identification of three different modes of representation, the enactive, the iconic, the symbolic, though not a detailed theory, appears more sympathetically appropriate for music educators. There is a necessity to avoid the pitfall of interpreting these theories in terms of hierarchical stages but, rather to emphasise the invariance of sequence (Piaget) and the notion of different emphases (Bruner).

The importance of imagery and representation for musical and other forms of learning is reiterated. Sensations become perceptions when images or representational schemata are formed. In turn, these schemata help to 'concretise' or provide the necessary tangibility to assist conceptualisation.

What is stressed also is the importance of rich sensory experience to the perceptual/attentional area of memory. Emerging research studies focus more closely on the need for close correspondence between sensory impression and resulting image.

References are made to the fact that music and the arts operate within sensory media, through sound, vision, touch and movement. As 'presentational forms' (Langer, 1942) they are also forms of representation themselves. Human perception of these representational systems may involve not just one sensory medium but others in interaction. It is interesting to note that theoretical studies lend much support for the more pragmatic, intuitive approaches of individual music educators for they advocate the enrichment of quality and quantity of sensory involvement by the use of multi-sensory strategies within such sensory systems.

In sum memory, and musical memory in particular, is reliant on specific ways of representing and internalising (both abstractly and symbolically) what one is alert to in music. These forms of representation depend on imagery and this imagery is derived from sensations which may be auditory, visual, motor, tactile, etc.

Throughout all the work described, the notion of kinaesthesis and physical action runs like a continuous thread. This is shown in the constructive rhythmic nature of pattern making, as viewed by cognitive psychologists,and in the schemata of action, demonstrated in Piagetian theory, from the earliest stages of sensori- motor behaviour to that of formal operations.

Bruner's enactive and iconic modes of representation refer both to the sensori-motor and the summarising images of that which has been acted upon. Gardner refers to the way in which action and symbol work reciprocally. Again, imagery has been described by more than one theorist as an internal imitation of an outward gesture (the gestures being auditory, visual, tactile, etc.)

Part two focussed on the nature and role of kinaesthesis and physical movement with a view to judging their potential as imagery strategies. Chapter four dealt with the prominent role of kinaesthesis in the initial stages of perception, particularly for making sense of rhythm and providing a broad structural framework for more complex processes. Its potential role for higher level musical perception has been recognised, especially for the purposes of musical analysis (harmony/texture) and for aural dictation. It has also been seen to be central to the development of musical imagery, as an overall musical ability. This evidence was reinforced by philosophical, psycho-analytical and clinical studies.

A succeeding chapter focussed on studies in which bodily movements have been tested for their effectiveness in tests of rhythmic perception and performance. Some concern was expressed about the complexity and nature of what is perceived as valid fusions of music and movement experience. Recognised was the fact that there are three aspects to the definition of rhythm, particularly that aspect which is an over-arching definition of rhythm as 'flow'. Much remains to be explored, including the connections between rhythmical experience, bodily movement and affect. Yet the nature of rhythmic experience, being complex and pluri-sensorial has resulted, so far, in research studies which are still too few and disparate to deal more substantially with the potential gamut of what constitutes rhythmic experience.

There followed a case-study of Dalcroze, who saw his work more as rhythmic education than music education, with widespread individual benefits as well as to the practice of the arts in general. His belief in harnessing mind to body, the Greek ideal, led to the aim of linking closely affect with intellect and, impression with expression. For Dalcroze, rhythm and dynamic feeling was dependent upon movement, resulting from the close connection between intensity of musical feeling and intensity of physical sensations. Through his approach he aimed for the maximum development of sensitivity in musical expression and musical artistry.

Dalcroze set out to cultivate a 'movement memory' in harness with musical memory, to promote mental pictures or 'images'. This was achieved through movement realisations expressing the structural and expressive sides of the musical coin, as near as possible to a visual score. His ultimate aim was to create an inner image or memory of the music, where all extraneous movements would be superfluous.

Following what had, up to this point, been a study of kinaesthesis and movement from the aspect of their instrumental function, it was necessary to examine more closely the expressive nature of movement and dance as an art form in its own right. This was done with a view to examining how closely the two art forms, music and expressive movement, correspond.

A close correspondence emerged from the fact that both spring from emotion or feeling states. These appear as basic gestures creating continuously unfolding dynamic patterns, the one in sound the other in space. Rhythm in all its aspects, but particularly in the sense of flow, appears to be a fundamental connection between them, enabling patterns to be created in time. Time, space and energy are their common parameters yet, within these parameters, elements receive different emphases, the one art focusses on the aural-spatial, the other on the visuo-spatial. Traditionally, as theatre arts, they have enjoyed a special relationship. The essential factors of energy and shape, highlighted by Rudolf Laban, are fundamental to both music and dance. Furthermore, musicians and dancers are engaged in representing primarily enactive and iconic modes of representation, creating imagery of different kinds - aural, kinaesthetic, tactile and visual.

There would appear to be sound educational reasons for relating the two arts. When music is combined with movement and dance aural imagery is an added sensory medium. It is believed that the aural dimension helps to enhance and intensify meaning. Conversely when movement/dance is combined with musical expression it adds large scale visuo-spatial and kinaesthetic imagery, corresponding closely to the weight and size of the dynamic qualities of music itself.

Despite the differing emphases, their shared dimensions provide a direct or ideo-motor correspondence.The combination of these two forms helps to create translations or metaphors for learning.

In particular it is the descriptive term 'trace form', applied to dance and now extended to music, which is especially appropriate. The vivid image of gestures, shapes and pathways which creates artistic form, applies both to process and product. There is the process of tracing patterns in sound and movement which we make with our ears, eyes and muscles, as both audience perceiver and performer, and the trace which, although transient, is left fleetingly as a product. This is perceived as resonating in the air or as a passing visual impression.

There would appear to be a richness rather than a paucity of evidence to support a kinaesthetic strategy. Some of the wider educational justifications will be dealt with in the concluding sections. However, in proposing a kinaesthetic strategy, which is amenable to empirical as well as theoretical testing, the evidence, so far, supports the following broad conceptual framework:

(1) that it is the 'attentional' stage of cognition which is of considerable importance, despite the fact that much work still needs to be done in this area;

(2) that it is, at this point, that the 'senses' need to be vividly engaged;

(3) despite the fact that music and the other arts are, in themselves, unique sensory experiential modes, for vivid imagery to occur and representational schemata to develop, strategies of inter-sensory stimulation need to be employed;

(4) kinaesthesis and physical movement are particularly relevant, for the response to sensory stimulation of a muscular kind involves pluri-sensorial feedback, i.e. the visual, tactile, auditory, kinaesthetic, etc.

(5) in addition, kinaesthetic stimulation is specifically appropriate, as muscular action is involved in all stages of the learning process. There is interaction between the sensory-motor and motor-sensory system which creates new neural pathways.

Linked to rhythm it is fundamental to the temporal arts. There is a direct correspondence or ideo-motor compatibility between music and expressive movement.

(6) by adopting such a strategy as a teaching principle, the resultant 'warming' of the senses should lead to rich encoding and form a strong memory 'trace'.

PART THREE

EMPIRICAL INVESTIGATION

INTRODUCTION

> 'The stronger the muscular sensations, the clearer and more precise the images' (Jaques-Dalcroze, 1921, p.67)

This quotation, from Dalcroze' Rhythm, Music and Education, forms the fundamental hypothesis underlying this thesis. The question, at this point in the investigation, was whether or not this kinaesthetic principle or teaching strategy could be subjected to empirical testing.

Part three, therefore, is primarily concerned with descriptions of the replications and investigations carried out in attempting to resolve this question.

It is necessary, before proceeding, to describe briefly some preliminary, informal investigations carried out with nine to ten year old children in two junior schools. A substantial amount of 'wood clearing' was done in these early endeavours. The researcher devised tests of rhythm and pitch, adapted those of others (Mainwaring 1933), and used them for pre- and post-test purposes. Between these tests there was an input of five teaching sessions using two different strategies. Much was learned about: the problems in tests of staging levels of difficulty and of providing an adequate range from easy to difficult; choice of language for instructional purposes; adequate differentiation of teaching strategy. This was evident in handling experimental and control groups where, as a concerned teacher, one does not wish to deprive a control group of qualitative teaching. An example of this is shown in the appendix (1A & 1B). Despite critical remarks made in chapter 5, these two example lessons show how unwittingly a researcher/teacher may interfere with a potential experiment. Physical movement, albeit restrained, was combined unintentionally with other attentional strategies (notation, colour) in the lessons with the control group, thereby not ensuring adequate differentiation between the two groups.

Perhaps the most useful knowledge gained from this period of experimentation was that one is not able to be a hybrid, a researcher and a teacher at one and the same time. In the five week 'treatment' period, when engaged in teaching the musical material, it was not only difficult to control the exact quantity of material with each group but it also proved to be neither 'teaching' (which involves dialogue and interpretation) nor 'instruction' but a curious mixture of both.

However, this work proved a useful period of discovery for the researcher. Having become acquainted with the basic problems of empirical work and with the difficulties encountered in devising testing procedures, the next step was to become familiar with the kind of investigation being pursued into memory for music which was concerned with promoting imagery in some way. This was done with a view to replicating, from the existing experiments on memory for music, one that appeared to have several interesting design features which could be subsequently incorporated into an experiment on kinaesthetic strategy.

CHAPTER 9: MEMORY FOR MUSIC: PROMOTING IMAGERY ACROSS THE SENSES

After these preliminary, informal investigations, the researcher set out to replicate an experiment. One, where memory for music is promoted through a strategy involving visualisation and imagery. Central to this experiment is the idea that imagery promoting titles can be differentiated between those described as 'concrete' and others as 'abstract'. As it turned out various age groups became involved in, what was to become, an interesting and valuable experiment.

This is an account of the replication of the experiment Memory for Music devised and executed by Delis, Fleer and Kerr (1978) at the University of Wyoming with psychology students as subjects.

Research has shown that the structural characteristics of what Meyer (1967) terms the 'embodied' meaning of a musical passage affect positively an individual's memory for music (Dowling 1973, Dowling and Fujitani, 1971, Dowling and Hollombe 1977, White 1960). This is in accordance with visual and linguistic research where memory is enhanced for familiar and well organised patterns (Neisser, 1967, Paivio, 1971).

Delis, Fleer and Kerr acknowledge that their study was inspired by research in which visual imaging had proved an effective strategy in improving memory for linguistic material (Paivio, 1969). It was designed to determine whether 'designative'meaning, i.e. the images and ideas that a musical passage may evoke, would prove to be an equally effective tool in memory recognition. Subjects could improve their memory for musical passages, they argued, by creating richer, more elaborate, designative interpretations of the passages.

Subjects were asked to make designative interpretations of musical passages, by constructing visual images while in the process of listening (see appendix 2A). These interpretations were manipulated by presenting six passages with assigned titles, three of them easy to understand (designated 'concrete') and three difficult to comprehend (designated 'abstract'). In addition, every combination of title with extract was used (6 x 6 design) so that each title was paired equally with all six extracts and subjects were grouped so that six groups of six subjects imaged to each particular music-title combination.

After responding to the experimenter about the vividness of imagery experienced for each item, a self-rating was made for each extract. An unexpected recognition test followed (appendix 2B), the results demonstrating that recognition memory for the musical passages was superior in the 'concrete' condition. This supported the original hypothesis that meaningful interpretation of stimulus material is a major determinant of memory accuracy.

At this point, it seems necessary for the researcher to declare her theoretical position with regard to the nature of this experiment. Although there is a danger in referentialism that every piece of music refers to something outside itself, there exists a large repertoire of 'programmatic' music which does have designated meaning. Similarly, the genres of song, choral music, opera, where words and music are fused, lend themselves to this category. This is a criticism which might also be made later about using a kinaesthetic strategy in teaching music. However, it could be argued that the direct correspondence or primary isomorphism which exists between music and movement, is rather different from the intentional promotion of visual images from given titles. The justification for replicating this experiment, however, was to purposely use a form of referentialism purely as a memory strategy, rather than to adopt an aesthetic position.

<u>Procedure</u>

The subjects were presented, individually, with 6 one-minute passages of classical music, taken from a selection of nineteenth and twentieth century symphonic works. Passages had been selected for their unfamiliarity, by means of a test previously administered to a separate group of thirty-two psychology students. This group rated 20 one-minute extracts on a scale from 1 (very familiar) to 7 (never heard before). The six passages receiving the lowest familiarity ratings were chosen, the mean familiarity being 5.49.

A sheet listing six titles was placed before each subject (appendix 2A). Each was asked to read the title, listen to the passage and mentally visualize those things to which the title referred, which might possibly be related to the sounds of the music. Each individual was then asked to describe any images evoked into a tape recorder and rate the vividness of each image on a scale of 1 (very vivid) to 7 (no image).

After all six passages had been described and rated, an incidental recognition test was administered. This consisted of 24 five-second passages (appendix 2B). The twelve passages for recognition were taken from the six test passages used in the imaging-vividness phase,i.e. two bursts from each item. The other twelve came from the next six unfamiliar extracts in the original familiarity test, again two bursts from each item. These were used as distractor items. The mean familiarity items of these passages was 5.04. The subjects were instructed to write 'yes', if they recognised the item as one just heard, or' no' if not. To safeguard any temptation to guess, subjects rated the confidence of their response using a five point scale, five indicating total confidence in their answer, through to one, a total lack of confidence.

Results

Using a 6 (passages) by 2 (concrete v. abstract title) within subjects, factorial design, the original experimenters found that images were rated significantly more vivid when associated with passages assigned to concrete titles than with abstract (see table 1).

TABLE 1

Titles:	Mean vividness rating*
Easy to comprehend (concrete)	2.92
Difficult to comprehend(abstract)	4.68

$F(1,35) = 13.198 \quad p < .005$

(*low= more vivid)

Source: taken from Delis, Fleer and Kerr 1978

The recognition test responses (twelve) were analysed for effect of title on passage recognition. Each recognition response was combined with its accompanying confidence rating and assigned a numerical value from 1 to 10, resulting in a transformed score for each item ranging from 1 to 10.

	totally confident				no confidence
Correct 'yes' or 'no' with rating:	5	4	3	2	1
scored:	10	9	8	7	6
Incorrect 'yes' or 'no' with rating:	5	4	3	2	1
scored:	1	2	3	4	5

An analysis of variance revealed significantly better recognition when passages were given concrete rather than abstract titles:

TABLE 2	Mean recognition score*
easy to comprehend (concrete)	6.77
difficult to comprehend (abstract)	5.79
$F(1,35) = 11.87 \quad p < .005$	

*high= better recognition

Source: Delis, Fleer and Kerr (1978)

Delis, Fleer and Kerr suggest that the results of their study indicates a significant and independent effect of designative meaning as a determinant of memory and that encoding strategies for music and language may be similar.

The experiment described, in accordance with general principles of memory investigation, was concerned with attaching or promoting meaning to a task. A subject's mental set was manipulated by means of instruction. As we have seen, the memory test was one of recognition, not recall. As no warning was given about any recognition test, the learning to be tested was incidental, rather than intentional. This reduces the chance of a subject being involved in extra cognitive processing in order to improve performance. Recognition involved remembering a sound stimulus, verbal information associated with a sound stimulus, and any visual imagery promoted in the discussion of the sound stimuli and titles.

Taylor Replication Experiment 1

In replicating this experiment, as convention demands, the hypothesis had to be stated in its null form.

Hypothesis: that there will be no difference in recognition success between musical extracts associated with titles considered to be either concrete or abstract.

