An Investigation Into The Pretend Play Shown By Children With Autism

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Abstract

This research investigated whether the absence of pretend play typically shown by children with autism is the result of a global inability to pretend, or reflects a failure to utilise intact pretend play abilities. A first experiment found that children with autism were impaired in their ability to produce spontaneous pretend play, relative to a matched group of children with moderate learning difficulties. They were also impaired in their production of pretence in elicited play conditions, in which direct encouragement to play was provided by the experimenter. However, a second experiment revealed that these children were not impaired in their ability to carry out pretend instructions. Further, a third experiment showed that they were unimpaired in their ability to comprehend pretend acts which the experimenter demonstrated before them.

These findings suggest that pretend play is something that children with autism can engage in, at a basic level at least. Consequently, two final experiments aimed to determine why children with autism do not utilise this capacity spontaneously. The first of these tested an 'executive deficit' hypothesis, which suggests that a failure to pretend is caused by a failure to disengage from the functional salience of objects. The results of the experiment disconfirmed this prediction. The second test examined whether children with autism have problems in generating pretend acts, and found that this was the case.

It is therefore hypothesised that children with autism suffer from some form of generativity impairment, which impinges on their apparently intact ability for pretence. This suggestion fits in with the pattern of results obtained from all the studies, as children were only impaired when the idea for pretence was not provided. Possible cause of such an impairment are discussed, as are the implications of these findings for our understanding of the psychology of pretend play.

To Roger and Eileen

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Preface

A literal translation of the Greek word 'thesis' is a place or a position. The purpose of this, my thesis, is to describe the place or position that I have reached after three years of research into pretend play in autism. The theoretical 'position' which I hold having completed this research will only be spelled out fully in the final chapter (chapter 7). What the earlier chapters will describe is exactly how I have come to arrive at this position, in a sense they will tell the story of my journey to the final 'thesis' or theoretical resting point.

The subject of my research is one that marries two distinct areas of developmental psychology. Both pretend play and autism are areas which have a vast literature and a great deal of previous research associated with them. However it could be argued that they are both aspects of psychology which, though well described, are not fully understood at a fundamental level. The manifestations of pretend play in young children and of autism are well documented and detailed, however the psychological mechanisms which underpin these two separate topics are less well formulated. Certainly there have been incisive and well-regarded attempts to describe exactly what is going on in pretend play (e.g. Leslie, 1987) and important theories advanced to explain autism on a psychological level, but I would claim that these theories are at present still at the stage of being tested and verified. Research into the meeting point of these two areas, into pretend play in autism, is therefore valuable, not only for what it tells us about children with autism's ability to pretend, but also for what it reveals about autism and for what it has to say about pretend play specifically. In a sense pretend play and autism come together like two continents; where they meet they push up a series of less well explored research questions. Once these questions have been addressed one has an exciting vantage point to look down, perhaps from a new and informative perspective, on the two land-masses below.

Given the hope that this research will have something significant to say about autism and about pretend play as areas of interest in their own right, two initial chapters will be devoted to them. The subject of pretend play will be discussed first (chapter 1), not because it is seen as a more important area than that of autism, but because certain issues which are best discussed with reference to pretend play (e.g. metarepresentations) are of subsequent relevance to a discussion of autism. Aspects of autism will therefore be covered in chapter 2. This chapter will not give an exhaustive account of the disorder, but rather concentrate on issues that are relevant to the current thesis only. Once these areas have been adequately reviewed, and outstanding theoretical questions highlighted, we can then proceed to consider the issues involved in pretend play in autism (chapter 3). This third chapter will provide an exhaustive review of previous research into pretend play in autism, and also describe a list of potential explanations for the pattern of results that emerge from these studies. Deciding between these potential explanations was the aim of the research reported here. The remaining chapters will outline the path this research took en route to the final thesis. Chapters 4 and 5 will describe work carried out to determine whether the characteristic absence of pretend play seen in autism reflects a global inabilty to pretend, or rather a failure to produce pretence. Chapter 6 will describe further studies designed to make explicit the exact nature of the pretend play deficit seen in autism, in the light of these initial findings.

I would like to gratefully acknowledge the support of my two supervisors, Dr Jill Boucher and Professor Peter Smith, both of whom have been continually encouraging and helpful throughout the period of this research. Their guidance, whether theoretical, methodological or practical was consistently relevant, and has proved invaluable to me. I am grateful also to Paul Harris for his help in designing Experiment 3, and for his constructive comments on the findings obtained from this study. Similarly Jim Russell's criticisms of Experiments 3 and 4 were useful to me.

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Chapter 1
Pretend Play

1.1 Introduction & Traditional Analyses

The purpose of this chapter is to provide an introduction into the general area of pretend play in young children. This is necessary before the evidence for, and the implications of, a pretend play deficit in autism can be fully evaluated (chapter 3). The chapter will discuss pretend play in three sections, beginning, in this section, with an outline of traditional and influential approaches to the subject, such as those of Piaget and Vygotsky. Subsequent sections will examine the phenomena of pretend play on two separate levels. Section 1.2 will provide a *descriptive* analysis, covering important developmental and definitional issues, while section 1.3 will attempt an analysis of theories and explanations of the *psychological* mechanisms involved in pretence. In both cases integrated summaries of these analyses will be presented.

1.11 Piaget

In his book, 'Play, dreams and imitation in childhood' (1962), Piaget charted the gradual development of pretend play, as he saw it, in young children. He suggested that pretend play has its roots in early sensorimotor adaptive reactions, which come to be acted out for 'functional' pleasure. In other words, rather than being a means for the child to find out about the world, these actions become purely assimilative, they are practised for the sake of being practised. From these early sensorimotor 'practice games', the child moves on to producing pretend play, and then to more formal rule-based games. Piaget used the term 'symbolic play' to refer to pretence, arguing that a child who pretends uses a present object or action (signifier) to stand in for, or to symbolise, an absent object or action (signified).

However as Piaget himself notes, "The question as to where to draw the line between symbolic and practice games is more than a mere matter of classification, and involves the main problems of interpreting play in general". The problem faced by Piaget, which is one that still persists as we shall see below, was how to impose a dichotomy between non-symbolic and symbolic play on a gradually developing and evolving 'ludic symbol'. The distinction between 'signifier' and 'signified' grows steadily as a child begins to acquire the ability to pretend, but at what point is it sufficiently large or distinct for the play to be termed symbolic?

According to Piaget, children engage in practice games during sensorimotor stages I to V (up to an age of around 12 months[1]). However the separation of signifier and signified first emerges in stages II and III (2-8 months) and continues to develop in stages IV and V. In sensorimotor stage VI signifier and signified do become dissociated, and the child produces 'symbolic schemas'. This represents the beginnings of symbolic play, but it is symbolic play of a primitive form; the child's schemas remain tied to their own repertoire of behaviour (Piaget reports the example of Jacqueline who, at 15 months, pretended to sleep by putting her head on objects that reminded her of her pillow). Piaget therefore sees these symbolic schemas as a transitional form of play between practice games and symbolic play proper, which can only emerge once the child has developed beyond the sensorimotor stages.

Piaget divides the further development of symbolic play into two (post-sensorimotor) stages. In stage 1 (from around 18 months) the child begins to project symbolic schemas and imitative schemas onto new objects, objects not conventionally associated with these schemas. In stage 2 (from around 24 months) children come to identify one object with another (object substitution) and begin to engage in role-play and sociodramatic play. Once again Piaget argues

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[1]Ages assigned to Piaget's stages of development are approximate, and are taken from his own examples of when children show pretend play corresponding to each stage.

that the separation of signifier and signified is not complete in the first of these two stages, and would argue that only in stage 2 does 'symbolic play proper' occur.

1.12 Vygotsky

Vygotsky's theories of pretend play do not differ greatly from those of Piaget, though his perspective on its development is an alternative and relevant one. Vygotsky (1966) concentrates less on the roots of pretend play, claiming that 'imaginative play' is something new that the child acquires around the age of three, but in common with Piaget he sees younger children's inability to pretend as a consequence of their being tied to the physical world. Pretence appears only when the child can distance themselves from the real world, thought becomes separated from objects, and actions arise from ideas rather than from things. This is illustrated in two developments in children's thinking. Firstly meaning becomes emancipated from objects, therefore rather than an object dictating meaning to the child, the child can dictate meaning to the object. This, Vygotsky notes, occurs in object substitution when a child pretends that a stick is a horse. Similarly, meaning is freed from action, so the child can impose their own, novel, imaginative meaning on familiar actions. This occurs, for example, when a child stamps their foot upon the ground when pretending to ride a horse. The notion of these two developments (shown diagrammatically in figure 1.1) is present in Piaget's account, but is made explicit by Vygotsky.

Whereas Piaget saw pretend play as having a purely assimilative function, the child gains pleasure from simply exercising their mastery over their own behaviour, Vygotsky gave it a much more causal role in the child's cognitive development. He claimed that it represented a transitional phase between the 'purely situational constraints of early childhood' and 'thought which is totally free of real situations'. This is probably because in pretending the child comes to learn that meaning can float free of objects and so comes to appreciate the abstract nature of thought; they also learn that meaning can be separated from action, and hence begin to realise that thought is voluntary and intentional.

Figure 1.1. Vygotsky's analysis of cognitive shifts associated with pretence

$$\frac{\text{Object}}{\text{Meaning}} \longrightarrow \frac{\text{Meaning}}{\text{Object}}$$

$$\frac{\text{Action}}{\text{Meaning}} \longrightarrow \frac{\text{Meaning}}{\text{Action}}$$

1.13 McCune-Nicolich

Drawing heavily on Piaget's initial proposals McCune-Nicolich (Nicolich, 1977; McCune-Nicolich, 1981) put forward a five stage model of the development of pretend play in young children. Other sources for this model were post-Piagetian empirical research, aspects of which will be outlined below, and her own longitudinal observation of the free-play of five children (Nicolich, 1977). McCune-Nicolich argued that her model represented an ordinal sequence of development, that children must progress through each stage sequentially. She did not assign a fixed age to each stage, and would I believe, argue that children develop at differing rates. However (very) rough ages have been assigned based on her comparisons to Piaget's stages of symbolic development, see table 1.1. The importance of this model was not just that it elaborated, and in certain cases made explicit, Piaget's ideas, but it also served as a framework for a great deal of subsequent research, and raised issues which will recur in the following section.

Table 1.1. McCune Nicolich's Levels of Pretend play Development.

Level	Approx. Age (m)	Title	Description (*example*)
1	To 12	Presymbolic Schemes	Understanding of object use (*using a toothbrush appropriately*)
2	12-18	Auto-Symbolic Schemes	Self-directed pretence (*eating from an empty spoon*)
3	18-24	Decentered Symbolic Games	Other-directed pretence (*feeding a doll*)
4	18-24	Combinatorial Symbolic Games	4.1 Single-scheme combinations, one scheme related to several actions or recipients 4.2 Multi-scheme combinations, several schemes related in sequence
5	24+	Planned Symbolic Games	Active other-directed pretend (*pretending that a doll feeds themselves*) Object Substitution (perceptually and functionally dissimilar) 5.1 Planned single-scheme acts 5.2. Combinations with planned elements

1.2 Descriptive Analyses

1.21 Developmental Trends

Piaget noted how the development of the distinction between signifier and signified in pretence was a gradual one. A large amount of subsequent research into pretend play has concentrated on elaborating the pattern of this development. In particular three developmental trends have been investigated. These are *decentration*, a move from self as agent of pretence to attributing agency to others, *decontextualization*, a move away from using realistic objects in pretend substitution, and finally *integration*, the ability to combine individual pretend actions into more complex sequences. The majority of studies into these areas have been comprehensively reviewed elsewhere (Bretherton, 1984; Fein, 1981; Rubin, Fein & Vandenberg, 1983), but there are good reasons for a selective review and reappraisal of this work here. Earlier reviews do not include a handful of more recent studies which deserve consideration. It is also vitally important to have a firm understanding of the manifestation of the development of pretend play in normal children before we go on to discuss the psychological mechanisms which might underlie this development. Finally there are novel interpretations to be drawn from these studies, and implications regarding the synthesis of separate developmental trends which arise from them and need to be outlined.

Decentration

The suggestion of the trend of decentration is not only implicit in Piaget's writings, but can be seen in Vygotsky's analysis of the changes involved in a child's thinking when they develop the ability to pretend. Decentration, moving away from self-agency to other-agency, reflects Vygotsky's suggestion that meaning becomes freed from action. A child who produces self-directed acts has not accomplished this separation, pretend play is still subservient to the child's repertoire of behaviour.

Experimental investigations of decentration can be characterised on the basis of the number of levels of agency which they ascribe to the child's pretend play. For example Lowe (1975) and Belsky and Most (1981) examined two levels of agency, self as agent and other as agent. Lowe observed the free play of seven groups of young children (ages 12, 15, 18, 21, 24, 30 and 36 months, around 30 children per group), presenting them with four toy sets, each containing a doll and miniature accessories. She found that in the youngest children the majority of play was self-directed, for example children would 'feed' themselves with a toy spoon. Levels of self-directed behaviour increased to a maximum amongst 18 month-olds, before decreasing. 21 month olds were seen as being 'transitional' in that they showed equal amounts of self-directed and doll-directed behaviour, while by 24 months doll-directed behaviour, feeding the doll rather than feeding oneself, was well established.

Belsky and Most (1981), on the basis of previous research, put forward a 12 stage sequential model of children's play behaviour. The early stages of the sequence are not of interest here, as they cannot be said to reflect pretend play of any description (e.g. mouthing and manipulation of toys). More relevant are stages 7- pretend self (self-directed acts), and 8- pretend other (other-directed acts). The authors examined the free-play of 40 children divided into ten groups aged between 7.5 and 21 months, and found general support for their model as a whole (as tested by a Guttman Scalar analysis), and hence for the decentration effects found previously. The first evidence of self-directed pretence occurred at 12 months while other-directed pretence first emerged at 13.5 months (though neither behaviour was consistently observed in the majority of children until 16.5 months).

Other studies of decentration have drawn a distinction between passive other-directed acts (for example the child feeds a doll) and active other-directed acts (where the child might pretend that the doll feeds themselves). Fenson and Ramsay (1980) report two such studies; study 1 examined the free-play of three groups of young children, aged 13.5, 19.5 and 24.5 months (24 children per group), while study 2 employed the same procedure longitudinally, testing a group of 19 children at these three ages. Examples of self-directed, passive other-directed and active other-directed pretend play were noted. It was found that the proportion of children showing other-directed acts increased with age. Though the number of self-directed play acts remained constant, the relative frequency of these acts decreased with age. The majority of children showed other-directed pretend play by 19 months, but passive acts were consistently more common than active acts, 17 of the 19 children observed longitudinally showed passive other-directed acts earlier than they showed active other-directed acts.

Lyytinen (1991) investigated decentration effects in a broader examination of all three developmental trends amongst five groups of children, aged from 2 to 6 years (18 children per group). The free-play of the children with a variety of 'Duplo' lego toys was observed for eight minutes. Play was divided into a number of possible categories, including (similarly to

Fenson and Ramsay) self-directed acts and passive other- and active other-directed acts. It was found that the number of examples of the two forms of decentered play increased linearly with age, even up to six years. Two year olds showed examples of both forms of decentered pretend play, though passive other-directed acts were consistently more common than active other-directed acts. The results also suggest that self-directed acts are no longer performed after about 3 years of age.

Watson and Fisher (1977) predicted that children would progress through a four stage developmental decentration sequence. Their hypothesised stages were: 1-self as agent (child pretends to sleep), 2-passive other as agent (child puts a doll to sleep), 3-active substitute as agent (child puts a block to sleep) and 4-active other as agent (child pretends that a doll puts themselves to sleep). They observed the free-play of three groups of children aged 14, 19 and 24 months (12 children per group) after some initial modelling, and found that the age at which duration of each type of agent use peaked, increased sequentially. The time spent engaged in self- and passive other-agent play appeared to drop off after 19 months. Further, individual patterns of behaviours shown by the children fitted the original predictions, children showed a step-wise progression through the hypothesized levels of agency (as shown by a Green's scalogram analysis). Watson and Fisher suggest that a fifth step in the sequence would be the use of an active substitute as agent (child pretends that a block puts themselves to sleep).

These experiments suggest that self-directed acts begin relatively early, at around approximately one year of age. It appears that these acts reach a peak at around 18 or 19 months of age (Lowe, 1975; Watson & Fisher, 1977), and thereafter decline with age. Other-directed play seems to emerge at around 20 months (Lowe, 1975; Fenson & Ramsay, 1980), and be well established by two years, though Belsky and Most (1981) found other-directed acts at earlier ages. There is evidence to suggest that active other-directed acts occur at a later stage than passive other-directed acts, and Watson and Fisher's results indicate that using a passive substitute occurs at a point intermediate between these two behaviours.

Decontextualization

Decontextualization is the developmental trend to move from object substitution with realistic prototypical items to the use of inappropriate dissimilar items. Whereas an analogy could be drawn between decentration and Vygotsky's notion of the emancipation of meaning from actions, decontextualization within children's pretend play, can be compared to his idea of the separation of meaning from objects. In early pretend play it is the objects that impose meaning on the child's play, but as the child develops they come to impose meaning on objects themselves through play, relying less on the cues which the objects provide, and more on their own ideas.

The ability to use objects as substitutes in pretence appears to emerge at around 18 months of age, though using realistic objects in early 'pre-symbolic' play may occur as early as 13 months (Belsky & Most, 1981; Corrigan, 1987; Jackowitz & Watson, 1980). The use of non-realistic substitutes could be interpreted as coinciding with a move from sensorimotor stage V to VI, and in terms of Piaget's theory, from practice games to symbolic schemas. A number of studies have looked at the subsequent development of the ability to substitute objects of varying similarity. Golomb (1977) found that young children followed a well defined order of 'appropriateness' in sequentially selecting props to fill a single defined role in a pretend situation. Lyytinen (1991) found that the proportion of decontextualized acts produced by children increased with age. She also noted that 'Children in the older age range may not be as eager as the younger children to accept imaginary non-real meanings for real objects'.

This last point raises the important question of the role of object function in decontextualization. While it is accepted that perceptual decontextualization occurs, the part played by object function in aiding or hindering substitutability is less well documented. However, interestingly, this aspect of decontextualization is the one that most closely parallels Vygotsky's emancipation of meaning; it is presumably predominately the function of an object, rather than its form, which gives it its meaning. It is also worth noting that while objects can essentially be viewed as perceptually similar or dissimilar (though clearly this admits of degrees), functional similarity appears to have three levels. Objects can be functionally similar, non-functional (e.g. block of wood) or counter-functional (having a function of their own that differs from that of the object to be signified).

That functionality plays a part in object substitution was shown by Copple, Cocking and Matthews (1984). They engaged two groups of children, each aged between 4 to 5.5 years, in one of two pretend scripts. In each case the experimenter provided the target for substitution, for example asking the child to find a 'spoon' from amongst a set of possible props, however the functional role that the spoon played differed between scripts. In script 1 the spoon was required for scooping out some ice-cream, in script 2 it was needed for stirring. The authors found that in the majority of cases children selected a prop which was able to fill this functional role, for example an egg shell for a scooping spoon and a stick for a stirring spoon.

Ungerer, Zelazo, Kearsley and O'Leary (1981) investigated the free play of four groups of young children (18, 22, 26, 34 months) and found that the number of substitutions using props providing low physical support (perceptually dissimilar) increased with age. They also noted that while the youngest children preferred to use non-functional as opposed to functional objects in substitutions, this difference was less marked in older groups. While these results appear to provide some support for the notion of two forms of decontextualization, perceptual and functional, it cannot be assumed that the children's choice of props ensures that perceptual similarity is held constant as functional similarity varies and visa versa.

While Lyytinen and Ungerer et al. examined free play with a variety of toys, and were therefore unable to hold either perceptual or functional similarity constant, there have been investigations which have looked at children's ability to substitute single objects presented to them. Elder and Pederson (1978) investigated the ability of 2.5, 3 and 3.5 year-olds to engage in object substitution with props that were similar or dissimilar to the target object. The 'similar' props resembled the realistic object in terms of size and shape, and had no defined meaning (perceptually similar, non-functional), while the 'dissimilar' props were both different in shape to the target object and had their own distinct function (perceptually dissimilar, counter-functional). The authors found that while no groups had difficulty in using the non-functional objects in substitutions, the 2.5 year olds were significantly impaired in their ability to utilise the counter-functional props. They note that in these cases the children often used these objects appropriately rather than in pretence, and suggest that the fact that these props each had their own distinct function played a part in making this condition more difficult for the youngest subjects. Though Elder and Pederson paid attention to both perceptual and functional similarity they themselves note that these two variables are confounded in their study.

Jacowitz and Watson (1980) identified the following sequential steps in object substitutability: 1- similar form and function, 2- similar form dissimilar function or similar function dissimilar form, 3- dissimilar form and ambiguous (non-functional) function, 4- dissimilar form and function. They found that two groups of children of mean ages 16 and 23 months both progressed sequentially through the proposed levels of substitutability, with age determining the highest level obtained. Their results also suggested no difference in difficulty between the two conditions identified in level 2. Though the authors themselves do not separate out the effects of each variable, this can be done from their data. Such an analysis appears to confirm that both form and function play a part in determining an object's substitutability. It also suggests that the effects of form and function are of a similar magnitude, and that they interact. Having said this, there appears to be little effect of function on the ability of the younger group to substitute perceptually dissimilar objects. It may be that perceptual similarity carries greater weight for younger subjects, and that they find object substitution with perceptually dissimilar objects particularly difficult.

The few studies reviewed here therefore provide good evidence for perceptual decontextualization, and some evidence for independent functional decontextualization. Two tentative suggestions also arise; firstly that younger children may give more weight to perceptual similarity than functional similarity, and secondly (and probably relatedly) that older children are affected more by functional dissimilarity than younger children. It therefore seems that though object substitution becomes generally less difficult with age, the relative salience of functionality increases. This could be due to an increase in the absolute magnitude of a functionality effect amongst older children, or alternatively, to a decrease in the relative effect of perceptual cues.

Integration

The trend of integration, combining a number of pretend acts into a sequence, has been examined less than decentration and decontextualization, perhaps because of the difficulties inherent in defining where one act ends and a second one begins. However a number of experimenters have specifically looked at integration effects, usually alongside an examination of decentration and/or decontextualization. This is true of Belsky and Most's (1981) experiment. One of the final stages in their proposed developmental sequence, elements of which have been described above, was 'sequenced pretend'. This referred to where a child produced a number of related acts such as putting a doll to bed then kissing them goodnight. They found evidence of this behaviour in one child aged 13.5 months, and in the majority of children in each age group from 16.5 months.

In addition to investigating decentration in their cross-sectional and longitudinal studies, Fenson and Ramsay (1980) also recorded instances of integration. They found that the proportions of children showing both 'single scheme combinations' (two consecutive acts where the same action is directed to two different objects) and 'ordered multischeme combinations' (two logically ordered acts directed towards the same recipient) increased with age. All of the children showed examples of single scheme combinations by 19 months, but it was only at 24 months that the majority showed evidence of ordered multischeme combinations.

Four of Lyytinen's (1991) play categories were designed to examine integration effects. These were single- and multi-scheme combinations, 'events' where four or five acts were combined and 'episodes' consisting of six or more play acts. The number of integrated acts produced by children increased linearly with age, though in fact increases were only seen in the number of events and episodes, the number of single- and multi-scheme combinations remained relatively constant. The two year old children produced examples of each kind of integrated behaviour, though events and episodes were uncommon in this group.

