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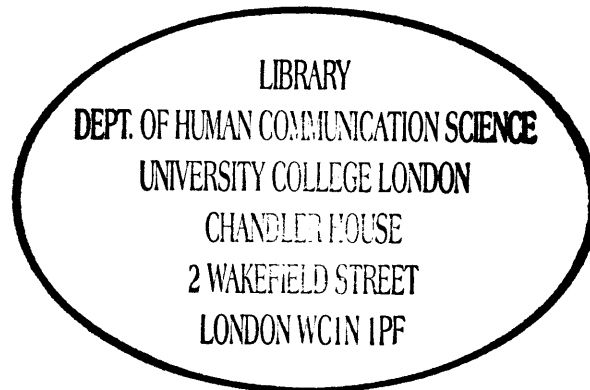


**AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN
SOCIO-ECONOMIC STATUS AND JOINT ATTENTION IN 2 - 4
YEAR OLD CHILDREN.**

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**FOR
REFERENCE ONLY**



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Sciences**

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Abstract

The relationship between socio-economic status and joint attention was investigated in 34, 2 – 4 year old children. The children attended four north London nurseries and were a culturally diverse sample. Socio-economic status was defined by whether a child attended a private or a state nursery. Joint attention ability was assessed through a task providing opportunities for the joint attentional skills of gaze switch and monitoring an adult's gaze or point. It was found that there was not a significant difference between state and private nursery groups on any measure of joint attention. This result suggested that joint attention is a robust phenomenon, which is not overly affected by environmental influences. Joint attention skills were shown to develop with age and gender differences were discovered, with girls scoring higher than boys on some measures. However, the results showing gender differences must be treated with caution and are considered in the light of the methodological limitations of the study. Further research was suggested.

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Introduction

Socio-economic factors have been found to influence various areas of a child's development such as language (Kontos, 1991) and theory of mind (Cutting & Dunn, 1999). However, studies on relations between socio-economic status and joint attentional skills have been scarce. This study aims to investigate this relationship in children between the ages of 2 and 4 years. Other participant variables will also be considered.

Socio-economic status

Socio-economic status can be defined in terms of an "interaction of social and economic factors" (Oxford English Dictionary, 2005) that can be utilised to categorise different groups within society. Researchers often consider socio-economic status in the wider context of family background and take into account variables such as family structure, number of siblings, number of languages spoken etc (e.g. Cutting & Dunn, 1999, Kontos, 1991).

Specifically, socio-economic status of groups within society has been defined by researchers in a variety of different ways. A common measurement is the use of information about family income (Kontos, 1991). The occupation of mothers and/or fathers is often considered (Cutting & Dunn, 1999, Wells, 1985, Kontos, 1991, Choudhury & Benasich, 2003, Saxon & Reilly, 1998). Cutting and Dunn (1999) categorised occupational class utilising the standard occupational classification of the office of population censuses and surveys (1991).

Occupations that were categorised as middle class were professional (e.g. doctor), managerial and technical (e.g. teacher) and skilled non-manual occupations such as a secretary. Working class occupations were categorized as skilled-manual such as a hairdresser, semi-skilled manual (e.g. gardener) and unskilled such as a labourer.

The educational level of parents' is also frequently used when defining socio-economic status (Cutting & Dunn, 1999, Wells, 1985, Kontos, 1991, Choudhury & Benasich, 2003, Saxon & Reilly, 1998). Cutting and Dunn (1999) categorised parental education level into four groups. The most educated was a parent with

a degree or higher, then education up to A-Level standard. Parents in the third group were educated up to GCSE / O- level standard and the least educated group had no qualifications. Several studies from the US have utilised the Hollingshead Four Factor index of socio-economic status to define a family's socio-economic group. This produces a score for a family utilising information about marital status, gender occupation and education (Choudhury & Benasich, 2003, Saxon & Reilly, 1998).

The relations between socio-economic status and language development

Several studies have considered the effect of a family's socio-economic status on a child's development. A relationship has been demonstrated between lower socio-economic status (SES) and lower language ability. Cutting & Dunn (1999) carried out a study on one hundred and twenty-eight children who attended nurseries in South London. They found that the educational status of the mother and their occupational class were strongly associated with their children's scores on tests of receptive vocabulary and narrative expressive language. Children from families that were classified as middle class scored more highly than those of working class families.

Similarly, Kontos (1991) studied 138 three to five year old children in the US and found that family background variables (e.g. parent's occupation, family income) predicted a child's cognitive and language development. Further support for the above studies was found by Horwitz, Irwin, Briggs-Gowan, Heenan, Mendoza & Carter (2003), who carried out a study on a random sample of children born at a US hospital over a period of two years. They found that children aged between one and half and two years who had a delay in their expressive language abilities were from families with low educational attainment, who were experiencing poverty and significant levels of stress due to parenting.

Several longitudinal studies have produced similar results, Croll (1995) reported on the Bristol Language Development Study, which followed children from their pre-school years until aged 16. He stated that family background was highly

related to the participant's grades in their 16+ examinations and moderately related to measures of comprehension at pre-school age.

There have been several factors proposed that could account for this association. Hart and Risley (1999) carried out a longitudinal study of forty-two one to two year old children and their parents. They recorded their interactions within the home every month for two and a half years. They discovered that the extent that the parents talked to their children was related to their SES.

Children from "welfare" families were receiving half the amount of language exposure from their parents when compared to children from "working class" families. Children from "professional" families were being talked to the most. However, they found that irrespective of a family's SES the amount a child was exposed to language by their parents was related to their vocabulary growth and their IQ score at three years old. They concluded that a family's SES was a less influential factor in a child's vocabulary development than the amount of language exposure from their parents up until the age of three.

Bishop (1997) suggests that there are several other variables as well as parental interaction style that could influence the association between SES and language development such as the family health, the size of the family and overcrowding within the home.

Further research is required to investigate the interrelated factors that underpin the relationship between SES and language development. However, it appears that there is considerable evidence that this association actually exists.

Joint Attention

Bruinsma, Koegel & Koegel (2004) state that joint attention is a confusing concept as it encapsulates a number of different behaviours that involve non-verbal communication to another individual about an entity within the environment. These behaviours include gaze switching, gaze monitoring, gestures such as pointing and showing and imitating.

Paparella & Kasari (2004) define joint attention as a “mutual mental focus between two or more individuals purely to share an experience. The intersubjective nature of the communicative exchange makes it particularly social” (pg 2).

During a joint attention interaction the child and adult organise their gaze to divide their attention between an entity and the other person (Mundy & Willoughby cited by Brunisma et al 2004). Tomasello (1995) outlines that joint attention is not simply two individuals looking at the same object or each other, nor is it a child watching an adult visually engaging with an object. Furthermore, he states that being conditioned to look to where an adult turns their head is also not true joint attention. He states that a child needs to understand others as “intentional agents” before being able to engage in joint attention. He describes “intentional agents” as individuals who can direct their attention according to the pursuit of their objectives (Tomasello, 2003).