Stage I of the experiment, the rating of twenty extracts of nineteenth and twentieth century orchestral music for unfamiliarity, was administered to thirty-six postgraduate students at the Institute of Education, University of London. Of the 27 females and 9 males, seven were music teachers. Compared with the original experiment, in which there was a bias towards males, here there proved to be a bias towards females.

The subjects were required to rate their familiarity with the twenty extracts by putting a mark across a continuum measuring 6 cm., ranging from 0 (never heard before) to 6 (very familiar). In this experiment five items were included which have been associated with television programmes or advertisements. This was done in order to give subjects some success in what would have proved to be, otherwise, a rather unproductive and melancholy exercise. These were Bach's Air on a G string, Orff's Carmina Burana, Strauss' Thus Sprach Zarathustra, Prokofiev's Classical Symphony and Katchaturian's Spartacus.

The twenty items also included the six passages found to be least known by the American research team. These are marked with an asterisk (*) on the following chart.

List of extracts used in stage I of the experiment:

1.	BACH	Air on a G string
2.	PROKOFIEV*	Love of three oranges suite, [pt. 5]*
3.	SIBELIUS	Symphony No. 5 [mov.1]
4.	ORFF	Carmina Burana
5.	NIELSEN*	Symphony No. 4 'The Inextinguishable' [mov.1]*
6.	R. STRAUSS	Thus Sprach Zarathustra
7.	SCHOENBERG	5 Pieces for orchestra [1]
8.	MAHLER*	Symphony No.2 [mov.1]*
9.	KATCHATURIAN	Spartacus [Adagio]
10.	BRAHMS	Symphony No. 4 [mov.4]
11.	BARTOK*	Divertimento (mov.2)*
12.	COPLAND	Appalachian Spring
13.	JANACEK	Sinfonietta

14. BERLIOZ* Symphonie Fantastique*

15. SHOSTAKOVICH Symphony No.1 [mov.2]

16. DELIUS Prelude to 'Irmelin'

17. PROKOFIEV Classical Symphony [mov.1]

18. DEBUSSY* Prelude de l'Apres-midi d'un faune*

19. BEETHOVEN Symphony No.3 [mov.1]

20. RIMSKY-KORSAKOV Procession of the Nobles (Mlada Suite)

The following table shows, in ranked order, the six least known works, followed by the next six, those to be used as distractor items. Although the results of this stage were analysed separately, non-musicians from musicians, stage two of the experiment was based on the results collected from the much larger group of non-musicians. These were thought to be more representative of the population to be tested in Stage II, the main stage of the experiment.

TABLE 3

Six least known works (low numbers indicate greater unfamiliarity.

Non-musicians	$\bar{x}$	s.d.	Musicians.	$\bar{x}$	s.d.
1. Bartok	0.54	0.92	Prokofiev	1.04	1.03
2. Prokofiev-	0.67	0.89	Nielsen	1.14	1.25
3. Nielsen	0.84	1.26	Mahler	1.27	1.55
4. Schoenberg	0.89	1.16	Schoenberg	1.74	1.06
5. Sibelius	0.92	1.31	Sibelius	2.10	1.76
6. Mahler	0.94	1.31	Delius	2.19	1.40
$\bar{X}$	0.8	1.14		1.58	1.34

Next 6 least known works:

	$\bar{x}$	s.d.		$\bar{x}$	s.d.
1. Shostakovitch	1.1	1.40	Bartok	2.39	1.77
2. Janacek	1.35	1.93	Berlioz	2.41	2.17
3. Berlioz	1.58	1.81	Shostakovitch	2.43	1.36
4. Delius	1.73	1.88	Rimsky-Korsakov	2.83	2.11
5. Brahms	1.83	2.04	Brahms	2.93	1.63
6. Copland	2.01	1.77	Copland	2.94	1.41
$\bar{X}$	1.6	1.8		2.65	1.74

Overall means for the twenty items rated were 2.45 total population, 2.24 non-musicians, 3.35 musicians. The difference between the means of non-musicians and musicians was found to be significant (t related means test: $t=-7.41$ $p<0.05$). However, the rank order of means for unfamiliarity was significantly similar ($r= .923$) for the two groups.

Stage II or the main stage of the experiment was then carried out with seventy-two fifth and sixth form students in four different schools. 36 were musically experienced (instrumentalists of at least four years standing) and 36 inexperienced, termed MS (music specialists) and NMS (non-music specialists) respectively. Females numbered 19, males 53. In encountering difficulties with choosing subjects, there was a bias towards males.

Following the procedures of the original researchers, the six least known musical extracts were randomly assigned six titles, those used by Delis, Fleer and Kerr. These were 'Ocean Voyage, Winter Forest, Peasants in the Field (deemed 'concrete') and, Refuge in Truth, Rebirth of Justice, Philosophical Questions' (deemed 'abstract').

Each title was paired equally with all six passages of music. As seventy-two subjects were to be tested, each title sheet was presented individually to 12 subjects i.e. a 6 x 12 design. The distribution of MS to NMS within each title-extract combination was random.

Rating for vividness was marked across a 6 cm. continuum ranging from 0 (low) to 6 (high) (see appendix 1A). Apart from this, the same procedure was used as in the original experiment with the exception that where Delis, Fleer and Kerr introduced the task by stating fallaciously that the titles were the composers' thematic interpretation of the music, these subjects were told that the titles had been assigned to the extracts by the designers of the experiment.

After listening to each extract, the subject, for each item, described his or her response to the task and gave a vividness rating. An unexpected recognition test followed immediately (appendix 2B) and the results were then analysed.

Results

The recognition test required subjects to make a response to 24 items. Recognition of these items resulted overall in high scores, with no raw score falling below 12 out of 24. The range was between 12 and 24, the mode 18 and the median 18.5.

A two-way analysis of variance (ANOVA) test was carried out on the raw scores (24 items) 2x2 unequal groups.

No significant difference was found between the means of male and female scores (males 18.04 and females 18.58). There was a significant difference, however, between the MS (19.06) and the NMS (17.31) ($F=8.22$ df.1, $p<0.05$)

Similar two-way ANOVAS were carried out for vividness on the six items. A significant difference was found between Abstract (A) and Concrete (C) conditions in three out of the six items (Prokofiev, Bartok, Nielsen) where the concrete condition was found to be more vivid (see table 4).

TABLE 4

	Vividness means	
	C	A
Prokofiev	3.64	2.11
Bartok	3.39	2.23
Nielsen	3.69	2.72

[$F = 14.92, 9.4, 4.01$, $p<0.05$]

A two-way ANOVA on the transformed recognition scores, derived from the subjects' use of a confidence rating (see p.219) found that there was a significant difference on four of the twelve items (two extracts from each of the six items). In one of which (Mahler, second extract) the abstract mean was higher (see table 5).

TABLE 5 Recognition means

	C	A
Schoenberg (item 19)	7.72	6.42
Mahler (item 2)	9.47	8.67
Mahler (item 24)	6.56	7.94
Bartok (item 8)	8.11	5.61

[F= 5.01,6.06,5.06,20.26,p$<$0.05]

To test whether there were differences between the recognition of 'concrete' and 'abstract' passages on both occasions, a related measures t-test was used over the overall means across the six passages.

Table 6 shows that, on both the first and second occasions, no significant difference was found in the means. (first occasion t=-.75, df 5, n.s.; second occasion t=-.26, df5, n.s.).

TABLE 6

Differences between overall means for recognition on occasions 1 and 2.

	Occasion 1	Occasion 2
Recognition concrete	8.08	6.79
" abstract	7.72	6.88
	t= -.75,df5,n.s.	t=-.26.df5.n.s.

The overall recognition rate for the 12 items was 76 (MS77.5, NMS 75.4).

Considering that it was also important to check the means for raw, as well as transformed recognition scores across the 12 extracts as either hits or misses the researcher found the MS to be 9.3 and the NMS 9.05

<u>Discussion</u>

In stage I, the preliminary stage of the experiment, a significant difference was found between the familiarity means of the non-musicians and the musicians. In the main part of the experiment, stage II, differences in the vividness and recognition means of 12 items were weighted towards the concrete in each case, but not sufficiently to be of significance. In each case the mean was higher than in the American study.

On vividness of imagery, a significant difference was found between abstract and concrete in only three of the six items. Again, however, this was in the concrete direction. On the recognition test, for both MS and NMS, the scores were high, with a significance being found between them on the raw scores. On the transformed scores, for the total population, a significant difference was found between four of the twelve items (6 x 2),three towards the concrete and one towards the abstract. Overall, the scores were high, which could be attributable to a number of factors such as:

1) that the subjects were an unusually musically intelligent sample, unrepresentative of the school population as a whole.

2) that the subjects were self or teacher selected, and, as such, highly motivated;

3) as 5th and 6th formers, they were experienced in taking examinations; the subjects were used to being tested;

4) that the music education in these four schools was of good to superior quality;

5) despite the fact that music from the symphonic repertoire was being exclusively used, for which the NMS declared little interest, the considerable interest expressed in pop music may infer that this genre is providing sufficient musical information to transfer to tasks of this kind;

6) that a cultural effect should be recognised. This experiment took place 9 years after the first and the subjects were European;.

7) that remembering, in the sense of recognition, rather than recall, is considered to be remarkably successful. (see Gagné 1977, p.80);

6) that the test itself, is too easy for this particular age group;

7) that the test itself is an effective teaching device;

8) that the immediate administering of a recognition test is a weakness. A delay of at least one week would be be more valuable test for endurance of memory trace.

The results were mixed to the extent that although one could not reject the null hypothesis, non-rejection was done with some reluctance. However, reassurance was found in the fact that the results leaned towards the concrete in the majority of cases.This provided sufficient stimulus to extend the experiment, this time to a larger number of younger subjects, namely third year secondary school children.

CHAPTER 10: REPLICATION 2 - DEVELOPING THE EXPERIMENT

Hypothesis: that there will be no difference in recognition success between musical extracts associated with titles considered to be either concrete or abstract.

Three secondary schools took part in this experiment, which was on a much larger scale than previously. One was an all girls inner city school where the majority of children were of Asian descent. Here, five third year classes were used, totalling 137 subjects. Another was a mixed, comprehensive suburban school with three third year classes, comprising 80 subjects and the third, one class of 30 from a boys selective grammar school in a coastal resort. The total number of subjects was 247 of which 167 were girls and 80 boys; this time there was a bias towards girls.

Procedure

Heads of the respective music departments kindly agreed to run the experiment for the researcher, this time with whole classes rather than with individuals. They were required to follow closely a set of instructions sent to them with a tape cassette. Only one set of extract-title combinations was used (sheet A from the set A to F), to avoid complexity, as the intention was to concentrate on varying the treatment conditions employed.

In view of what had been learned in the first replication an opportunity presented itself to develop the experimental strategy. It seemed vital to introduce delay between hearing the musical extracts and the recognition test. Also, there was an opportunity to judge what effect no title had on memory. Therefore the researcher asked the two teacher assistants, who were running more than one sample group, to apply three different treatments. Treatment A was as before, i.e. normal. Treatment B was normal but with 1 week's delay inserted before the recognition test. In treatment C, subjects were to be given no titles or imagery instructions (no title) but asked to listen closely to 6 short extracts of music without any further explanation, the assistant calling out the number of each extract in turn. Particular analyses would be done in view of possible ethnic differences in School 1. The schools are referred to as school 1 (girls), school 2 (mixed) and school 3 (boys).

Results

Table 7 shows the range, mode and raw score mean of the nine classes originally involved in the experiment.

The two scores given for School 2 (3X - treatment B) in table 7 is explained on page 235.

TABLE 7

School	Class	Raw Score M	Mode	Range
Treatment A (normal)				
1 (Girls)	3E	15.8	17	10–19
"	3L	16.16	16 & 18	11–19
2 (Mixed)	3Y	16.6	18	10–22
3 (Boys)	3rd yr.	17.6	17	14–20
Treatment B (one week delay)				
1	3S	16.59	17	11–20
2	3X	14.42 16	15 15	11–19 9–21
Treatment C (no titles)				
1	3P	17.3	19	9–22
"	3H	16.8	17 & 20	11–20
2	3Z	17.16	18	11–21

Although not as high as previously, the recognition scores were still fairly high, with the total mean raw score 14.42 out of a possible 24.

Following the collection and charting of data various analyses were carried out. First, one and two-way ANOVAS were made of the raw scores (see appendix 3A to F for detailed data).

A one-way ANOVA between schools 1 and 2 treatment A female subjects revealed a significantly higher mean for school 2 ($F=12.27$, df34, $p<0.05$) (appendix 3A).

Another one-way ANOVA between schools 1 and 2 treatment B girls found that school 1's mean was significantly higher than school 2. Through an error in running the experiment, school 2 treatment B sample had received the recognition test twice, once immediately after the vividness phase and then a second time one week later. There was no significant difference between the raw score means after the 1 week delay. Interestingly, the mean for school 2 rose with the delay, from 14.25 to 15.22, (appendix 3B).

Although the mean scores were high for the two classes of school 1 (treatment C), there was no significant difference between the girls scores (appendix 3C). Similarly, a one-way ANOVA between the five classes of school 1 found no significant difference between the three different treatment conditions (appendix 3D).

To check for gender differences, as well as treatment differences, two-way ANOVAS were carried out on the three school 2 classes. Analysis revealed no significant differences here between either gender or treatment, yet there was a significant interaction between them (appendix 3E).

A two-way ANOVA was used on the data from the boys of school 2 and 3 exposed to treatment A. Checking for significance between schools and between music specialists and non-music specialists proved that there was significant interaction only. This might be explained by the fact that both schools have a similar population although they are not schools of the same type, one being a selective school. Of interest was the fact that the non-music specialists of school 3 scored higher than the same schools music specialists (a mean score of 17.7 compared with 17.46: appendix 3F). Generally these boys were of a high intellectual ability, probably used to being 'tested' throughout their school life.

In charting and analysing data, the main stage was to chart the transformed scores for each class and carry out two-way ANOVAS to test the null hypothesis:

> there is no difference between
> concrete and abstract title
> conditions and no difference
> between the first and second

occasions of hearing the extracts
to be recognised

One might reasonably expect decay between first and second occasions hearings, although it must be remembered that these constitute two different 5 second bursts from the same 1 minute extract. Tiredness might be expected to be a factor, as might confusion. Figures 8 to 17 (appendix 3G) show how each sample group performed. In the treatment C condition, for example, school 1 (figure 15), there is a significant difference between first and second occasions in the expected direction. There is also a significant difference between what for the other groups constituted concrete and abstract conditions, the former being higher. Interaction is also significant. This does not hold for school 2 however, where treatment C group shows significance only between occasions (figure 16).

Out of the four groups (2 girls, 1 mixed, 1 boys) receiving treatment A, occasions, conditions and interaction are significant in all but one (the boys group- figure 10)) where there is no significant difference between conditions.

It was interesting to find that the scores were so high for the 'no title' condition. Two of the three classes were from School 1 where visualisation came easily. It may have been that, for this group, titles were not so important. The fact that all three schools scored highly may have been due to the novelty or 'Hawthorne' effect of the experiment itself.

Another interesting finding was in the analysis of the two classes from schools 1 and 2 who received treatment B (delay)(figures 11 and 13). Condition and interaction were significant but there was no significant decay between first and second time occasions. As a consequence, the researcher decided to ask for one more sample to be run under this treatment, to see if the trend were maintained. Disappointingly it was not and there was a significant decay between first and second occasions. Figures 8 to 17 (appendix 3G) show the mean raw scores between conditions and occasions for all classes and treatments.

Table 8 indicates the high F value for class 3NV, the tenth, maverick or outlier group compared with classes 3S and 3X.