From these three studies only tentative conclusions can be drawn. It does seem that by two years of age children are able to combine pretend acts into sensible sequences. It is also clear that the length and complexity of these combinations increases with age.

Amalgamating The Three Developmental Trends

For the most part the experiments described above have investigated trends of decentration, decontextualization and integration, but have kept these trends separate, and have not attempted to combine them in a more coherent framework. However there are a few studies that have tried to draw these threads together. In particular the combined effects of decentration and decontextualization have been examined. This has been done by suggesting that the effects of agency (decentration) and of object similarity (decontextualization) might be in some way additive, and that weightings could be applied to particular combinations of these two aspects of any particular pretend play act, in order to predict its developmental degree of difficulty. Both Corrigan (1982) and Watson and Jackowitz (1984) investigated the combined effect of three levels of agency, 'self', 'other' and 'substitute' and two levels of object similarity: 'realistic' prop or 'substitute' prop. The weightings given to each level as a result of their observations of children's play differed slightly, but their models were essentially similar, and both gave similar strengths of weighting to decentration and decontextualization effects.

These two models were drawn together in a subsequent study by Corrigan (1987), which also took into account the difference between passive other- and active-other directed acts highlighted by a number of the studies of decentration described above (Fenson & Ramsay, 1980; Lyytinen, 1991; Watson & Fisher, 1977). Corrigan tested 16 children longitudinally at ages of 14, 20 and 26 months, observing their free play after modelling play acts of a variety of combinations of levels of agency and object similarity. The ages at which children first showed particular combinations, for example passive other-directed with a substitute object, were noted, and it was found that children progressed sequentially through a series of stages depending on these levels. Table 1.2 shows the final five step sequence (consisting of eight different combinations) along with the ages at which children first showed each step, and the weightings subsequently applied to each level by Corrigan.

Table 1.2. Corrigan's (1987) model, and results.

Step	Agency	Object Similarity	Total Weighting	Mean Age shown (m)
1	Self (0)	Realistic (0)	0	14
2	Other (passive) (1)	Realistic (0)	1	16.6
3a	Self (0)	Substitute (2)		
3b	Other (passive) (0)	Substitute (2)	2	18.6
3c	Substitute (passive) (2)	Realistic (0)		
4a	Substitute (passive) (1)	Substitute (2)	3	25.3
4b	Other (active) (3)	Realistic (0)		
5	Other (active) (2)	Substitute (2)	4	26

The weightings given by Corrigan depend on the number of 'symbolic substitutions' required to perform a certain act, for example using a substitute object requires the setting aside of both form and function, and hence receives a score of 2. The table shows that once a child has produced a certain level of agency, the weighting for that level drops by 1 in subsequent steps. The rationale for this adjustment seems particularly ad-hoc, especially as a similar habituation effect is not applied to the object weightings. The model also takes no account of degrees of object similarity or dissimilarity, nor of differential effects of object form and function. However its strengths are that it combines two developmental trends, decentration and decontextualization, and that it is consistent with the results of previous studies into these two areas.

Corrigan's analysis also serves to further emphasise that the development of pretend play reflects a gradual growth of the distinction between signifier and signified. This is similarly seen in the other studies described above, especially in relation to decentration and decontextualization. The seeds of pretence are sown as early as 12 or 13 months, and the character of a child's pretend play continues to develop and change over a number of years.

The extent and range of this development raises again the problem that was highlighted at the start of the chapter, namely how can one impose a dichotomous distinction between non-pretend and pretend play on such a gradually evolving behaviour. When is it fair to say that children really engage in pretend play? This troublesome problem will be returned to, and discussed in subsection 1.24.

1.22 Parallels With Language Development - The Semiotic Function

As noted initially, Piaget (1962) argued that pretence was symbolic because it involved the use of a 'signifier' to represent an absent or imaginary 'signified'. In the same way language is often thought to be symbolic, as words are used to designate certain concepts or referents which may or may not be present. Consequently Piaget (see also Werner & Kaplan, 1963) considered language and pretend play to be separate manifestations of a common, developing symbolic ability, or 'semiotic function'.

There is a large body of empirical evidence in favour of some form of underlying link between these two domains. Children with advanced levels of language typically show corresponding levels of play, and vice versa (Casby & Della Corte, 1987; Jurkowitz, 1988; Rosenblatt, 1977). More formal correlations between measures of symbolic play and language abilities have also been demonstrated in young children (Ungerer & Sigman, 1984; Tamis-LeMonda & Bornstein, 1989, 1990; Vibbert & Bornstein, 1989) and amongst developmentally delayed children (Casby & Ruder, 1983; Hulme & Lunzer, 1966; Kennedy, Sheridan, Radlinski & Beeghly, 1991; Sigman & Ungerer, 1984a). An important point about these correlational studies, noted by Fein (1981), is that they typically take no account of the common effect of age on the two variables, hence the presence of a significant relationship may only indicate that play and language develop at a similar rate with age. However, in some cases a significant relationship between pretend play and language measures remains even when age has been partialled out (Lowe & Costello, 1976; Lyytinen, 1991).

Clearly correlations do not prove the presence of an underlying semiotic function, language development might lead directly to increased pretend play skills, or visa versa. Further evidence for the notion of a general symbolic ability comes from parallels in the developmental patterns, and from co-occurrences of important developmental landmarks in the two domains. In her analysis of the development of pretend play (discussed earlier), McCune-Nicolich (1981) also drew parallels between the five levels of play which she identified, and corresponding levels of language acquisition In common with others (Sinclair, 1970) she highlighted the fact that a child's first referential words emerge at the same time as the onset of pretend play, and also suggested that combinatorial behaviours emerge simultaneously in pretend play and language. Similar parallels have been reported by Ogura (1991), who suggests that the two domains develop together until the level of combinatorial behaviour, and inter-dependently thereafter, and by Volterra, Bates, Benigni and Bretherton (1979), who also noted an overlap in the content of the 'vocabulary' of language and play in the second year.

While the studies reviewed briefly above provide reasonable evidence for the existence of a common semiotic function, the form of this function is still unclear. In particular it is not obvious whether it subserves the development of pretend play and language alone, or rather represents some more global abstract reasoning ability which plays an important role in the development of cognition as a whole. What is clear is that language and pretend play abilities are closely related. This has important implications for studies which attempt to compare the pretend play abilities of different population groups. These groups must be equated for levels of language functioning, or any differences that may emerge in pretend play skills may simply reflect differential language abilities.

1.23 Definitions - Functional And Symbolic Play

"Toys were symbols- of real things. That toy monkey stood for a real monkey, that toy train for a real train, and so on: in miniature."

Martin Amis - London Fields (p. 220)

As was seen initially Piaget was hesitant when it came to deciding what was, and what was not symbolic play. He proposed that transitional symbolic schemas emerged in sensorimotor stage VI, but was only confident that play was properly symbolic in symbolic stage II (18-24 months). Initially McCune-Nicolich's analysis was similarly, and understandably, non-committal, though she did argue that a shift in the child's thinking occurs at Level 5 in her analysis, from linear sequential play to a hierarchical coordination of representational structures (McCune-Nicolich, 1981). However, in a later paper (McCune-Nicolich & Fenson, 1984) she suggests that the planning of pretend play indicated that signifier and signified were clearly separate, and emphasised the parallel between her level 5, at which this planning occurs, and Piaget's symbolic stage II which he saw as being clearly symbolic.

It could, of course, be argued that it is quite wrong to attempt to impose a distinction on this developing behaviour, and that doing so does not tell us more about pretend play, but rather results in a loss of information. This is a valid argument, collapsing a continuous variable to a dichotomy does result in a reduction of explanatory power and especially of subtlety. However it is possible that we are not dealing with a continuous variable in this instance, and that there is a point at which play moves from being non-symbolic to being symbolic.

A version of this view was put forward by Huttenlocher and Higgins (1978), though they draw on earlier work by El'Konin (1966). Essentially their argument was that, before a certain point, one cannot be sure that pretend play is symbolic. This is seen in cases when a child plays with miniature, realistic toys, such as a toy tea set. In this instance it is not possible to be certain that they are using the miniature tea cup as a symbol for a real cup, it may be that they simply see it as a very small real cup, not as a substitute at all. Similarly when a child uses an object appropriately, such as when they brush a doll's hair with a comb, it may be that they are only performing an activity which they know to be associated with that object, without symbolising the comb as a real comb, or the doll as an real person. According to Huttenlocher and Higgins therefore, Martin Amis would be incorrect to ascribe symbolic status to play with miniature toy trains and monkeys.

This type of play has been termed 'functional play', because it consists of using toys in a way which is appropriate to their obvious function (it should be noted that the use of the term in this instance differs from that employed by Piaget to refer to early assimilative play). Ungerer and Sigman (1981) provide a helpful definition, stating: "Functional play involves the appropriate use of an object or the conventional association of two or more objects such as using a spoon to feed a doll or placing a teacup on a saucer." They go on to assert that "Symbolic play is characterised by the complete differentiation of objects and actions. Children are able to represent and transform objects internally in thought, fully independent of overt action. As a result play is no longer constrained by the physical and functional properties of the available objects[2]."

Even though Ungerer and Sigman provide a theoretical definition of what constitutes symbolic play, there still remains the problem of deciding whether any particular piece of play that a child produces is symbolic. What then are the practical criteria for making this inference? Huttenlocher and Higgins note that speech often provides a means of identifying true symbolism, and suggest that "...play is only clearly symbolic when the child makes an advance announcement of his intentions". This suggestion parallels McCune-Nicolich's assertion that the fifth level of her pretend play scheme was certainly symbolic, but is only helpful in a limited number of instances, since children do not always provide a commentary of their intentions. Leslie (1987) noted that the non-literal nature of pretend play is evidenced by the fact that it can entail abuse by deviant referent (pretending that a banana is a telephone), by deviant truth (pretending that a dry table is wet) and by deviant existence (pretending that an empty cup is full of water). He therefore proposed three corresponding, fundamental and necessarily symbolic forms of pretence. These are *object substitution* (deviant referent); *attribution of pretend properties* (deviant truth) ; and *imagining absent objects* (deviant existence)[3]. These three forms of pretence have subsequently been generally accepted as necessary and sufficient

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[2]With this quote we have come full circle and returned to notions raised at the very beginning of the chapter. In common with Piaget, Ungerer and Sigman claim that pretend play is only truly symbolic when signifier and signified are completely separate. They also echo Vygotsky in suggesting that this comes about when thought is internalised and freed from objects and actions.

[3]Though these three criteria were proposed by Leslie it is worth noting that they are drawn from Ungerer and Sigman's (1981) suggestion that three examples of symbolic play are object substitution, ascribing animation and creating imaginary objects with no tangible referents.

indicators of symbolism, and therefore provide the means for inferring whether a child is truly engaged in symbolic play.

1.24 Further Developments In Pretence

Almost all the empirical research into the development of pretend play described so far, has focused solely on the *individual* as a *'producer'* of pretence. However, as will become apparent, it is important to also consider children's ability to understand pretence, and developments in cooperative pretending. These two aspects of pretence will therefore now be reviewed briefly.

Comprehension Of Pretence

Flavell, Flavell and Green (1987) claim that by three years of age children are capable of understanding the distinction between real and imaginary situations. In two tests an experimenter acted out a pretend object substitution (for example, pretending that a sponge was a truck), and children were asked whether the experimenter was imagining the object's pretend or real identity. Three-year old children claimed that the experimenter was pretending that the sponge was a truck rather than pretending that the sponge was a sponge. This is perhaps unsurprising, by definition one cannot imagine an object's real identity. The tasks were also simplified by the fact that children were told what the experimenter was pretending initially.

However Flavell et al. did employ a slightly more stringent test of ability to infer pretend identities. Children were shown a candle that looked like an apple. An experimenter took the candle and pretended that it was an apple, doing so by miming eating actions. 95% of children claimed that the experimenter was pretending that the candle was an apple, rather than a candle, and 75% stated that the candle was a pretend apple rather than a real apple.

Woolley and Wellman (1990) examined 7 young children's use of the terms 'real' and 'pretend' in spontaneous speech, and found that children first used 'real' or 'really' to emphasise a contrast between real and non-real situations from around three years of age. Woolley and Wellman also replicated Flavell et al.'s findings, showing that three-year-olds could identify the pretend status of imaginary actions.

However, it might be argued that Flavell et al. and Woolley and Wellman's results do not show that three-year-olds fully understand pretence, rather that they are simply aware of the non-reality of imaginary situations. Stronger evidence for an ability to understand pretence at this age comes from a series of studies reported by Harris and Kavanaugh (1993) which show that three-year-olds are able to infer the pretend consequences of imaginary actions. In one case (their experiment 5) an imaginary act, such as the pouring of pretend tea, was directed towards one of two toy animals. In over 75% of cases, 28 month-old children directed a 'remedial act', for example wiping with a cloth, to the appropriate animal. This could represent a simple bias towards responding to the animal who had been acted upon, rather than an appreciation of that animal's pretend state. However in further studies, slightly older children were shown to be able to describe the consequences of similar acts. In these experiments (their experiments 6 and 7) three-year-olds 'correctly' identified a pretend substance that had been poured from a container onto a toy animal, or onto an animal's pretend food, in at least 73% of cases. When asked about the results of the action three-year-olds answered in terms of a pretend outcome (e.g. the animal was 'wet'), rather than in terms of the literal state of affairs (the animal being 'dry') in at least 86% of cases.

In contrast to these findings, Lillard (1993a) found that four-year-old children were reluctant to deny that a character who was unaware of the existence of a certain entity could still pretend to be that entity (for example children were asked whether a troll, who didn't know about rabbits, was pretending to be a rabbit when they were hopping up and down like a rabbit). Clearly this task is more complex that those employed by Harris and Kavanaugh, and indeed it might be argued that it is more a test of linguistic logic rather than of pretence itself. What Lillard seems to be assessing is children's understanding of the link between beliefs and pretence, rather than the ability to understand a pretend act itself.

In general then, these results indicate that by three-years of age children are capable of distinguishing between reality and non-literal situations, and more importantly, can 'make pretend sense' of imaginary scenarios which are acted out before them.

Social Pretend Play

The most comprehensive investigations into the development of cooperative social pretend play have been carried out by Howes and colleagues (see Howes & Matheson, 1992; Howes, Unger & Seidner, 1989; Howes, Unger & Matheson, 1992). Through this series of experiments Howes has developed a sequential scale of social pretend play development. The stages of this scale (as reported in Howes & Matheson, 1992) are i) *parallel play* - two children playing in close proximity, but without any interaction; ii) *parallel aware play* - as parallel play, but with eye contact; iii) *simple social play* - children engage in simple interaction, talking and exchanging toys; iv) *complementary and reciprocal play* - action based reciprocating games such as 'tagging' and peek-a-bo; v) *cooperative social pretend play* - children act out complementary roles within social pretence, and vi) *complex social pretend play* - complementary roles are acted out with metacommunication.

Of interest to the present discussion (and to later sections of the chapter) are the later two stages, which will temporarily be termed Co-op SPP and Complex SPP for the sake of brevity. The distinction which can be drawn between them rests on the nature of the social interaction involved. In Co-op SPP the roles which children are acting out are 'understood' and implicit in the pretend scenario. In Complex SPP they are actively communicated between partners. Children at this stage are able to disengage from the pretend situation to comment on that situation. Howes and Matheson (1992) looked for evidence of these levels of social pretend play in a three-year longitudinal study of 72 children, initially aged between 13 and 24 months (the sample size fell to 48 children over this time). They found that Co-op SPP first emerged between 19 to 23 months, and was present in half the sample by 30 to 35 months. Complex SPP was first seen in children at 30 to 35 months, but was not present in half the sample until 42 to 47 months. In an earlier cross-sectional study which looked at stages up to an including Co-op SPP, but excluding Complex SPP, Howes et al. (1989) observed Co-op SPP in children aged between 29 and 38 months.

Howes et al. (1992) summarise and elaborate these findings with reference to both mother-child and peer-child play. They claim that at 25 to 30 months children will offer pretend scripts to the mother and to peers, but integration of scripts does not occur. At 31 to 36 months social pretence takes on the joint enactment of complementary roles (Co-op SPP). By 37 to 48 months children are established in their ability to communicate and instruct the cooperative integration of roles (metacommunication, Complex SPP).

1.25 Summary And Synthesis

The aim of this subsection is to summarise the material that has been presented above concerning the description of the phenomena of pretend play, and of its development, and to integrate it into a coherent framework. This framework borrows directly from a number of sources. The stages proposed by Piaget (1962), adopted and expanded slightly by McCune-Nicolich (1981; Nicolich, 1977) do appear to be followed through successively by children as they develop. Any model of this development must therefore draw heavily on these accounts. A model must also capture the gradual nature of the development of pretend play, but at the same time must also be able to answer important questions, these being 'when does pretend play emerge', and 'when does it become symbolic'?

Combining the information presented in subsections 1.21 and 1.23 provides a means of answering these questions. Pretend play is generally first found at around 13 months of age (e.g. Bates, 1979; Fein, 1981). This can be seen in a number of the experimental studies described above (Belsky & Most, 1981; Corrigan, 1987). The form of pretend play that does emerge at this point is self-related (other-related play does not emerge until around 20 months (Lowe, 1975; Fenson & Ramsay, 1980) or involves the use of realistic objects (Corrigan, 1987; Jackowitz & Watson, 1980). In other words it is functional play that first emerges in children.

One way of determining when symbolic play emerges, following Leslie (1987) and the arguments outlined in subsection 1.23, is to look for evidence of attribution of absent properties, object substitution and/or the imagination of absent objects. Of these three behaviours it is the emergence of object substitution that is most clearly documented. This occurs (with non-realistic props) at around 18 months (Corrigan, 1987). However, while one must see this as 'symbolic play' if one accepts Leslie's criteria, it might be argued that the complete separation of signifier and signified in pretence does not occur until as late as 24 months. In terms of the trend of decentration, this would appear to occur when a child attributes agency to an external figure, rather than being the agents of pretence themselves. As noted above, other-directed acts emerge at around 20 months, but in the case of passive other-directed acts the child is still the agent. Active-other directed acts emerge slightly later, and appear to be in evidence by 24 or 25 months (Corrigan 1987; Fenson & Ramsay, 1980; Lyytinen, 1991). Therefore, while one might wish to talk in terms of the onset of symbolic play between 18 and 24 months (Doherty & Rosenfeld, 1984; Leslie, 1987; Ungerer & Sigman, 1981), it could be argued that it is only after 24 months that one can be confident that signifier and signified are entirely separate. Corrigan's (1987) analysis provides further support for this suggestion (see table 1.2). It is only in the fourth and fifth steps of her model that a substitute prop is combined with a 'decentered' (substitute or active other) agent; at previous levels there is always some connection between signifier and signified, whether in terms of agency (not fully decentered) or in terms of object identity (not fully decontextualized).

In the light of these points three levels of solitary or individual pretend play are proposed here, these are *functional play*, *symbolic play onset*, and *solitary symbolic play proper*. A clear parallel can be seen between the later two symbolic levels and McCune-Nicolich's levels 4 and 5. In the same way that McCune-Nicolich would only be confident that level 5 was symbolic, it does seem that one can only be certain that symbolic play, which begins to appear after 18 months, is truly symbolic after 24 months. A further reason for proposing these two 'symbolic' levels is that it seems that the shift between McCune-Nicolich's levels 4 and 5 corresponds to some sort of landmark in the inter-dependent development of pretend play and language. The onset of combinatorial behaviour in both domains appears to mark the point at which the two diverge (Ogura, 1991; see subsection 1.22).

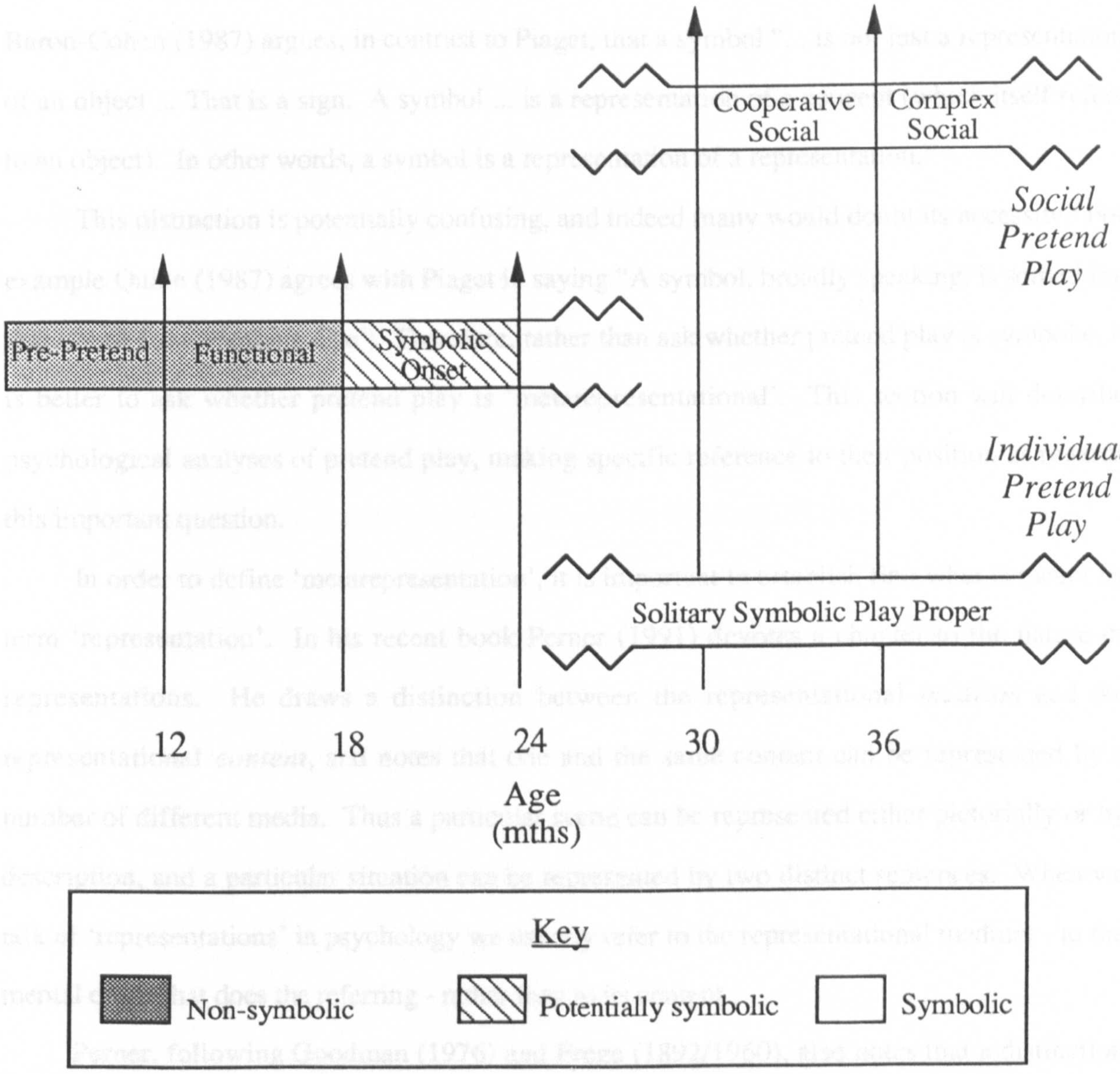
The proposal of three separate levels of individual pretence should not be taken to indicate that children progress sequentially though a fixed sequence of stages as their pretend play abilities develop, nor that their symbolic skills do not develop further after 24 months. Children of 18 months and above certainly engage in functional play, and as noted in subsection 1.24, comprehension of pretence appears to develop at around three years of age. The purpose of outlining the three levels considered here is to give a guideline as to onsets of particular behaviours.