Tomasello (2003) considers joint attention as triadic and not dyadic as it incorporates an interaction between two individuals and an entity rather than simply two individuals or an individual and an object. He states that as children develop their joint attentional skills they take part in longer sessions of joint engagement, which then contribute to their understanding of the context of the communicative attempt. He states that this is communication within a “joint attentional frame” and that communicating within these frames improves the understanding of younger children.

The link between joint attention and theory of mind

Joint attention behaviours have been closely linked to theory of mind development. Tomasello (1995) proposes that beginning to understand others’ as “intentional agents” at one year old and comprehending others’ perspectives or demonstrating theory of mind at four years old are both stages in the process of learning about others.

Many research studies have found a relationship between joint attention behaviours and theory of mind. Charman, Baron-Cohen, Swettenham, Baird, Cox & Drew (2000) found that joint attention at 20 months was related to scores on theory of mind tasks at 44 months. They state that joint attention has a fundamental part in the development of understanding others' perspectives.

The development of joint attention and its connection to language

Tomasello (1995) observes that children do not engage in joint attention interactions in their first nine months of life. However, from nine to eighteen months they begin to develop their joint attentional skills. Carpenter, Nagell, & Tomasello (1998) investigated the development of joint attention from the age of nine to fifteen months in twenty-four children. They state that early attention behaviours include joint engagement and attention following. They found that joint attentional engagement first becomes significantly apparent at around nine months. They describe a typical example of joint attentional engagement as when a child carries out a gaze switch between an adult and a toy, when they are both engaging with that toy. Bakeman & Adamson (1984) found that these behaviours increase in frequency and length with the child's age.

This particular joint attentional behaviour at around nine months has been considered more difficult to identify as true joint attention in terms of the child understanding others as intentional agents. However, it has been argued that when this behaviour is combined with children starting to monitor an adult's gaze or point to an object this provides more evidence that children are starting to understand the intentions of others (Carpenter et al, 1998). It has been found that children follow an adult's gaze at around 8 – 10 months. However, it has been shown that they cannot carry this out when there are distracter objects within the vicinity until 12-15 months (Carpenter et al, 1998). It has also been shown that the ability to follow a point appears before the ability to follow a gaze by around a month (Carpenter et al, 1998).

During the nine to eighteen month period that these behaviours are developing other social behaviours are appearing such as social referencing, imitative learning and intentional communication. Tomasello (1995) argues that as all of

these behaviours appear at a similar time the understanding of others as intentional agents underpins their development.

Sigman & Kasari (1995) define the joint attention behaviour of social referencing as when infants use others' expressions to identify how they should react to a situation, which is perceived as potentially dangerous or ambiguous. Checking behaviours may appear similar to social referencing behaviours. Carpenter et al (1998) describe checking behaviours as when a child checks that their mother is still within sight. They state that this is an attachment behaviour rather than a joint attentional behaviour as it does not involve a triadic interaction between the child, adult and object.

Tomasello (1995) proposes that the strongest evidence for children aged 12-14 months understanding others' intentions is that they start to use language. Tomasello (2003) asserts that language is a form of joint attention. He states that for a child to understand and use a new word appropriately they must engage in joint attention. Bruner (1975 cited by Carpenter et al, 1998) considers that joint attentional skills are a precursor to language development and that they are the basis on which language skills are built. Research has found that joint attention ability is positively related to language development (Baldwin, 1995).

Given that there is a close link between language development and joint attentional skill and that socio-economic status has been shown to be influential in language development, it may be expected that socio-economic status could also effect the development of joint attention.

It has been found that language ability can be predicted by the length of joint attentional interactions engaged in by the parent and child: the longer the interactions, the more linguistically skilled the child (Tomasello & Todd (1983) cited by Saxon & Reily, 1999). Further support has been found for this relationship as Tomasello and Farrer, (1986) found that mothers who participated in less joint attention interactions have children with less developed vocabularies and delayed syntactic development. It could be reasonable to expect that there would be a relationship between socio-economic status and

the frequency and length of joint attention interactions, as there is a positive correlation between socio-economic groups and the amount of language experience children are given (as discovered by Hart & Risley, 1999).

If this is the case it could be that one of the factors that underpins the relationship between socio-economic status and language development is the effect of socio-economic status on the quantity and length of joint attention interactions. However, other joint attention variables could influence the relationship between language and SES. These could include the nature of the joint attentional interaction or the child's joint attentional skills. Further research is required to explore these variables.

Demographic differences: implications for joint attention development.

It is important to consider the effects of demographic differences on the development of joint attentional skills, as only when this has been considered can we be confident in generalising research to different populations of children.

The effects of socio-economic status

Research that has directly considered the effects of socio-economic status on joint attention is sparse. In fact the majority of research on joint attention and theory of mind development has been conducted on families from high SES backgrounds apart from Raver and Leadbeater's (1995) research on adolescent single mothers from socially disadvantaged backgrounds (Saxon & Reilly, 1999, Cutting & Dunn, 1999). Therefore, there is a significant need for research in this area.

There has been a link discovered between theory of mind and socio-economic status. It seems pertinent to take this into consideration as there is little research directly on joint attention and as joint attentional skills have been outlined as a precursor to theory of mind.

Dunn and Brown (1994, cited by Cutting & Dunn, 1999) discovered that a child's understanding of emotions was related to the educational and occupational

status of their father. Further support has been found for this relationship by Cutting and Dunn, (1999). They found that the educational and occupational status of the mother had a strong association with the false-belief and emotion understanding skills of their children at four years of age. They concluded that the family background of a child significantly influences the development of social cognition.

Interestingly, a study that has directly considered the effects of socio-economic status on joint attention did not find any relationship. Saxon and Reilly (1999) recorded joint attentional interactions of 84 dyads. They found that there was generally no association between SES and joint attentional behaviours. They stated that this was a surprising outcome. However, they considered that this result provided more information about the validity of generalising research findings in this area.

Given the above findings it could be hypothesised that joint attention development is a robust phenomenon that is not overly affected by environmental influences. Furthermore, the effect of socio-economic status on language and theory of mind development could be attributed to other factors rather than joint attentional skill development. Further research is required to contribute to this debate.

The effects of gender differences

Choudhury and Benasich (2003) state that a main risk factor for speech and language difficulties is gender. The ratio of boys to girls for SLI is 2:1-3:1 (Bishop, 1997). Research has shown gender differences in language development within the general population. Horwitz et al (2003) found that male gender was related to expressive language delays in their random sample of children born within a US hospital over a two year period.