TABLE 8 F VALUES FOR TRANSFORMED SCORES

	Normal			Delay			No titles		
	3E	3L	3Y	3	3S	3X	3NV	3H	3P	3Z
(O)	16.62 *	42.76 *	17.94 *	31.19 *	1.0 n.s.	0.58 n.s.	28.77 *	8.23 *	20.05 *	18.39 *
(C)	12.56 *	4.6 *	abs 5.8 *	1.16 n.s.	8.71 *	5.43 *	6.35 *	8.76 *	5.12 *	1.16 n.s.
(I)	2.21 *	4.16 *	5.48 *	5.08 *	5.26 *	2.71 *	3.59 *	2.85 *	4.76 *	1.86 n.s.

* = significant at $p<0.05$
(O) = between occasions; (C) between conditions; (I) interaction

The table also shows, at a glance, a summary of the F values collated from the research data and that, out of ten sample groups, eight revealed a significant difference between concrete/abstract conditions, which was the main purpose of this replication experiment. The two exceptions were school 2 (class 3Z, treatment C) and school 3 (class 3, treatment A). In 5 of the 7 sample groups, (normal and delay only), the concrete condition scored significantly higher than the abstract. In only one sample (3Y) was the result significant in the other direction. It seemed, from these results, that the null hypothesis could be rejected and that one could state that the association of concrete titles with musical extracts did lead to higher recognition success than abstract titles.

Discussion

This experiment yielded a considerable amount of data. Various lines of development appeared attractive to follow. The running of different treatments brought an awareness of the experiment's potential to concentrate on different aspects of memory in general. The fact that an error had been made with one class in school 2 presented what might, on another occasion, provide a fourth or alternative treatment. Again, one might be led to embark on a series of experiments on gender differences or memory strategy preferences related to gender.

Why were the females of school 2, class Y, producing such superior scores?. On examination there appeared to be no clustering of music specialism. Neither was this related to the finding that, in school 3, the non-music specialists outscored the music specialists. Could Spearman's 'g' factor be of greater importance in this work than musical experience? From discussions with the teachers, there was no reason to believe that these were unusual groups. In school 3, however, all the boys were selected by means of an 11 plus examination.

Another line of enquiry would have been to pursue cultural effects, for the female pupils of school 1 belonged to a cultural group who responded naturally when asked to visualise to music. The reason given by the head of music was that films were a major part of the pupils life. Music figured prominently and was used in a highly symbolic manner.

One other analysis was undertaken, a nested design, on class 3S from school 1 (treatment B) to find out whether more detailed cell analysis would produce further useful information. However, this was abandoned for lack of data.

At this point, a decision was made to press on towards the preparation for the experiment proper, confident that the positive results yielded from the promotion of memory through concrete rather than abstract conditions, had been made evident with this age group and with a far larger subject sample. It appeared that the present experiment had much to commend it, as a basis for further work and experimental developments. As the mean score was still relatively high, there would appear to be no problem in carrying out the final experiment with even younger subjects.

As a result of carrying out this work, it was decided not to use analysis of variance in the experiment to follow. It appeared that there would be little of likely significance to justify using an ANOVA instrument, given that far smaller numbers were envisaged. There was also unease about the processing of scores based on confidence levels. This instrument appeared to be of doubtful validity, both in terms of interval and ordinal data. Raw scores seemed to be the most reliable and a 't' test and Mann-Whitney test could prove to be adequate statistical tests to process them.

CHAPTER 11: PHYSICAL MOVEMENT AND MEMORY FOR MUSIC: THE EXPERIMENT

In Memory for Music imagery promoting strategies were used to aid the memory. Certain aspects of the experimental methodology had proved to be so useful that they were to be retained in the final experiment. The main feature of the replication had been the presentation of short musical items for later recognition, through very brief bursts of the original items, intermingled with distractor items of the same length. This would be adopted in the new experiment. Despite the problems of validity voiced about the confidence rating scale, it would also be used as a helpful tool in fine tuning the quality of the subject responses in order to avoid any chance of guesswork.

Apart from the reasons of questionable validity, already voiced, other factors such as temperament, personality, gender, could influence the use of this scale. Therefore the researcher intended to use only 'raw' scores. In the final analysis, the answers could be only 'correct' or 'incorrect'.

So far, the experimentation had been concerned with the promotion of imagery through the evocation of visual images. The conditions 'abstract' and 'concrete' were fundamental to this work. This implies, and is in accordance with the conceptual framework drawn up at the end of part two, that the 'attentional' stage of cognition is of such importance that strategies of drawing attention to music should be an essential concern of educators. It is here that the senses are utilised and where they need to be vividly engaged.

Although the very nature of music constitutes, in itself, a 'sensory' mode of experience - an 'aural' experience- intersensory stimulation, the researcher suggests, particularly aids the formation of representational schemata. The response to sensory stimulation of a muscular kind, the kinaesthetic, involves pluri-sensorial feedback: the visual, tactile, auditory and kinaesthetic are inter-related. There is also an ideo-motor compatibility between movement response and a musical stimulus. Therefore, in this experiment, the experimental condition would be concerned to promote this ideo-motor correspondence.

Bearing in mind the Dalcroze hypothesis heading the introduction to part three, the researcher now proposed to test whether physical movement or gestures, used as a strategy for encouraging musical memory, would be more successful than conventional means. Stated conventionally in null form the hypothesis was one-tailed:

There will be no difference in promoting memory for music by using physical movement as a strategy than by conventional means.

The most attractive experimental design for this purpose was the one described by Campbell and Stanley (1963) as a 'simple natural package'. This design, the Post-test only, control group design, appeared to lend itself naturally to an experiment involving a novel instructional strategy with limited access to child subjects, in this case a group of first year secondary school children.

It is evident that, in working with human subjects, it is difficult to provide adequate controls in the experimental situation, whatever the design. Sometimes quite complex, overlapping designs or time series experiments have been employed to counteract this. In the school environment, particularly in the current educational climate, it appeared necessary to work swiftly with the least disturbance to the school. The Post-test only design seemed most relevant, where a control and an experimental group undergo two different treatment conditions, before receiving an identical test.

In wishing to introduce a kinaesthetic strategy, the use of any pre-test would have been an intrusion. Not only had the researcher encountered problems in preliminary investigations which led to the conclusion that appropriateness is a a problem, but there is a difficulty if one is using a recognition test. One can not use material for a pre-test which is later to be included for a recognition test. As Campbell and Stanley state, in justification for this type of experimental design:

> '...even so, many problems exist for which pretests are unavailable, inconvenient, or likely to be reactive, and for such purposes the legitimacy of Design 6 still needs emphasis in many quarters' (Campbell and Stanley 1963, p.26)

The key to this design, regarded by Campbell and Stanley as greatly underused in educational and psychological research, is randomisation. It would be essential for the subjects to be randomly assigned to one of two groups. Given this requirement one group, the experimental group, would be given a kinaesthetic strategy as its treatment condition and the other, the control, the conventional use of verbal language, considered equivalent in directing attention to the music.

Seventy-two children were used as subjects, a group of first year (11-12 year old) secondary school children. These were randomly divided into two groups: experimental and control. It was vital that both control and experimental groups received an equal amount of exposure to the musical items, the same environmental conditions and the same ordering of items. Whereas thé replication experiment was a within-subject design, this time the subjects were treated as groups, a between-subjects design. One of the key points about kinaesthetic strategy, as a teaching technique, is that it takes full account of peer group learning, i.e. that learning takes place through seeing not only one's own movements but those of other people.

In the original experiment and the replications, all the musical items were taken from the western orchestral repertoire. Clearly, if one selects items representing different genres, they will be fairly easily recognised. However, to avoid any criticism of the original musical extracts being either monocultural or eurocentric, selection was made of just four of the original western 'classical' items and a further selection made of four items from both the mainstream jazz tradition and classical Indian, making 12 items in all, grouped in three sets. By extending the number of items and by grouping them in sets, diversity and homogeneity could be attained.

In order to present the experimental group with as realistic a task as possible, the instructions indicated a specific purpose in carrying out the researcher's requirements. This was to be asked to imagine that one was helping a deaf child of the same age to understand how the music sounded.

Procedure

The procedure, given both orally and on instructional sheets, was as follows:

CONTROL

Imagine that you are helping a deaf child who is the same age as you.
I am going to play some short extracts of music.
Listen once, then when the music is played a second time begin immediately to **jot down words or sentences, whatever you feel would help this deaf girl or boy to know how the music goes.**

Let's try a couple of practice items.

How would you describe this?

.... play 1 min.
(repeat)

EXPERIMENTAL

Imagine that you are helping a deaf child who is the same age as yourself.
I am going to play some short extracts of music.
Listen once, then when the music is played a second time begin immediately to **move to the music in any way you like, using physical movements or gestures to help this deaf girl or boy to know how the music goes.**

Let's try a couple of practice items.

How would you show this?

.... play 1 min.
(repeat)

Do this again with a second example.

Then play the twelve extracts twice each.

4 jazz
4 classical western
4 classical Indian

The exposure times to this procedure were to be carefully monitored so as to be equal for each group, approximately

5 minutes for practice and 35 minutes for the task itself. Paper would be handed out to the control group and collected in afterwards. With the experimental group, the researcher would be seen to be making notes about the group's movements and gestures.

Not only would this treatment be sufficiently long for one period of concentration, without administering the recognition test at this time, but it had been found useful, in the previous experiment, to delay the recognition test for a week. As teaching is essentially concerned with what remains of an enduring nature, inserting a week's delay before testing for recognition appeared to be educationally desirable.

Two points of difference from the replication experiment should be noted. In the replication, as in the original experiment, each item was first presented as a one minute extract. In order to accustom subjects to this particularly novel experimental condition, the item length was now extended to approximately one and a quarter minutes. The order: jazz - classical western- classical Indian was deliberate from the point of view of first providing an opportunity for subjects to become acclimatised to the style of each genre. Second, to start with a genre, jazz, which should appear more familiar and approachable for movement gestures. The sequence and the choice of genres were chosen from the point of view of working through from the potentially familiar to the least familiar. It was thought unlikely that the children would have come into contact with any of the items chosen from the jazz and Indian traditions. Items from the western classical tradition were those previously tested for unfamiliarity with a group of adults.

For the recognition test, taken one week later, two 5 second extracts (bursts) were prepared from the first three items of each group. The last item from each set of 4 was abandoned with a view to reducing the element of expectancy. These extracts, together with 9 distractor bursts, representing the three genres, were then randomly arranged. The total of extracts to be recognised was 27. It had been found in the previous experiment that subjects began to tire after the twentieth extract. It seemed desirable, therefore, to confine the test to a number under 30.

Both the experimental and control groups, in each of the three classes or sub-groups, were to take the recognition test together. As before, it was anticipated that this test would take about 15 to 20 minutes to carry out. A further short task would require the subjects to comment briefly at the end of the test sheet about their attitude towards the activity in which they had been engaged in the treatment session.

Before proceeding, a short piloting session was carried out in a modified form. This took place in the same secondary school with one second year class of 30 subjects. They were treated as a single group and were given both treatment conditions, the first six items in the control situation and the second in the experimental. A recognition test was presented immediately afterwards. The purpose of this was to establish if the procedure and strategies were feasible with children of the lower secondary age range and also to test the timing involved.

In the event the strategies proved acceptable but the 12 items appeared to be too long to adequately sustain attention. These were reduced to three sets of three without the necessity to adjust the recognition test. It was also found that nine items required all of 35 minutes which, combined with an initial practice time of 5 minutes, totalled 40 minutes treatment time. This was strictly adhered to with each group of subjects.

There were nine extracts, ordered as follows:

Jazz

1. Miles Davis - Milestones
2. Benny Goodman - Let's Dance
3. Stan Getz - The Nearness of You

Classical Western

4. Mahler - Symphony No. 2 (1st movement)
5. Bartok - Divertimento (2nd movement)
6. Nielsen - Symphony No. 4 (1st movement)

Classical Indian

7. Music of Pakistan
8. Sarod - Ali Akben Khan
9. Shahnai - Bismillah Khan -Thaptaal

Distractor items were as follows:

Jazz

1. Graham Collier - Opening to 'Portraits'
2. Bill Perkins Octet - 'For Dancers Only'
3. Stan Tracey Trio - 'Baby Blue'

Classical Western

1. Berlioz - Symphonie Fantastique (1st movement)
2. Brahms - Symphony No. 4 (4th movement)
3. Delius - Prelude to Irmelin

Classical Indian

1. Bhimsan Joshi

2 and 3 Leela Floyd - two contrasting items from the Øxford Topic cassette: Indian Music

Recognition Test, Order of Items

1. Distractor Jazz 1 *- Collier
2. Indian Classical - Shahnai 1
3. Western Classical - Nielsen 1
4. Jazz - Goodman 1
5. Indian Classical - Shahnai 2
6. Western Classical - Nielsen 2
7. Distractor Indian 1 - Bhimsan Joshi
8. Distractor Western 3 - Delius
9. Distractor Indian 2 - Leela Floyd
10. Jazz - Goodman 2
11. Indian Classical - Music of Pakistan 1
12. Jazz - Miles Davis 1
13. Western Classical - Mahler 2
14. Western Classical - Mahler 1
15. Distractor Jazz 2 - Bill Perkins
16. Jazz - Miles Davis 2
17. Indian Classical - Music of Pakistan 2
18. Indian Classical - Sarod 2
19. Distractor Indian 3 - evening raga
20. Distractor Classical 1- Berlioz
21. Distractor Classical 2 - Brahms
22. Indian Classical - Sarod 1
23. Jazz - Stan Getz 2
24. Distractor Jazz 3 - Stan Tracey
25. Jazz - Stan Getz 1
26. Western Classical - Bartok 2
27. Western Classical - Bartok 1

*refers to first or second extract from item

Results

The sample consisted of 72 boys and girls, randomly divided into an experimental and a control group of equal size (36 x 2).

It was decided to proceed with a one-tailed hypothesis and, in view of the fairly small numbers involved, to accept $p<0.05$ as a significant level.

In each sub-group (tutor group) the mean score for the experimental group was found to be higher than the control. (1SM 21.3 to 19.8; 1SV 18.72 to 17.69; 1NV 18.5 to 17.75). To test for significance over the total group, an unrelated t-test was carried out on the scores with the result:

TABLE 9

	Experimental	Control
Mean:	19.61	18.36

't' value 1.81 df. 70 $p<0.05$

Given a critical value for t of 1.67, the result was significant at the 5% level of probability (see appendix 4A). As a further statistical measure, the non-parametric Mann-Whitney test was also used. This conservative measure assuming ordinal rather than interval data, reinforced the t-value with an associated probability of p=0.03 (see appendix 4B).

As a result, the null hypothesis was rejected and it could be stated that, in the researcher's view, the experimental treatment, physical movement and gesture, a kinaesthetic strategy, does make a positive difference to recognition and leads to a higher retention of musical information. Obviously, replications of this experiment would further strengthen or weaken this assumption.

Further analysis revealed that there was barely any difference between the performance of the girls and the boys (mean: females 19, males 18.9). It was clearly not significant and justified no further statistical analysis.

Over the target items, in terms of performance levels, the result were very mixed (see appendix 4C figures 18,19). The most easily recognised items, by both groups, were the Indian (Shahnai) and Jazz (Miles Davis) items, both arresting in terms of timbre and novelty. At the other end of the scale the least recognised items, for both groups, were two of the western classical - the Nielsen, closely followed by the Bartok. In that the passage selected from Bartok's Divertimento is very quiet, one could foresee that it might present some difficulty for the subjects in their physically being able to hear the extract in an institutional setting, particularly for the experimental group. As there were two extracts in this category, perhaps, as several writers have suggested, western classical music may present a weaker, less arresting genre for children of this age. The placing of items would appear to be an important factor. The two most easily recognised items were presented at the beginning and at the end of the treatment, the two least remembered came in the middle.