The fact that aspects of pretend play develop in parallel is emphasised by the final two stages of the proposed model. These concern the development of social pretend play, which, it is argued, develops alongside individual pretence (the question of whether there exist causal developmental relationships between the two domains will not be considered here, though see Howes, 1992). These two levels are taken directly from Howes' work (see subsection 1.24), and are *cooperative social symbolic play*, and *complex social symbolic play*. Once again, the use of these particular levels should not be seen to infer that pretend play cannot be social until this point of development. Howes' other levels clearly indicate that social pretend play occurs much earlier. Nor should they be taken to indicate that children move directly and sequentially from solitary symbolic play proper to cooperative social symbolic play. In fact the model does not explicitly differentiate between individual and social pretence until after 24 months To reiterate, the proposed model is therefore not an exhaustive description of the development of pretend play in normal children, but a selective (and approximate) guide to the onset of particular stages of interest. It is shown in table 1.3, and interpreted diagrammatically in figure 1.2, which emphasises the gradual development of symbolic ability, and the two streams of the model.

Table 1.3. Proposed model of pretend play development

Age (mths)	Level	Type of Play
to 12	Pre-Pretend	Manipulation of objects, conventional use of objects
13-18	Functional	Appropriate use of realistic toys, Self-directed acts
18-24	Symbolic Play Onset	Some object substitution
24+	Solitary Symbolic Play Proper	Other directed acts, object substitution with perceptually and functionally dissimilar objects
30-36	Cooperative Social Symbolic Play	Complementary roles enacted in social interaction
36+	Complex Social Symbolic Play	Complementary roles enacted with metacommunication

Figure 1.2. Diagrammatic interpretation of the model



1.3 Psychological Analyses

1.31 Introduction And Notes On Terminology

"It is hazardous to enter the intellectual jungle that is known as semiotics"

Peter Hobson (in press)

This section of the chapter will outline recent and current theories of pretence. As seen in the previous section, it has generally been assumed that (non-functional) pretence is symbolic (e.g. Piaget, 1962). However, while for Piaget symbolisation involved 'standing in for something else', and was therefore in a sense representational, the term 'symbolic play' is now often accepted to refer to 'meta-representational' processes (Baron-Cohen, 1987; Leslie, 1987). Baron-Cohen (1987) argues, in contrast to Piaget, that a symbol "... is not just a representation of an object ... That is a sign. A symbol ... is a representation of a concept (which itself refers to an object). In other words, a symbol is a representation of a representation."

This distinction is potentially confusing, and indeed many would doubt its necessity. For example Quine (1987) agrees with Piaget in saying "A symbol, broadly speaking, is something that stands for something else". Therefore, rather than ask whether pretend play is symbolic, it is better to ask whether pretend play is 'metarepresentational'. This section will describe psychological analyses of pretend play, making specific reference to their position as regards this important question.

In order to define 'metarepresentation', it is important to establish first what is meant by term 'representation'. In his recent book Perner (1991) devotes a chapter to the nature of representations. He draws a distinction between the representational *medium* and the representational *content*, and notes that one and the same content can be represented by a number of different media. Thus a particular scene can be represented either pictorially or by description, and a particular situation can be represented by two distinct sentences. When we talk of 'representations' in psychology we usually refer to the representational medium - to the mental entity that does the referring - rather than to its content.

Perner, following Goodman (1976) and Frege (1892/1960), also notes that a distinction must be drawn between *representing* (referring) and *representing-as* (sense). These correspond to two distinct constraints on the accuracy of a description of a representation. In some circumstances, and for some purposes, a representation may be described adequately by specifying its worldly referent, whereas in others, an adequate description will also have to convey *the way in which* it represents what it does. In passing on to someone a report of the weather, it will generally make no difference whether I say that the forecaster has said that it will be sunny *tomorrow*, or sunny *on Tuesday*, providing that tomorrow is Tuesday. Whereas it makes all the difference, in reporting Oedipus' belief, whether I say that he takes himself to be married to *Jocasta*, or married to *his mother*. Perner argues that we need to concentrate on sense rather than reference, and therefore offers the following definition: "A representation represents something *as something*".

There is another distinction that Perner does not draw which is worth making at this point, since it will be of importance later. This is between the *content* of a representation on the one hand, and the *type of mental attitude* involved in that act of representation, on the other. I can have a number of distinct mental attitudes that share the same content. For example I can *believe* that ice cream is in the fridge, I can *wish* that ice cream were in the fridge, or I can *suppose* that ice cream is in the fridge.

If metalanguage is language used to describe language and metacognition is knowledge about what I know, are metarepresentations therefore representations of representations (second- or higher-order representations)? In a sense they are. However, if representation properly defined is representing something *as* something, metarepresentation is therefore representing a representation *as* a representation (or more long-windedly, representing a representation *as* a representation of something as something) This is how Pylyshyn (1978) originally used the term - "ability to represent the representational relation itself", and this is the definition that will be referred to throughout this thesis.

1.32 Pretend Play is Metarepresentational: Leslie

Children who pretend are generally ascribed a 'double knowledge' about the situation (McCune-Nicolich, 1981). That is to say, they are pretending that a banana is a telephone, for example, but at the same time they know that it is a banana *really*. Leslie (1987) notices that this poses a potentially disastrous problem for the child, namely that of 'representational abuse'. How can a child who holds a primary representation (a literal, factual, representation 'defined by a direct semantic relation with the world') of a real object or situation, **this is a banana**, at the same time juggle a second representation, **this is a telephone**, when engaging in object substitution? How is it that the child's representational system is not totally undermined by this - is this a banana or is it a telephone? Both representations cannot be 'primary' as they contradict each other semantically. To account for the child's ability to readily substitute a wide variety of objects without losing a grip on their literal meaning Leslie argues that the pretend representations must be 'quarantined off' from primary representations in some way. This is done, he proposes, by the use of meta-, or second-order, representations.

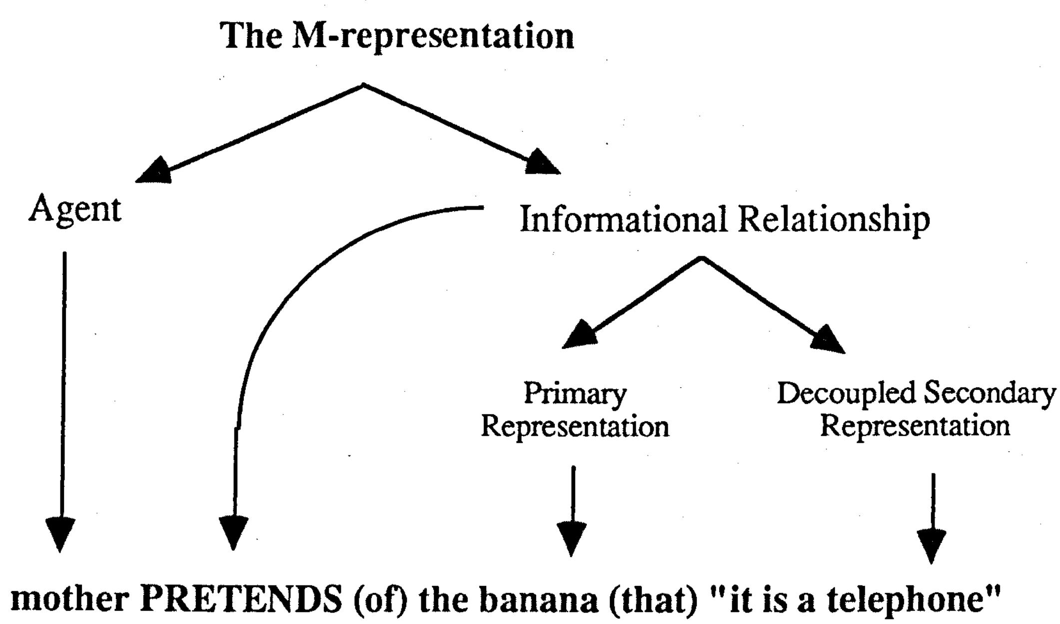
Leslie argues that during an act of pretence the primary representation, **this is a banana,** is copied into another context, "**this is a banana**". This secondary representation is 'decoupled' from reality, and its reference, truth and existence relations are suspended; so representational abuse is avoided. The opacity afforded by the decoupling of the secondary representation's input-output relations is supposed to allow the decoupled expression to be transformed without abusing the primary representation, as in "**this banana is a telephone**". Leslie also suggests that the decoupled expression will be a second-order one, maintaining that it will be a representation of the primary representation.

In his original paper, Leslie sometimes seems to suggest that the mere fact that the mechanisms underlying pretence are supposed to involve copying a primary representation is sufficient to make pretence metarepresentational. This is clearly not the case. It may be true that sometimes, a copy of a representation is at the same time a representation of that representation, but when, for example, an artist paints a portrait from a photograph of their subject, the result is a representation of the person in question, not of the photograph. The resulting portrait is not a metarepresentation, despite the fact that it was produced by copying a representation. The status of the copied representation depends on the way in which it is used. So when we consider Leslie's postulated mechanism of decoupling, the question to ask is whether the copy of the primary representation, "**this is a banana**", is used as a representation of the earlier representation. And there is not the slightest reason to believe that it is. On the contrary, it continues to be used as a representation of the banana, only now in connection with some unusual predicates, such as "**is a telephone**", or "**is a source of sound**" (see subsection 1.32).

Leslie in fact probably never intended to suggest that simply copying a primary representation constitutes metarepresenting. This is clear from his argument that pretend play in childhood emerges at the same time as the ability to understand pretence in others (Leslie, 1987). In terms of his theory, to understand pretence a child must be able to 'compute the relation **PRETEND (a, "e_i", e_j)**', where **a** is the agent and **"e_i"** and **e_j** are the secondary and primary representations respectively. Rather than suggest that the decoupled secondary representation is itself the *metarepresentation*, he proposes that metarepresentations take the general form: **Agent - Informational Relationship - "Expression"**. Here the decoupled secondary representation is the "expression" and the informational relationship is included to indicate the nature of the (non-automatic) relation between the decoupled expression and its corresponding primary representation. For example: **Mother - PRETENDS - "this is a banana"**.

Though he makes minor reformulations to his approach in subsequent papers (Leslie, 1988; Leslie & Frith, 1990), this is generally how Leslie defines metarepresentations, and as he is referring to a representation of a *representational relation* he is correct to do so. Put another way, Leslie's metarepresentation is a representation of the *secondary representation* as a representation of the *primary representation*. Leslie and Roth (1993) have suggested that metarepresentations have a number of components: the agent, and the informational relationship between an aspect of reality (primary representation) and an imaginary situation (decoupled representation), see Figure 1.3. The secondary representation is therefore now seen as only one component of the metarepresentation as a whole. Leslie and Roth introduce the term M-representation to refer to this relational structure.

Figure 1.3. The M-representation (Leslie & Roth, 1993)



There can be no doubt that Leslie's M-representation is indeed metarepresentational. Were a child to have this sort of representation of another person representing something as something else they would be employing a metarepresentation. This does not necessarily mean that pretence is metarepresentational. Solitary pretending must be considered separately from shared pretence, because even if a child begins to pretend at around the same time that they understand pretence in others (this assumption will be discussed later), this does not imply that the same cognitive processes are operating in each case. The only reason for supposing that individual pretence is metarepresentational would be if it were assumed that children have some self-awareness of their pretending, in other words if they themselves are the 'agent' in the M-representation. It seems highly unlikely that a child necessarily needs to represent the fact that **I PRETEND** (of) **the banana** (that) **"it is a telephone"**. Clearly they may do this at times, for example when asked what they are doing by an adult, but there is still no reason to suppose that in general they need do anything other than employ a suppositional secondary representation (see below).

1.33 Pretence is not Metarepresentational: Perner

A key point in Leslie's argument is that a child cannot simultaneously hold two primary representations that contradict each other semantically. However, in defining 'representation' we noted that the attitude associated with a mental act of representation may vary while the content of the representation remains the same. Thinking in these terms we can see Leslie as defining primary representations as having a 'know' or 'believe' attitude to a certain state of affairs. We can then similarly suggest the existence of *secondary representations*, having a non-literal 'suppose', 'what if', or counter-factual attitude. Under this analysis there is no logical reason why non-literal, non-primary representations cannot be first-order (i.e. representational, as opposed to metarepresentational). This forms the basis of Perner's account (Perner 1988, 1991).

Perner argues that young children proceed through three levels of 'semantic awareness'. At the initial level of semantic awareness infants have a 'mental model' of the world. This model is said to be determined veridically by perception, and consists of primary representations. It represents the world *as it is*, and makes up a non-manipulable knowledge base. Around the beginning of the second year children develop the ability to use mental models. They can copy elements from the knowledge base to create new models representing a variety of not necessarily literal situations. These models can be used to represent the world *as it could be*, to represent hypothetical situations. Because they do not share a direct causal relationship with the world, and are therefore not primary representations, they are secondary representations. The child can compare secondary representations with one another and with their primary knowledge base. What they cannot do, however, is to create models of models. This meta-representational ability reflects acquisition of the third level of semantic awareness and occurs at around the age of four. This ability is necessary if a child is to compare a model of another's mental model with their own knowledge of the world (as is required in a false belief task, for example; see subsection 2.21).

Perner suggests that in pretence children create a counter-factual model of the pretend situation. Within the scope of his theory this ability is available to children operating at the second level of semantic awareness. In other words, this can be done using hypothetical, counter-factual secondary representations and does not require metarepresentations. It might be argued that these hypothetical models, originating from the knowledge base, are representations of the primary representations in the base, and are therefore metarepresentational after all. Perner counters this objection by pointing out that, though drawn from and placed in comparison to the knowledge base, the counter-factual pretend models are still models of the external world (as it could be) and not of the base. This is analogous to the earlier example of a photograph used as the basis of a portrait. Or, to return to the mental attitude/content distinction, Perner is arguing that all that is needed in pretence is the ability to hold a 'suppose' attitude rather than a belief attitude to a certain content.

Does Perner's theory solve the problem of representational abuse? There are clear parallels between his theory and Leslie's. Because Perner's counter-factual mental models are hypothetical they are detached from reality and are therefore 'decoupled'. Because they are separate from the knowledge base they are 'quarantined' from it. Perner therefore circumvents the problem of representational abuse in much the same way as Leslie; he agrees that a child cannot concurrently hold two semantically conflicting (reality oriented) *primary* representations. Where he differs from Leslie is in his use of secondary representations as opposed to metarepresentations.

1.34 Simulation Theory[4]

A group of authors who would agree with Perner concerning the non-metarepresentational nature of pretence are those that adopt a 'simulation theory' approach to the area of young children's theory of mind. However, the line of argument leading to this conclusion which would be advanced by proponents of simulation theory is different from that adopted by Perner. It is also more tortuous and requires a digression into the relationship between pretend play and 'theory of mind'.

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[4]The reader is referred to the special edition of Mind and Language (1992) vol. 7, which is devoted to the issue of Simulation Theory and which will be drawn on in this section.

What constitutes a 'theory of mind' will be discussed fully in the following chapter (section 2.21). However, it can basically be thought of as the ability to hold beliefs about someone else's beliefs. I have a theory of mind when I am able to understand that other people are 'minded' in their own right; that they have their own intentional states, beliefs and desires, which may or may not be different from my own. Representing another's belief (whether it be false or true) is undoubtedly metarepresentational. For example, if I believe that my friend Pete believes that his box of cornflakes is in the cupboard, then I represent Pete as having a representation of the cornflakes as being in the cupboard. I therefore have a metarepresentation (properly defined). Because a theory of mind requires the ability to have metarepresentations, and because pretend play is thought by many to be metarepresentational, a functional link has been drawn between the two, and pretend play is seen as a precursor to a fully fledged theory of mind (Baron-Cohen, 1987, 1991a; Leslie, 1987, 1988).

Simulators do not argue that theory of mind is non-metarepresentational - it clearly is metarepresentational - but they do contend that even older children (and adults) do not routinely employ a theory of mind when predicting another's behaviour (Goldman, 1989, 1992; Gordon, 1986, 1992; Johnson, 1988). A theory of mind, or folk-psychology of behaviour, is one way in which I can make explanatory predictions about others. I can predict that my friend Pete will search for my cornflakes in the wrong cupboard because I believe that (he believes that (the cornflakes are there)). An alternative strategy would be for me to 'put myself in Pete's shoes' as he comes down hungry for breakfast. What would I do if I were Pete? I would look in the cupboard where the cornflakes are normally kept. In essence this is the 'simulation' view of predicting behaviour. Note that, in contrast to the theory of mind approach, the simulation view does not require me to theorise about Pete's mental state; I need only consider what I would do in his place. Simulation is therefore first-person centred, and eliminates the need for third-person rationalisation.

If, as suggested by simulation theory, I do not need to use metarepresentations to predict what someone will do on the basis of a false belief, then I would not need to use them to follow through my own counter-factual reasoning in pretence. Harris (1991) has used a simulation approach to argue directly for the non-metarepresentational nature of pretence. He highlights the early acquisition of the ability to imaginatively entertain mental states in pretence (by two or three) and notes that children are able to reason with pretend premises at this stage (Dias & Harris, 1990). Simulation, involving imagining a hypothetical situation and then reasoning from this pretend premise, should therefore be available to children at an early age.

Where Harris goes beyond previous accounts is in his appreciation that simulation will be more difficult the more the child has to take into account the idiosyncratic status of the other person (the other person might want something the child would not want, for example)[5]. Harris terms this 'setting aside default settings' and identifies two such types of setting; these are the child's intentional stance towards reality and their specification of reality itself. By this analysis understanding another person's desire calls for setting aside intentional default settings (what one wants), while understanding pretence requires setting aside reality defaults (what really is). Predicting behaviour requires both sets to be ignored (one must appreciate what another wants, and what they believe to be the case) and is consequently a developmentally harder task.

What Harris is saying about pretence, therefore, is that all a child need do in order to produce pretend play themselves is to imagine what the world could be like, and to reason from there. This does not require metarepresentations but the ability to simulate counter-factual, hypothetical reality by setting aside what one knows about the world. Again this account appears to differ little from what Perner proposes about pretence. Whether this form of approach is more valid than Leslie's, and whether it is applicable to all cases of pretend play, are questions which will be discussed in the following, concluding, subsection.

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[5]Gordon (1992) notes the possibility of total or partial projection, but says little more about these processes.

1.35 Summary And Synthesis

The purpose of this final subsection is to address the question of whether pretend play is metarepresentational, taking account of the theoretical material outlined above, and of aspects of the development of pretence described in section 1.2. Leslie's account raises two possible reasons for supposing that pretence necessitates the use of metarepresentations. The first is the need to circumvent representational abuse. Metarepresentational pretence does manage this quite easily, by decoupling the metarepresentation from the primary representation. However, Perner's account reflects the mental attitude/content distinction and makes use of secondary representations which are effectively 'decoupled' from the knowledge base. These counter-factual representations are not metarepresentational, yet representational abuse still appears to be avoided. Similarly Harris argues that pretence can be carried out at the representational level by engaging in suppositional reasoning. The fact that children can engage in simple counter factual reasoning at the age at which pretend play begins to emerge, shows that the ability to manipulate non-primary representations of the world is present at this stage (indeed it is a developmentally simpler task than manipulating metarepresentations).

The second possible reason for adopting Leslie's approach, concentrating now on his notion of the *M-representation*, is that it could be argued that pretence does indeed need to capture the informational relationship between the primary and secondary representations. The crucial question is therefore whether I need to represent the secondary representation (the banana as a telephone) as being a representation of the primary representation (the banana), or whether it is enough to hold that secondary representation alongside the primary representation without having the relationship between the two made explicit.

It would certainly seem that having a decoupled secondary representation would be sufficient for *individual* pretence. As noted above there is no reason to suppose that a child who pretends alone 'represents themselves as representing one object as representing another'. Leslie's suggestion that the onset of individual pretend play at around two years marks the start of metarepresentational understanding in young children can therefore be rejected on the grounds of parsimony, since it is quite possible to argue alternative non-metarepresentational theories of this form of pretence, which ascribe less competence to the pretender.

Having said this, would we want to argue that all pretend play is non-metarepresentational? Not necessarily. If it is accepted that a child who computes a version of Leslie's M-Representation is employing metarepresentations, then there is still an argument for some cases of metarepresentational pretence, notably in joint pretence. This would be the case, for example, if a child really did compute the representational relation 'mother PRETENDS (of) the banana (that) "it is a telephone"'.

Crucial to Leslie's account is his claim that shared pretence co-occurs with the onset of individual pretend play. Leslie therefore argues that 2-year-old children must be able to compute the M-representation. Studies of comprehension of pretence (reviewed in subsection 1.24) show that by three years of age, and perhaps earlier, children are perfectly able to understand or make sense of pretend play acts carried out by another person. However, just because two people are involved in the pretend situation, one acting out the pretence, the other understanding it, there is no need to assume that the 'understander' must necessarily represent the 'actor' as pretending. In other words it is possible, and indeed likely, that young children understand pretend acts of this kind by treating it as individual pretence, albeit pretence not generated by themselves. In terms of Perner's notion of suppositional thinking (using secondary representations), a child may pick up cues in the actor's intonation and facial expression that indicate that 'as if' behaviour is taking place, and prompt them into 'suppositional' rather than 'literally-receptive' mode. Similarly, Harris (1991; Harris & Kavanaugh, 1993) argues that young children, faced with a potentially puzzling non-literal behaviour, may simply search for a personal pretend scheme that could explain this. They could then understand that the banana was being used as if it were a telephone while by-passing the metarepresentational attribution of the actor's pretence. In doing so the child might rely heavily on 'scripts', or quite generalised knowledge about behaviour sequences and scenarios, in order to join in a mutual pretend play episode.

It could be argued that evidence of understanding the representational relation comes when a child moves from a simple, almost passive understanding of another's pretend actions, to a point of being able to join in and interact with their pretence. At first sight joining in pretence in this way would seem to imply an understanding of the play-partner as 'pretending'. This would amount to Cooperative Social Symbolic Play in the analysis of pretend play development presented in subsection 1.25, which appears at around 30 months. However there are still reasons to believe that metarepresentational understanding is not necessary for this form of pretence. Lillard (1993b) has argued that social pretend play at this age is still based firmly upon a child's scripted knowledge of the world. This echoes work by Bretherton (1989) who specifically proposed an 'event representation' theory of pretence. Bretherton argues that complex and apparently novel pretend interactions can be built up with simpler scripted building blocks, claiming that 'Even in the third and fourth years, when collaborative pretending flourishes, many children still confine themselves to joint enactments ... for which both know the basic 'script''. Bretherton does not argue that this renders social pretend play non-metarepresentational (she does not address this argument specifically, but vaguely ties her theory in with Leslie's). However as Lillard (1993b) contends, the use of scripted knowledge provides a way for a child to cooperate in apparently flexible and interactive social pretence, without having to represent the other as pretending. The child is able to act out the pretence based on their own knowledge of what goes on when mother cooks dinner, or when one visits the doctor for example, without having to take into account the other's mental states at all.

Lillard argues that this form of scripted play continues until the fifth year, but this is not the case. To return to Howes' work, complex social pretend play would appear to differ from cooperative social pretend play in a way which cannot be explained purely by event representation theories. In complex social pretend play, children engage in metacommunication about the pretend situation. The use of metacommunication is good evidence that the children involved in the pretence have metarepresentational understanding. This is because communicating about the pretend situation necessarily implies an appreciation of the listener as understanding that pretend situation. In other words if one metacommunicates about pretend play, one must represent the other as pretending. It would therefore seem that metarepresentational understanding is only clearly implicated in complex social symbolic play.