Intuitively, it could be thought that, as research has shown gender differences in language development, these may also be apparent in joint attention ability. Saxon & Reilly (1999) did indeed find that girls more regularly participated in joint attentional interactions than boys. Furthermore, Butterworth & Jarrett

(1991) discovered gender differences in the ability to specifically locate an object by following a caregiver's eye gaze. Girls scored higher than boys on this task at 6-12 months. However, at 18 months there was not a significant difference. Moreover, Raver and Leadbeater (1995) found that males' joint attention interactions were more influenced by a mother's parenting style than females. In view of these research findings it may be pertinent to consider gender differences when generalising research findings or when developing joint attention assessments.

Clinical relevance of joint attention research

Joint attention behaviours are of interest to health and educational professionals involved in supporting and contributing to the diagnosis of children with difficulties such as language delay and autism. It has been consistently found that children with autism have difficulties with eye contact (Bruinsma et al, 2004). This has been shown to significantly affect their joint attentional interactions. Wimpory et al (2000, cited by Bruinsma et al, 2004) found that parents of children with autism reported a deficit in the use of eye contact and gestures such as pointing and following points, giving and showing. This information has been used diagnostically (Baron-Cohen, Cox, Baird, Swettenham, Drew, Nightingale, Morgan, Drew & Charman, 1996).

Presently, the checklist for Autism in toddlers (The CHAT, Baron-Cohen et al, 1996) is used to assist with the diagnosis of children with autism within the UK. This takes into account joint attentional behaviours. The Early Social Communication Scales (Mundy, Hogan & Doehring, 1996) also takes into account joint attentional skills. However, it is not a standardised tool. Other than this there is not a joint attention assessment available that can be utilised for children with language delay. Therefore, there is a clinical need for a tool to be developed.

The current study

The current study aims to contribute to the standardisation of a joint attention assessment that can be utilised with children with possible delays in language

development. It is important to consider demographic differences within joint attentional skills. Therefore, this assessment will be validated by taking into account differences in socio-economic status and other participant variables. This study can then also contribute to knowledge about the generalisability of joint attention research across populations.

The main focus of this study is whether a child's socio-economic status affects the joint attention behaviours of gaze switch and gaze and point monitoring.

Methodology

Design

This study employed a between subjects design to investigate the effects of several participant variables on joint attention. The main focus of the investigation was on socio-economic status. The independent variable of socio-economic status was defined in terms of nursery: private fee paying nursery or a state nursery. The other participant variables considered were age, with 3 levels (2.5-3.0 yrs, 3.1-3.6 yrs and 3.7-3.11 yrs) and as a continuous variable (age in months) and the independent variable of gender. Age was considered, as there was a difference in the frequency distribution of ages in the groups. The four dependent variables employed in the study were the participants' scores on a joint attention assessment. The first two variables were scores for a gaze switch between an object and the researcher (or the researcher to an object). The third variable was the score for monitoring the researcher's gaze or point. The final dependent variable was the participants' overall score for the assessment.

The independent variable of age will be explored by carrying out three correlations. Socio-economic status will be analysed by four Mann-Whitney U tests and a one-way between subjects ANOVA, co-varying age. Gender differences will be investigated by carrying out four one-way between subjects ANOVAs. Again, age will be co-varied.

Participants

The participants were 34 children, 18 females and 16 males, whose ages ranged from 2:5 to 3:11 years. The participants attended four North London nurseries (see appendix 1 for a full list of participant details). Two of the nurseries were state provisions and the other two were private fee paying nurseries. There were equal numbers of participants and males and females in the state and private groups (see table 1 for mean ages and standard deviations).

Table 1 – Mean age and standard deviation by nursery type

Nursery Type	Mean age (in months)	Standard deviation	Range (Min – max)
State	41.41	5.96	29-47
Private	39.76	4.89	31-47

The two private nurseries were matched in terms of their fees (see table 2 below).

Table 2 – Nursery fee's per term

Nursery	No of participants	State / Private	Term Fees		
			AM session	PM Session	Whole day
1	5	State	Free	Free	Free
2	12	State	Free	Free	Free
3	10	Private	£1100 Aged 2-3 yrs	£1300 Aged 3-4 yrs	Not possible as sessions divided by age
4	7	Private	£1300 All ages	£1300 All ages	£1700

Nursery 1 - was a voluntary aided nursery. However, the participants' parents did not pay any voluntary contributions. All of the participants were eligible for free school meals.

Nursery 2 – was located in a sure start area and is an early excellence centre. Due to this the nursery is over subscribed and the council have several priority criteria including: -

- 1) Children whom the director of education accepts have exceptional education, medical or social need for a place at the centre.
- 2) Children in public care.

3) Children living closest to the centre.

It is considered that these two nurseries are similar in terms of the socio-economic status of the families that utilise this provision.

Nursery 3 & 4

Eligibility for a place at these nurseries is based on the parents'/caregivers' ability to pay the nursery fees.

It is considered that the socio-economic status of families that use nurseries 1 and 2 is different from those that use nurseries 3 and 4.

The samples from nurseries one, two and four consisted of participants from a wide range of ethnic backgrounds and cultures. Fifteen of the participants spoke English as an additional language. The participants from nursery three were all white English children and did not speak an additional language.

Materials

The assessment of Joint Attention (the egg task) used for this investigation was developed for a research project on variables that may predict language disorders in children referred for speech and language therapy (Chiat & Roy, 2002-2005).

The materials used for the Joint Attention assessment comprised of a cardboard egg box containing six plastic eggs which were all differently coloured (pink, green, orange, purple, blue and white). Each egg contained a miniature object. These objects were a toy plastic man, hat, tiger, bag, birthday candle and ring. Also equivalent larger objects were used: a puppet man, a child's hat, a household candle, an adult's bag, a soft toy tiger and an adults' ring.

Procedure

The assessment was carried out in a separate room or a quiet corner of a larger room to reduce distractions. However, the room or area that was used was familiar to the child. The large objects were placed around the room or area at

an appropriate line of vision for a child. The tiger was positioned behind and to the left of the child. The hat and candle were located on either side of the child. The bag was next to the experimenter and the puppet was placed on a chair to the right of the child. The ring was placed on the researcher's finger. All objects were positioned prior to the child entering the room or area.

The child was introduced to the researcher by nursery staff. The nursery staff occasionally stayed with the child initially to make them feel more comfortable. The child was encouraged to sit down facing the researcher. The researcher talked to the child for a few moments in order to settle and relax them. Then the egg box was placed on the floor.

The researcher then produced the following statement, "Let's see what's inside". The box was then opened and the researcher remarked "Oh look! Here are some eggs". The participant was then asked to give the researcher an egg and the researcher held their hand out. If the child did not select an egg the researcher chose one and stated, "I am going to look at this one".

The researcher then looked at the child and extended their arm out to the side, away from their face and shook the egg. The researcher was silent while carrying out this action. The child was then observed to see if they gaze switched between the egg and the researcher. The action was discontinued after five seconds. If the child gaze switched they scored one point. If they did not gaze switch they scored zero. The researcher recorded their score at this point.