Discussion

Having randomly assigned subjects to groups, it seemed reasonable to discover where the musically experienced were located. This was done by asking the music teaching staff to check the listings made. Five appeared in the experimental group with scores: 16, 18,18,18,22 = mean 18.4. In the control there were 4, with scores: 16,20,21,21 = mean 19.5. Interestingly, the highest scores (above any of those just detailed) were those of 8 subjects not identified as musically experienced: 23 x 3, 24 x 4, 25.

One could speculate about the reasons. There could be subjects whose musical potential has not been recognised. The background and training of the musically experienced could have proved an interference to the task in hand, perhaps another way of thinking about music which conflicted with their set patterns. In terms of general music education and listening, in particular, it would seem that those lacking musical experience, in the sense of performance training, suffered no disadvantage, quite the contrary. Again, as was found in previous empirical work, general intelligence or the Spearman 'g' factor might be a prominent factor for high achievement.

After the recognition test, subjects were asked to evaluate their experience by jotting down comments at the end of the task sheet. An analysis of these comments revealed that, of the control group, just over half (19) ranged from finding it 'quite enjoyable' or 'fun', to just under half (17) who found it a 'bit boring' or ' wishing they had been in the other group'.

Interestingly, and this supported the researcher's personal observations, in the experimental group more than three-quarters (29) ranged from believing it to be 'quite enjoyable', to finding moving 'good fun', compared with less than one-quarter (7) who, either' did not enjoy it',or 'felt it was all right'. Contrary to the researcher's expectations, in this latter group, the girls were more prone to being embarrassed to begin with, before going on to admit to enjoying the activity. The boys, on the other hand, were less inhibited and showed evident delight in being able to be very much more physically active in the listening (school?) situation.

As already pointed out, these written comments supported the impressions gained by the researcher throughout the experiment. The description 'boring' only appeared as a rider, after a positive statement in the evaluations of the experimental group but was used prominently by 11 in the control. Irrespective of the comments, once attention had been aroused, the movement activity sustained concentration on account of its direct correspondence to the flow of the music. As long as the music was heard the children were actively responding to it. They were able to see themselves and each other, sometimes relating their movements to those of another child. As one child remarked in her evaluation:

> 'I enjoyed moving to the music.
> I think you had to really concentrate'

Concentrated thought allied to physical response of the whole body was evident. This is not to say that there was a lack of concentration in the approach to the task of the control group. Yet, as the latter approached it in a conventional manner, jotting down words or sentences, there was less chance of maintaining the interest level, as the items proceeded from 1 to 9, with the same involvement as the physical movement demanded. It was interesting to note that the initial embarrassment described by some of the girls in the experimental group, did not detract from the accomplishment of the task and overall test scores.

In observing the range and quality of the movement behaviour, one saw a similar pattern emerging with each of the three sub-groups. From an initial slightly self-conscious beginning in restricted, personal space, as confidence grew the whole of the room was used. Confidence inspired individual as well as dual interpretations.

Movements were very much related to the overall style of the musical extract, moving with the flow of what was heard, often moving in time to a self- chosen pulse, in cases of music with a strongly marked metrical rhythm, such as the jazz extracts. There was a rapid response to the differing tempi of the jazz music. With the western classical extracts, response to atmosphere was quickly evident and often programmatic. For example, various chases, mock fights, shadow boxing or stealthy movement scenes were enacted. Movement was often very sensitively performed to the Indian extracts. The sound qualities here were shown in extremely fluid and flexible gestures, sensuous bodily movements, florid use of hands and arms and an association with the cultural context of music conveyed. No gender difference could be discerned. Many could be termed instinctive movers who knew immediately what to do.

Scrutiny of the verbal descriptions, carried out in the control group, revealed such comments as 'jolly, full of rhythm and beat' (Miles Davis-Milestones - item 1); 'slow, sad, smooth, flowing '(Getz - The Nearness of You- item 3); 'Indian, slow and then twangy '(Sarod - item 8); 'drastic, weird, scary' (Bartok-Divertimento - item 5); 'loud, jumpy, very fast, conquering, battle music' (Nielsen-4th Symphony - item 6); 'snake charming' (Shahnai - item 9); or 'not very dancitive' (Bartok-Divertimento - item 5).

Over half the comments revealed highly visual associations, reflecting the influence of the media and, particularly, of television. There were comments such as 'a graveyard at night' (5); 'a dark ghostly house' (5); 'being in the wood at night with something following you' (6); 'New York street scene with people dashing through the street, busy cars, fast'(1).

From observation and analysis, the experimental group appeared to be outwardly expressing what the control group was expressing linguistically and reflectively. In other words, it appeared to be saying similar things in non-verbal terms. As a strategy it appeared to be not only enjoyable to the majority of children in the experimental group but also of greater effectiveness in promoting memory for music. Given that so much of the conflicting empirical work on physical movement has been concerned with measuring rhythmical performance, often based on unsupported assumptions about children's capabilities on set tasks, the results of this experiment, concerned with promoting imagery at the attentional stage of learning, were very encouraging.

CHAPTER 12: EMPIRICAL WORK: GENERAL FINDINGS

Apart from the adult subjects, involved in the early sifting of material, experimental data was collected from a total of 441 school- children. These subjects represented samples from 10 school populations, ranging in age from 9 to 17 years.

The experiments themselves were concerned with recognition rather than recall. As a result, fairly high scores could be expected. If this work were to be developed, it would be interesting to attempt the construction of adequate testing procedures for recall with school age subjects, although it represents a difficult and challenging task

Memory for Music, the experiment devised by Delis, Fleer and Kerr, formed the basis for this empirical work. It was believed to be particularly relevant as the deliberate promotion of visual imagery was intended to create richer, more elaborate interpretations. It represented a way of 'concretising' and personalising musical information.

As was found in the first replication (chapter 9), the results did lean towards the ' concrete' direction, although they were not significant to warrant rejection of the null hypothesis. On reflection, the fifth and sixth formers were rather a self-selected group of mature school students, at this stage in their lives prone to have strong musical preferences. More importantly, a sample of this age group is probably less likely than a younger group to be influenced by novel memory strategies or any attempt to control their individual learning styles.

The development of the replication (chapter 10), on the other hand, offered an opportunity to apply the testing procedure to an age group (13 to 14 years) which was thought to be more open to experimental influence. Testing classes rather than individuals meant that a really substantial sample of 247 could be involved. A 'delay' treatment was introduced with some of the classes, which was to become standard procedure later. The results from this experiment were more encouraging. It was found that, for the most part, 'concrete' titles were more easily recognised than 'abstract', although the results were not robust across all the groups.

As young secondary school subjects are often expected, in their first year of secondary school, to learn more in accordance with Piaget's 'formal operations', it seemed appropriate that the final experiment should be devised with this age group in mind. In this, post-test only, experiment a 'kinaesthetic' as opposed to a 'language' strategy was used in an attempt to create richer, more 'concretised' imagery. Here it was the main features of the original experimental method which were used as a basis for the experiment. An educationally appropriate feature was the cultural diversity shown in the choice of items. This possibly helped to maintain overall arousal throughout the task.

The control group, in using language, did produce highly visual associations (the secular influence?). From their comments, one might assume that a considerable amount of imagined movement was going on. Yet, unlike the experimental group, who used gross bodily movements as well as small muscles, there was no movement enacted - nothing outwardly shown. Clearly, their activity lacked the direct or ideo-motor correspondence of the experimental group.

Attitude to task was important. Although there were no gender differences observed, in the quantity and quality of physical movement demonstrated, it was the boys who were particularly pleased to be 'active' and were the more prone to initiate proceedings.

The results from this experiment proved significant in the right direction. It was found that the kinaesthetic strategy did lead to higher recognition than a more conventional approach.

A finding from the earlier replication experiments, that there was some outscoring of 'musically experienced' subjects by the 'inexperienced', was maintained in the final experiment. This leads to speculation in several directions. Does a general intelligence or Spearman 'g' factor, in this kind of work, have more influence than musical experience? Are there young people, of musical aptitude in the school population, who have not been discovered? Are these high scorers, in reality, undisclosed 'musically experienced' who keep their extra-curricular activities very much to themselves? Or, as has been raised earlier, does the prior experience of the musically experienced establish a cognitive style which interferes with this experimental task.These are all avenues for further research and beyond the scope of this study.

Another question raised is that of what makes some passages more 'arresting' or vivid than others. It was obvious that the jazz and Indian items were novel to the children in terms of curriculum music, although from the movement interpretations there was no doubt about the visual associations (media influence) which these items held for them. The most successfully recognised items were the Indian (Shahnai) and the Jazz (Milestones). One could speculate that the former's distinctive reedy timbre would help to create 'memorability'. In the case of the latter, it was possibly the punchy, rhythmic urgency and clarity of melody in the opening bars which accounted for it. Placing of items, though, is more likely to be a factor for memorability, as has been found in verbal memory research (see Cohen et al. 1986) and these items were in first and last positions.

This experiment could be developed further by replicating it with the order of items changed. Another development might be to attempt a within-subjects design, if it could be adequately controlled, to test whether individual subjects are more successful in one condition rather than another. Again, these are important, interesting potential areas for future empirical work, relevant to this line of enquiry.

Although limited in terms of subject numbers, it was found that an experimental strategy using physical movement led to significantly higher recognition for musical material. As such, this represents a contribution to empirical work in an area in which much remains to be explored in terms of 'testable' theory. It would appear that the kinaesthetic principle, proposed by Jaques-Dalcroze, is strengthened by this empirical work and lends support to the conceptual framework drawn up at the end of chapter 8.

CHAPTER 13: CONCLUSIONS AND GENERAL IMPLICATIONS

As a result of this study the researcher has hoped to bring attention to bear on kinaesthesis, as a memory strategy amenable to empirical testing. The theoretical or conceptual parts 1 and 2 have been based on a study of relevant literature in cognitive psychology, music psychology, arts education, movement and dance and from practical work and observations in the field of Dalcroze Eurhythmics.

Specifically, the researcher has attempted to selectively accumulate knowledge on memory and memory strategies from the area of cognitive psychology and apply it to a particular curriculum area in the arts. This has been carried out through synthesizing knowledge from several contributory areas of study and by conducting some empirical work.

The researcher acknowledges that one can not make substantial claims about the effectiveness of empirical work when dealing with a relatively small sample. Yet, the results do give a positive indication, particularly when supported by the theoretical evidence which has been amassed.

As a result, it is hoped that this research study will form a contribution to the music education literature of immediate practical relevance to teachers of music in primary, secondary and higher education. Following the lead of other researchers (Sloboda 1985 and Hargreaves 1986 and 1989) it has been an attempt to reduce the gap between psychologists and teachers in a relatively complex area. It is the researcher's hope that educators, generally, will find the work applicable. Despite the fact that it has been addressed to a particular curriculum area, a wider educational relevance has been constantly implicit throughout the study.

Given the cognitive perspective and the spread of documentary evidence, there are clearly pertinent areas, which have not been treated in depth. Although having a place in this study, the nature of rhythm, a large and complex area, constitutes an investigative study in itself and has not been comprehensively examined. In the same way neither has psycho-motor skill learning. The ethnomusicological and aesthetic bases of music and movement, again though pertinent, have not received extensive coverage, although aesthetic considerations were necessary to the discussion in part two. All these constitute potential further areas for investigation, as do aspects of the empirical work described.

What are the general implications arising from a study concerned, in the widest sense, with processes of learning? In terms of educational practice, the study of learning processes would appear to be particularly relevant to the implementation of the National Curriculum. In achieving targets of attainment, there will be an increasing need to examine and promote those processes of learning by which they may be more effectively reached. This is particularly relevant now that priorities of curriculum and subject content have been established.

Important, yet relatively neglected areas of pedagogy are: the acknowledgement of individual learning styles and sensory preferences, and the appropriateness of particular teaching styles relative to age level.

With respect to teacher education, at initial or pre-service level, it would be particularly appropriate to commit more time on courses than at present to the examination of principles of learning and the place of kinaesthesis and action across all the subject areas. This would also need reinforcement at in-service level.

There are more specific implications for music educators and for the curriculum. The rather fragmented, empirical work appears to be moving into more challenging areas such as listening skills and cognitive styles, due to the efforts of American researchers (particularly Lewis 1985, Schmidt and Lewis 1987, Lewis 1988; and Sims 1988).

As the corpus of theoretical and empirical research begins to amass, this should lead to a greater awareness in the profession to the potential value of kinaesthesis and movement in music learning. The discovery of a 'movement principle', operating in different teaching approaches, might lead to more detailed examination of the principles of Dalcroze, as the originator, theorist and practitioner whose work has so influenced other methodologies. Above all it is the part of his work which deal with the nature of expressive response to music which could most fruitfully be addressed.

At the same time, different movement 'focuses' in educational practice should also be acknowledged, taking into account the varying practices which will be seen in schools. For example, folk dance in junior schools teaches much about phrasing and form and the influence of Laban on expressive dance and movement in secondary schools, when well taught, increases sensitivity to the shaping elements of music and movement. By reviewing teaching strategies in order to incorporate a movement 'principle' rather than a named approach, individual teachers may be better able to personalise and adapt their work to the variable needs of specific educational contexts. Apart from pedagogical reasons, it must also be acknowledged that British music education does not, on the whole, favour methodologies in general music curriculum practice, a fact which makes 'principles' rather than 'approaches' pragmatically appealing.

However, practice is not readily affected, merely by making a desk study of such principles. The notion of experiential learning applies to teachers as well as students, particularly as those who train for teaching at secondary level have so often reached their position from one of pre-disposition rather than struggle. In courses at initial teacher education level, as well as in-service, 'movement' principles should be given more than cursory exposure. In time, if implemented, such influence might be seen both in practice and in the professional literature, including the authoritative documents emanating from Her Majesty's Inspectors and from professional bodies and associations.

Direct involvement and increased knowledge on the part of the music teacher could:

a) extend understandings and insights, both pedagogically, by enhancing teaching skills, and, musically, by being drawn into the more concentrated aural education which this work demands;

b) extend teaching repertoire by the study of, and practical involvement in, expressive movement. It is not enough, solely to move or be active. Movement quality demands a knowledge and understanding of the nature and range of expressive movement. This, when combined with musical quality, should intensify the learning experience. and

c) be rejuvenating in a personal and affective sense, for continued learning experience in the arts is vital to personal growth and professional development in teacher education.

However, one can not deal with general implications for practice without considering implications for current pedagogical practice. It is these issues that the final chapter will address.

CHAPTER 14: CURRICULUM IMPLICATIONS AND DALCROZE REVISITED

From varied sources of evidence, kinaesthesis is seen to have a fundamental role in:

. rhythmic performance tasks;

. the recall of musical experience;

. higher level musical processing;

. making sense of rhythmic patterns in new material;

. re-afference: a reciprocity between sensory-motor and motor-sensory learning as new neural pathways are set in operation.

In its overt manifestation: motor response, particularly in the practice of music and movement, it is evident that:

. the hidden (covert) is exteriorised (overt) for movement is visible, tangible and assessable;

- there is an immediacy of experience as the body becomes an instrument or vehicle for expression;

- the body has a capacity to communicate motion and emotional factors;

- expressive movement has a fundamental part to play in an integrated learning experience encompassing the cognitive, affective and psychomotor domains;

- Bruner's modes of representation: the skills of handling, seeing, imaging and ultimately symbolising (as the cognitive/physical experience is translated into symbolic terms) are seen in practice.

Education through music and movement should be viewed as fundamental in the teaching of children in nursery, primary and the early years of secondary school. It is also relevant in secondary and higher education, not only in integrated or combined arts programmes but particularly in tackling new material adapted relevantly to context, setting (free or restricted space) and appropriateness.