Complex Social Symbolic Play emerges at around 36 months according to Howes. This is close to the age at which metarepresentational understanding emerges in young children as evidenced by their performance on theory of mind tasks. This is of course unsurprising, given that Leslie's M-representation is required for both behaviours, and is employed in an entirely analogous way in each case. While there is a danger in reading too much into this co-occurrence, this approach at least avoids a problem inherent in Leslie's account, namely the need to explain why pretend play emerges at two years while the ability to pass standard theory of mind tasks is not evident until at least three and a half years (see subsection 2.21). Leslie explains this developmental lag between two behaviours which, according to his account, share the same psychological mechanism, in terms of task complexity (Leslie & Thaiss, 1992). While this is not, in essence, an invalid approach, Leslie's arguments are ad hoc and he has no positive experimental support for them. In contrast, the position advanced here, namely that individual pretence is non-metarepresentational when it first emerges at two, that 'individual' comprehension of pretence is similarly non-metarepresentational, and that metarepresentational pretence emerges in a social situation at around 36 months, is not only theoretically parsimonious, but empirically justified.

Chapter 2
Autism

2.1 *Introduction To Autism*

The aim of this chapter is to give an outline of the features of autism which will be relevant to a subsequent discussion of the area of pretend play in autism (chapter 3). Therefore the initial section will only provide a brief introduction to the autistic syndrome in general. The majority of the chapter will concentrate on descriptions and evidence for two potential underlying psychological deficits in autism, theory of mind deficits (section 2.2), and deficits in executive functioning (section 2.3). Both of these accounts make clear predictions as to the pattern of pretend play deficits expected in autism (see next chapter). The prospects for finding a unifying and underlying psychological explanation of autism will be discussed in conclusion (section 2.4).

2.11 Historical Background

Autism was not recognised as a distinct developmental disorder until the 1940s. Kanner (1943) was the first to adopt the term (though the notion of autistic behaviour, isolation from the social world, was present in psychology before this). Working independently from Kanner, Asperger (1944) also described a similar syndrome, and coincidentally applied the same label to it (see Frith, 1989a). Both Kanner and Asperger saw the disorder as being the result of a basic failure to interact socially with others; Kanner arguing that this was due to emotional deficits, claiming that children with autism suffer from an '...innate inability to form the usual biologically provided affective contact with people'.

The notion of autism as a disorder of affective or emotional understanding is one that still persists, though a specifically psychoanalytic approach (e.g. Bettleheim, 1967) which laid the cause of the disorder firmly at the feet of the 'refrigerator mother'[1] has long since been discredited. Subsequent research has emphasised the fundamental importance of other aspects of the disorder. In the 1960s autism was seen as a developmental language disorder (see Baron-Cohen, 1992a; Rutter, 1978); while in the 1970s a series of findings emerged to suggest that there were particular cognitive deficits associated with autism (e.g. Hermelin & O'Conner, 1970) and a purely cognitive approach to autism is one that remains popular.

2.12 Epidemiology And Aetiology

Details of the prevalence and possible causes of autism will be discussed very briefly here, as these issues are not relevant to a later discussion of pretend play in autism (for more detailed coverage of these areas see excellent reviews by Frith, 1989a; Gillberg, 1990a, b, 1992).

Levels of reported incidences of Kanner-type or nuclear autism have been steadily rising over the past few decades, from around 2 per 10,000 children in the 1970s to a current figure of around 8 per 10,000 (see Gillberg, 1992), though the prevalence of children with autistic symptoms may be around 20 per 10,000 (Wing & Gould, 1979). This increase may be partly due to the use of broader diagnostic criteria, and also to greater awareness of autism in those that diagnose developmental disorders in children (Gillberg, 1992). One consistent finding in studies of morbidity is that autism is more prevalent in boys than in girls, though the extent of this discrepancy has varied from study to study (averaging out at about 3 or 4:1, Gillberg, 1990a)

There appears to be good evidence for some genetic component to the aetiology of autism (Folstein & Rutter, 1977; Gillberg, 1992), and most would also argue that autism is associated with neurological dysfunction of some sort (Frith, 1989a; Gillberg, 1990a). However there is little consensus as to the nature of these proposed brain abnormalities, and little evidence as yet for

[1] It should be noted that Kanner himself subscribed to this view at one point, see Gillberg (1992)

consistent loci of impairment in all children with autism (see Coleman & Gillberg, 1985; Reichler & Lee, 1987). The same is true for evidence of neurochemical abnormalities in autism (see Gillberg, 1992). There are suggestions that complications before and during birth increase the risk of autism (see Konstantareas, 1986), and links between viral infections such as maternal rubella have been made (Frith, 1989a). Gillberg (1990a) concludes that '...autism represents a syndrome of multiple neurological injuries. ...with many underlying etiologies'.

2.13 Symptomatology - The Triad Of Impairments

In his original account of the disorder, Kanner noted what he saw as the two 'cardinal features' of the disorder. These were 'autistic aloneness' and 'obsessive insistence on sameness'. More recent definitional criteria have been based around three key areas of impairment which were identified by Wing and Gould (1979) in their epidemiological study of autistic features in a broad population of children. They found that children who might be seen to be autistic showed: a) a failure to interact socially, b) impaired ability to communicate, and c) an absence of imaginative activity. This 'triad' of features has since become accepted as a hallmark of the disorder, and often forms the basis for a diagnosis of autism. The evidence for social and communicative impairments is substantial, and will not be discussed in detail here. Social impairments include a failure to interact with others, ignoring people or treating them as 'means to an end' rather than as people, a tendency to make socially inappropriate remarks and an apparent lack of attachment with caregivers (see Baron-Cohen, 1988; Volkmar, 1987). Communicative impairments take the form of a severe delay in language acquisition (in many cases language is never acquired). If language is acquired it is marked by repetitive and idiosyncratic use and other features such as pronoun reversal and abnormal prosody (see Frith, 1989b; Paul, 1987). The support for imaginative deficits will be discussed at length in the following chapter.

One disadvantage of focusing on Wing and Gould's proposed triad of impairments is that it can lead to an over-simplification of the extent of the symptoms seen in autism. As well as impairments in socialization, communication and imagination, children with autism exhibit a wide variety of other characteristic behaviours. Perhaps the most notable is Kanner's 'obsessive desire for sameness', which is seen in a preference for routines and in preoccupation with very specific interests or pursuits. It is also reflected in perseverative behaviour, children with autism will repeat actions and segments of speech time and time again. Other characteristic behaviours include echolalic language use (repeating words heard parrot-fashion), hand waving or flapping, and the covering of the ears or eyes in the presence of loud noises or bright lights. Though the majority of individuals with autism also show general learning difficulties, some have abilities which are typically in advance of their level of general intellectual functioning. They may perform very well on non-verbal spatial reasoning tasks for example, evidenced by their ability to do jigsaws. A minority of children with autism (idiot-savants, as they are termed) have exceptional talents in a particular area, for example in calendar calculating, drawing or in music.

2.14 An Explanatory Model

Most researchers in autism would agree that it is a developmental disorder, with a number of possible biological causes, which in turn result in structural and/or neurochemical impairments within the brain. The manifestations of these impairments take the form of deficits in the domains of socialization, communication and imagination[2], though some would argue that perseverative impairments and stereotyped behaviour are key symptoms also. Where differences of opinion occur is at a level that mediates between the (relatively unknown) biological basis of the disorder and the (well documented) behavioural manifestations of these brain impairments. This mediating level is the psychological level of impairment in autism, and researchers differ in their interpretations of what the fundamental psychological causes of the disorder might be. Some have argued for a single, underlying and fundamental mediating psychological impairment (e.g. Frith, 1992a), though several different fundamental psychological deficits have been proposed. The

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[2]Though clearly the extent of any imaginative impairments is still an issue of key importance within the scope of this thesis.

function of the following sections of this chapter is to outline the theory behind, and the support for, two of the more promising candidates for this elusive psychological cause of autism. These are the 'theory of mind' and 'central executive dysfunction' hypotheses. There are many other alternative explanations of the autistic syndrome, though they tend to be less global than those that have been considered here (an exception being Hobson's socio-affective theory). Considerations of space prevent a general discussion of these accounts, though a number of them will be discussed with specific reference to the predictions they regarding pretend play in autism (sections 3.2, 3.3, & 3.4).

2.2 Potential Underlying Deficits I -Theory Of Mind

2.21 What Is Theory Of Mind?

"*Doublethink* means the power of holding two contradictory beliefs in one's mind simultaneously, and accepting both of them"

George Orwell - Nineteen Eighty-Four (p. 223)

In recent years there has been a great amount written about how children develop what is termed a 'theory of mind' (for example see Astington, Harris & Olson, 1988; *British Journal of Developmental Psychology*, 1991; Frye & Moore, 1991; Wellman, 1990; Whiten, 1991). A potentially oversimplified explanation of what it means to have a theory of mind was offered in the previous chapter (section 1.34), where it was defined as the ability to hold beliefs about another's beliefs. As was noted then, this implies an understanding of intentional states and their behavioural consequences, and the realisation that these beliefs and desires may differ from one's own. It also implies the ability to manipulate and process metarepresentations (properly defined).

The best way of testing whether a child has fully acquired the ability to represent other people's mental states is to see if they can predict another's behaviour, particularly when the child knows that the other person has a false belief which will influence their actions. In this case the other person will behave differently from the way in which the child would behave in the same situation, and the child must be able to take this into account in their prediction. In other words, the child must be able to 'doublethink', to borrow George Orwell's terminology.

Consequently false belief tests of this form, used originally by Wimmer and Perner, (1983), and variants of them, have been used extensively in this area of research (Gopnik & Astington, 1988; Hogrefe, Wimmer & Perner, 1986; Perner, Leekam & Wimmer, 1987). These studies typically show that children are able to pass false belief tests at four years of age, but have severe difficulty with them at three years. As tests have become more contextually relevant to children, and as the language employed in them has been simplified, the age at which children pass has been seen to drop to below four (perhaps around three and a half years) (Freeman, Lewis & Doherty, 1991; Lewis & Osborne, 1990; Sullivan & Winner, 1991). This does not imply that at three and a half children suddenly 'see the light' and become totally sophisticated mind-readers. Children's belief-desire psychology develops slowly over time, beginning long before four years (see Wellman, 1990). Also four and even five year old children find second-order false belief tasks (reasoning about X's beliefs about Y's false belief) very difficult (Perner & Wimmer, 1985; Baron-Cohen, 1989a). However the false belief task does serve as a landmark in theory of mind development, and many would argue that it is at this point that a workable 'theory of mind' can be said to have been acquired.

2.22 Why Might Theory of Mind Be Important In Autism?

As described above, the autistic syndrome is characterised by a triad of impairments in socialization, communication and imagination. It would appear that a theory of mind is a necessary precursor for development in these domains. This is most easily seen in the case of socialization. If I lacked the ability to understand exactly how people's beliefs influence their actions, then the social world would almost certainly appear as a bewildering environment. Others' actions might seem unmotivated and certainly unpredictable, the world would be confusing and arbitrary. Faced with such an environment one solution would be to withdraw, and to avoid potentially confusing social interaction (Baron-Cohen, 1992a). Another possible coping strategy would be to surround oneself with a reassuringly rigid environment. By constructing a world centred around routines and sameness one would be able to impose order and a degree of predictability on life. The notion of a lack of a theory of mind can therefore quite readily account for social withdrawal and the characteristic preference for the routine seen in autism.

It is also able to account for problems seen in communication, especially if one accepts a Gricean interpretation of the processes involved in successful communication. According to Grice (1975), and to Speech Act Theory (Austin, 1962; Searle 1965) one must intend to influence the listener's intentions for successful communication. This appears to presuppose an understanding of the listener as having intentions which can be influenced. It is therefore argued (Baron-Cohen, 1988; Frith, 1989b) that effective communication requires both speaker and listener to represent the other's representational state. A further argument is that an appreciation of the 'other's' mental state is necessary in order to be 'relevant' in communication (Sperber & Wilson, 1986; see Frith, 1989b). If one is aware of what a listener does and does not know, one can tailor communication accordingly.

Exactly how the lack of a theory of mind would lead to deficits in imaginative ability will be described in detail in the following chapter (subsection 3.21). However, put simply, it follows from arguing that pretend play is metarepresentational, and that a failure to acquire a theory of mind implies an inability to process metarepresentations. Where a theory of mind account has the greatest difficulty is in explaining bizarre behaviours in autism, such as hand-flapping. It could be argued that these features follow from a failure to appreciate what is socially acceptable behaviour, but very young infants, who presumably have little grasp of social expectancies, do not show similar stereotypies.

2.23 Direct Evidence Of A Theory of Mind Deficit

Traditional Tests of False Belief

The first study to directly investigate whether children with autism suffer from some form of 'theory of mind' impairment was performed by Baron-Cohen, Leslie and Frith (1985). They found that only 4 of 20 children with autism (20%) passed a typical false belief task (as used by Wimmer & Perner, 1983), despite their having a mean verbal mental age of five years five months, well above that at which non-autistic children pass the test (indeed the test was passed by 86% of Downs syndrome controls, with a lower verbal mental age, and 85% of normal control children, with a mean age of less than five).

Similar results emerged from an extension of this study, performed by Leslie and Frith (1988), who used real protagonists in their false belief task, and who employed a control group of children with language impairments, matched for language abilities (to counter criticisms of Baron-Cohen et al.'s original study made by De Gelder, 1987; see also Leslie & Frith, 1987). They tested 18 children with autism, all with a verbal mental age of above four and a half years, and found that only 5 of them (28%) were able to predict where an experimenter would search for an object on the basis of a false belief. In contrast all of the controls passed this test satisfactorily. They also found that the children with autism performed poorly on a test of limited knowledge, only 8 of them were able to say that an uninformed experimenter would not know about the presence of a hidden object.

Subsequent studies have employed this form of traditional task, often alongside other tests of mental state attribution ability, and have found a similar degree of impairment amongst children with autism. Pass rates which have been reported are 15% (Reed & Peterson, 1990), 32% (Leekam & Perner, 1991), 27% (Russell, Mauthner, Sharpe & Tidswell, 1991), approximately 25% (Leslie & Thaiss, 1992), and 29% (Sodian & Frith, 1992). In all of these cases these levels of successful performance were notably lower than those of controls (though matching of controls was not strict in the Reed and Peterson and Russell et al. studies), and significantly poorer than would be expected on the basis of the children's verbal mental ages.

However a discrepant pattern of results has emerged from two studies. Oswald and Ollendick (1989) found that their group of children with autism were not impaired relative to matched control children with moderate learning difficulties on a traditional false belief test. Two possible reasons for this anomalous finding have been suggested (Baron-Cohen, 1992b). Firstly, no minimum mental age inclusion criteria were used (matching was on the basis of non-verbal IQ), it is therefore possible that both groups included children with mental ages of below four years, who would not be expected to pass such a test, regardless of diagnosis. Secondly, the sample sizes employed were very small (10 children in each group).

The second set of 'inconsistent' results emerged from a study performed by Prior, Dahlstrom and Squires (1990). They found that 11 of their sample of 20 children with autism were able to pass a traditional false belief task. Prior et al. suggest that this higher level of performance (55%) is explained by the fact that the children had a higher verbal mental age than the populations described above (mean of 7 years 2 months). Of a subgroup of 12 children with autism with a verbal mental age of below seven and a half years, only 4 passed this test (33%), and even when considered as a whole, the performance of the group with autism is still significantly poorer than a control group of children with learning disorders matched for verbal mental age.

Another possible explanation of the high-levels of performance observed by Prior et al. is that they used a slightly different procedure to that employed by Baron-Cohen et al.. Rather than asking children where Sally would look for her marble, they asked where she would look first. In a subsequent experiment, Eisenmajer and Prior (1991) found that this manipulation improved performance amongst a group of children with autism. Nine of 18 children who failed a traditionally-phrased task were able to pass a subsequent modified test ('where will Sally look *first*'). Of course children with autism's difficulties on the false belief task cannot be wholly ascribed to a failure to understand what is intended by a traditional question (i.e. interpreting it as asking where Sally would ultimately look, or where she must look in order to be successful), as Prior et al.'s results show that they are still significantly impaired when the 'look first' modification is included. It is also likely that young normal children would similarly benefit from this manipulation (see Lewis & Osborne, 1990).

Other Tests of Belief Attribution

Perner, Frith, Leslie and Leekam (1989) extended this series of studies by investigating children with autism's ability to understand mistaken beliefs. They used a deceptive-appearance paradigm (Perner, Leekam & Wimmer, 1987) in which children were shown a tube of smarties which in fact contained pencils. When initially asked about the contents of the tube, children confidently assert that it contains smarties. They are then show that the tube in fact contains pencils, and are asked to report their previous false belief and to predict what an uninformed child will say is in the tube. Perner et al. found that only 4 of 23 children with autism (17%) were able to predict that an uninformed child would think that the tube contained smarties (compared to a 92% pass rate amongst controls). The children with autism also performed poorly (though less poorly) on a test of knowledge attribution in which they were asked whether they or an experimenter knew the contents of a box depending on who had seen inside it. One further, intriguing result of Perner et al.'s study was the finding that, despite being impaired on attributing another's misinformed belief, 14 of the children with autism were able to report their own previous false belief on the smartie tube task (61%). Similar results on this task were obtained by Leslie and Thaiss (1992). They found that of 15 children with autism with a mean verbal mental age of six years three months, 10 passed a self-belief test, but only 4 passed an other-belief test. These children were impaired relative to mental age matched controls on the later test, but not on the former.

The ability to reason about the consequences of false beliefs was further tested by Baron-Cohen (1991b). He found that children with autism were not impaired relative to normal and handicapped controls in their ability to say that a protagonist would be happy if they opened a box containing something they desired, or conversely that they would be sad if they opened an alternative, empty box (desire tasks). However these children were impaired when asked to say how the protagonist would feel upon opening a box which contained something unexpected (belief task) (only 33% passed this task compared to 100% of children with moderate learning difficulties, and 77% of normal controls). Baron-Cohen (1991b) argues that these findings show that children with autism understand desires, but not beliefs, as causes of emotions. This conclusion is not entirely warranted, as a failure to understand beliefs as causes of emotion may simply result from a failure to understand beliefs per se.

The fact that some of the children with autism assessed by Perner et al. (1989) were able to pass the knowledge attribution task, but not the developmentally more difficult false belief task, coupled with the relative improvements noted by Prior et al. (1990) amongst developmentally more able children with autism, suggests that theory of mind does develop in autism, albeit very slowly. This is similarly shown by the fact that all the studies described above indicate that a proportion of children with autism (at least 20%, though the figure rises with verbal mental age) are able to pass a false belief test. It is therefore not the case that a child with autism will never acquire a theory of mind. To investigate the possibility of a severe developmental delay in autism Baron-Cohen (1989a) selected 10 children with autism who had previously passed a false belief test, and gave them a second-order false belief test (the child has to understand X's false belief about Y's belief). All of the children with autism failed this task, despite having a mean verbal mental age of over seven years (normal children pass this form of test at around six years, Perner & Wimmer, 1985) and despite pass rates of 60% amongst Downs syndrome and 90% amongst normal controls of a similar developmental level. On the basis of these findings Baron-Cohen concluded that children with autism suffered from a *specific developmental delay* in their acquisition of a theory of mind. Acquisition is *delayed* rather than being totally impaired because it is clear that some children with autism do reach a level at which they can pass first order false belief tests, however even these children are still delayed in acquiring higher-order theory of mind skills. This delay is *specific* because it is not related to general developmental delay, children with autism fail these tasks despite having a verbal mental age which would normally be sufficient for success.

The notion of a developmental delay was further investigated in a subsequent study carried out by Baron-Cohen (1991a). Children were given five tasks, being initially made to, Believe, Pretend, Perceive, Desire or Imagine a particular state of affairs. That state was then changed and children were asked to report their previous Belief, Pretence, Perception, Desire or Imagination. Control groups of children with mental handicap and normal children found the Pretend, Perception and Imagination tasks equally easy, the Desire task harder and the Belief task harder still. This pattern of performance was also found in normal children by Gopnik and Slaughter (1991). However the 15 children with autism produced a different pattern. They found the Imagination and Pretend tasks harder than the Perception task, and their performance on these two tasks, as well as on the Belief task was significantly poorer than that of controls.

One aspect of this study is of particular interest. As noted above Perner et al. (1989) and Leslie and Thaiss (1992) surprisingly found that children with autism, though impaired at attributing false beliefs to others, were not impaired when asked what their previous false belief had been. In contrast Baron-Cohen (1991a) found that children with autism were significantly impaired on this task (the tasks used were similar, all employing Perner et al.'s, 1987 'smartie tube' paradigm). Though he did not note the conflict of findings at the time, Baron-Cohen later provided a possible explanation for the discrepancy (Baron-Cohen, 1992b). In his test Baron-Cohen asked children what they had originally *thought* was in the tube, while Perner et al. and Leslie and Thaiss asked them what they had originally *said* was in the tube. Baron-Cohen (1992b) convincingly argues that the phrasing of Perner et al.'s question may have led children with autism to report their previous utterance, rather than their previous false belief. This proposal is echoed by Leslie and Thaiss, who suggest that while three-year-olds interpret a 'what will X say?' question as meaning 'what does X think?', children with autism do not infer a causal relationship between beliefs and utterances (see Roth & Leslie, 1991).

Deception

Consistent with the view that children with autism have severe difficulties in making inferences about other people's mental states, is evidence that they are impaired on tests of deception. Being able to deceive presupposes that one appreciates that successfully planting a false belief in another's mind, will influence that person's actions accordingly. True deception, therefore, clearly requires metarepresentational understanding. Sodian and Frith (1992) tested children with autism on both a 'Deception' and a 'Sabotage' task. Children were introduced to a 'nice smartie friend' who gave the child a smartie whenever they found one, and a 'nasty smartie eater' who devoured whatever smarties he came across. Sodian and Frith found that the children with autism were not impaired relative to controls on the Sabotage test - they locked a box containing smarties when the nasty smartie eater approached, but opened it for the friend. However, they were impaired in their ability to carry out the deception task which required them to lie to the nasty smartie eater about the contents of the box. Interestingly they also found that this differential pattern of performance was not maintained when two boxes were included in the experiment, one containing a Smartie, one empty. In this case the children with autism were not significantly better at sabotage than at deception.

Baron-Cohen (1992b) noted two potential problems with Sodian and Frith's procedure, suggesting that the language employed was relatively complex, and that the deceptive game used lacked ecological validity. Consequently he employed a more simple and familiar task in an assessment of deceptive ability in children with autism, building on a task used previously by Oswald and Ollendick (1989). In their study (described in part above) Oswald and Ollendick (1989) found that children with autism were impaired relative to controls in deceiving an experimenter about the location of a penny hidden in one of their hands. The children with autism were less likely to adopt a random hiding strategy, but rather repeatedly hid the penny in one hand, or alternated the hiding place rigidly (see Baron-Cohen, 1992b). However it is not clear that this represents true deception, it does not necessarily involve the implanting of a false belief into another's mind, and children with autism's failure on this task may be due to behavioural inflexibility rather than to an inability to mentalize.