The researcher then moved the egg back to the midline of their body and slowly opened the egg whilst predominantly looking at the child. They then showed the contents of the egg to the child whilst staying silent and making no comment on their actions. The child was allowed to play with the toy. The researcher then recorded if the child carried out a gaze switch between the toy and themselves. If they did look at the researcher they scored one. If they did not carry out a gaze switch they scored zero.

The researcher then requested that the child replace the miniature object back into the egg by the statement “shall we put it back in the egg now”. As this was being carried out the researcher stated “I brought my person (the object stated was the same as miniature object selected) with me today” and looked in the direction of the equivalent large object. The child was observed in order to record whether they followed the direction of the researcher’s gaze. If the child did follow the direction of the researcher’s gaze they scored two points. If they did not follow the gaze the researcher then repeated the statement and also pointed at the object. If the child then looked at the object they scored one point and if they did not follow the point they scored zero. This process was then repeated until all of the eggs had been opened. The order that the eggs were opened was random, as it depended on which eggs the child selected.

A second researcher was also present in the room. This researcher was in a position where they could observe the child’s gaze. However, they were out of the direct eye line of the child to reduce distractions. This researcher also scored the child throughout the assessment and both researchers’ scores were compared for inter-observer reliability.

The table below shows the maximum possible score for each measure of joint attention.

Table 3 – Maximum score for each joint attention behaviour.

Stage of assessment	Maximum Score
Gaze switch before egg is opened	6
Gaze switch after egg is opened	6
Monitoring gaze / point	12
Overall score	24

Results

The 34 participants included in the study readily engaged in the joint attention task. Two children from the state nurseries did not co-operate in the task and were excluded from the study. One of these children found it difficult to settle in the room as they were not familiar with the researchers and the other child displayed significant attention and interaction difficulties and could not be encouraged to sit down to carry out the task.

Inter-observer reliability

A measure of inter-observer reliability was carried out to ascertain whether the data collected was a robust measure of joint attention. The percentage of agreement between researchers was calculated for each dependent variable (see table below).

Table 4 – Percentage of inter-observer reliability for each joint attention measure.

Stage of assessment	Percentage of inter-observer reliability.	Comments
Total for gaze switch before egg is opened	100%	
Total for gaze switch after egg is opened	94%	Discrepancies for two participants' scores, one participant on 2 items, the other participant on 1 item.
Total for following gaze / point	94 %	Discrepancies with the same participants as above both on 2 items (gaze).
Overall scores	94%	

One of the participants that produced a discrepancy in the researchers' scores was wearing a cap, which they would not remove when requested. Therefore at

times their eyes were slightly obscured. The other participant that produced a discrepancy in the scoring moved seating position during the assessment. Therefore the second researcher did not have a clear line of vision. The final scores used were that of the researcher who was carrying out the assessment, as they had the clearest view of the child.

These results demonstrate that the data collected was a reliable measure of joint attention (see appendix 2 for raw data).

Comparison of age distribution in state and private groups

An independent t-test was carried out to compare the ages (in months) of the participants in the state and private groups in order to establish whether the samples were comparable (see table 1 for mean ages and standard deviations). Levine's test was not significant therefore the variances were equal. The t-test showed that there was not a significant difference between the mean age of the state and private groups ($t=.880$, $d.f.= 32$, $p =.386$ ns).

However, there was a difference in the frequency distribution of ages in the groups (see appendix 3 for histograms). In the state group there were 13 children over the age of 40 months and in the private group there were 8 children over this age. It is possible that the age of the child would influence their joint attention scores. Therefore the effects of age were investigated further.

Investigation into the effects of age on joint attention scores

The participants were categorised into three age groups. The group sizes could not be matched due to the distributional issues of the sample (see table 5).

Table 5 – Age categories and group sizes for each nursery type.

Age of participants (in years)	Nursery type	Group size
2.5 –3.0	Private	6
	State	4
	Total	10
3.1 – 3.6	Private	5
	State	3
	Total	8
3.7 – 3.11	Private	6
	State	10
	Total	16

Descriptive statistics were produced for each dependent variable (see tables 6 - 9 & figures 1 to 4). The small and unequal group sizes should be taken into account when interpreting the results.

Table 6 shows the means scores and standard deviations for the variable “gaze switch before the egg is opened”. Scores for both state and private groups are outlined. This data is also illustrated in figure 1. However, the scores in this figure are for the state and private groups combined.

Table 6 – Mean scores, standard deviations and range for gaze switch before the egg is opened for both state and private groups.

(Maximum score = 6)

Age (in years)	Private Nursery			State Nursery			Private & state nursery combined		
	M	SD	R	M	SD	R	M	SD	R
2.5 – 3.0	5.17	.98	4-6	4.25	1.50	3-6	4.80	1.22	3-6
3.1 – 3.6	4.80	1.78	2-6	5.67	.577	5-6	5.13	1.45	2-6
3.7 – 3.11	5.67	.516	5-6	5.30	.949	4-6	5.44	.814	4-6

Key

M = mean scores

SD = Standard Deviation

R = Range (min – max)

Figure 1 – Scores for gaze switch before the egg is opened by age with combined state and private groups

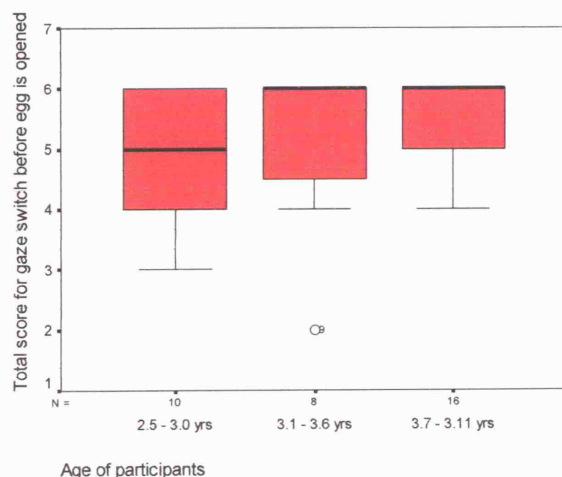


Table 7 shows the means scores and standard deviations for the variable “gaze switch after the egg is opened”. Scores for both state and private groups are

outlined. This data is also illustrated in figure 2, with combined state and private group scores.