As was evident from chapter 6, Dalcroze' central aim was to harness mind and body through a form of rhythmic education concerned both with the holistic in terms of musical expression and sensitivity, and with the detailed attention to structural design which serves as a means to this end.

The work which is carried out in this country exemplifies the best of Dalcroze principles in practice. In the light of this investigation, however, there are several implications for practice which should help to clarify aims and objectives, at the same time, incorporating those principles of learning which have been highlighted throughout this study.

What follows should be viewed as a set of teaching principles which together constitute a 'movement principle'. This is meant to apply to practice across the age groups, with children or adults, adapting one's language appropriately.

1. As far as possible, make the implicit, explicit

Make clear the musical objectives of this work in fostering a reponse to music in three ways:

a) an **expressive** response (a general sensitivity to overall shape, flow, mood, what could be termed: the **qualitative**);

b) a **rhythmic** response (an awareness to the detail of figure, phrase, structure, relationships, what could be termed: the **quantitative**);

c) an **imaginative** response (the freedom to explore ideas, opportunities for individuality and the creating of material for musical inventiveness).

2. Demonstrate close correspondence between musical aims and physical means.

This is concerned principally with matching long sounds with long actions, short sounds, with short actions, but it is also about appropriateness: clapping,tapping, patsching, tracing in the air, the question is always how should this be expressed? What is the most musical way? A typical problem is how to express a sound in movement which is longer than a crotchet. Aranoff (1982) shows how to encourage young children to make large claps in the air, bringing the arms arcing round to meet up again. Another way with older children is to slide one hand along the other in making the clapping motion.

3. Demonstrate the analogous relationship between musical expression and movement expression.

Demonstrate and clarify the way in which music and movement/dance arise from effort actions which are shaped and patterned into continuously unfolding 'trace forms'. Emphasise the factors of **time, space, energy, weight** and **flow.** Through carefully selected material, at one time focus on the time aspect, e.g. stopping and starting, beat, duration; another on spatial aspects: e.g. in place (axial), through space (locomotor), where?: straight across, diagonal; how?: curved, direct pathways, high, medium and low levels; now on weight: gently, heavily, getting heavier, getting lighter etc., another on flow: feeling for wholeness of phrase, keeping the movement flowing, timing the action in starting, sustaining and releasing; inhibiting and letting go; expanding and retracting; touch: smooth and detached.

4. Use and encourage descriptive language to aid picturing or pictorialising

One could say that in expressively moving to music, through enacting, one is articulating through body language. Having 'shown' how the music goes, the next step is to 'say' how the music goes. As was demonstrated in the final piece of empirical work, the experimental group were enacting what the control group were expressing verbally. The articulation of the experience in words should assist imagery and result in heightened understanding.

5. Arrest the attention

To surprise, introduce novelty, make an arresting initial impact on the senses. Ensure that the first activity is a very carefully thought out one, prefaced by perhaps a single word: 'listen' or 'watch' or 'imagine' or 'move'.

6. Assist the learner in highlighting surface characteristics before assembling more complex structural layers

This may be done through choreography, for example creating a visual score of Copland's Fanfare for a Common Man, where the erupting and dying showers of sound (gong and percussion) at the beginning gradually begin to be understood and appreciated as they relate to the whole structure. How many times is there an eruption? Is it louder on each repeat or is it softer? Or in a piece of pop music, 'The Tears of a Clown', for example, first ask the students to move only when they hear the 'hook'. Then draw attention to other features. Move only to the vocal line or to the bass, and so on. This gives rise to repeated concentrated listening and thus an opportunity to build through active response and articulation more complex structural representations.

7. Help to facilitate representations and imagery

Make clear how choreography or movement realisations assist in 'creating structure and relationships' by making visual pictures and creating muscular memory. This assists the learner and helps the teacher to assess both levels of understanding and the ability to express this understanding. Choreography or movement realisation, through work as individuals, in pairs, in groups, serves as a kind of visual score. Herbie Hancock's 'Watermelon Man' is a particularly effective example of a layered jazz piece which lends itself well to group realisation as each layer is added and then eventually taken away. At the other end of the scale, using any simple song forms, young children can be encouraged to express musical shape and phrasing by turning and moving in a different direction at the end of each phrase.

8. <u>Whenever relevant make explicit Bruner's sequence of representational modes from the most immediate to the abstract</u>

An example of this would be to teach a movement sequence to a song in which the first section is repeated after a sharply contrasting middle section. Correspondingly contrasting movement qualities should be used. Visually, on overhead projector or blackboard, ask questions which lead to drawing what has just been experienced. This graphic, initially figural, interpretation can be taken through various stages to the point where shapes stand for sections e.g. triangle, circle, triangle, and then to the symbolic A B A letters which stand for what is eventually labelled as 'ternary' form.

9. <u>Be aware of opportunities for 'warming' the senses</u>

The tactile sense may be highlighted by activities such as feeling isometrically the 'threeness' of three. Partners face each other, palm to palm and alternately push on every strong beat in response to the music. This can also be done standing side by side in a circle, with hands raised palm against palm, particularly effective for additive times such as 'Take Five' or 'The Unsquare Dance' by Dave Brubeck. The muscular sense can also be highlighted in similar ways,for example by clenching and releasing the fists to express accent in combination with music which has particularly evident strong- weak patterns. The visual and the aural are contextual constants throughout this work yet there are times when one might lead to the eventual climax of focussed listening (a concentration on the aural) by teaching through a sequence: listen and move; listen and imagine moving; close your eyes and listen.

10. <u>Provide ample opportunities for imaginative response</u>.

Individuality of response is built into expressive 'movement', yet there are further opportunities to enable ideas and musical material to be generated. Opportunities should be made for individuals to improvise for movement, whether on piano, orchestral instruments, or on typical classroom instruments. This can be done in twos, in groups or as whole classes. Image evoking ideas may be given for group movement pieces which are later extended into movement and music: e.g. Shadows, Rainforest, The Human Machine. At one time movement acts as a stimulus for music, at another music acts as a stimulus for movement. As a result of this interplay,imaginative possibilities appear to be extended and this often gives rise to naturally more extensively worked compositions.

These principles are clearly concerned with what takes place within a movement lesson, in other words at syllabus level. In terms of wider practical application of current practice to the school music curriculum there are other factors to be borne in mind.

First, the musical content of movement work needs to be reflective of a world view of music. This would give rise to several natural opportunities for integration in the arts where, especially in African musics, musical sound, dance and song are inextricably linked.

Second, its relevance has also to be seen in terms of the three parameters of musical experiencing:

performing, listening and composing. These are not mutually exclusive areas but could apply to different aspects of one individual's musical functioning with, of course, 'listening' being fundamental to all areas.

A summary of the benefits which could be seen to accrue from movement work include:

For the performer: such things as timing (judging attack, sustaining sound);

touch (assists in the experiencing of contrasts, extending range and sensitivity;

expressivity or feeling (mood, atmosphere, feeds the performer with ideas from the experience of living);

a feeling for flow and deviation from flow, e.g. pauses, rits., accelerandi;

feeling for phrasing, form,

For the listener: deeper attention to and analysis of the music;

opportunities for greater acquaintance (repeated hearings);

outward, physical working of the material becomes part of a muscular memory leading to inner imitation;

For the composer: tangible ideas become the basic material for composing;
the feeding of imagination through music and movement leads to the sustaining of musical ideas;

exposure to different music and movement ideas provides more variety in musical starting points;

improvising for movement is challenging and imaginative. As a functional activity, it takes the focus away from the individual to the task in hand.

In all three areas, expressive movement helps to increase the spectrum or range of musical shaping elements: energy or dynamic level, tempo, touch. All these can be related to aspects of general life, we hurry, draw breath, linger, hesitate,etc. It makes the abstract, tangible.

It must be stressed that 'movement experience', however pleasurable, is not an end in itself but a means to an end. It is an active form of appreciating, expressing and analysing music which combines the holistic with the atomistic, the affective with the cognitive and psychomotor, the expressive with the functional. Through pluri-sensorial experience it leads back to the sensory focus of musical education which, above all, is acute listening.

In investigating the nature of musical memory and the means to its promotion, the evidence suggests that kinaesthetic strategy has much to offer. If a sufficiently strong theoretical and empirical basis has been laid for kinaesthesis in promoting imagery and, consequently, musical memory, then the conventional view of aural education as a single sensory activity will require re-examination. For, in endeavouring to make tangible this most elusive, transient and abstract art: music, there does appear to be a crucial role for kinaesthesis and motor response. The Dalcroze quotation:

> 'the stronger the muscular sensations, the clearer and more precise the images'

merits attention as a working principle rather than an unsubstantiated assertion. Accordingly, it is hoped that this study may lead to further investigations and developments into a complex, yet worthwhile area of research.

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APPENDICES

APPENDIX 1A

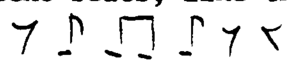
LESSON 1 I GOT A LETTER (adapted from F. Aronoff <u>Move With the Music</u>

<u>Experimental</u>	<u>Control</u>
Who received a letter this morning? How did you feel?	Who received a letter this morning? How did you feel?
Here's a song about receiving post. (sing 'I got a letter')	Here's a song about receiving post. (sing 'I got a letter')
Clap with the song, any way you like.	Clap with the song, any way you like.
Here are some ways to clap.	Here are some ways to clap.
big, bouncy, with the words oh - oh - yes - - -	big, bouncy, with the words. oh - oh - yes - - -
(repeat song)	(repeat song)
Another, smaller, faster oh - oh - yes - - -	Another, smaller, etc
(repeat song)	
Yet another - throw hands to sides on the 'ohs', with claps in between oh - oh - yes ______	Yet another, etc.
These are called 'off-beats'	These are called 'off-beats'
STAND UP AND FIND AN EMPTY SPACE	**TEACHER GIVES OUT SONG SHEET WRITE YOUR NAME ON THE TOP.**
Children sing introduction	**Children sing introduction**
(a)'Walk big steps to the song Stop when the music stops'.	**(a) Follow the music with your finger. Stop when the music stops.**
(b) Half the class stands and sings. Other half claps as they walk, softly so that they can hear the singing.	**(b) How many times do we sing Oh, oh, yes?** **How many times do we sing I got a letter?**

Change over.	**Mark one with the letter A Colour it.** **Mark the other with the letter B and colour it differently.** **Half the class sing A phrase Half sing B phrase, then change over.**
Turn and walk in a different direction at the start of each phrase.	**Sit in a circle, make up different verses in turn. Keep the pot boiling. e.g. I brushed my teeth this morning.**
Let your feet step 'Oh-oh-yes' pattern - short, short, long, throughout the whole song. Add a clap after yes. **- - ______ X**	
Add ostinati on glockenspiel or chime bars ♩ ♩ 𝅗𝅥 F E D ♩ ♩ 𝅝 D A D with clap on suspended cymbal indian bell.	Add ostinati, etc.
(a) Show how melody moves with your arm and hand	**(a) Take a pencil, hold it in the air. Bring it down as melody falls.**
(b) Do it with your shoulder Clap the phrase 'I got a Letter'. Show everything else with your shoulders.	**(b) Draw shape of tune on sheet**
Final performance with piano, chimes, glockenspiel and cymbals	Final performance with piano, chimes, glockenspiel and cymbals.

APPENDIX 1B

LESSON 2 Miss Mary Mack (from F. Aronoff Move with the Music)

Experimental	Control
Feel the beat as you listen to the story, by tapping one hand against other arm.	Feel the beat as you listen, etc.
This is a nonsense song. Let's learn the words.	This is a nonsense song, etc.
This time fill in the silent beats with the last word of each phrase (echo-words)	This time fill in, etc.
(a) How many times do you sing each echo-word?	(a) How many times, etc.
(b) Which are the words that rhyme?	(b) Which are the words, etc.
(c) Walk the beats to the whole song and sing only the echo-beats.	**(c) Give out copy of song notation to follow. Mark with a pencil the echo-beats as you sing them.**
(d) Play the echo-beats on a drum or tambourine as you walk. Sing them inside	**(d) As you are sitting now, play the echo-beats on a drum or tambourine.**
Pass the drum game (2 circles) Sing song, play echo-beats and immediately pass on.	Pass the drum etc.
Divide the beat, by patsching the echo-beats, like this: 	Divide the beat, etc.
Divide the class so that half sing main text, half echo.	Divide the class, etc.
'Walking the square' Start walking as I play the song. Feel the strong climax point 'Mack' and turn.	**Listen to the song. How many phrases are there? (Play one verse)**
What shape have you made? How many sides has a square? Then, how many phrases has this song? 4 phrases make up the verse.	

Sing whole of song to find out how many verses there are.

Trace shape of phrase in the air slowly, showing height, depth and movement.

Are the 1st and 2nd phrases alike?
What is the difference?

Trace it with your shoulders
Trace it with your head.

Final performance

Trace shape of phrase in the air slowly, showing height, depth and movement.

Are the 1st and 2nd phrases alike?
What is the difference?

Colour over any fragments of the tune which are the same.

Final performance.

APPENDIX 2A

STAGE II

A
No.......
M F

Phase One: VIVIDNESS OF IMAGERY.

You are going to hear six short extracts of orchestral music.

First read the title of the passage,

Now listen to the passage and mentally visualize those things to which the title seems to refer that could relate to the music.

After hearing each passage, DESCRIBE YOUR IMAGES into the tape recorder and then rate your image on the continuum according to how vivid was the image, in each case by making a mark like this:

no image	very vivid image

example: ____________________|____

MUSICAL EXTRACTS

Title:	No image	v.vivid image
1. Philosophical Questions	______________________	
2. Ocean Voyage	______________________	
3. Peasants in the Field	______________________	
4. Refuge in Truth	______________________	
5. Winter Forest	______________________	
6. Rebirth of Justice	______________________	

APPENDIX 2B

Phase II Recognition of Extracts

No.......
Male/Female

You will now hear some very brief extracts of music.

Circle 'YES'if you recognise the passage as taken from the six passages you have just heard or 'NO' if you do not recognise the passage.

For each answer, also rate the confidence you have in your answer on a 5 point scale. 5 indicates 'high confidence', 1 'very little confidence

Extracts:			High				Low
			5	4	3	2	1
1.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
7.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
8.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
9.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]
10.	Yes	No	[ ]	[ ]	[ ]	[ ]	[ ]

		5 4 3 2 1
11. Yes	No	[ ][ ][ ][ ][ ]
12. Yes	No	[ ][ ][ ][ ][ ]
13. Yes	No	[ ][ ][ ][ ][ ]
14. Yes	No	[ ][ ][ ][ ][ ]
15. Yes	No	[ ][ ][ ][ ][ ]
16. Yes	No	[ ][ ][ ][ ][ ]
17. Yes	No	[ ][ ][ ][ ][ ]
18. Yes	No	[ ][ ][ ][ ][ ]
19. Yes	No	[ ][ ][ ][ ][ ]
20. Yes	No	[ ][ ][ ][ ][ ]
21. Yes	No	[ ][ ][ ][ ][ ]
22. Yes	No	[ ][ ][ ][ ][ ]
23. Yes	No	[ ][ ][ ][ ][ ]
24. Yes	No	[ ][ ][ ][ ][ ]

APPENDIX 3A

ONE WAY ANOVA: UNEQUAL GROUP SIZE

THE MEANS OF THE GROUPS ARE AS FOLLOWS:

LEVEL 1 MEAN = 16.16
LEVEL 2 MEAN = 18.9

F TABLE

SOURCE	SS	DF	MS	F
BETWEEN	53.63	1	53.63	12.27
WITHIN	144.26	33	4.37	
TOTAL	197.89	34		

APPENDIX 3B

ONE WAY ANOVA: UNEQUAL GROUP SIZE.