However, in his subsequent experiment, Baron-Cohen found that only 3 of 15 children with autism demonstrated 'information occlusion' when hiding the penny (i.e. actively prevented the competitor from finding out its location). In contrast information occlusion was shown by 10 of 15 children with mental handicap and 11 of 13 normal children (both groups having a lower verbal mental age than the children with autism). Again it could be argued that these results do not really show a failure to actively deceive in autism, as they do not indicate a failure to *implant* a false-belief, rather they appear to reflect a more passive failure to take into account another's mental state.

Other Areas Of Mentalistic Understanding

The body of research reviewed so far almost exclusively suggests that children with autism have severe difficulties in attributing mental states to others, and that these difficulties take the form of a severe delay in acquiring a 'theory of mind'. Consistent with this view is other evidence which implies that children with autism's difficulties persist beyond attribution of mental states, and are seen in other, more general areas of 'mentalistic' understanding. Baron-Cohen, Leslie and Frith (1986) found that children with autism were able to correctly order sequences of pictures which combined to tell mechanical (a rock rolls down a hill) or behavioural (a boy dresses himself) stories, but were impaired relative to control groups of Down's syndrome and normal children when asked to sequence mentalistic stories (a boy is surprised to find that his bag of sweets is empty, being unaware that the bag has a hole in it). Baron-Cohen has also shown that children with autism are impaired in their ability to distinguish between mental and physical phenomena, and to ascribe a 'mental' function to the brain (Baron-Cohen, 1989b), have impaired appreciation of Appearance Reality Distinctions (i.e. saying that a stone that looked like an egg, really was a stone; Baron-Cohen, 1989b), and are impaired in their ability to both produce and to comprehend protodeclarative pointing (pointing designed to elicit shared reference to an object or an event; Baron-Cohen, 1989c).

Unimpaired Non-Mentalistic Social Cognition

While children with autism have difficulties with protodeclarative pointing, they appear to be unimpaired in producing and in understanding protoimperative pointing (pointing designed to elicit a simple response, such as signalling desires for objects; Baron-Cohen, 1989c). This dissociation of impairment highlights a third line of support of the theory of mind deficit theory. It appears that 'social cognition' which requires or rests upon an appreciation of or an ability to influence another person's intentional state is impaired in autism, whilst social tasks which do not presuppose these mind-reading skills are not. It is not the case that children with autism simply perform poorly on any test that requires social understanding. Baron-Cohen has also shown that children with autism are perfectly able to appreciate social relationships (e.g. mother-child pairings) and to engage in interpersonal reciprocity (joining in a collaborative ball-rolling game) (Baron-Cohen, 1991c). Children with autism can also appreciate another's perceptual perspective (Baron-Cohen, 1989c; Hobson, 1984; Leslie & Frith 1988)

False Photographs

However one study, Leekam and Perner (1991), stands in stark contrast to the rest of the body of this research, in that it shows that children with autism are significantly better than young normal children on a test which could be considered to require 'theory of mind' abilities. This is a false photograph test, used initially by Zaitchik (1990), in which children watch as the experimenter takes a picture of a certain situation with a Polaroid camera (in this case, of the doll wearing a red dress). While the photograph is developing the situation changes (the doll changes into a green dress), and children are asked what colour dress the doll would be wearing in the picture. Zaitchik found that 3 year olds have difficulties with this task that mirror their problems with traditional tests of false belief. However, despite finding an impairment in their children with autism on a false belief task, Leekam and Perner found that these children were significantly better than four-year-olds on the false-photograph test; 95% of children with autism passed this test, compared to 58% of normal children.

These surprising results have been replicated. Leslie and Thaiss (1992) found that their group of children with autism (described above) performed significantly better on two false photograph tasks (one in which an object changed location, one in which it changed identity) than they did on two tests of false belief attribution (the analogous traditional task and smartie tube task). In fact all 15 of the children with autism passed the photograph version of the identity change task.

Summary

These studies show that children with autism have clear difficulties on tasks that appear to require them to attribute mental states to others. They perform consistently poorly on traditional false belief tasks. Only a small minority of children with autism pass such tasks, even though they have verbal mental ages well above the level required for success in normal children and controls with learning difficulties. These findings are well replicated, and the failure to find this degree of impairment in two cases (Oswald & Ollendick, 1989; Prior et al., 1990) is easily explained.

Children with autism are similarly impaired on other tests of mental state attribution such as predicting mistaken beliefs and inferring limited knowledge in others (e.g. Perner et al., 1989). Interestingly they do seem to be able to report their past false utterances, but it is not clear that this necessarily implies the ability to report past false beliefs. They have difficulties in deceiving others, which is generally seen to reflect a failure to appreciate the value of planting a false-belief in the mind of a competitor (though see section 2.42 for an alternative explanation). Other areas of mentalistic understanding, such as understanding appearance-reality distinctions, protodeclarative pointing, and intentional sequences of pictures, are similarly impaired. In contrast aspects of social cognition which do not require mentalistic understanding, such as perspective taking, appreciating social relationships and understanding protoimperative pointing, appear to be unimpaired.

In many ways children with autism's performance on these tasks parallels that of three-year-old children. However, their problems persist well beyond a verbal mental age of three. Even those children who are able to pass a first-order false belief task are impaired on a second-order task (Baron-Cohen, 1989a), again failing when their verbal mental age should be sufficient for success.

It is clear therefore that children with autism are impaired in their acquisition of a theory of mind (if, for the time being, one accepts that failure on these tasks reflects the absence of such a theory). What is also clear is that this delayed development is deviant. Children with autism do not perform exactly like three-year-olds; they are able to report previous false utterances, the pattern of their development of a 'theory of mind' is non-normal (Baron-Cohen, 1991a), and they pass the false photograph test.

2.24 Summary - Explicit Explanations Of Theory Of Mind Difficulties

The notion of deviance and delay in the acquisition of the ability to attribute mental states to others in autism appears to be clearly supported by the experimental evidence described above (though see section 2.42). This is the level of analysis at which Baron-Cohen generally makes his claims about autism, and it is a level which has both explanatory and predictive power. However at the start of this section (subsection 2.21), and in the previous chapter (subsection 1.31) we noted that attributing beliefs to others requires the ability to process metarepresentations. Other authors have been more explicit in claiming that poor performance on theory of mind tasks shows that children with autism therefore have a deficit in processing metarepresentations (Frith, Morton & Leslie, 1991; Leslie, 1987, 1988, 1991; Leslie & Frith 1990; Leslie & Roth, 1993; Leslie & Thaiss, 1992). In addition the strong claim is made that delayed and deviant acquisition of the ability to form and process metarepresentations is the fundamental psychological cause of the autistic syndrome.

One clear problem for this metarepresentational deficit account however, is in explaining why children with autism have no difficulties on a false photograph task. While the photograph itself is only a representation of a doll as wearing a red dress (for example), the child must represent the photograph as representing the doll as wearing a red dress (Perner, 1991). On this analysis metarepresentations are required in this task.

If this is the case then children with autism cannot have problems in understanding all forms of metarepresentations. Recently Leslie and colleagues have argued that the metarepresentational deficit in autism is *domain specific*, and applies only to mentalistic metarepresentations (Leslie & Thaiss, 1992; Leslie & Roth, 1993). They argue that the difference between understanding mental representations and photographic representations is that photographic representations lack *agency*, they cannot hold any particular attitude to a proposition. It is this distinction, coupled with the argument that attitudes such as 'believe' are sui generis and so demarcate a domain of mentalistic understanding, which are used to justify Leslie's rather post-hoc analysis.

In contrast, Perner (1993) argues that there are two ways of understanding photographs (and representations in general). These are as a 'Situation Theorist' or as a 'Representation Theorist'. Within his model (outlined in subsection 1.33) a situation theorist functions at the second level of semantic awareness, and is therefore able to use and compare secondary representations or models of the world. In contrast a representation theorist is able to model models, or use metarepresentations (the use of the term 'representational theorist' is therefore somewhat confusing). Perner argues that photographs can be 'understood' on either of these levels, by representing them as representations (representation theorist using metarepresentations), or by representing them as a non-literal view of the world (situation theorist using secondary representations). He claims that children with autism are situation theorists, and as false beliefs cannot be understood by situation theorists, but only by representation theorists, this account ties in with the experimental evidence described above. It is also consistent with the fact that children with autism are able to report their previous false utterances (representing what was said) but not their previous false beliefs (representing what was thought).

However, while Perner roundly criticises Leslie's explanation of children with autism's ability to pass the false photograph task, his views are more similar to Leslie's than one might think. Leslie notes that photographs cannot hold attitudes to propositions, but fails to see the implications of this point. In subsection 1.32 it was noted that a fundamental property of propositional attitudes is opacity. Photographic 'representation' does therefore not necessarily entail opacity[3]. If this is the case then there is no real need to represent photographs as representations, a child can simply represent the 'state of affairs' as they perceived it at the time the photograph was taken. As Perner's line of argument suggest, a child with autism might therefore simply represent: a picture of the doll in a red dress. This conclusion can be derived from an alternative line of thought. If Leslie's M-representation properly defines a metarepresentation, then anything without an informational relationship (or propositional attitude), which is the crux of this structure, cannot be metarepresentational. There therefore appears to be no need to propose a failure to understand domain specific metarepresentations in autism, as by this analysis the false photograph task is not metarepresentational in nature.

There remain two other possible arguments against the assumption that failure on theory of mind tasks implicates a metarepresentational deficit in autism. Firstly, as simulationists would argue (see subsection 1.34), it is possible that one need not 'metarepresentationally' attribute beliefs to others in order to predict their behaviour. Theory of mind tasks may therefore not tap metarepresentational understanding. Harris (1991) takes this line and argues that false belief tasks could instead be passed by setting aside 'intentional' and 'reality' default settings, and by then reasoning through another's consequent behaviour for oneself. If this is the case then children with autism would appear to have problems in setting aside these default settings, rather than with metarepresentational thought.

Alternatively, it is possible that attribution of belief is necessary in theory of mind tasks, but that children with autism fail these tasks for some reason other than a metarepresentational deficit. If so there must be some other common factor in these tasks which children with autism find problematic. This is the argument made by Russell and colleagues (Russell et al., 1991; Hughes &

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[3]It might be argued that in this case the photographic representation has 'temporal opacity' because the real-world situation has changed since the photograph was taken. This is not a valid argument, the child is in a position to know exactly what form the photograph will take. Its contents are therefore not opaque in any sense.

Russell, 1993). Their claim, which will be outlined fully in subsection 2.42, is that theory of mind tasks consistently require children to inhibit a salient response. They further argue that, as children with autism show dysfunctional 'executive control' of behaviour (see next section), they are impaired in their ability to inhibit these form of responses.

There is a certain commonality amongst all these proposals. Children with autism appear to have difficulties when they have one belief, but are asked to report a different belief. Moreover these problems seem to be limited to situations where there is a 'contradiction of simultaneity'; the false photograph task, and the reporting of false utterances have a temporal lag embedded in them which removes this problem. In other words, to return to the start of this section and to the words of George Orwell, children with autism cannot 'doublethink'. An impairment in 'holding two contradictory beliefs in one's mind simultaneously, and accepting both of them', could be explained by a metarepresentational deficit account (a failure to represent the relation between a primary and a decoupled secondary representation), by a simulationist account (a failure to set aside the default setting of reality) and by an executive dysfunction account (a failure to disengage from reality, see next section).

The merits of these alternative standpoints will be discussed fully at the end of the chapter (in section 2.4). For the meantime it is sufficient to note that a metarepresentational deficit hypothesis could account for the range of experimental findings regarding theory of mind development in autism (though there appears to be little need to argue for a domain specific impairment), but that alternative explanations are possible.

2.3 Potential Underlying Deficits II - Executive Dysfunction

2.31 What Are Executive Functions?

The term 'executive functions' is a rather broad label which is applied to a variety of high-level cognitive processes (high-level because they are controlled or consciously activated). Authors typically attempt a definition of 'executive functions' by listing areas of behaviour which rely on them, these include: planning, decision making, directed goal selection, and maintaining of ongoing behaviours (Stuss, 1992); also self-monitoring, suppression of prepotent but incorrect responses, and behavioural flexibility (Hughes, Russell & Robbins, in press), and also organized search (Ozonoff, Pennington & Rogers, 1991). However, attempts at a firmer definition have been made. Posner and Rothbart (1990) argue that 'The executive system is held to be capable of inhibiting and thus controlling automatic activation patterns...', while Hughes et al. (in press) define executive functions as '...the mental operations which require the individual to disengage from the immediate context in order to guide behaviour by reference to mental models and goals.'

Given that these definitions are either relatively vague and certainly broad, or based on a list of the supposed manifestations of these rather elusive functions, it is worth pausing to consider why it is necessary to posit the existence of an executive system. Any explanation of the need for executive functions begins at the same starting point, this being that introspection shows that human behaviour can be divided into two streams. On the one hand there is behaviour that is automatic and not under conscious control. Examples of this form of behaviour are often seen in everyday life. It is common to have been driving a car for some miles before suddenly realising that one has not really been paying attention to the road at all. Yet importantly (both theoretically and practically) one has driven relatively safely, moving the wheel to take corners and changing gear. On the other hand there is behaviour which is controlled, or willed, behaviour that is directed, intentional and open to conscious reflection; I might for example, having realised that I have gone some distance in my car 'unconsciously', decide to pull over and stop for a cup of coffee.

This distinction has recently been taken up, notably by Shallice and colleagues (Norman & Shallice, 1986; Shallice, 1988; Shallice & Burgess, 1991) to provide the basis of their model of executive functioning. However it is certainly not a new one in psychology. William James (1890) drew exactly this distinction between ideo-motor (automatic) and willed (action). It is therefore somewhat appropriate that it is through further introspection that the model is developed. Shallice and colleagues point out that the actions that are available to conscious control are simply those that are operating when control is absent. In other words there appear to be certain action schemas which will determine behaviour automatically if not consciously controlled. The difference between automatic and controlled behaviour is therefore simply the imposition of conscious control on the selection of action. A further aspect of the model follows as a consequence. There must be some automatic system for deciding which of a variety of possible action schemas is selected when conscious control is not operating. Shallice and colleagues call this system 'Contention Scheduling'. They suggest that each of the possible action schemas within the realm of behaviour has a threshold activation value. The schemas 'contend' with each other, via a process of lateral inhibition, to reach this activation level. Once this is achieved that particular schema is acted out. Given that lateral inhibition occurs between schemas, once one schema has been selected there is nothing to prevent it from remaining activated unless conscious control is exercised. However, it is clearly true that one is able to (non-consciously) alter one's behaviour. To return to the example of driving a car automatically, if a corner approaches the wheel will be turned, even in the absence of the awareness of doing so. Shallice and colleagues therefore propose that external stimuli or situations are able to influence contention scheduling by selectively activating particular and appropriate action schemas.

The final aspect of the model is the conscious control process itself. This is termed the Supervisory Attentional System (SAS), and its function is to guide behaviour with reference to pre-planned goals. This requires two separable levels of control[4]. The first is the higher, more abstract level of monitoring and awareness; the SAS must attend to what is going on in contention scheduling, and make reference to hypothetical goal states. The second level of control is the lower, more practical level whereby the SAS actively imposes itself on the automatic process of contention scheduling. This can only be done in two ways, by inhibiting the activation of an inappropriate action schema, and by raising the activation level of an appropriate schema. This dissociation is important, because though the proposed planning and monitoring functions of the SAS are rather vague concepts and are not easily broken down into concrete subsystems or processes, they can only directly affect behaviour via the lower level of functional control.

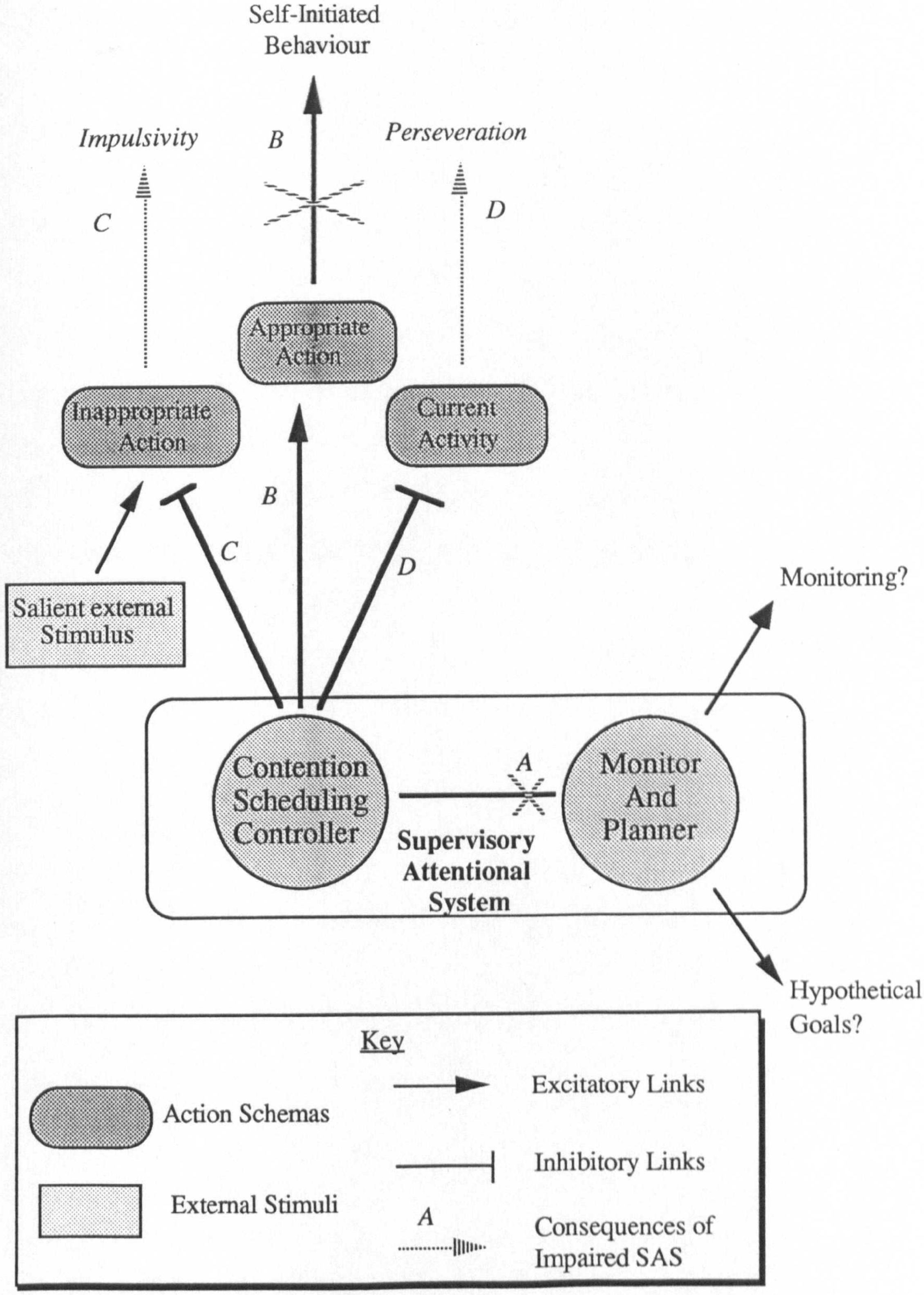
This allows one to consider the possible implications of an impairment to the SAS in terms of a limited number of possible consequences. The first is a loss of ability to plan, to reflect or to monitor that would coincide with failure of the abstract level of functioning of the SAS. The other impairments would be due to failure at the functional level of control. Failure to activate appropriate action schemas would lead to an absence of self-generated or initiated behaviour. Failure to inhibit inappropriate action schemas would have two-fold consequences. Firstly, if an environmental stimulus raised the activation level of an inappropriate action schema, there would be nothing to prevent this inappropriate action from being selected and carried out. Impulsive behaviour or a failure to inhibit responses to salient stimuli would be seen. Secondly, if an action schema was operating having reached threshold activation level, there would be nothing to cause it to be

[4]This is not a distinction made by Shallice and colleagues. However Stuss (1992) does relate the functioning of the executive system to a higher level of awareness and consciousness, and Frith (1992b) discusses both self-awareness and functional control aspects of the SAS.

deselected, or to lower its activation level below threshold. Perseveration of action would therefore occur.

There therefore appear to be four possible consequences of an impairment to the SAS (though clearly the first of these really represents a host of rather vague and probably related functions): a) Failure to monitor and plan, b) failure to generate self-initiated behaviour, c) impulsivity, and d) perseveration. These are shown in figure 2.1 below, which provides a diagrammatic interpretation of Shallice et al.'s model. Two subcomponents of the SAS are hypothesised, on the basis of the distinction drawn above between levels of SAS control. These are the 'Contention Scheduling Controller' and the 'Monitor and Planner'. Again it should be noted that Shallice et al. do not make this distinction.

Figure 2.1. A Model Of Executive Functioning



Though the initial justification for Shallice et al.'s model is drawn from introspection and logical argument, there is empirical support for its formulation. This comes from evidence of the four types of impairment described above amongst patients with damage to the frontal lobes of the brain (and in particular the prefrontal cortex).

An impairment in planning amongst frontal lobe patients has been demonstrated on Tower-Of-Hanoi type tasks which require the ability to plan with reference to a desired goal state (Shallice, 1982). There is also some evidence of failure to initiate action in frontal patients (Ackerly & Benton, 1948 reported in Bishop, 1993). Shallice (1988) notes that typical of frontal dysfunction is an inability to inhibit responses triggered inappropriately by external stimuli. In the extreme this can take the form of 'utilisation behaviour' (Lhermitte, 1983) where patients are 'captured' by presence of objects and cannot leave them alone but use them as their function dictates. Another form of impulsivity noted by Shallice is 'distractibility'. Though there is some controversy about the extent of this impairment in frontal patients, it is consistent with the notion of a failure to 'disengage from the immediate context'. Finally, perseveration is evidenced in patients with frontal lobe dysfunction by their performances on the Wisconsin Card Sort Test (Grant & Berg, 1948). This requires patients to sort a pack of cards, carrying stimuli which differ in colour and shape, according to a certain rule (e.g. by colour). After a period of initial sorting the rule is changed (e.g. by shape). Frontal patients show an inability to shift to a new rule, and perseveratively sort using the old one (see Walsh, 1978; Stuss & Benson, 1986). This has been termed 'stuck-in set' behaviour (Sandson & Albert, 1984) and has been interpreted as an inability to inhibit 'central sets' (Milner, 1963; Mishkin, 1964). This parallels Posner and Rothbart's notion of inhibiting current activation patterns. Perseveration occurs because of a failure to override or switch from current activity.

Two caveats should however be made regarding the claim that the frontal lobes are the 'seat of executive control'. Firstly the frontal lobes are complex neurological structures, and subserve a range of different functions (see Levin, Eisenberg & Benton, 1991). Secondly a number of patients without specific frontal lobe pathology perform poorly on the tasks described above (e.g. children with attention deficit disorder, see Barkley, Grodzinsky & DuPaul, 1992; and patients with Parkinson's disease, see Owen, James, Leigh, Summers, Marsden, Quinn, Lange & Robbins, 1992).

2.32 Why Might Executive Dysfunction Be Important In Autism?

Damasio and Maurer (1978) were the first to suggest a link between autism and frontal lobe dysfunction, on the basis of parallels between impairments in autism and in neuropsychological patients with frontal lobe damage in the following areas: motility, communication, attention and perception, and ritualistic and compulsive behaviours. Children with autism characteristically exhibit inflexible stereotyped behaviour, and have a strong preference for routines and for sameness, which could be interpreted as a consequence of being unable to initiate actions. Hammes and Langdell (1981) suggest that while children with autism may be able to form mental images, they are typically 'stimulus bound'. This ties in with the notion that external stimuli have the ability to 'capture' the child with autism's mental processes, suggesting that there is a failure to inhibit inappropriate responses to salient external stimuli. Perseveration is also an accepted aspect of the disorder.