Table 7 – Mean scores, standard deviations and range for gaze switch after the egg is opened for both state and private groups

(Maximum score = 6)

Age (in years)	Private Nursery			State Nursery			Private & state nursery combined		
	M	SD	R	M	SD	R	M	SD	R
2.5 – 3.0	2.67	1.96	0-5	2.50	.577	2-3	2.60	1.50	0-5
3.1 – 3.6	4.40	2.30	1-6	3.00	2.64	1-6	3.88	2.35	1-6
3.7 – 3.11	5.00	2.00	1-6	4.90	1.52	2-6	4.94	1.65	1-6

Figure 2 – Scores for gaze switch after the egg is opened by age with combined state and private groups

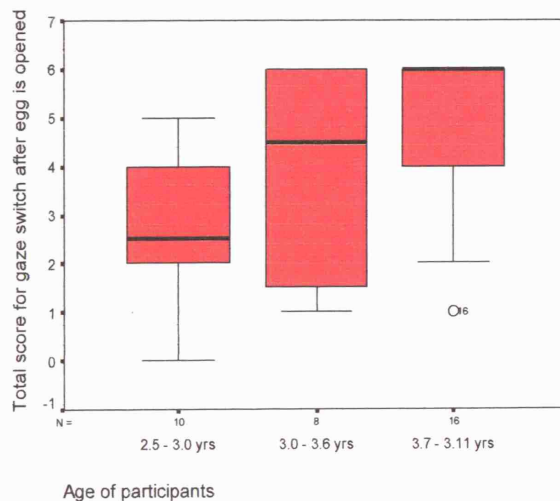


Table 8 shows the means scores and standard deviations for the variable “monitoring/gaze point”. Scores for both state and private groups are outlined.

This data is also illustrated in figure 3, with combined state and private group scores.

Table 8 – Mean scores, standard deviations and range for monitoring gaze/point for both state and private groups

(Maximum score = 12)

Age (in years)	Private Nursery			State Nursery			Private & State nursery combined		
	M	SD	R	M	SD	R	M	SD	R
2.5 – 3.0	9.00	3.46	2-11	8.50	2.38	7-12	8.80	2.96	2-12
3.1 – 3.6	10.40	1.51	8-12	10.00	1.00	9-11	10.25	1.28	8-12
3.7 – 3.11	11.00	.632	10-12	10.10	1.79	6-12	10.44	1.50	6-12

Figure 3 – Scores for monitoring gaze/point by age with combined state and private groups

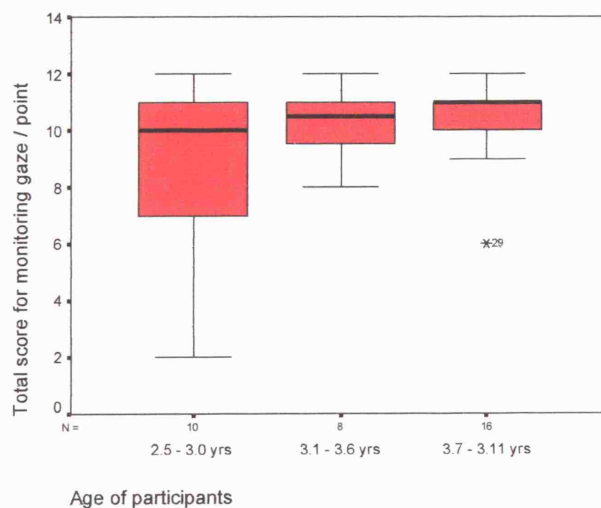


Table 9 shows the means scores and standard deviations for the overall scores for the joint attention assessment. Scores for both state and private groups are

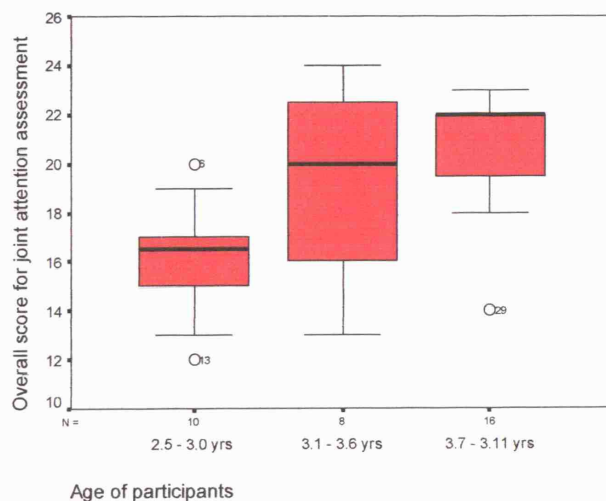
outlined. This data is also illustrated in figure 4, with combined state and private group scores.

Table 9 – Mean scores, standard deviations and range for overall scores for both state and private groups.

(maximum score = 24)

Age (in years)	Private Nursery			State Nursery			Private & State nursery combined		
	M	SD	R	M	SD	R	M	SD	R
2.5 – 3.0	16.83	2.78	12-20	15.25	1.70	13-17	16.20	2.44	12-20
3.1 – 3.6	19.60	4.82	13-24	18.67	3.05	16-22	19.25	4.02	13-24
3.7 – 3.11	21.67	1.96	18-23	20.30	2.54	14-22	20.81	2.37	14-23

Figure 4 – Overall scores for joint attention assessment by age with combined state and private groups



The means of all of the groups increase with age at every measure of joint attention, apart from the “gaze switch before” variable. However, there is still an increase in mean score when private and state nurseries are combined.

The standard deviations for the 3.1-3.6 yrs age group tend to be the largest for each measure apart from monitoring gaze/point. In the private nurseries this age group has three out of four cases where the standard deviation is greatest and in the state nurseries it has two out of four cases. The youngest children have the most variability in their scores for the measure of monitoring gaze/point. These results may suggest greater variability in younger groups. However, these findings should be interpreted with caution considering the small group sizes.

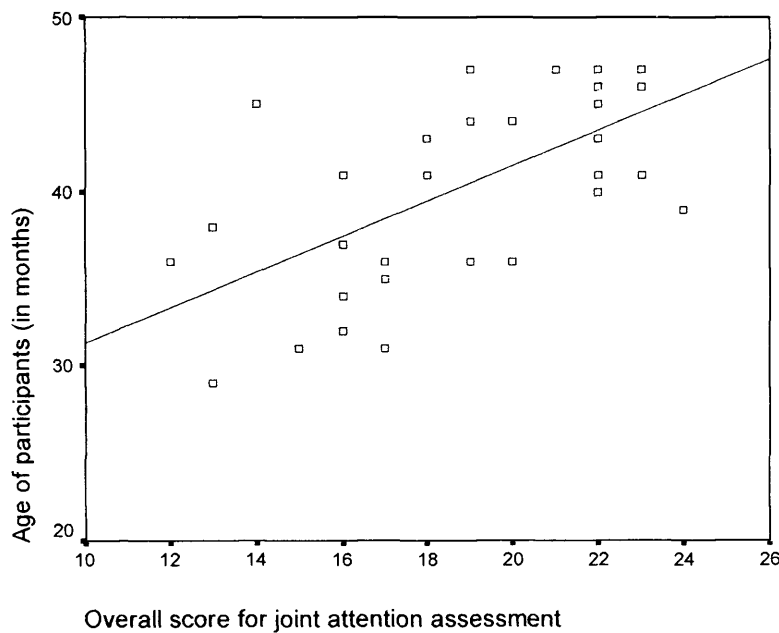
The box plots highlight that many of the older children scored highly on the measures of joint attention. Therefore, there is a ceiling effect and the data is skewed. The median scores for the “gaze switch before” variable and the “monitoring gaze/point” variable are high for all ages, whereas the median scores for the “gaze switch after” variable are more distributed, increasing with age.