THE MEANS OF THE GROUPS ARE AS FOLLOWS:

LEVEL 1 MEAN = 16.59
LEVEL 2 MEAN = 14.25 (15.22)

Level 2, 2nd time in brackets.

F TABLE

SOURCE	SS	DF	MS	F
BETWEEN	33.87 (12.68)	1	33.87 (12.68)	8.47 (2.48)
WITHIN	132.02 (174.07	33 (34)	4 (5.12)	
TOTAL	165.89 (186.75)	34 (35)		

APPENDIX 3C

ONE WAY ANOVA: UNEQUAL GROUP SIZE

THE MEANS OF THE GROUPS ARE AS FOLLOWS:

LEVEL 1 MEAN = 17.09
LEVEL 2 MEAN = 16.89

F TABLE

SOURCE	SS	DF	MS	F
BETWEEN	.31	1	.31	.05
WITHIN	209.59	37	5.66	
TOTAL	209.9	38		

APPENDIX 3D

ONE WAY ANOVA: UNEQUAL GROUP SIZE

THE MEANS OF THE GROUPS ARE AS FOLLOWS:
LEVEL 1 MEAN = 15.9
LEVEL 2 MEAN = 16.16
LEVEL 3 MEAN = 16.59
LEVEL 4 MEAN = 17.39
LEVEL 5 MEAN = 16.89

F TABLE

SOURCE	SS	DF	MS	F
BETWEEN	39.18	4	9.8	1.53
WITHIN	845.93	132	6.41	
TOTAL	885.11	136		

APPENDIX 3E

TWO WAY ANALYSIS OF VARIANCE: EQUAL/UNEQUAL GROUPS

ANALYSIS OF VARIANCE TABLE

SOURCE	SS	DF	MS	F
BET.TR. A	10.7	1	10.7	1.55
BET.TR. B	29.18	2	14.59	2.11
A X B	76.58	2	38.29	5.53
ERROR	512	74	6.92	

MEANS FOR TREATMENTS

	MEAN
TRMT. A1	16.24
TRMT. A2	17.13
TRMT. B1	16
TRMT. B2	16.61
TRMT. B3	17.16

CELL MEANS

CELL:

A1B1 = 16.39
A1B2 = 15.33
A1B3 = 17.21
A2B1 = 15.22
A2B2 = 18.9
A2B3 = 17.09

APPENDIX 3F

TWO WAY ANALYSIS OF VARIANCE: EQUAL/UNEQUAL GROUPS

ANALYSIS OF VARIANCE TABLE

SOURCE	SS	DF	MS	F
BET.TR. A	16.31	1	16.31	3.5
BET.TR. B	10.46	1	10.46	2.24
A X B	22.14	1	22.14	4.75
ERROR	205.16	44	4.66	

MEANS FOR TREATMENTS

	MEAN
TRMT. A1	17.56
TRMT. A2	16.34
TRMT. B1	15.33
TRMT. B2	17.6

CELL MEANS

CELL:

A1B1 = 18
A1B2 = 17.46
A2B1 = 14.8
A2B2 = 17.71

APPENDIX 3G

Figure 8

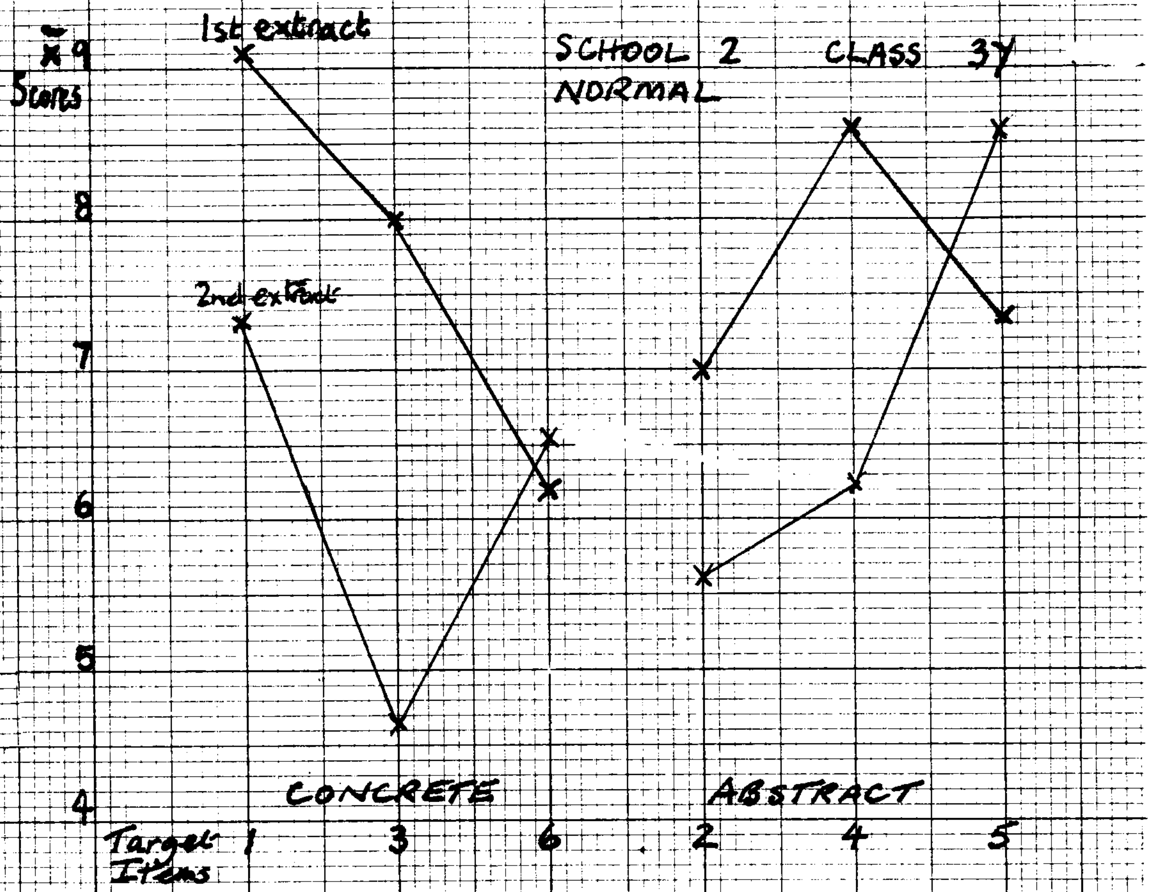


Figure 9

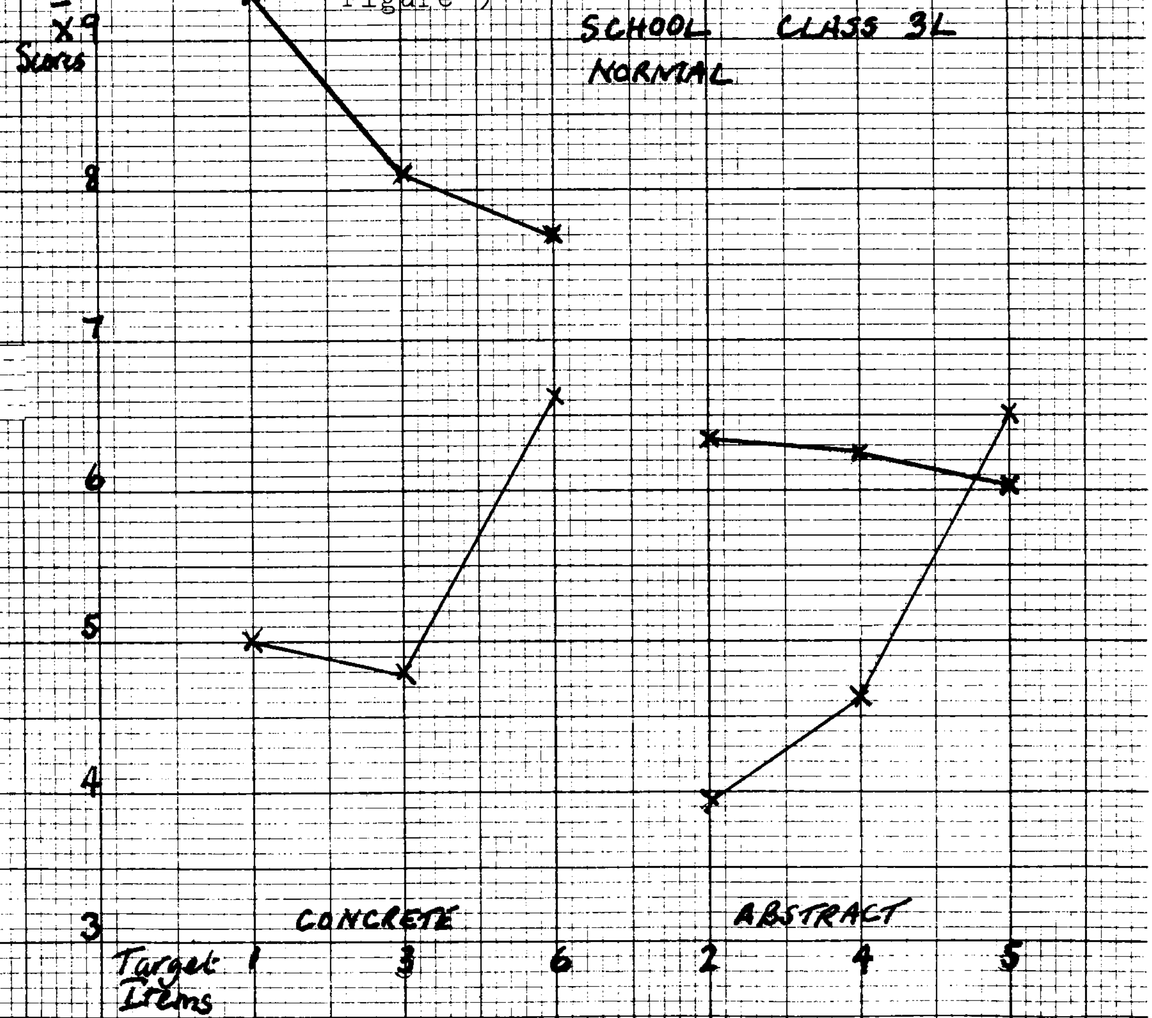


Figure 10

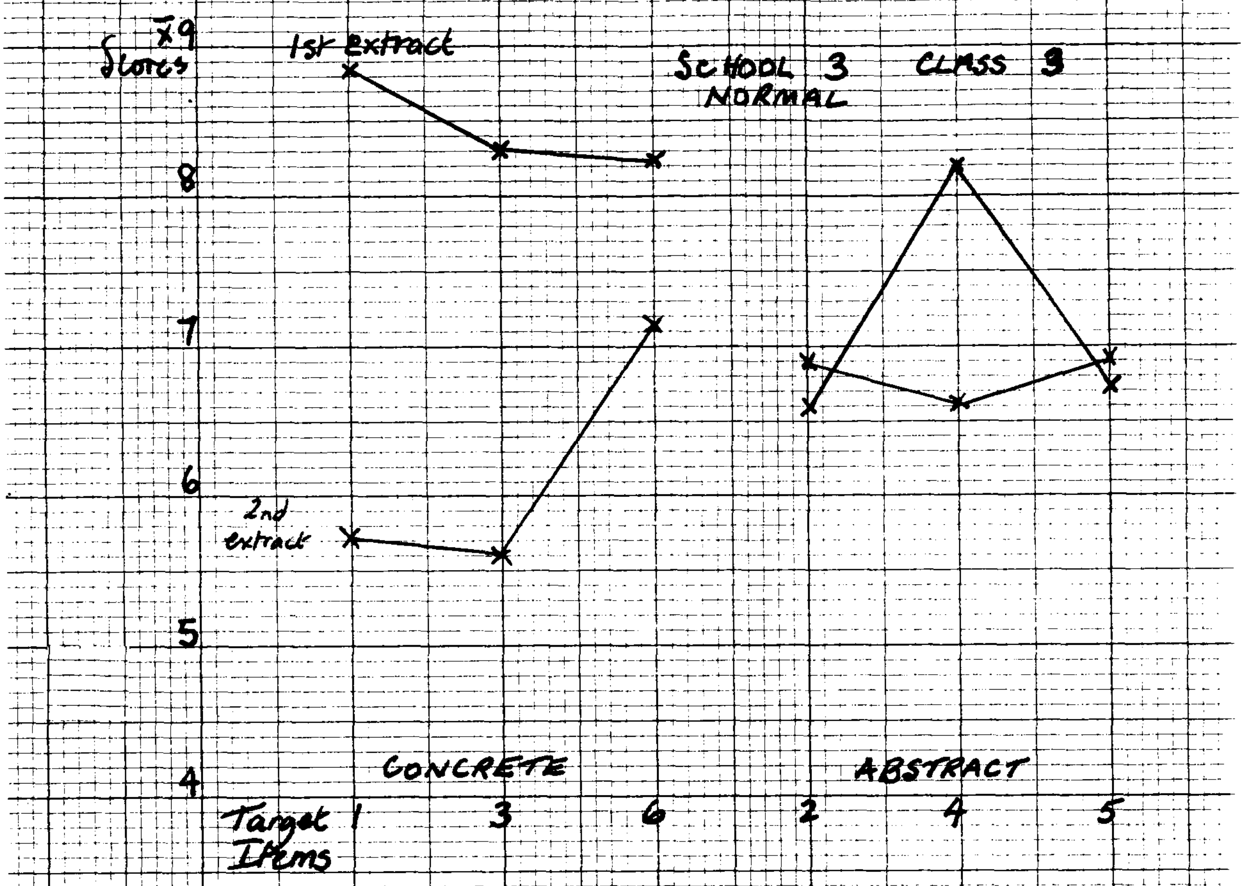
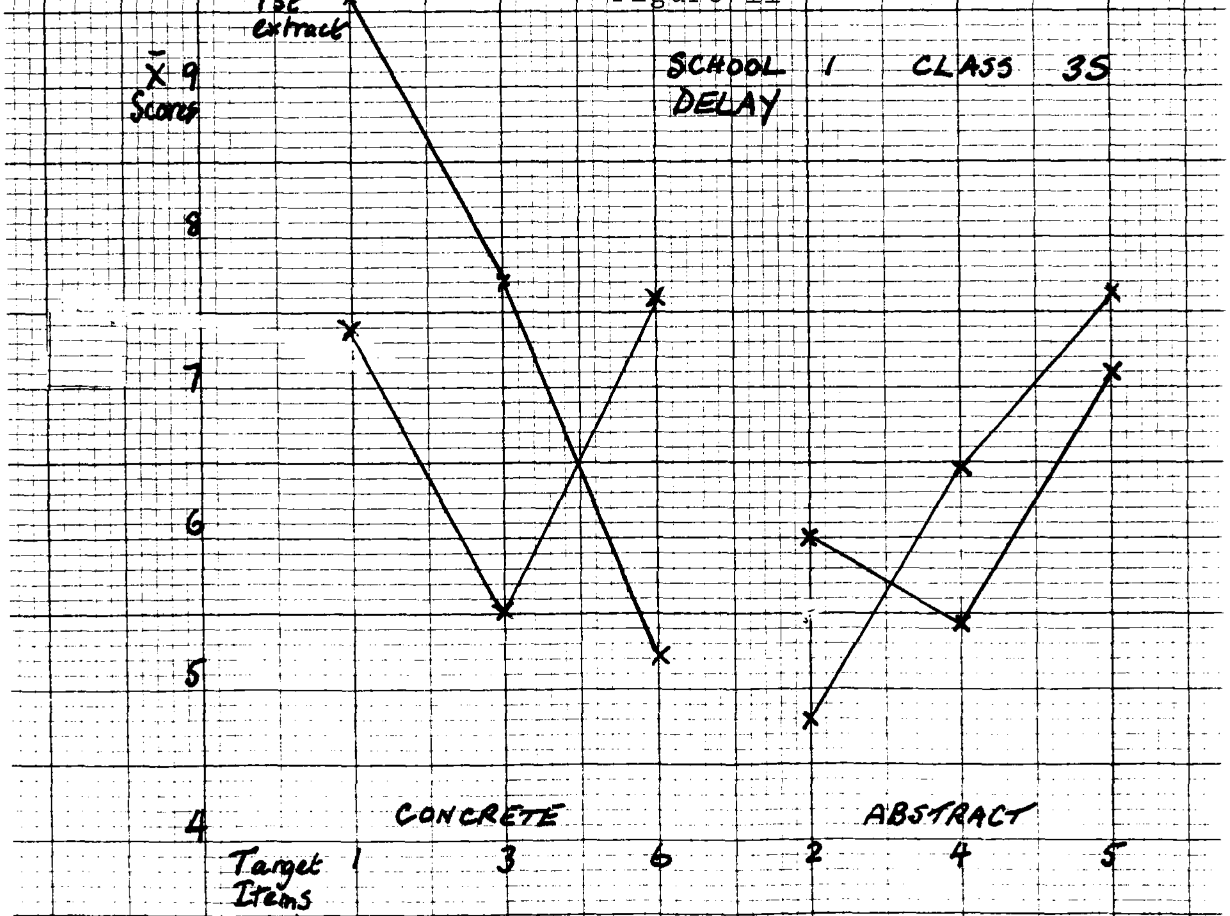