Whether a lack of executive functions can explain the triad of impairments seen as characterising the autistic syndrome is less clear. Patients with frontal lobe pathology often show disinhibited and inappropriate social behaviour (see Bishop, 1993; Joseph, 1990), but not the withdrawal from social interaction seen in autism. This failure to socialize could conceivably be explained in terms of a failure to monitor the nuances of social interaction, or to plan appropriate social behaviours (Hughes & Russell, 1993)[5]. Impairments in communication could similarly be

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[5] A more convincing explanation for a failure of socialization is that executive functions are required in order to develop or operate a theory of mind. The relationship between these two domains will be discussed fully in section 2.4.

explained in terms of deficiencies in planning and monitoring. As will be seen later, an absence of imaginative behaviour can also be explained by an executive deficit account. The problem with explanations based on monitoring and planning deficits is that they are so broad. There are very few behaviours, or patterns of action, which do not rely on executive functions to some extent. Any action which is open to conscious reflection is potentially under executive control. It is therefore possible to explain almost any pattern of symptoms in terms of executive dysfunction (Bishop, 1993).

Having said this, additional evidence for executive dysfunction amongst children, and indeed amongst well-recovered adolescents with autism, is provided by direct studies of frontal-type impairments amongst these populations. These studies will now be described in some detail.

2.33 Direct Evidence Of Executive Dysfunction

Steel, Garman and Flexman (1984) presented the first evidence of frontal-type impairments in autism, reporting a single case-study of an autistic idiot-savant. This child was found to be impaired on a number of tests sensitive to frontal lobe dysfunction and which implicate executive dysfunction, though clearly few firm conclusions can be drawn from a single case report. A larger group of 9 high-functioning adults with autism were tested on the WCST by Rumsey (1985). She found that the group with autism were significantly impaired on the majority of measures arising from the test, compared to a control group of 10 adults matched for educational level. On the basis of these results Rumsey proposed that despite their relatively high levels of intellectual and verbal functioning, the adults with autism were exhibiting two problem-solving deficits, perseveration and impaired 'conceptual level responding'.

It is not clear whether Rumsey took into account the increased levels of perseveration in the group with autism when calculating differences in conceptual-level responses. It would appear that an inability to inhibit perseveration would automatically result in less conceptual-level responses being given. Other criticisms of this study include the matching of the control groups, which was rather loosely based on level of education and not IQ or MA. However many group differences remained significant when IQ was accounted for.

Similar results were obtained in subsequent studies by Rumsey (Rumsey & Hamburger 1988, 1990). Both of these studies report the results of the assessment of a group of 10 high functioning adults with autism on a neuropsychological test battery. The age profiles of these groups is identical, suggesting that the two studies are reporting results from the same set of participants, however the control groups employed differ between studies. Normal controls, matched for age and educational level are employed in the first (1988) study, an additional group of dyslexic participants are included in the second (1990) study. The combined results of these experiments show that the adults with autism were impaired on the WCST, completing fewer categories than controls. They were also impaired on a test of word fluency (generating as many words as possible starting with a particular letter) relative to normal controls, though not to dyslexic controls.

Prior and Hoffman (1990) presented 12 children with autism, and two groups of controls matched for i) chronological age, and ii) mental age, with three tests of executive function. These were the Milner Maze (Milner, 1965), the Wisconsin Card Sort Test, and the Rey-Osterrieth Complex Figure Design Copying Test (Rey, 1959). It was found that the children with autism took significantly longer than the other two groups to complete the Milner Maze test, making three times as many errors in doing so. Prior and Hoffman noted that perseverative errors were common, and that the younger children with autism also made impulsive responses. The groups differed similarly on the WCST, the group of children with autism producing significantly more perseverative errors than either control groups. On the Rey Figure test the children with autism were impaired only on their ability to recall the figure, not on measures of initial copying. Taken together, these results suggest that children with autism have definite problems of perseveration, that mirror those shown by patients with frontal lobe dysfunction. There is some suggestion of impulsive behaviour in the younger children with autism, but relatively little support for a deficit in planning.

In a comprehensive follow-up study of 16 adults with autism, Szatmari, Bartolucci, Bremner, Bond and Rich (1989) found that unlike early impairments in sociability, language use and behaviour, IQ and performance on the WCST were significantly correlated with levels of adaptation (measured by the Vineland Adaptive Behavior Scales). This study did not compare the performance of the adults with autism to that of controls. However in a subsequent study, Szatmari, Tuff, Finlayson and Bartolucci (1990) report the results of the presentation of a test battery (which included the WCST) to three groups of participants. These were 17 children and young adults with autism, 26 children with Asperger's syndrome and 36 young psychiatric outpatients. The children with autism, though not those with Asperger's syndrome, were impaired relative to the outpatient controls on the three reported subsections of the WCST.

Ozonoff, Pennington and Rogers (1991) included two tests of executive functioning in a test battery used to assess a variety of impairments in autism (including theory of mind, see above). These were the WCST and the Tower of Hanoi. They found that their group of 23 children with autism were impaired relative to controls (matched for age and verbal IQ) in their performance on both of these tests. Further analysis showed that the problems experienced by the children with autism on the WCST were in avoiding perseverative errors. They were not impaired in set maintenance, indicating that shifting between sets was particularly problematic for them.

A final body of results which provide support for the notion of executive dysfunction in autism, comes from work performed by Russell and colleagues to investigate children with autism's ability to disengage from externally salient objects. In an initial study, Russell, Mauthner, Sharpe, and Tidswell, (1991) presented children with autism, children with Down's syndrome and normal 3 and 4 year olds with a test of strategic deception, the 'Windows Task'. This took the form of a competitive game in which children had to learn how to deceive an opponent, by pointing to one of two locations which did not contain a reward (the reward was visible to the child, but not to the opponent). Russell et al. found that despite having language comprehension ages of around four years or above, the children with autism were significantly more likely to point to the location of the reward than normal 4 year old children, and that they showed striking perseveration, often sticking with this loosing strategy for twenty trials. Russell et al. suggest that a lack of executive control in autism may result in knowledge of physical reality being more salient than knowledge of mental reality for such children. In other words children with autism appear to fail this task because of an inability to inhibit an inappropriate response to a salient object.

This suggestion was explored further by Hughes and Russell (1993). Sixty children with autism were tested on the windows task described above, but half the children played the game without an opponent. A control group of children with moderate learning difficulties was also employed. The groups were not strictly and individually matched for verbal mental ages, but the authors claim that matching was satisfactory. The children with autism found both tasks significantly harder than did controls. However, while the children with moderate learning difficulties found the no-opponent version of the task significantly harder than the competitive task, the children with autism were equally impaired on both tasks. This suggests that children with autism's problems on this task do not stem from its competitive or deceptive requirements. Hughes and Russell argue instead, that it is disengaging from the salient object that underlies their difficulties.

Hughes and Russell do note, however, that even without an opponent the Windows task could be construed as being competitive; the child may see themselves as competing against the experimenter. They therefore performed a second experiment which attempted to remove all competitive and social elements from a test of ability to disengage from a salient object. This task consisted of learning that a marble, which could be clearly seen inside a box, could not be obtained simply by a direct reach into the box (doing this broke an infra-red beam which caused the marble to drop out of reach). Initially the marble could be obtained by turning a knob at the side of the box. Once participants had learnt this contingency, they had to learn a new route to obtain the marble, doing so by switching a lever (which turned off the infra-red beam) before reaching. Forty children with autism were significantly less likely to achieve a success criteria than were matched control groups of children with moderate learning difficulties, and normal preschoolers. Rather than consistently adopting the switch route, they showed more direct reaching for the marble, and a greater 'failure to capitalize' by not consistently employing the switch route even when just having used it successfully.

The findings of this second experiment appear to be consistent with the notion of a failure to disengage from salient external stimuli in autism. However Hughes and Russell point out possible problems with this interpretation. Firstly the children with autism were all quite able to learn the 'knob route' to success, and so were able to disengage from the marble to some extent. However the direct causal connection between turning the knob and obtaining the marble would appear to explain why this section of the task was trivially easy. Children with autism have no difficulties in learning these sorts of contingencies. They will often drag an adult by the hand to a bike shed, or to a toilet door, in the knowledge that the adult may then provide them with what they desire (a bike to ride, or access to the toilet). It could be argued that in these cases that disengagement from the object is not actually occurring, the child's actions are all 'linearly' and causally directed at obtaining the object of their desire. Hughes and Russell also note that failure to use the Switch route in the group with autism was not always due to perseverative direct reaching towards the object (though this was common), and suggest that problems in planning and in understanding an arbitrary route to a goal may also explain these children's poor levels of performance. They conclude that their two experiments '...provide evidence for a general executive impairment in autism rather than for a specific impairment in mental disengagement'.

Finally Hughes, Russell and Robbins (in press) tested three groups of children on a modified and computerised version of the Tower of Hanoi task. These were 30 children with autism, 40 mentally handicapped children matched for chronological and verbal mental age, and 40 normal children whose chronological age matched the verbal mental age of the other two groups. While all groups performed well on simple versions of the task, when presented with more complex problems which required greater planning the children with autism required significantly more moves to solving each problem than did controls, and produced significantly fewer correct solutions. This evidence of a planning deficit was supported by evidence that children with autism's failure on this task was not due to impulsive behaviour; they did not initiate moves any faster than did the mentally handicapped children.

In addition to empirical evidence of executive dysfunction in autism, support for this account could also be seen to come from evidence of neurological impairments to frontal systems in autism. However to use such evidence (if it were forthcoming- see Prior & Hoffman, 1990) raises the danger of a circular argument. If one is attempting to show that children with autism, like frontal patients, have an impaired SAS one can certainly cite evidence of disorders of planning, initiation, impulsivity and perseveration; these are deficits that would be predicted given an absence of supervisory control. This is the line of argument taken here. However it is another thing to argue that children with autism are like frontal patients, and therefore because frontal patients have an impaired SAS, so must children with autism. This is not such a strong argument, as the link between autism and impaired executive control is less direct in this case. However only in this second case is it really relevant to draw strong parallels between the two disorders on a neurological level, especially as the neurological locus of impaired executive control in frontal patients has not been specifically located.

2.34 Summary

Concentrating solely therefore on a psychological level of manifestation, there remains considerable evidence for executive dysfunction in autism. Four areas of impairment were originally predicted on the basis of Shallice's model of Supervisory Attentional Control. In autism there appears to be evidence of *planning deficits*, as evidenced by poor performance on Tower of Hanoi type tasks (Hughes, Russell & Robins, in press; Ozonoff, Pennington & Rogers, 1991). There is fairly firm support for difficulties in *disengaging from, or inhibiting a response to, a salient* *external object* (Hughes & Russell, 1993; Prior & Hoffman, 1990; Russell et al., 1991). Finally *perseveration*, which is widely accepted as a characteristic feature of the syndrome anyway, has been shown on the WCST (Ozonoff, Pennington & Rogers, 1991; Prior & Hoffman, 1990; Rumsey, 1985; Rumsey & Hamburger, 1988, 1990). The only area in which there appears to be no direct empirical support for an impairment is that of *self-initiated behaviour*, but even in this case there is no evidence against an impairment.

2.4 Conclusions - Prospects For A Unifying Theory

The theoretical and empirical support for two potential explanations of the autistic syndrome have been discussed in this chapter. Before moving on to a synthesis of the areas of pretend play and autism, it is worth considering briefly, whether these accounts really provide the basis for a fundamental, unifying theory of autism. This will be done as follows: Firstly the question of whether a theory of mind impairment is a more fundamental deficit than executive dysfunction will be addressed. Secondly the contrary question, whether executive deficits are primary to a theory of mind will be considered (see Bishop, 1993, for a further discussion of these two questions). Finally each of these two accounts will be evaluated in the light of the requirements of a unifying theory.

2.41 Could A Theory of Mind Deficit Lead To Executive Dysfunction?

If one wishes to argue that an impairment in the ability to understand other minds, or in the ability to process metarepresentations, is the fundamental underlying cause of the autistic syndrome, one must be prepared to show how all the other characteristic problems seen in autism arrive from the more basic theory of mind deficit. As seen in subsection 2.22, a theory of mind account can explain impairments in socialisation (quite easily) and in communication (somewhat more elaborately). As shall be seen in subsection 3.21 it can explain imaginative impairments also (though this form of explanation will be criticised in this thesis). Some of the more bizarre behaviours seen in children with autism can be accounted for by a failure to appreciate social niceties. What is less easily explained by a theory of mind account is the executive dysfunction which seems to be associated with autism. How can an inability to understand other's mental states lead to impairments in planning, in inhibiting responses to salient stimuli, and of perseveration?

Leslie tacitly admits that the theory fails to explain these deficits when he argues that a metarepresentational impairment is domain specific. Indeed, in his model (see Leslie & Roth, 1993; Leslie & Thaiss, 1992) he proposes a separate executive module which is impaired, along with his Theory of Mind Module in autism. Leslie therefore does not argue for the total primacy of theory of mind, though he would no doubt argue that it is the consequences of an impairment in this domain that are the more wide ranging in autism.

However one could attempt to explain executive dysfunction as a result of theory of mind impairments if one was prepared to argue that metarepresentational knowledge is required for self-awareness. Such a reflexive theory of consciousness has been proposed by Carruthers (in press), and leads to the prediction that if metarepresentational understanding was impaired, then ability to reflect on ones 'conscious' actions would be impaired also. A stronger claim that could be made is that performing actions under conscious control would be similarly impaired. This would result in executive dysfunction.

In essence this form of account argues that the successful functioning of the Supervisory Attentional System, or more specifically the 'Monitor and Planner' of the model outlined in figure 2.1, relies on the ability to process metarepresentations. In this sense this argument mirrors that made by Frith (1992b; Frith & Frith, 1991), who has claimed that the frontal lobe is implicated in the processing of metarepresentations, and that these metarepresentational processes underlie self-awareness, and echoes suggestions made by Stuss (1992), who argues that the Supervisory Attentional System contains a higher order conscious component. It is therefore possible to argue for the primacy of theory of mind deficits over executive function deficits. Whether it is valid to do so is questionable. The problem with this explanation is that, if anything, it is more broad and wide ranging than an executive dysfunction account. To imply that children with autism are impaired in conscious self-awareness really does paint a bleak picture for them; what can one do without an awareness of oneself, one's actions and one's thoughts? While it could be argued that many of children with autism's characteristic difficulties could be explained by this lack of awareness, there is clear evidence of a degree of self-awareness in autism. Children with autism are able to report their previous utterances (Leslie & Thaiss, 1992; Perner et al., 1989). They can certainly also reflect on what they are doing, and what they have done, as evidenced by a number of autobiographical accounts written by high-functioning individuals with autism (e.g. Jolliffe, Lansdown & Robinson, 1992).

2.42 Could Executive Dysfunction Lead To A Theory of Mind Deficit?

One advantage that an executive dysfunction account has over a theory of mind account is that it can more readily explain the other deficit. Both Russell (Russell et al., 1991; Hughes & Russell, 1993), and Harris (1993) note that theory of mind task typically require a child to suppress a response to where a salient object is (the smartie in the 'wrong' cupboard) and to refer to an empty location. In other tasks the child is still required to 'disavow reality' and to inhibit an answer in terms of what they themselves know to be true. As these authors argue, this imposes significant executive demands on the child, and failure on these tasks could therefore be explained by executive dysfunction rather than by a theory of mind deficit. Support for this view comes directly from Russell et al.'s (1991) study, which showed that children with autism were impaired at deceiving an experimenter, but that this failure was due to an inability to disengage from the target object in the task. Similarly Sodian and Frith (1992) note that in their test of deception in autism, children with autism may have had difficulties in performing 'Sabotage' in the two box condition (see description of this experiment in subsection 2.23) because they were required to focus on an empty box and inhibit a response to the box containing the smartie.

However, it is not clear that a failure to inhibit a response to a salient object can explain all children with autism's difficulties on theory of mind type tasks. Bishop (1993) has argued that there are tasks which children with autism find difficult and which do not require this inhibition, for example ascribing limited knowledge to another. In Leslie and Frith's (1988) version of this task the experimenter knew that there was an object hidden at one location but not at the other. Therefore the poor performance on this task found in their group of children with autism cannot be due to these children having difficulties at indicating an empty location. It is still possible though that the second object that they had hidden in the experimenter's absence was particularly salient for them. Bishop also argues that Baron-Cohen's (1991a) test of previous false beliefs shows that children with autism are impaired when a response does not have to be inhibited. She argues that an answer in terms of a box's contents is not the most salient one (the box's appearance should prompt a more salient response). This misses the point of the executive dysfunction hypothesis, it is the child's knowledge of reality that is salient to them and which is hard for them to disengage from.

Leslie and Roth (1993) have further claimed that children with autism can inhibit a response to salient states of affairs in certain cases, citing their ability to pass false photograph and false map tests correctly (Leekam & Perner, 1991; Leslie & Thaiss, 1992). While it is true that in these cases the correct response is one that is at odds with current reality, as discussed in subsection 2.24 it need not be at odds with what the child perceives to be the 'reality of the picture'. An executive dysfunction account (or indeed any other explanation of autism) would not want to argue that children with autism cannot hold two beliefs at once, just that they cannot hold two simultaneously contradictory beliefs. It should be quite possible for a child with autism to represent (a girl in a green dress) and the reality of the picture (of a girl in a red dress). In fact both these representations would be aspects of the current reality for them, and a response making reference to one would not have to be inhibited at the expense of the other.

Russell would in fact make a stronger claim regarding the links between executive dysfunction and failure on theory of mind tasks in autism. Though he argues that most of these tasks have a substantial executive component, he would still accept that children with autism are impaired in their ability to attribute mental states to others. Russell's claim (Russell, in press) is that executive functions are necessary for the development of a theory of mind. He argues that a concept of oneself as an 'agent' is a necessary prerequisite for appreciating that others are 'minded' in their own right (this view echoes suggestions by Hobson, see subsection 3.22). According to Russell a child develops the concept of agency by monitoring the effects and feedback resulting from actions which they themselves deliberately initiate. A child who suffers from executive dysfunction will not be able to initiate behaviour, or adequately monitor its effects, and so will be impaired in their development of this concept, and hence of a theory of mind.

There are further reasons to believe that executive dysfunction may be quite fundamental to autism. A number of the studies described in subsection 2.33 found a lack of executive control amongst well recovered adults with autism (Rumsey, 1985; Rumsey & Hamburger, 1988, 1990; Szatmari et al., 1989), executive dysfunction therefore appears to persist long after other cognitive and behavioural problems may have been overcome. In their studies, Ozonoff, Pennington and Rogers (1991) found that 96% of their group with autism were impaired on executive function tasks, but only 52% were impaired on traditional theory of mind tasks. A composite score of executive dysfunction was also a better discriminant of groups than theory of mind abilities. In addition Ozonoff, Rogers and Pennington (1991) found that executive dysfunction was present in both children with autism, and children with Asperger syndrome, but that theory of mind deficits were only present amongst the children with autism.

There is therefore reason to believe that an impairment to executive functioning may be more fundamental in autism than a failure to attribute mental states to others, but this is not to say that children with autism are unimpaired at understanding mental states.

2.43 What A Theory Must Do.

Ozonoff, Pennington and Rogers (1990) outline four criteria which must be fulfilled by a theory that attempts to provide a fundamental and global explanation of the problems associated with the syndrome of autism. These are universality (the deficit must be present in all cases), specificity (the deficit must be fundamental to autism alone), persistence (the deficit must remain as long as the syndrome persists), and causal priority (the deficit must not be secondary to other features of the disorder). It is not clear that either an executive dysfunction or a theory of mind deficit account can fulfil all these stipulations. The fact that a minority of children with autism pass false belief tests could imply that a theory of mind deficit cannot both be universal and persistent, though it is possible that an attenuated impairment in understanding of mental states persists in these individuals. More problematic is the fact that theory of mind deficits could be secondary to executive dysfunction. However, given Chris Frith's arguments, the same criticism could potentially be levelled at the executive dysfunction account. In addition there are clear executive function deficits in frontal patients (and possibly in schizophrenic patients) yet these individuals are not autistic. I am not convinced that these differences can be reconciled in terms of age of onset of the disorders, as Frith (1992b) suggests.

As well as considering what a unifying theory must do, it is worth considering briefly what such a theory would be like. It could take one of two forms. Given the very broad range of symptoms associated with autism that it would have to explain, the theory itself would have to be either extremely specific (amounting to little more than a description of these symptoms), or be based on an impairment to very fundamental processes with wide ranging implications. Put another way, it is hard to imagine what form of theory could be advanced to explain (and not simply describe) the specific symptoms of autism, without at the same time predicting other non-existent symptoms. This appears to be the problem with the executive dysfunction account, and a self-awareness/theory of mind impairment. These are such broad-based explanations that their difficulty lies not in explaining the presence of the symptoms seen in autism, but in explaining the absence of symptoms that are not seen. If children with autism suffer from frontally mediated executive dysfunction, then why do they not show distractibility (see subsection 2.31)? If they lack a reflexive theory of consciousness how is it that they can describe autobiographical events?

It may therefore be impossible to find a unifying psychological theory of autism that is not so global as to be of little predictive power. A more appropriate way of studying the disorder may be to tackle a number of symptoms at a time, and to propose localised causes for these symptoms. This is in fact the approach adopted by the majority of researchers.

2.44 Conclusions

This chapter has hopefully outlined a large number of experiments which put together a picture of the psychological pattern of symptoms in autism. It has concentrated on two particular areas of impairment, theory of mind and executive dysfunction. These are the areas which are seen at present as the most likely candidates for a fundamental impairment in autism. However, as discussed above, it is not clear that either of these accounts meet the criteria for a unifying deficit, or that they would do much more for us if they could be shown to.

This said, there still remains good evidence for both types of impairment in autism. It is also possible that either impairment could be more fundamental than the other, giving rise to it. There is a great deal to be gained from determining which of these two accounts is the more primary. As will be seen in the next chapter, pretend play provides a potential means of answering this question, as both types of account make radically different predictions regarding the pattern of impairments expected in pretend play in autism.

Chapter 3
Pretend Play In Autism

The purpose of this chapter is to bring together themes that have been developed in the previous two chapters, and to consider possible explanations of children with autism's problems with pretend play. Before this synthesis can be properly addressed it is first important to determine exactly what these particular difficulties are. The first section of the chapter (section 3.1) therefore consists of a (hopefully exhaustive) review of empirical research into the area of children with autism's deficits in pretend play. The aim of this section will be to outline the extent of these deficits, and to fully describe their characteristics. Having done this, the remaining sections of the chapter will describe possible explanations of these deficits. Section 3.2 will describe the range of competence deficits which have been put forward, while Section 3.3 will concentrate on performance deficit interpretations. Section 3.4 will weigh the merits of the various accounts, in the light of the empirical evidence in the area, and will outline the way in which the research described in this thesis aims to decide between these accounts.

3.1 Review Of The Literature.

3.11 Introduction To The Area

It is a commonly held belief that children with autism are specifically impaired in their ability to engage in pretend play. Ungerer and Sigman (1981) write, "Most autistic children never develop symbolic play. In the few autistic children manifesting symbolic play it is repetitive and stereotyped and lacks the innovation, development and change found in normal symbolic play", and in her review Wulff (1985) comments, "The autistic child's play is striking in its lack of fantasy and all other aspects of symbolic play". Such is the acceptance of this stand-point that the National Autistic Society itself cites a 'lack of creative pretend play' as one of the features characteristic of the syndrome.