The mean scores of the state nurseries appear to be slightly lower than for the private nurseries in all of the measures of joint attention at all ages apart from “gaze switch before” for the 3.1 – 3.6 yrs age group.

Statistical analysis – effects of age

A Spearman’s rho correlation was carried out to investigate whether the age of participants (in months) was related to their overall score on the joint attention assessment. A non-parametric test was selected, as the assumptions for a parametric test were not met. The calculated Coefficient was .597 ($p < .001$), which shows a strong positive relationship between age and joint attention scores (see figure 5). Therefore, it can be concluded that joint attention skills developed with age in this group.

Figure 5 – Scatter graph to show the relationship between the age of the participant and their overall scores on the joint attention assessment.



Spearman rho correlations were carried out for the state and private groups individually to investigate whether these effects of age were present in the two experimental groups.

The calculated coefficient for the state group was .607, which shows a significant positive relationship ($p < .05$) between joint attention and age. The calculated coefficient for the private group was .661, which likewise shows a strong positive relationship ($p < .01$) between these variables. Therefore it can be concluded that age effects are not predominant in one group.

The effect of age on joint attention and the age distribution issue within the state and private groups will be taken into account when interpreting other results.

Investigation into the effects of socio-economic status on joint attention

Table 10 shows the mean scores and standard deviations for each measure of joint attention for both the state and private nurseries. This data is also illustrated by figures 6 – 9.

Table 10 – Mean scores, standard deviations and ranges for each nursery group

Stage of assessment	Private Nursery			State Nursery		
	M	SD	R	M	SD	R
Gaze switch before egg is opened (max score = 6)	5.24	1.14	2-6	5.12	1.11	3-6
Gaze switch after egg is opened (max score = 6)	4.00	2.20	0-6	4.00	1.87	1-6
Monitoring gaze/ Point (max score = 12)	10.12	2.28	2-12	9.71	1.86	6-12
Overall score (max score = 24)	19.35	3.72	12-24	18.82	3.14	13-22

Figure 6 – Total scores for gaze switch before egg is opened for state and private groups

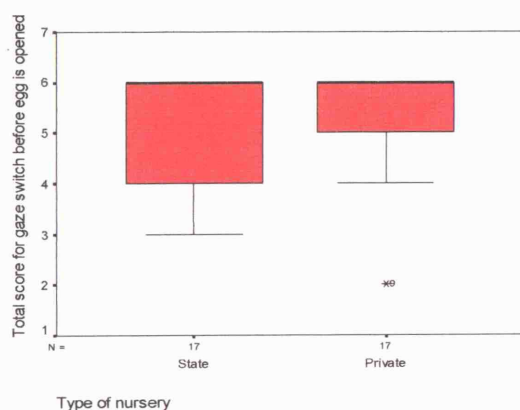


Figure 7 – Total scores for gaze switch after egg is opened for state and private groups

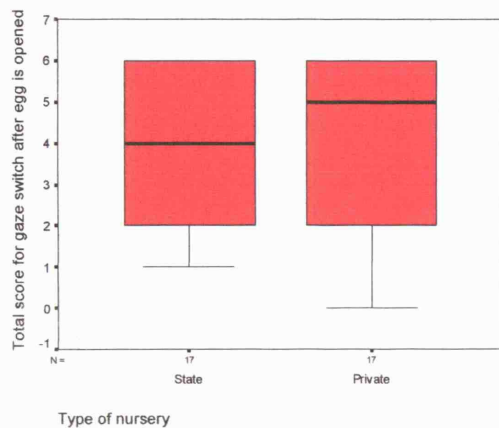


Figure 8 – Total scores for monitoring gaze/point for state and private groups

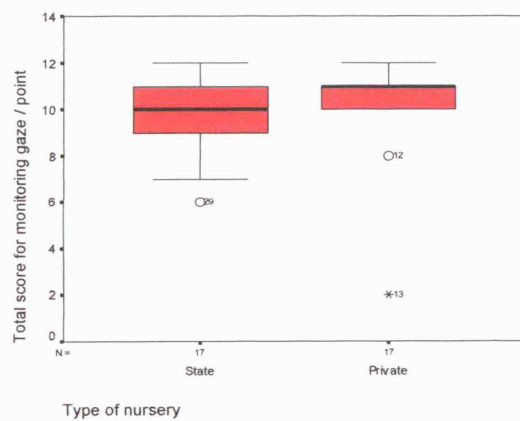
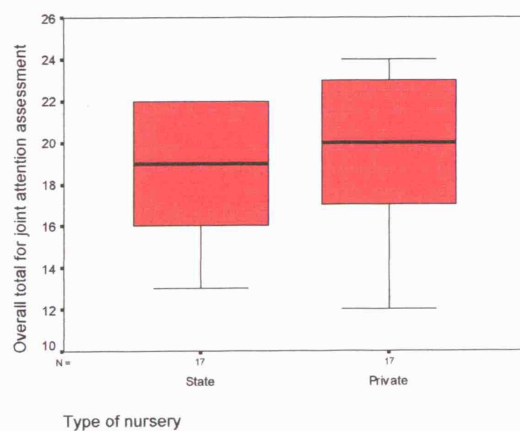


Figure 9 – Overall scores for joint attention assessment for state and private groups



These descriptive statistics show trends observed within age groups above. The mean scores for the state group are slightly below that of the private

group. There is also a ceiling effect and the data is skewed. Therefore, again, a non-parametric test was required.

Statistical analysis – effects of socio-economic status

Mann-Whitney U tests were carried out to explore any differences between the private and state nursery groups. The tests showed that there was not a significant difference between the groups on any measure of joint attention with or without outliers removed (see results below with outliers included).

Gaze switch before egg is opened, $U = 134$, $p = .389$ ns

Gaze switch after egg is opened, $U = 143.5$, $p = .971$ ns

Monitoring gaze/point, $U = 116$, $p = .311$ ns

Overall score, $U = 122$, $p = .434$ ns

The effect of age on joint attention cannot be taken into account using the above non-parametric tests. In order to account for age a parametric test is required. Pring (2005) states that it is difficult to meet all assumptions for parametric tests and that it is advisable to use these tests on data until there is further evidence that supports the contrary. However, when Levine's test was carried out on the data it was not significant, which shows that there was equal variance in each group. Therefore, this assumption was met. A one-way between subjects ANOVA with age of participants (in months) as a covarying factor was carried out. The main effect of socio-economic status was not significant ($f = 1.78$, $d.f. = 1,31$, $p = 1.91$ ns). This result confirms the above findings from the non-parametric tests and suggests that these were not due to age differences between groups. Therefore it can be concluded that the development of joint attention was not affected by socio-economic status.