Figure 11



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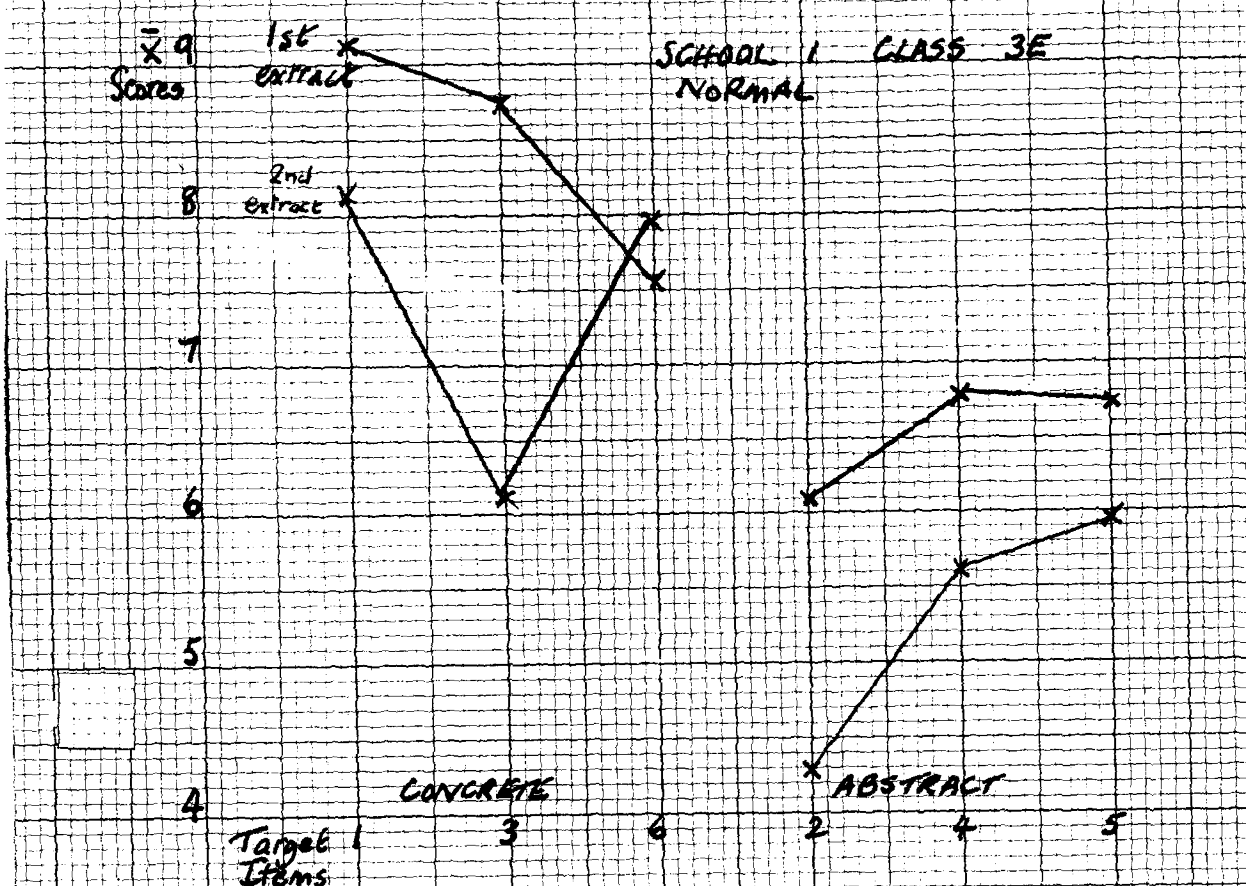
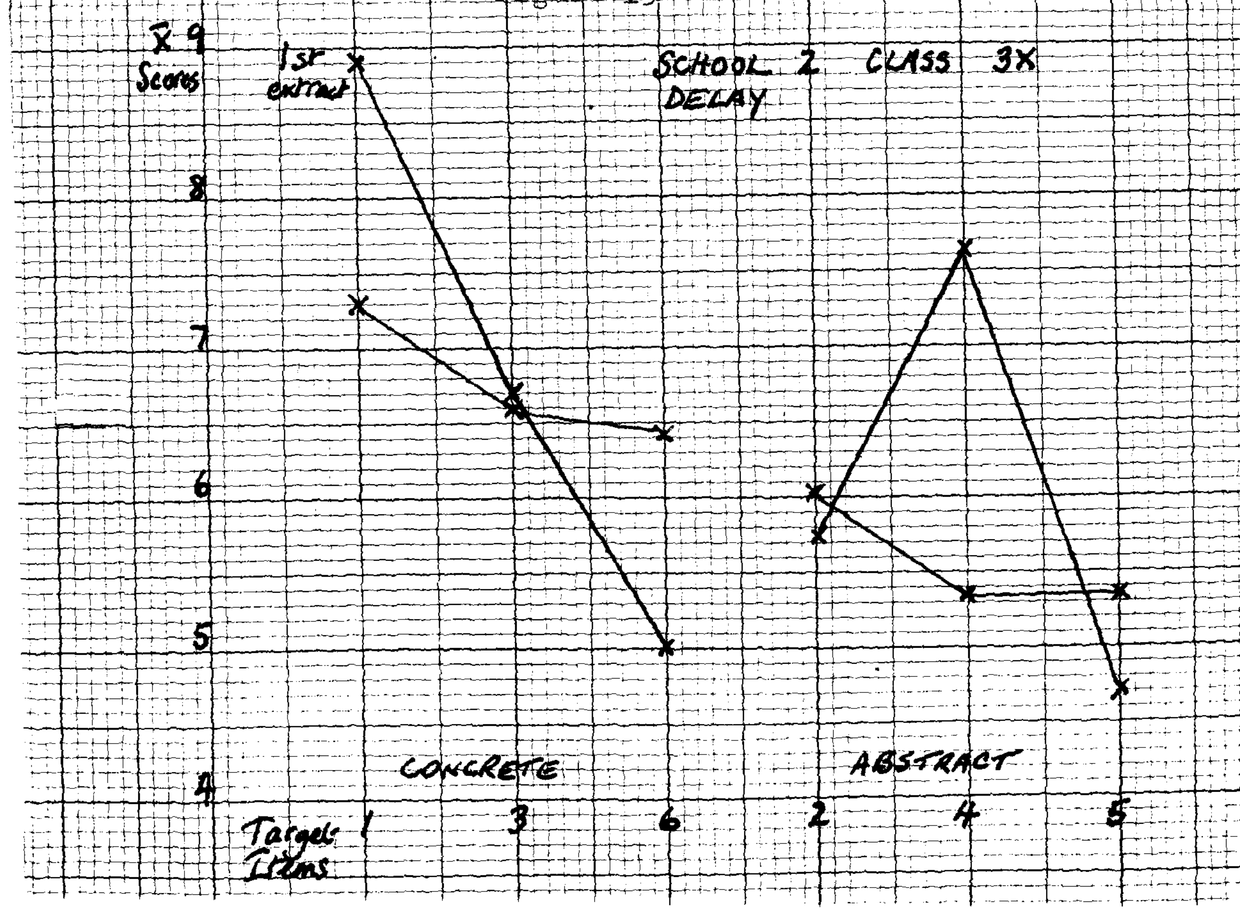


Figure 13



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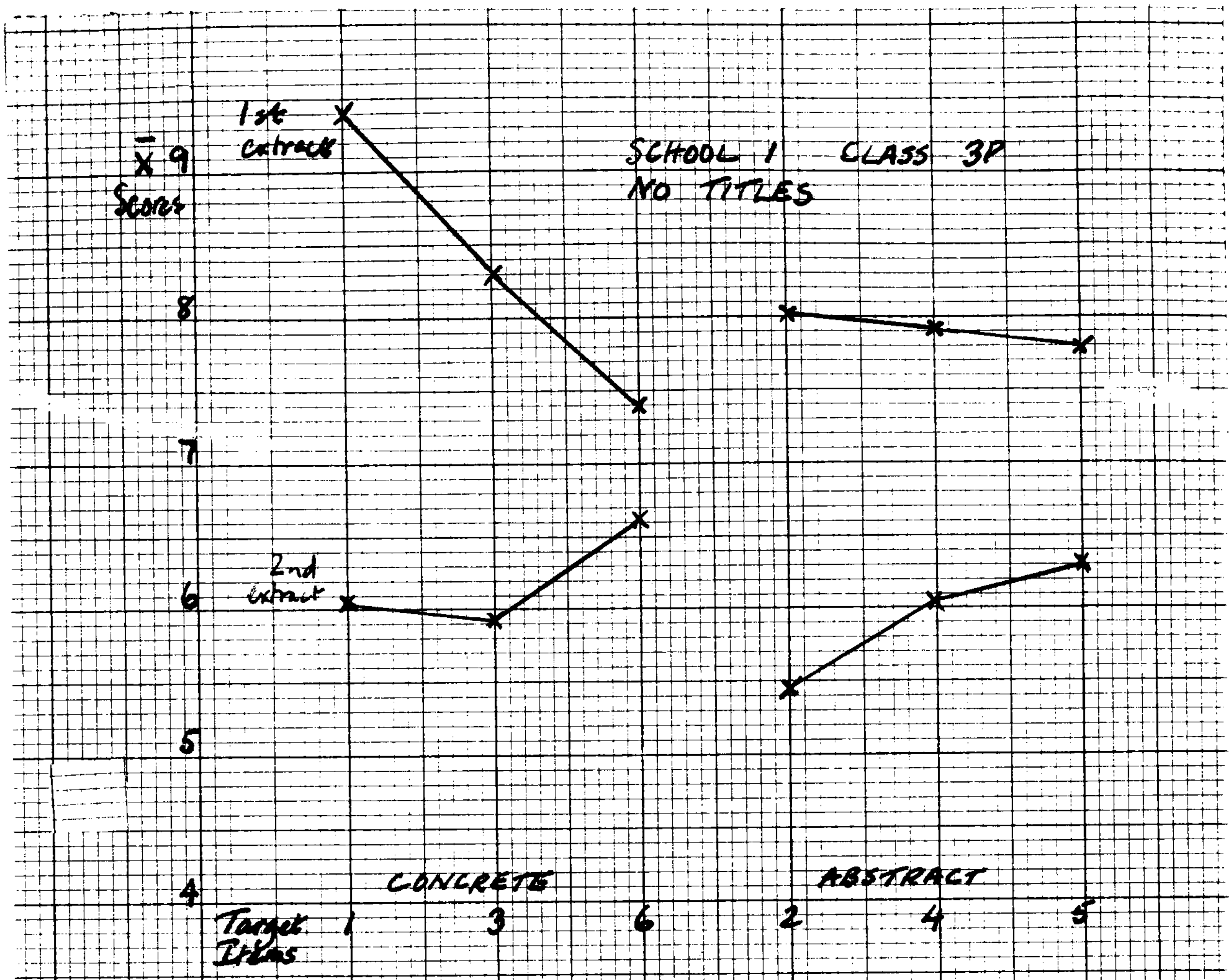