While an observed lack of pretend play in autism is accepted, this need not necessarily imply a specific impairment in the symbolic ability of children with autism, not least given the arguments outlined in section 1.3 regarding the necessity to infer that pretend play is symbolic in a metarepresentational sense. A failure to pretend might reflect a more general cognitive or social deficit associated with autism impinging on the whole area of play development. It might also result from a motivational deficit of some description. Since Wulff's paper a number of notable studies in this area have been published. The purpose of this section is firstly to critically evaluate the methodology of these and previous investigations into pretend play in autism (subsections 3.12 to 3.15); and secondly, by examining the findings of these studies in the light of this criticism, to attempt to clarify the nature of the impairment in pretend play seen in autism (subsection 3.16).

In her review of pretend play in autism, Wulff (1985) claims that studies in this area conducted until the mid 1960s are of limited validity as they incorrectly grouped together individuals with both autism and schizophrenia (e.g. Loomis, Hilgeman & Meyer, 1957; Schacter, Meyer & Loomis, 1962). Although she confined her attention to work undertaken from 1964 onwards, some confusion of terms persisted in this literature. There still remains uncertainty regarding the exact position of the boundaries of the autistic syndrome, but the division made by Wulff will be adopted here.

The studies to be reviewed have attempted to determine whether children with autism are impaired in their ability to pretend by comparing the pretend play of a sample of children with autism with other population groups. Clearly the procedure used to match controls is of vital importance. If participant groups are not adequately matched then the implications that can be drawn regarding any *relative impairment* in the pretend play of children with autism are severely limited. The experiments considered here fall into four broad categories; those where participant groups are not formally matched, those where participants are matched on the basis of chronological age (CA), those where matching is by non-verbal or general mental age (MA) and finally those using verbal MA as the basis for matching. These categories will be examined in turn. Throughout the following sections the term 'pretend play' will be preferred to 'symbolic play'. However the later term will be employed when referring to studies that themselves use it as a play categorization. In these cases it can be assumed that it is being used analogously to 'pretend play' unless otherwise indicated.

3.12 Studies Without Formal Matching

One of the first studies to specifically investigate the pretend play of children with autism was carried out by Wing, Gould, Yeates and Brierley (1977). They identified a community sample of 108 autistic, autistic-like and mentally-retarded children (aged between 5 and 14), and by means of parental interviews and experimental observations in homes and schools, classified each child as capable of showing either symbolic, stereotyped symbolic or no symbolic play. The authors' definitions of these terms is not entirely clear. Examples of play classed as being symbolic range from making appropriate noises whilst pushing a toy car, and brushing a doll's hair (functional play), to the invention of stories and drawing of imaginative pictures. Also the distinction drawn between symbolic and stereotyped symbolic play, a repetitive form of pretence, appears rather arbitrary.

Of the 12 children in Wing et al.'s autistic group, 8 showed no symbolic play and the remaining 4 exhibited stereotyped symbolic play, compared to the group of 47 mentally retarded children of whom 5 showed no symbolic play, 1 showed stereotyped symbolic play and 41 showed symbolic play. Wing et al. claim that "...complete absence of symbolic play is closely linked to the presence of typical early childhood autism...". This conclusion may be queried. The groups are not formally matched, either for CA, or more importantly, for MA. Exact details of

MAs are not given, but a lower proportion of the mentally retarded group have a non-verbal MA of less than 20 months than the other children (autistic and autistic-like groups).

A further point is that of a total of 32 children with a non-verbal MA of less than 20 months, none show symbolic play regardless of diagnosis. This is to be expected as true symbolic play does not emerge in normal children until around this age (subsection 1.25). As the groups are not matched, it is dangerous to include such children in a comparison of numbers showing symbolic play in each group. Wing et al. do take note of this and divide these children out; however the experiment also reveals that no child with a language comprehension age of below 20 months shows symbolic play and not all of *these* children are partialled out as they should be. It is unclear exactly which groups these children fall into, but it can be inferred that the number of children with a diagnosis of autism and both a language comprehension age and non-verbal MA above 20 months must range from 4 to 6. This study therefore only presents us with 4 certain cases of children who certainly who could be expected to show symbolic play, 2 of whom show stereotyped symbolic play, 2 of whom show none.

It is possible to widen the sample by including the group of children with autistic-like features; those with simple stereotypies and social impairments and those with repetitive speech. If this is done, again discounting any children with a language comprehension age of below 20 months, it is found that 2 of 24 children show full symbolic play, 20 show stereotyped symbolic play and 2 show no symbolic play.

The same pattern of results emerged from a subsequent extension of this study by Wing (1978) which involved a slightly larger community sample of children with autism and mental retardation below the age of 15. Children were divided into a 'psychotic' group of 84 showing to some degree both of Kanner's criteria for autism (lack of affective contact and stereotypies; cf. Lotter, 1966), and a 'non-psychotic' group of mentally retarded children. Again it was found that no children with a non-verbal MA or a language comprehension age of below 20 months showed symbolic play. However in this case all such children are separated out, leaving 31 'psychotic' children of whom 1 shows symbolic play, 27 show stereotyped symbolic play and 3 show no symbolic play. The 57 mentally retarded children with non-verbal and language comprehension ages above 20 months all show symbolic play, but again the two groups are not formally matched.

Atlas and Lapidus (1987) (also reported in Atlas, 1990) compared the play of 26 children with autism and 22 children with schizophrenia (mean CA of all children 114 months), as well as investigating other aspects of 'symbolic expression'. They observed children in a 15 minute free-play situation providing them with a variety of props. The play of the children was rated as either 'no-symbolic play', 'stereotyped play' or 'pretend play'. Atlas' definitions are similar to those used by Wing et al. (1977); pretend play includes a degree of functional play, e.g. drinking from an empty cup, while 'stereotyped play' is really stereotyped symbolic play. Children were given a score of 1 if they produced no symbolic play, 2 if they produced stereotyped play and 3 for symbolic play. It was found that the children with autism had a significantly lower mean pretend-play score than children with schizophrenia. A discriminant analysis of the children's play levels was also carried out, and revealed that this variable was a significant predictor of original diagnosis ($P<0.02$). This analysis also highlighted a 'transitional' or 'symbiotic' group of children, consisting of children from each group showing stereotyped play. When this group is set aside, Atlas (1990) notes that 13 of 16 children with autism show no symbolic play, while 14 of the 18 remaining children with schizophrenia show symbolic play. However, it is not appropriate to remove 'transitional' children from the analysis, with only three play categorizations such a group is bound to emerge. When the groups are considered as a whole it is seen that 13 of the children with autism showed no symbolic play, 10 showed stereotyped play and 3 showed symbolic play. These figures compare to 4 children with schizophrenia who showed no symbolic play, 4 who showed stereotyped play and 14 who showed symbolic play. It is also possible that these groups include children whose language age is below 20 months as did Wing et al.'s groups (the lowest chronological ages are 53 months). This set of findings are therefore not surprising, and mirror those found by Wing et al., indicating that when children with autism produce pretend play, it is typically repetitive or stereotyped.

A more serious criticism of this experiment is that the results that Atlas describes (Atlas & Lapidus, 1987; Atlas, 1990) are not consistent with those reported in another of his papers (Atlas, 1987). In this third paper exactly the same procedure is described, the same testing conditions, materials and rating procedures are used, but results from smaller groups are given. In this case the groups consisted of 13 children with autism (mean chronological age 120 months) and 20 children with schizophrenia (mean chronological age 108 months). The 13 children with autism produced a mean play score of 2.3, which does not differ significantly from that of 2.6 for children with schizophrenia. This finding is clearly at odds with the interpretation drawn from Atlas and Lapidus (1987), since it shows no difference in levels of play between the groups.

Atlas may indeed have performed two quite separate experiments, using different populations, though given the fact that the procedures are identical, and that the two papers were published in the same year, this seems unlikely. Even if this were the case the clear difference in the results obtained must raise questions about the methodology employed, which is the same in each case. It seems more likely that the experiments are related; either selective reporting of the results of a single study is occurring, or two experiments have been performed and Atlas and Lapidus (1987) is an extension of Atlas (1987) with a further 13 children with autism tested to double the size of this group. If this is the case then the initial group of children with autism must have had a total play score of 30 (mean of 2.3 x thirteen subjects), compared to 42 for the group reported in Atlas and Lapidus (1987). The 13 extra children with autism added between experiments must therefore have all shown 'no play' (and a point has been lost somewhere as well!). This extra group is clearly quite different from the original autistic population, a fact which would undermine the validity of the second set of results and cast doubts on the motives for a replication.

Regardless of the validity of Atlas' findings, it appears that a good proportion of 'autistic-syndrome' children are capable of showing some symbolic play, albeit a repetitive form of pretence. Whilst Wing differentiates between 'true' and stereotyped symbolic play, it seems unlikely, given their desire for sameness and preference for rituals, that children with autism would exhibit free, novel and generalised pretend play even if they had no specific deficit in this area. However a major problem in accepting stereotyped symbolic play as evidence of symbolic ability is that it is possible that the play behaviours seen are simply learnt routines that have been taught by parents and teachers.

Finally Doherty and Rosenfeld (1984) investigated the symbolic play of a group of 15 children with severe language impairments. Of this group 7 children had a diagnosis of autism (mean CA 153.9 months, mean verbal MA 56.0 months[1]), the other 8 children having a variety of diagnoses reflecting their language impairments (mean CA 132.4 months, mean verbal MA 63.0 months). On the basis of free play observation and parental interviews children were rated as capable of showing either sensorimotor, functional or symbolic play. All the children with autism were said to lack symbolic play by their parents, though there was controversy as to whether symbolic play had been observed experimentally in two of the children. In contrast 7 of the other 8 children were rated as capable of showing symbolic play on both measures.

Doherty and Rosenfeld suggest that play assessment may be a useful tool in the differential diagnosis of children with language disorders, and that a deficit in pretend play ability may be specific to autism. While there may be value in play assessment as a means of differentiating children with autism and other language impaired children of a similar age, the findings of this study cannot be taken as evidence for an autism-specific pretend play impairment given the lack of formal participant matching.

[1]Verbal mental age measured by the Peabody Picture Vocabulary Test. Two of the 7 children with autism were unscorable. Mean value given for the remaining 5 children.

3.13 Studies Employing CA Matching

While little can be inferred regarding the specificity of any pretend play deficit from the results of studies that fail to match different groups, simply ensuring that children are formally matched does not necessarily result in methodological validity. For example, matching for CA fails to take into account MA differences that may well exist between children with autism and mentally handicapped groups, and almost certainly exist between children with autism and normal children.

An early study that employed CA matching was performed by Tilton and Ottinger (1964). They conducted an investigation into the free play of children with autism, comparing the play repertoires and toys used by a group of 13 children with autism (mean CA 5 years) with those of mentally retarded and normal children of a similar age. They found that the group with autism showed more oral play and more repetitive use of toys, as well as fewer total play acts and less combinatorial play than the other groups[2].

As well as failing to match these groups for MA this study has nothing to say regarding pretend play specifically. However, DeMyer, Mann, Tilton and Loew (1967) extended Tilton and Ottinger's work by including their 13 children in a larger group of 30 children with autism, (aged between 2 and 7), whose toy play, including dramatic (pretend) play, was investigated by means of a maternal questionnaire. The advantages of this approach were thought to be that it avoided testing situations that could prove stressful to the children and that it effectively increased play behaviour sampling time.

A control group of 30 normal children was included but again the children were matched on CA rather than MA. Over the wide range of play behaviours examined by the questionnaire, children with autism were reported to show less of the majority of play categories, object assembly

[2]Following criticism of the statistical methods employed in this study (see Quinn & Rubin, 1984) a reanalysis of the results was later performed (Weiner, Ottinger & Tilton, 1969). This reanalysis failed to find an effect of oral play and repetitive toy use, though the number of play acts and combinations remained significant.

and oral body use being exceptions. Of the children with autism, 30% exhibited dramatic play of some kind (compared to 90% of normal children), though only 3% showed dramatic doll play (as opposed to 67% of normals).

The finding that 30% of children with autism were reported to show some pretend play is consistent with the findings of Wing et al. (1977), Wing (1978) and Atlas and Lapidus (1987). The significantly higher numbers of normal children exhibiting this behaviour cannot be taken as evidence for a specific deficit in the pretend play of children with autism because of the lack of MA matching. A final point of interest is that elementary forms of dramatic play were more often reported by mothers than observed in the laboratory. This could be the result of bias on the part of the mothers, leading to an overestimation of their child's abilities. However in general there was good agreement between the ratings obtained experimentally and by questionnaire (72%) suggesting that either the removal of an artificial and potentially stressful situation, or an increase in sampling time allowed these behaviours to be observed.

Stone, Lemanek, Fishel, Fernandez and Altemeier (1990) investigated both the play and imitation of preschool children with autism, and compared these behaviours with those shown by children with similarly handicapping conditions. The groups employed consisted of 22 children with autism, 15 hearing impaired, 19 language impaired, 15 mentally retarded and 20 non-handicapped children (mean CAs: 55.2, 50.4, 54.0, 62.4, 51.6 months respectively). Though these groups are again age matched, the children with autism had significantly lower IQ scores than all but the mentally retarded children, and importantly, significantly worse verbal communication scores (as measured by the Childhood Autism Rating Scale) than all other groups.

The free-play of the children was observed and the number of toys used, the time spent playing and the level of toy play (manipulative, 'relational', functional or symbolic) was recorded. The children with autism spent less time playing than other groups and performed fewer functional acts than other children. There was no difference in the number of symbolic play acts, but significantly fewer children with autism engaged in symbolic play. However, given the absence of MA or verbal communication ability matching of groups, these findings are unsurprising.

3.14 Studies Employing General MA Matching

The studies considered so far have all concentrated on the pretend play shown by children with autism under spontaneous or free-play conditions. Pilot work reported by Ungerer and Sigman (1981) indicated that a structured play situation produced more sophisticated and diverse pretend play than was produced spontaneously, and they proposed that previous studies, "...may have failed to tap the full potential of autistic children's capacities for play". Their own study involved a group of 16 children with autism (mean CA 51.7 months, mean MA 24.8 months), and was later expanded to include control groups of mentally handicapped and normal children matched for general MA (Sigman & Ungerer, 1984a). As well as observing free-play behaviour, a structured testing condition was also employed, which consisted of an experimenter working one-on-one with each child. In this condition play was elicited if not produced spontaneously. A criticism of this procedure is that the eliciting of play involved modelling of play acts and consequently any resultant play could simply reflect imitation (Baron-Cohen, 1987). It also appears that the modelling was not designed to produce pretend play specifically.

The group of children with autism showed less diverse functional play than controls, especially doll-directed functional play, in both the free and structured situations. They also produced significantly fewer symbolic acts in both situations. It is possible that the children with autism performed these acts for longer periods of time than controls. The duration of symbolic play did not differ between the groups in the free-play setting but is unfortunately not reported for the structured condition. The number of symbolic acts produced by the children with autism did rise when play was elicited, but as mentioned above this may have been due to imitation rather than the tapping of latent symbolic abilities. An association between symbolic play and receptive language was also found in all groups.

The same testing conditions, free- and structured play, were employed in a subsequent study by Mundy, Sigman, Ungerer and Sherman (1986). As part of a search for non-verbal behaviours that might serve to discriminate autism from other developmental disorders, they examined the play of 18 children with autism (mean CA 53.3 months, mean MA 25.7 months) and of 18 mentally retarded and 18 normal children (mean CAs 50.2, 22.2 months, mean MAs 26.0, 25.0 months respectively). These children were matched on the basis of general mental age, and their play abilities were assessed by recording the total number of different functional and symbolic acts produced in the two testing conditions. It was found that the children with autism consistently showed fewer different functional and symbolic play acts than the other two groups, though this difference was only significant for structured symbolic acts. Once again these results do not shed any light on the important question of whether children with autism spent less time than controls in functional and symbolic play in either testing condition; it is possible that they produced fewer acts of longer duration.

Power and Radcliffe (1989) also investigated children with autism's ability to produce pretend play in a structured play situation. They employed a formal test of symbolic play ability, the Lowe and Costello play test (Lowe and Costello, 1976), and compared the scores obtained on this test by a group of 247 developmentally disabled children with their performance on either the Bayley Scales of Infant Development or the Stanford-Binet Intelligence Scale. The children were divided into various clinical groups: mildly retarded, moderately retarded, language disordered, borderline (IQs between 70 and 85) and atypical or autistic-like. It was found that the 19 atypical children given the Bayley scales (median CA 36.8 months, mean MA 20.3 months) scored significantly lower on the symbolic play test than the children in the other clinical groups given the Bayley Scales, even when MA was controlled for.

While this would seem to indicate a specific deficit in the symbolic play of children with autism, observed under structured testing conditions, it should be noted that the 8 atypical children who received the Stanford-Binet Scale rather than the Bayley Scales (median CA 42.5 months, mean MA 26.1 months) did not show a similar deficit when compared to the other children tested on the Stanford-Binet Scale. Also the atypical group did not consist solely of classically autistic children, but was made up of any meeting DSM-III criteria for pervasive developmental disorder. It is also important to note that the Lowe and Costello test, which is based on play with miniature objects, in fact assesses functional play rather than pretend play as recently defined (Baron-Cohen, 1987). Given these points the evidence that this study presents for a pretend play impairment specific to autism is far from conclusive.

A final point, that also applies to Sigman and Ungerer's (1984a) and Mundy et al.'s (1986) studies, is that though groups were matched for general MA, they were not matched for *verbal* MA. The relation between play and language seen in both normal children (subsection 1.22) and children with autism (Wing et al., 1977; Ungerer & Sigman, 1981; Mundy, Sigman, Ungerer & Sherman, 1986) suggests that verbal MAs should be used for matching if pretend play ability specifically is being investigated. Any deficit seen in a group of children with autism might otherwise be due to differences in language levels, rather than to an autism-specific pretend play deficit. It is also likely that non-verbal MA matching procedures disadvantage children with autism, who perform better on non-verbal than on verbal tests (Ozonoff, Pennington & Rogers, 1990).

3.15 Studies Employing Verbal MA Matching

One well known study that did match control groups for verbal MA was that carried out by Baron-Cohen (1987). The extent of symbolic play shown under free-play conditions by a group of 10 children with autism (mean CA 97 months, mean verbal MA 29 months) was compared to that shown by Down's syndrome and normal controls. Play with three sets of toys was observed, firstly stuffed animals and wooden blocks, secondly a toy kitchen with utensils and a toy telephone and finally a number of playpeople. Interestingly no child in any group showed any symbolic play with the playpeople. More importantly, in the other two toy conditions significantly fewer children with autism than controls produced any symbolic play. 80% of the children with autism showed some functional play, compared to 90% of Down's and 100% of normal children. These differences are not significant, but it should be noted that the performance of controls is at or near ceiling.

While this experiment appears to provide firm evidence for a direct impairment in children with autism's ability to pretend, the matching procedure used in this case is still not above criticism. Lewis and Boucher (1988) point out that Baron-Cohen's use of the British Vocabulary Picture Scale to evaluate verbal MA may have resulted in the autistic group being disadvantaged; children with autism's vocabulary often being more advanced than other aspects of their language (Paul, 1987). The extent to which the use of this test might handicap the autistic sample, and therefore the strength of Lewis and Boucher's criticism, is hard to estimate.

Gould (1986) assessed a group of 31 children showing "...the triad of social and communicative impairments" (cf. Wing & Gould, 1979), (mean CA 101.1 months), using the Lowe and Costello Play Test (cf. Power & Radcliffe, 1989). The level of play predicted formally by the test was compared with that observed experimentally. She found that this socially impaired group had lower 'play test ages', and lower ratings of spontaneous play than a group of 29 sociable children retarded in language comprehension. These two groups were not matched initially, so little can be inferred from this finding; however the groups were further divided into subgroups scoring within the range of the play test (19 socially impaired, 10 language comprehension compared). It emerged that the socially impaired subgroup, despite having test scores and language comprehension ages that did not differ from those of the control subgroup, showed significantly less and significantly poorer observed spontaneous symbolic play, at levels lower than predicted by the test. The importance of this result is that it indicates that these children perform better when tested formally than when simply observed in a free-play setting.

It might be objected that the socially impaired group was not a homogeneous one. Three of the 31 children, and 2 of the 19 members of the selected subgroup, had Down's syndrome. However the fact that these latter 2 children, unlike the other members of the subgroup, did show observed levels of play similar to those predicted by their play test scores, indicates that they were not contributing to the difference between formal and spontaneous testing seen in the group as a whole.

Similar results emerge from a subsequent study by Whyte and Owens (1989). They matched a group of 9 children with autism (mean CA 97.5 months) with 9 normal children (mean CA 22.5 months) on the basis of their scores on the Lowe and Costello symbolic play test. They then compared the language comprehension and expression abilities of these two groups using the Reynell Developmental Language Scales (1983). Though these groups were not initially matched on a verbal measure, their language comprehension scores did not differ significantly. This study therefore presents two groups of equivalent language comprehension ability who perform equally well on the Lowe and Costello symbolic play test. The two groups did differ on one of three sub-components of the language *expression* test, namely that assessing language content and there were significant correlations between symbolic play scores and both language measures for both groups. The authors point out that the mean language comprehension age of the autistic group was sizeably larger than their mean symbolic play test age, and that this discrepancy was greater than that observed in the normal group; concluding that this indicates an impairment in the development of pretend play skills in autism. However as none of these differences are statistically significant this conclusion seems unfounded.

Despite the fact that the Lowe and Costello play test is really a measure of functional and not symbolic play ability, it is interesting that this work appears to demonstrate a lack of functional play in socially impaired children/children with autism in spontaneous but not structured situations. These results suggest, as Ungerer and Sigman (1981) noted, that formal or structured testing of pretend play might improve the performance of children with autism. A number of investigators have attempted to determine the extent of this improvement in a similar way to that employed by Sigman and Ungerer, by comparing pretend play under elicited as well as spontaneous play conditions.

Wetherby and Prutting (1984) examined cognitive-social abilities in a sample of four young children with autism (mean CA 114 months). As part of this investigation pretend play in both free-play and elicited play conditions was recorded. The eliciting procedure involved initial modelling with the toys used, the child was then presented with each toy, followed by similar items to test for generalisation ability. The quality of pretend play shown by the children with autism was found to be poorer than that of four normal children "...functioning at similar stages of language development.". For this analysis the 'most symbolic' act produced by each child, in either testing condition was taken as a measure of their pretend play ability. Quality of play in the two conditions was not directly compared to examine the effect of eliciting play specifically, and nothing is said about children's ability to generalise behaviour following modelling. The result suggests that even with the aid of modelling children with autism are impaired relative to normal children in their ability to play symbolically, but though the groups were paired on the basis of similar language ability, they were not formally matched. This coupled with the small size of the subject sample, undermines the validity of this finding.

Riguet, Taylor, Benaroya and Klein (1981) also proposed that the optimal conditions for observing play in children with autism would involve a structured testing environment. They used a limited number of toys in both free-play and structured conditions, again eliciting play with modelling in the latter condition. However unlike Ungerer and Sigman they modelled pretend acts specifically. Ten children with autism (mean CA 120 months, mean verbal MA 30 months) were matched for verbal MA with control groups of Down's syndrome and normal children. It was found that the autistic group played less in both conditions, and that the 'symbolic quality' of the children with autism's play was significantly poorer than that of controls, lending support to the argument for an impairment in pretend play in autism. A correlation between level of symbolic play and verbal MA was observed in the children with autism.