Investigation into gender differences in joint attention

Table 11 shows the mean age and standard deviation for male and female groups.

Table 11 – Mean age (in months), standard deviation and range for male and female groups

Gender	Mean age (in months)	SD	Range (min-max)
Male	38.6	6.04	29-47
Female	42.33	4.24	35-47

Comparison of ages between male and female groups

An independent t-test was carried out to compare the ages (in months) of participants in the state and private groups in order to establish whether the samples were comparable. Levine’s test was not significant, which shows that there was equal variance in each group. The t-test showed that there was a significant difference in the ages of the groups ($t = -2.082$, $d.f. = 32$, $p < 0.05$).

Age was therefore controlled for in the following analysis. A one-way between subjects ANOVA with age as a covarying factor was carried out for each dependent variable (see below). A parametric test was selected for the reasons outlined by Pring (2005) referred to earlier.

Gaze switch before & after egg is opened and overall joint attention score

Levine’s test was not significant for the variables of gaze switch before and gaze switch after the egg is opened, which highlights that there was equal variance in each group. The tests showed that there was not a significant gender difference on scores for gaze switch before the egg is opened ($f = 1.276$, $d.f. = 1,31$, $p = .267$ ns) or after the egg is opened ($f = 2.774$, $d.f. = 1,31$, $p = .106$ ns). However, there was a significant gender difference for the overall joint attention scores ($f = 8.251$, $d.f. = 1,31$, $p < 0.01$).

Monitor gaze/point

Levine’s test was significant for this variable, which highlights that there was not equal variance in each group. The test showed that there was a significant gender difference for this variable ($f = 9.164$, $d.f. = 1,31$, $p < 0.01$). This result should be treated with caution and would need to be investigated with a larger sample size.

The effect of age has been controlled for in the above analysis. However, this effect will be explored further to discover whether age may be more of an influence in the male or the female group. Spearman's rho correlations were carried out to investigate the relationship between the age of participants (in months) and each measure of joint attention for the male and female groups. There was not any significant correlation between age and a measure of joint attention for the male groups (see below), although it was close to significant for the overall score.

Gaze switch before the egg is opened – correlation coefficient = .354, $p = .79$ ns

Gaze switch after the egg is opened – correlation coefficient = .339, $p = .200$ ns

Monitoring gaze/point – correlation coefficient = .249, $p = .353$ ns

Overall score for joint attention – correlation coefficient = .481, $p = .059$ ns

However there were two significant positive relationships for the female group. There was a positive relationship between gaze switch after the egg is opened (correlation coefficient = .571 $p < 0.05$) and between the overall score for joint attention and age (correlation coefficient = .551 $p < 0.05$). The other two measures were not found to be significantly related (see below).

Gaze switch before the egg is opened – correlation coefficient = .249, $p = .319$ ns

Monitoring gaze/point – correlation coefficient = .022, $p = .932$ ns

Thus the girls showed more age effects than the boys, even though their age range was more limited than the boys (see table 11). Although caution must be exercised given the small numbers of children in the sample and the number of correlations calculated. These findings suggest that the gender differences discovered are independent of the male group being younger. This provides further support for the earlier findings.

Discussion

This study aimed to investigate the relations between socio-economic status and joint attention in 2-4 year old children. Socio-economic status was defined by whether the child attended a private or a state nursery. This was considered as a measure of family income. Participant variables of gender and age were also considered.

Summary of results

There was a difference found in the frequency distribution of ages between the state and private groups. Therefore, the effect of age was investigated to highlight whether this may influence scores on the joint attention assessment. It was discovered that there was a strong positive relationship between age and overall scores on the joint attention assessment. This association was found for both state and private groups. This result suggests that joint attentional skills develop with age. The younger groups tended to have greatest variability in their scores. However, these findings should be treated with caution due to the very small sample size. The effect of age was controlled for in the analysis of the other results, although this presented some problems in selection of statistical tests (discussed below).

It was found that there was not a significant difference between state and private groups on the joint attention behaviours measured: gaze switch before and after the egg was opened, monitoring of adult's gaze / point and the overall scores. Non-parametric tests were used as the data was not normally distributed. However, the effect of age could not be controlled for by these tests. Therefore a one-way ANOVA, was carried out and age was co-varied. The ANOVA result confirmed that of the non-parametric tests. These findings suggest that the development of joint attention is not influenced by socio-economic status. Again the constraints of the small sample size have to be considered.

Gender differences were found on the measures of monitoring gaze/point and for overall joint attention scores, with females scoring more highly than males.

These results were found by carrying out ANOVAs in order to co-vary age. However, there was not equal variance in the groups for the monitoring gaze/point variable. Therefore, these results needs to be treated with caution and investigated with a larger sample size. There was not any significant gender differences found on any other measure of joint attention. In addition, it was discovered that females showed more age effects than boys, even though their age range was more limited.

Implications of results

The effect of age

This study did not aim to investigate the effect of age on joint attentional skills. However, it was important to consider this factor given the unequal distribution of ages within the groups. Joint attention development in children between the ages of two to four has generally not been addressed in the research literature. Therefore the finding that there is a significant development in joint attention ability is interesting and could be investigated further in the future.

The effects of socio-economic status

These results support Saxon and Reilly's (1999) findings that there is not an association between socio-economic status and joint attentional behaviours. They also suggest that even though there appears to be a link between language development and socio-economic status, this connection does not seem to be mediated by joint attention development. It could be proposed that joint attention is a robust phenomenon that is less affected by environmental influences than language development. These findings also suggest that there are other factors that underpin the link between language development and socio-economic status. Further investigation into these areas is required.

Bakeman and Adamson (1984) state that assessments of joint attentional skills and the frequency of joint attentional interactions are influenced by the ability and motivation of the interactional partner. Saxon and Reily's (1999) study of socio-economic status and joint attention investigated parent-child dyads and focused on the adult partners behaviours. This investigation of joint attentional skill provides a different perspective on joint attention. It is more independent of

the influences of the interactional partner as only two experimenters, both unknown to the children, carried out the assessment. Therefore, from the combined results of Saxon and Reily's (1999) study and this study it can be suggested that socio-economic status does not overly influence the joint attentional skills of the parent or the child, providing further support for the proposal that joint attention is not affected by environmental influences.

This investigation provides some support for the validity of generalising joint attention research across populations. It could be tentatively suggested that even though the majority of joint attention research has been carried out on high SES samples their results can be generalised across different SES groups.

Furthermore, these findings provide support for the joint attention assessment (the egg task) being a valid measure of joint attentional skills across SES populations.

The effects of gender differences

These findings do provide some limited support for previous research that there are some gender differences in joint attention abilities (Saxon & Reilly, 1999, Butterworth & Jarrett, 1991, Raver & Leadbeater, 1995). In fact Butterworth and Jarrett (1991) specifically found gender differences on monitoring eye gaze, with girls' scoring higher than boys at age 6 – 12 months. However, they did find that this difference was not apparent at 18 months.