Figure 15

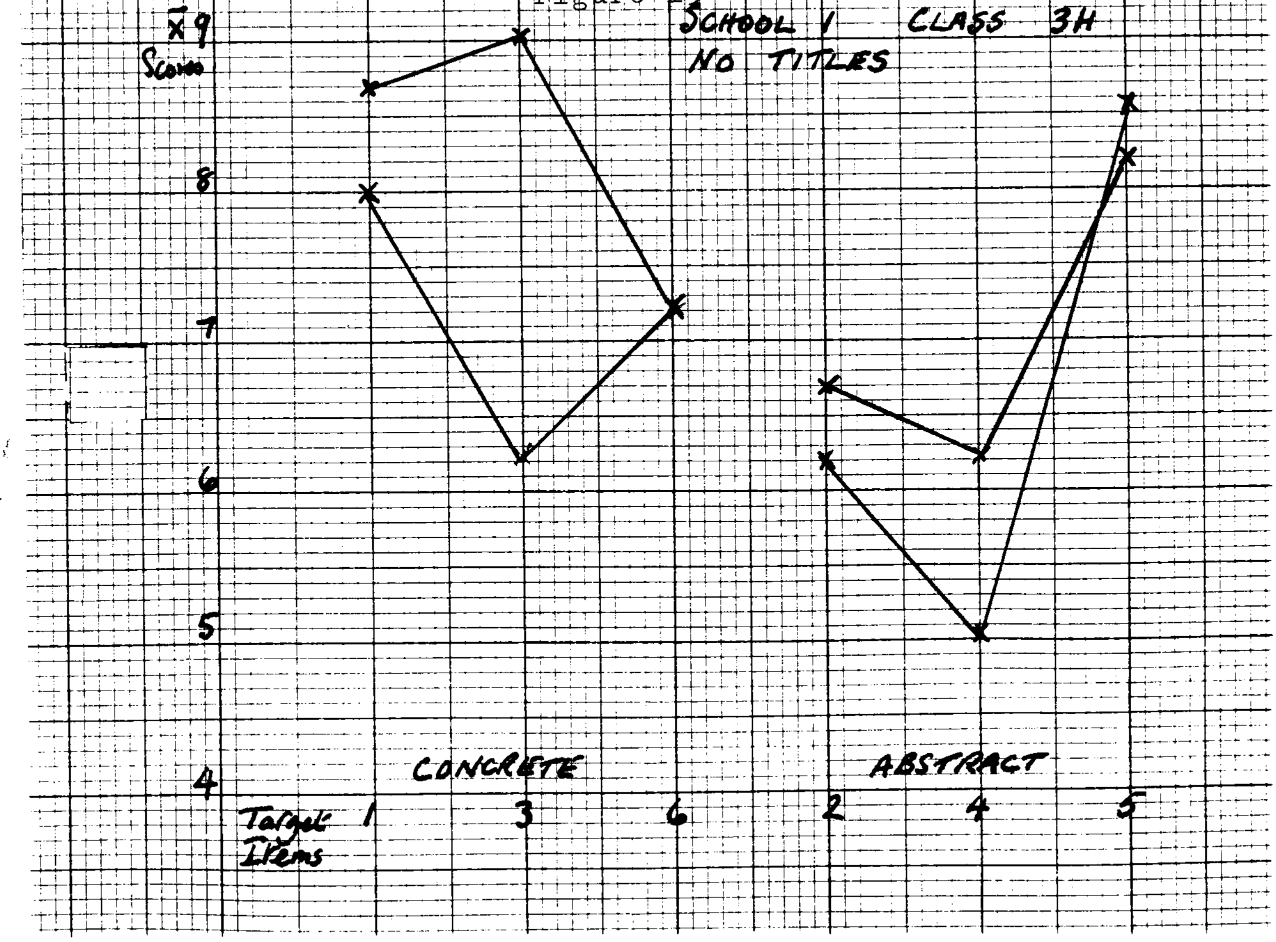


Figure 16

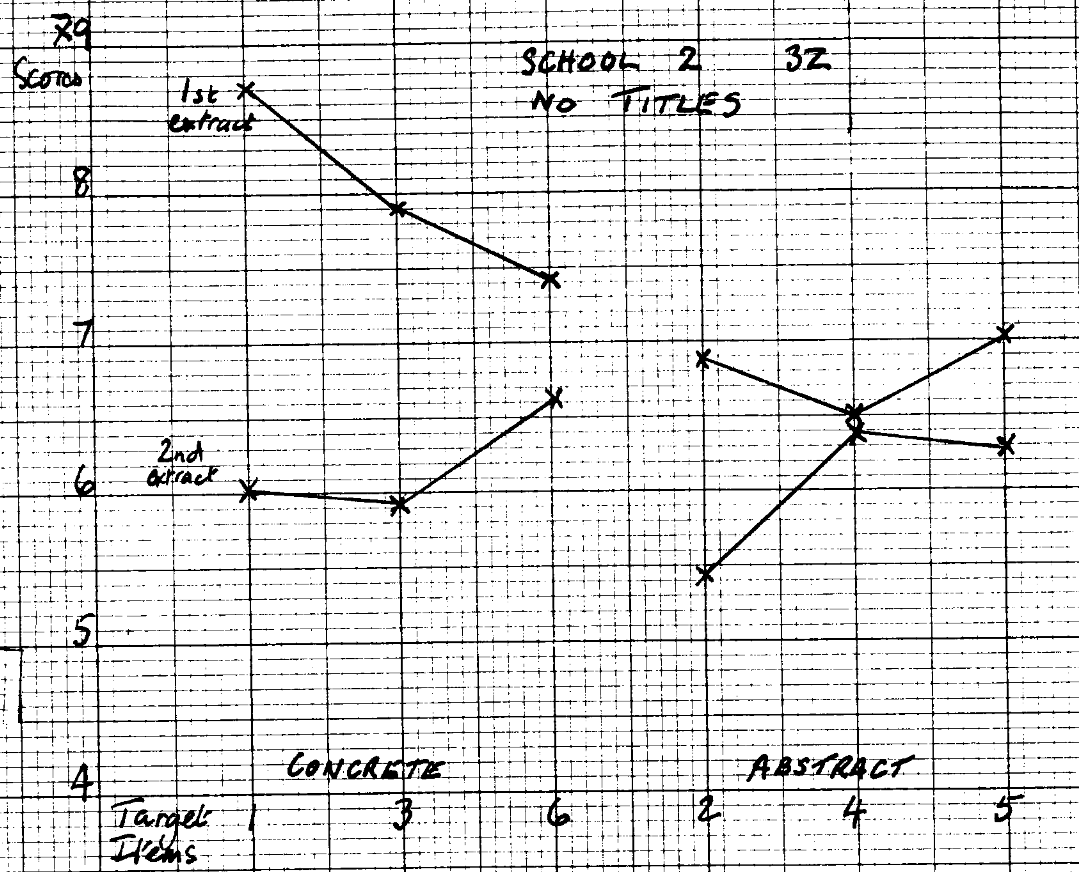
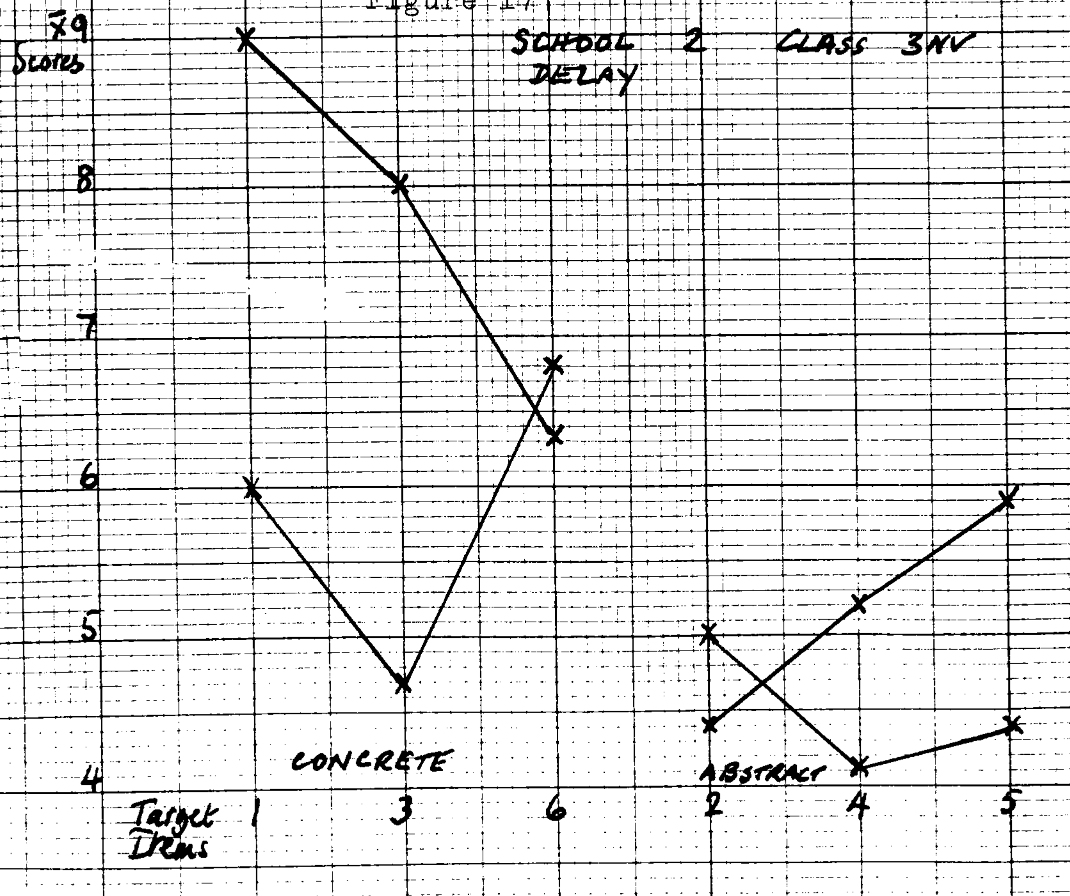


Figure 17



APPENDIX 4A

Two-sample t-test
between
Control and Experimental

Control - Experimental = -1.249998
Associated t-value = -1.816176 on 70 degrees of freedom.
Probability = 0.0351 (one-tailed)

SUMMARY STATISTICS

VARIABLE 1:- Control 36 OBSERVATIONS

Mean	= 18.36111
Standard Deviation	= 2.929191
Standard Error	= .4881985
Variance	= 8.580161
Skewness	= 9.059684E-02
Kurtosis	=-1.08058
95% confidence limits	= +/- .9908624
Biggest value	= 24
Smallest value	= 13
Sum	= 661
Sum of Squares	= 12437

VARIABLE 2:- Experimental 36 OBSERVATIONS

Mean	= 19.61111
Standard Deviation	= 2.910844
Standard Error	= .4851407
Variance	= 8.473015
Skewness	=-6.296109E-02
Kurtosis	=-1.150086
95% confidence limits	= +/- .9846563
Biggest value	= 25
Smallest value	= 14
Sum	= 706
Sum of Squares	= 14142

APPENDIX 4B

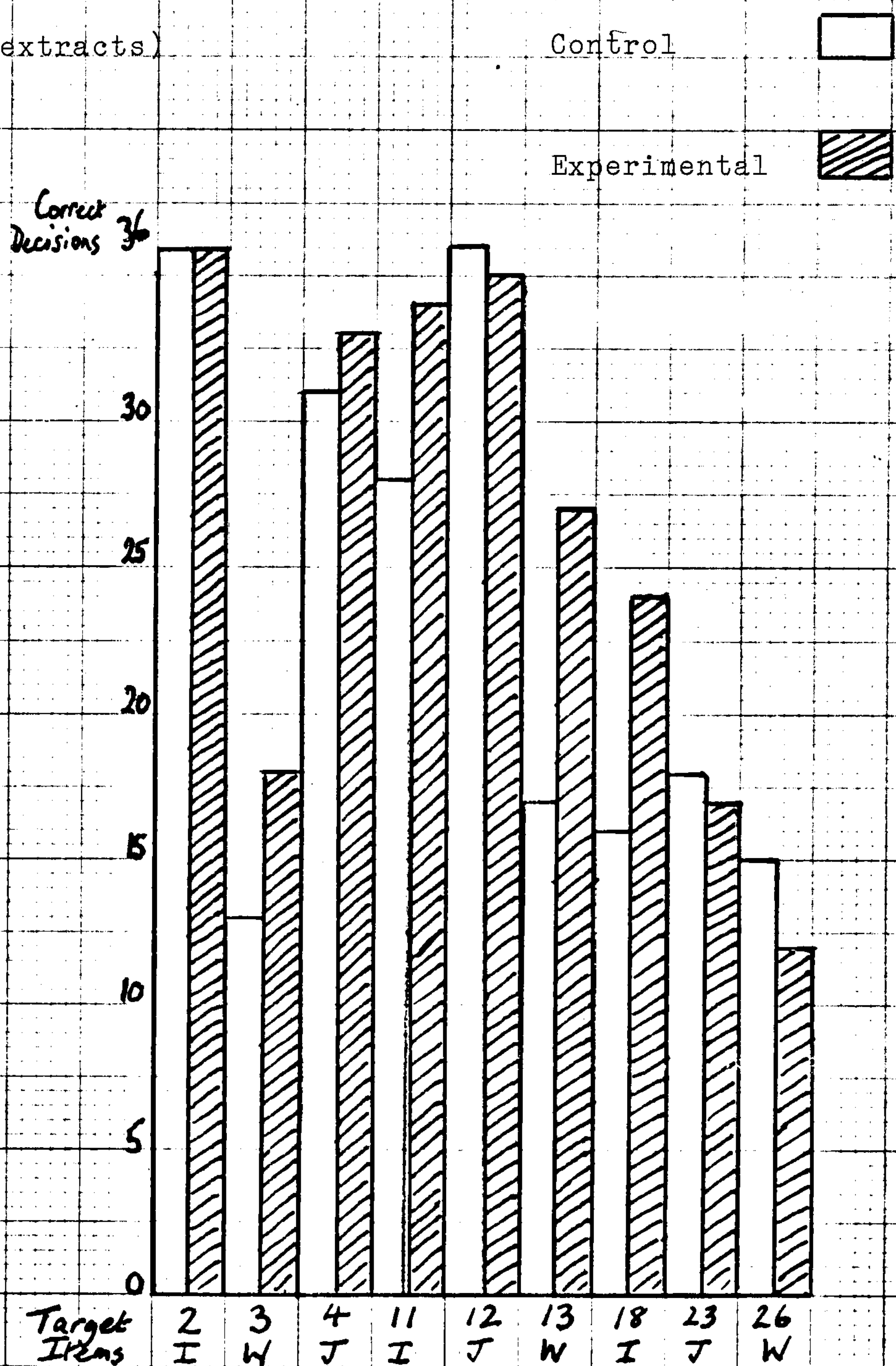
Mann Whitney test
between
Control and Experimental
U = 488 / U'= 808 / N1XN2 = 1296

Associated probability = 0.0332
(one-tailed)

APPENDIX 4C Figure 18

GROUP SCORES ON TARGET ITEMS

(first extracts)



Key: I Indian classical

W Western classical

J Jazz

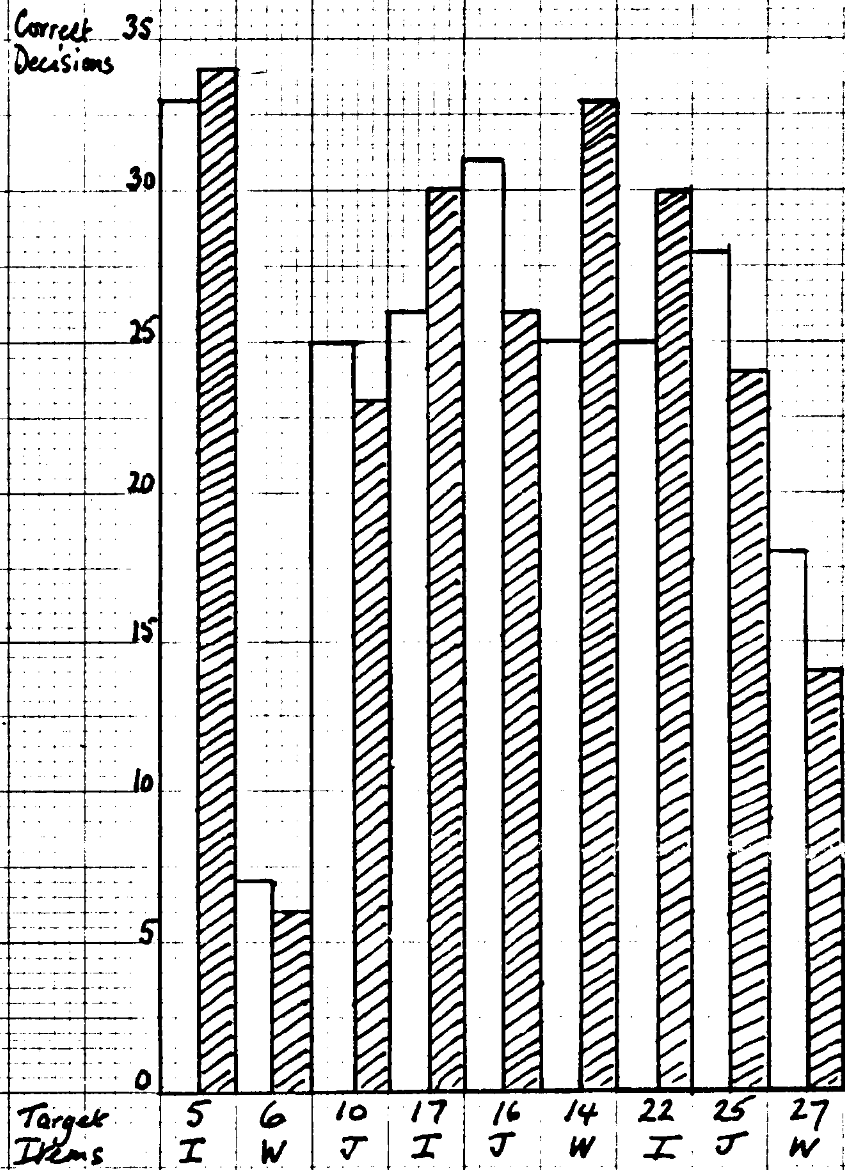
Figure 19

Group scores on target items

(second extracts)

Control

Experimental



Key: I Indian classical

W Western classical

J Jazz