Carpenter et al (1998) proposed that following an adult's gaze/ point might be a truer measure of joint attention than gaze switch (see introduction). This behaviour is a more active display of joint attention than switching gaze between an adult and an object, as the child has to follow the adult's focus. Furthermore, it could be argued that as this skill is later developing it is more complex and requires a greater understanding of others as intentional agents. In addition, monitoring gaze cannot be confused with checking behaviours (see introduction) i.e. checking that the caregiver is still near. Therefore, it could be suggested that monitoring gaze/point is a more discriminating measure of joint attention than gaze switch and that could account for the gender difference

being more apparent. However, this result does have to be treated with caution due to the reasons outlined previously.

It is interesting that females showed more age effects than males. It could suggest that females are more likely to follow a developmental hierarchy than males in their acquisition of joint attention skills. However, due to the small sample size this finding should be interpreted cautiously. Further research into this area is required.

These results suggest that researchers should consider gender differences when carrying out investigations into joint attention. Furthermore, gender differences should be considered when generalising results. In addition, gender could be taken into account when developing the joint attention assessment (The egg task) further. However, these findings need to be replicated on a larger sample to be considered reliable.

Limitations of the study

The most significant limitation of this study is that the age range of the children was not equally distributed between groups. This has impacted on the validity of the research findings and limits their interpretation. Therefore, further studies need to consider matching children for age and if possible using larger sample sizes.

It could be argued that defining socio-economic status by whether the child attended a private or state nursery may not be the strongest measure. This does reflect the family's income, however, a more robust measure could also take into account the mother and father's occupation and education level. Further investigation of this area with these additional measures of socio-economic status would increase the validity of the results.

Future research

It has been proposed within this study that joint attention is less affected by environmental influences than language development. It would be interesting to

directly explore this hypothesis. This could be achieved by comparing language input and joint attentional interactions in the same parent-child dyads from different socio-economic groups.

The results of this study suggest that joint attention, which is a socio-cognitive skill, is not affected by socio-economic status. However, Cutting and Dunn (1999) found that another area of social cognition, theory of mind, is influenced by family background. Therefore, it would be interesting to investigate whether other socio-cognitive skills such as symbolic play are influenced by a family's socio-economic status.

This study has measured joint attention solely concentrating on the skills of the child, whereas most other research has concentrated on parent-child dyads. It would be interesting to explore this perspective further and investigate the extent of which measures of joint attention reflect the skills of the adult rather than the skills of the child. If it was discovered that the child's skills were not affected by the adult's this would provide further support for the proposal that joint attention is not overly influenced by the environment.

Future research could also be carried out on the influence of culture on joint attention interactions. There has been a small amount of research that has indicated cultural differences in joint attention behaviours in parents and children e.g. Dennis, Cole, Zah-Waxler, and Mizuta (2002). However, this area should be investigated further to provide information about the generalisability of research across cultural populations.

Conclusion

The results of this study have suggested that a family's socio-economic status does not influence the joint attention behaviours of a child. It has therefore been proposed that the association between language development and socio-economic status is not underpinned by differences in joint attention. Joint attention appears to be a robust phenomenon, which is less affected by environmental influences than language development. The findings also indicate that there are gender differences in joint attentional skill, with females

having a higher ability. However, this result has been treated with caution and needs to be considered in the light of the methodological limitations of the study.

Word count = 8247

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Appendix 1

Participant Details

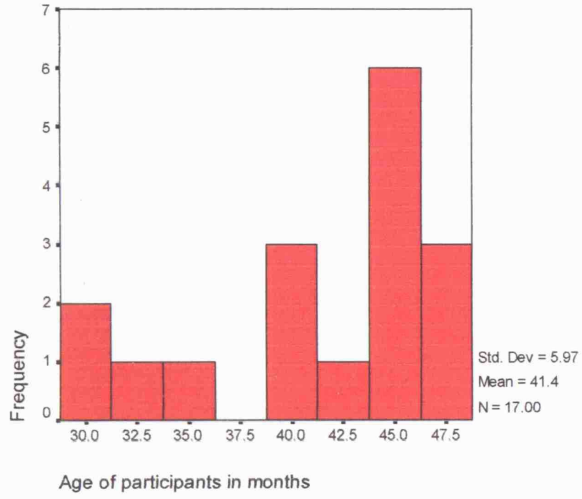
Participant number	Nursery	Gender	Age in months	Status	Language
1	1	F	46	state	EAL
2	1	F	46	state	EAL
3	1	F	47	state	Eng
4	1	M	47	state	Eng
5	1	M	47	state	Eng
6	4	M	36	private	Eng
7	4	M	46	private	Eng
8	4	M	47	private	EAL
9	4	M	37	private	Eng
10	4	F	41	private	EAL
11	4	F	31	private	Eng
12	4	F	38	private	Eng
13	3	F	36	private	Eng
14	3	M	39	private	Eng
15	3	M	43	private	Eng
16	3	M	43	private	Eng
17	3	F	36	private	EAL
18	3	F	47	private	Eng
19	3	F	46	private	Eng
20	3	F	40	private	Eng
21	3	F	36	private	Eng
22	3	M	34	private	Eng
23	2	F	35	state	EAL
24	2	M	29	state	EAL
25	2	F	41	state	Eng
26	2	M	41	state	EAL
27	2	F	44	state	EAL
28	2	M	44	state	EAL
29	2	M	45	state	EAL
30	2	F	45	state	EAL
31	2	F	41	state	Eng
32	2	M	31	state	EAL
33	2	M	32	state	EAL
34	2	F	43	state	EAL

Appendix 2 – Raw data

Participant number	Score for gaze switch before egg is opened.	Score for gaze switch after egg is opened.	Score for monitoring gaze / point	Overall joint attention score
1	6	6	10	22
2	5	6	11	22
3	4	6	12	22
4	6	4	9	19
5	4	6	11	21
6	6	4	10	20
7	5	6	12	23
8	6	6	11	23
9	2	3	11	16
10	6	6	11	23
11	4	2	11	17
12	4	1	8	13
13	5	5	2	12
14	6	6	12	24
15	5	6	11	22
16	6	1	11	18
17	4	4	11	19
18	6	5	10	21
19	6	6	11	23
20	6	6	10	22
21	6	1	10	17
22	6	0	10	16
23	3	2	12	17
24	3	2	8	13
25	5	2	11	18
26	6	1	9	16
27	6	3	11	20
28	6	4	9	19
29	6	2	6	14
30	4	6	12	22
31	6	6	10	22
32	5	3	7	15
33	6	3	7	16
34	6	6	10	22

Appendix 3

Histogram to show the age distribution in the state group.



Histogram to show the age distribution in the private group