Various questions can, however, be raised regarding Riguet et al.'s methodology. Firstly, the rating scale used to assess play quality extended beyond simple symbolic play to elaboration and sequencing of symbolic acts. It may be that such a scale selectively handicaps children with autism who find integrating and combining their behaviour particularly difficult (Rutter, 1983). It is therefore perhaps not a pure measure of the pretend play ability of these children. Secondly, Baron-Cohen (1987) notes that only object substitution and not imagination of absent objects and attribution of non-existent properties (cf. Leslie, 1987) was considered as evidence of pretend play, so that pretend play capabilities may have been consistently underestimated. Finally, though children with autism were able to imitate modelled pretend acts to an extent, they were not able to transfer this behaviour to other toys provided for generalisation, suggesting that the effect of eliciting play may be due to imitation alone.

Lewis and Boucher (1988) compared the play of a group of 15 children with autism (mean CA 132 months, mean expressive language age 65/51 months[3]) with that of control groups of children with moderate learning difficulties and of normal children, matched for expressive language abilities. Three testing conditions were employed, these being spontaneous, elicited and instructed play. In the elicited condition children were simply asked to show what the toys presented to them, sets of cars or dolls with appropriate or junk accessories, could do. In the instructed condition specific prompts to pretend were given. It was found that in the spontaneous condition, children with autism spent less time playing functionally than controls. However their symbolic play was comparable to that of the other groups. This seemingly anomalous result appears to be due to general floor effects. A wide range of miniature objects (e.g. cars and appropriate accessories, dolls and dolls' house furniture) in addition to junk materials (boxes, bricks, fabric strips etc.) were available. Most of the children played exclusively with the former set of toys, producing functional play at the expense of symbolic play. McGhee, Ethridge and

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[3]Expressive language ability measured by the Renfrew Action Picture Test which produces two scores, one for informational content and one for grammatical correctness of the subject's replies. Here mean informational score = 65 months, mean grammar score = 51 months.

Benz (1984) have shown that normal preschoolers spend more time playing with realistic rather than with non-realistic toys, and that they show more pretend play with less realistic toys.

Lewis and Boucher reported that the number of functional acts produced by children with autism in the elicited play condition did not differ significantly from those produced by controls. In addition, levels of symbolic play increased in the elicited and instructed conditions, and no impairment in the pretend play of the children with autism relative to that of controls was seen, either in terms of duration or of quality of symbolic play. Baron-Cohen (1990) has claimed that these conditions do not require children to generate symbols for themselves, and that the autistic group's performance might simply reflect guessing on their part; a child given a car and a box can do little else except place one inside the other when asked what they can do with them. Similarly when told to park the car in a garage a child can easily guess that the box is meant to represent the garage and follow the instruction. Boucher and Lewis (1990) ruled out this possibility by publishing new data showing that the range of symbolic play shown by children with autism in the elicited and instructed conditions was considerably more imaginative and diverse than had been apparent from their initial report, reflecting true creativity rather than guessing in the large majority of instances.

More problematic is Lewis and Boucher's use of the Renfrew Action Picture Test to equate the groups. This test requires a degree of inferential understanding; children are asked to describe scenarios which sometimes involve the explanation of someone's action. Children with autism may find this aspect of the test particularly difficult, and equating groups on the Action Picture Test may therefore advantage the children with autism over controls in terms of vocabulary and grammar comprehension.

3.16 Summary Of Findings

What is apparent from the above review is that the majority of studies have failed to include control groups or to match control groups adequately. Experiments that indicate a lack or absence of pretend play in children with autism relative to age matched controls cannot be seen as reflections of an impaired ability to pretend. This can only be inferred from studies that have matched controls on the basis of MA. Even those studies that have matched control groups for MA are not above methodological criticism. The importance of using verbal rather than general MA matching measures has already been discussed. Only three studies assessing pretend play have in fact used strict verbal MA matching, these being Baron-Cohen (1987), Riguet, Taylor, Benaroya and Klein (1981), and Lewis and Boucher (1988). Even for these studies, the appropriateness of the matching procedures used is at present unresolved.

Given these criticisms, what can be concluded about the nature of pretend play in autism? There appears to be good evidence for an impairment in the spontaneous pretend play of children with autism. This the firm conviction of parents, clinicians and teachers, and the experimental investigations of Baron-Cohen (1987) and of Riguet et al. (1981) support these observations. Only Lewis and Boucher (1988) failed to find this spontaneous impairment, a failure that is readily explained in terms of the toys used.

What is less clear is first, whether the deficit in spontaneous play is specific to pretend (or symbolic) play (narrowly defined), or extends to both pretend and functional play; and second, whether the deficit is specific to spontaneous play, or extends to play elicited in structured settings. Concerning the first of these points, observation confirmed by generally acceptable experimental investigations (Gould, 1986; Lewis & Boucher, 1988; Whyte & Owens, 1989) suggests that there is a deficit in functional as well as in pretend play. Baron-Cohen's (1987) study does report a dissociation between children with autism's relative spontaneous functional and spontaneous pretend play abilities, but this may be the result of ceiling performance in controls. The experimental evidence concerning the second point, namely the specificity of the deficit to spontaneous play situations, is more evenly balanced: the studies of Lewis and Boucher, Gould and Whyte and Owens suggest that the deficit does not persist into structured play, in contrast to the studies of Riguet et al. (1981) and Sigman and Ungerer (1984a).

These conclusions have implications for explanations of abnormal play in autism which have been proposed in recent years. Possible explanations are discussed below in relation to these implications. These fall into two categories. There are those that explain a failure to pretend in autism in terms of a competence deficit, proposing that pretend play is something that children with autism simply cannot do. Alternatively there are performance deficit hypotheses; implicit in these accounts is the suggestion that pretend play is not something that children with autism can't do, but is simply something they don't do. Two caveats should, however, be made concerning this distinction. Firstly it is clear that children with autism will almost certainly always display some lack of 'competence' relative to age-equivalent normal children, because of their characteristically lower levels of linguistic and intellectual functioning. Performance hypotheses propose that an absence of pretend play *relative to verbal mental age matched controls* is not the result of a lack of competence. Secondly it is unlikely that an absence of pretend play in autism is wholly the result of a failure to perform. It is more probable that a failure of competence in some other domain impinges on the production of pretend play. To give an example, I might never be heard to speak French spontaneously while on holiday in France, yet my behaviour may convince an observer that I have a good understanding of the language. I might also, when pressed, translate given English sentences into French. I may be able to speak fluent French, and yet choose never to do so (classic performance). Alternatively I might have some peculiar difficulty in deciding what to say to a French person. In this later case a failure of competence in another domain, not being able to think of things to say, impinges on my ability to converse.

A key question is whether we would want to say that I could really speak French if I could never think of anything to say in the language. In this case the distinctions between competence and performance become blurred. Consequently, for the purposes of this, and the following two chapters, the term 'performance' will be used to refer to accounts which claim that children with autism are able to engage in or understand symbolic play in some situations. Competence accounts must necessarily predict that children with autism show a global failure to produce or comprehend pretence. However, when it comes to thinking about reasons why children with autism might not pretend, this distinction becomes less useful, and will be set aside.

The two sets of hypotheses will be discussed in turn in the following sections. Many of these accounts stem from proposed general deficits in autism which have been discussed in some detail in chapter 2. While there will therefore be a degree of overlap of the material discussed there, and in the following sections, the aim of this chapter is to evaluate these proposed deficits in the light of the predictions they make regarding pretend play specifically. Specific explanations of an absence of pretend play will therefore be outlined here (this was not done in chapter 2), criticisms of these specific explanations, rather than of the general deficits, will be discussed, and the predictions made by these accounts as regards pretend play will be spelled out.

3.2 Competence Hypotheses

3.21 Metarepresentational Hypothesis

The metarepresentational deficit account of autism has already been described and discussed in detail (subsection 2.24). While such an account is able to explain children with autism's difficulties on theory of mind tasks, it has also been seen as a clear explanation of their apparent failure to pretend. The explanation is based on Leslie's (1987) analysis of the metarepresentational nature of pretence (described fully in subsection 1.31). Clearly if pretend play is metarepresentational, and children with autism cannot process metarepresentations, or are delayed in acquiring this ability, they will be impaired in their development of pretend play skills. Both Leslie (1987) and Baron-Cohen (1987) have explicitly argued that it is this selective impairment in the ability to produce metarepresentations that underlies the observed lack of pretend play seen in autism.

The most recent instantiation of the metarepresentational deficit theory has been put forward by Leslie (Leslie & Roth, 1993; Leslie & Thaiss, 1992). While Leslie still argues that a failure to process M-Representations (see subsection 1.31) is at the heart of children with autism's failure to pretend, this recent model also attempts to explain why pretend play emerges in normal children at two years, but the ability to pass theory of mind tasks develops at around three and a half years (see subsection 1.35). Leslie proposes that an absence of pretend play in autism is caused by impairment to the 'information processing device' which constructs M-Representations - the 'Theory of Mind Mechanism' (ToMM). The ToMM is also required to pass false belief tasks, but so is another hypothesised device, the Selection Processor. The proposed function of this second device is to select the appropriate counter-factual representation from which to draw inferences from (via the ToMM). It is not at all clear why the Selection Processor should not be required to understand another's pretence, if it is needed to understand their belief, however, this is not at issue here. The crux of Leslie's current model as far as pretend play in autism is concerned, is the same as that of previous accounts put forward by him (Leslie, 1987, 1988; Leslie & Frith, 1990), namely that an absence of pretend play is due to an inability to process the M-representation (representational relation) required for pretence.

Though widely held, metarepresentational explanations of children with autism's apparent problems with pretence can be criticised on three grounds, two of which have already been discussed. Subsection 2.24 raised reasons to be cautious in inferring a metarepresentational deficit in autism from failure on theory of mind tasks. It is possible that metarepresentational competence is not required to predict another's behaviour in these tasks (the simulationist's view), or that children with autism fail these tests for some other reason than their metarepresentational demands. Subsection 1.35 summarised the arguments against the assumption that pretend play, or at least individual pretence, is metarepresentational in nature. Clearly if pretend play only requires a child to be able to manipulate first-order counterfactual or suppositional representations, as was argued, the logic of a metarepresentational deficit account breaks down.

Finally, the thrust of the performance deficit accounts to be described below is that children with autism can indeed produce pretend play. The preceding review of the literature provides some, albeit equivocal, evidence in favour of this suggestion. Perner (1993) has also suggested that "... it is not clear whether autistic children are incapable of understanding pretence - as the decoupling-deficit theory (Leslie's theory) suggests - or whether they are - for some unknown reason - reluctant to engage in such activity". Perner goes on to claim that empirical evidence shows that children with autism must have intact all the necessary components of Leslie's decoupling mechanism (see Leslie, 1987[4]), and argues that their ability to pass the false-photograph test, but not to produce spontaneous pretence shows that they must have difficulties either in manipulating the content of the decoupled representation, or of generating appropriate behaviour from it. There are therefore three potential flaws in a metarepresentational deficit account: first it is possible that children with autism are not metarepresentationally impaired; second it is possible that pretend play (individual pretend play at least) does not involve metarepresentations; and third it is possible that children with autism can produce pretend play. Clearly these three points are not mutually exclusive, the relationships between them and the consequent implications for a metarepresentational deficit account will be returned to in the final chapter.

Turning to the predictions made by a metarepresentational account, the failure to manipulate metarepresentations implies that children with autism will not only be impaired in their production of pretend play in free-play conditions, but also that pretence will be impaired under structured conditions (of course assuming, as this account does, that pretence is metarepresentational).

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[4]Perner, following Leslie, divides the decoupler into three subcomponents. These are the 'Expression Raiser' whose function is to copy and quarantine representations, the 'Manipulator' which manipulates the content of the decoupled expression, and labels and personalises its context, and the 'Interpreter, which translates the obtained metarepresentation into action.

Regardless of the aid given to children with autism in elicited and instructed conditions, nothing can overcome their basic inability (or delayed ability) to manipulate and process the metarepresentation required for pretence. This account must also predict that comprehension of pretence should be impaired in autism (though none of the studies described above provide a test of this suggestion), as metarepresentations are equally if not more importantly involved in comprehension than in production of pretence. A metarepresentational account is therefore a clear example of a competence deficit hypothesis.

While being able to account for both children with autism's failure on theory of mind tasks, and their lack of spontaneous pretend play, the metarepresentational impairment hypothesis has difficulty in explaining an impairment of functional as well as of pretend play in autism. In functional play there is no need for a child to decouple their representation (of a toy car as a small toy car to be pushed along) from any real-world knowledge base, the essence of functional play is that the child uses a toy appropriately (Ungerer & Sigman, 1991), in other words appropriately to their first-order representation of it. There is therefore clearly no danger of representational abuse in functional play, and no need for decoupling, let alone inferring a metarepresentational informational relation.

3.22 Social Theories

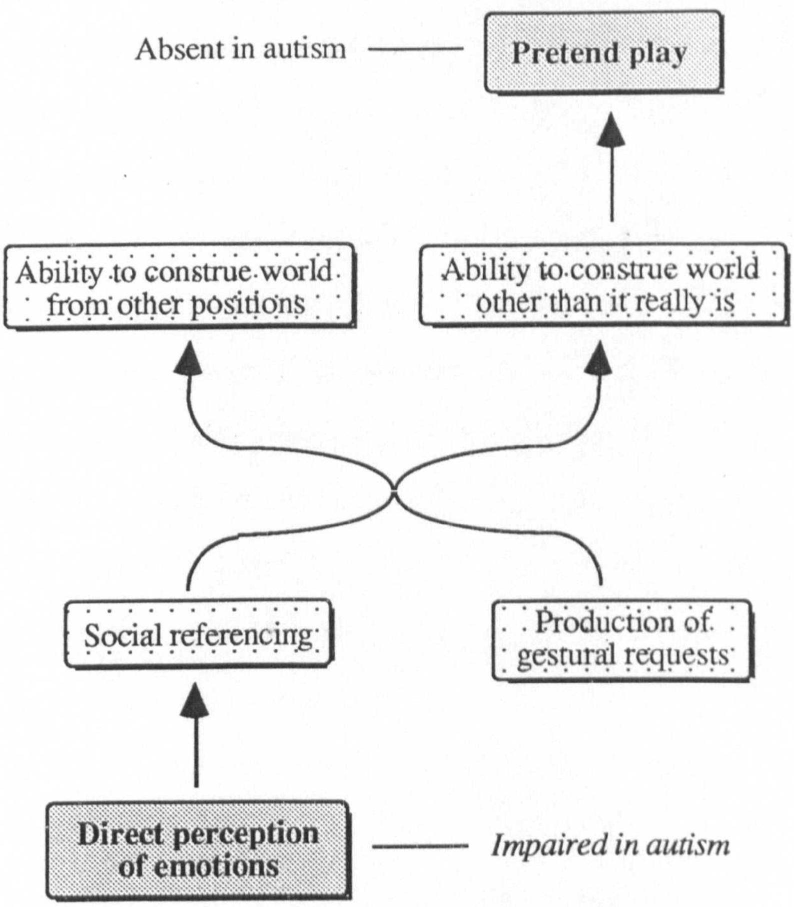
Hobson's Theory

A number of authors have suggested that the characteristic social impairments seen in autism may lie at the heart of the disorder (e.g. Fein Pennington, Markowitz, Braverman & Waterhouse, 1986; Fotheringham, 1991). One of the most explicit and well reasoned of these accounts has been put forward by Hobson (1989a, b, 1990a, b, 1991a). Hobson's fundamental argument is that a young child's basis for understanding other people as 'other people' is their experience of early reciprocal interactions with others. In these early affectively coordinated interactions the child has the opportunity to realise that other people see or appreciate the world differently to the way they do. This realisation is mediated by the understanding of emotion, which Hobson argues is directly perceivable in others. In other words, through affective social referencing, young children come to realise that others have their own subjective orientations to the world. The child therefore comes to understand that situations are 'pregnant' with a variety of meanings in that they can be perceived and appreciated in different ways by different observers. This in turn leads to the realisation of their own ability to hold multiple orientations to a given object or situation, and gives rise to the ability to symbolise.

The fundamental problem in autism, as Hobson sees it, is a socio-affective one which strikes at the early stages of this process. A failure to interact *socially* is a characteristic of autism, and it is this that prevents children with autism from engaging in normal social inter-personal relationships. However Hobson also emphasises an *affective* side to children with autism's problems, claiming that the ability to perceive and understand emotions is impaired in autism. It is not clear which of these two aspects of his theory Hobson ascribes more importance to, but essentially either would prevent the normal development of symbolic ability, and result in a failure to engage in symbolic play. According to Hobson, children with autism are prevented from arriving at a stage at which they are able to hold two orientations to an object (see figure 3.1, interpreted from Baron-Cohen, 1991d).

Support for this form of account comes from reports of the pretend play of congenitally blind children. It is argued (Hobson, 1990a, 1991a) that these children's lack of sight hinders emotion perception and social referencing in a way analogous to the social deficits of children with autism, and with comparable effects; there is some evidence of delayed symbolic play development in such children (Fraiberg & Adelson, 1977). Further support for Hobson's general account, comes from studies which have shown impaired *recognition* (Hobson & Lee, 1989; Hobson, Outson & Lee, 1988; Macdonald, Rutter, Howlin, Rios, Le Conteur, Evered & Folstein, 1989), *naming* (Hobson, Outson & Lee, 1989), *production* (Macdonald et al., 1989; Kasari, Sigman, Mundy & Yirmiya, 1990), and *matching* of emotional stimuli in autism (Hobson, 1986a, b).

Figure 3.1. Hobson's Theory



Rogers and Pennington's Theory

Another variant of a competence deficit model for autism, which emphasises the fundamental role of social impairments, has been proposed by Rogers and Pennington (1991). Taking as a basis Stern's (1985) analysis of interpersonal development in infancy, they argue that a primary deficit in autism originates in impaired formation and coordination of specific self-other representations. This is manifested first in impaired imitation, especially of another person's actions or affect expressions. In turn, this leads to impaired emotion sharing; thus, while the child with autism's sense of self in relation to the physical environment would be relatively unaffected, their sense of self in relation to other social beings would be deficient. These latter representations would develop solely from observed behavioural contingencies, and would lack the characteristics of Stern's 'intersubjective self'. Impaired performance on 'theory of mind' tasks would follow.

Rogers and Pennington propose that impairments in imitation and theory of mind abilities then cause pretend play deficits. They emphasise the proposed role of deferred imitation in the development of symbolism (Werner & Kaplan, 1963), and suggest that impaired imitation and theory of mind deficits result in the child with autism being "shut out of the richness and complexity of the social world", which in turn means that they have "too little knowledge of the social world to act it out in play". This latter view echoes Harris' (1989a) suggestion that children with autism might be impaired in their ability to produce 'human' but not physical based pretence.

While it is certainly the case that children with autism are impaired in their ability to interact socially, there are a number of arguments against the primacy of a social disorder, and against Hobson's account in particular. Ozonoff, Pennington and Rogers (1990) found that children with autism were impaired relative to controls on tests of sorting and matching affective vs. non-affective stimuli, when controls were matched for *non-verbal mental age*, but were unimpaired when matching was by *verbal mental age* (see also Braverman, Fein, Lucci & Waterhouse, 1989; Prior, Dahlstrom & Squires, 1990; Fein, Lucci, Braverman & Waterhouse, 1992). Ozonoff et al. argue that this reflects the fact that non-verbal abilities are relatively unimpaired in autism (Prior, 1979), and hence matching on these abilities may selectively disadvantage experimental participants with autism. They further argued that this, rather than specific deficits in emotion perception, was the cause of impairments found in the studies described above.

However, while this may be true to a extent, it fails to explain why children with autism, matched to controls by non-verbal MA are *selectively* impaired on affective-tasks (they are typically unimpaired on non-affective control tasks[5]). Secondly, as Hobson (1991b) cogently argues, it is

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[5]Ozonoff et al. (1990) argue that this is due to differential effects of task difficulty, though this form of explanation is unparsimonious.

possible that verbal understanding is itself dependent on affective comprehension. In other words the relatively low levels of verbal performance seen in autism (compared to non-verbal abilities) may be due in part to affective impairments, and hence matching for verbal abilities may 'control away' some of the affective difficulties.

Baron-Cohen (1991d) further criticises Hobson's theory (and indirectly, Rogers and Pennington's), noting that children with autism do show signs of attachment behaviour (e.g. Sigman & Ungerer, 1984b), do understand simple emotions (Baron-Cohen, 1991b; Tan & Harris, 1991), and use simple emotion terms in their speech (Tager-Flusberg, 1989). These findings do not rule out the possibility of a specific impairment in the ability to perceive how other's emotions relate to shared situations, which is what Hobson holds to be critically impaired in autism, though they do count against the claim for an innate and global inability to understand emotions. Baron-Cohen also argues i) that Hobson does not explain how the normal understanding of observable emotions leads on to the ability to impute opaque mental states, and ii) that the mechanism by which the appreciation of differing subjective perspectives leads to the ability to hold multiple perspectives oneself, is not made explicit in this account. The first of these criticisms could be countered if one adopted a simulationist perspective (see Johnson, 1988 especially), as by this account one's own (non-opaque) experience of the relation between emotions and mental states can bridge this gap. The second is not problematic if one accepts Vygotsky's (1962) view that mental understanding is arrived at via the internalisation of social understanding (this is in fact exactly Hobson's claim, Hobson 1990a).

In terms of the predictions, Hobson's account resembles the metarepresentational deficit hypothesis in that it explains children with autism's problems in pretend play in terms of a competence-type deficit, claiming that children with autism are impaired simply in the ability to symbolise itself. This affective account is consequently subject to the same difficulties as the metarepresentational deficit hypothesis; all competence hypotheses would have difficulty in explaining why children with autism's play in structured situations is not impaired (relative to controls) should this be confirmed. Hobson's approach might however be taken to predict that variance in earlier affective disturbance would predict later variance in symbolic play ability.

Additional to Rogers and Pennington's account is the suggested role of impaired imitation in children with autism's play deficit. Impaired imitation could explain a lack of both symbolic and functional play, though since Rogers and Pennington hypothesize that symbolic play would be further affected by delayed development of metarepresentations, they might predict a more marked effect in children with autism's symbolic as opposed to their functional play. Their account also seems to suggest that physical pretence should be less impaired than social pretence (cf. Harris 1989a).

3.3 Performance Hypotheses

3.31 Motivational Theories

In subsection 3.16 a failure to speak French was used as an example of a performance deficit, and it was noted that this might simply be the result of not choosing to talk in French. Similarly, the observed lack of pretend play seen in autism may be due to the fact that children with autism are not motivated to engage in pretence. There appear to three potentially discrete ways in which a lack of motivation could be manifested. A lack of pretend play could be due to a specific aversion for pretence. Lord (1985) suggests that pretend play may hold little interest for a child with autism. Alternatively it could be due to a preference for other forms of play which are carried out at the expense of pretence. Harris (1989a) writes, "It is conceivable that autistic children rarely produce pretend play, not because they completely lack the ability to do so, but because the type of object-directed play that they prefer can be readily carried on without much call for pretence". Finally an absence of pretend play could be the result of a global lack of motivation to perform amongst children with autism.

Relevant to this final suggestion is a review by Zigler and Hodapp (1986) of a wide range of factors that have been implicated as capable of reducing the motivation of retarded children, and consequently impairing their performance (see also Merighi, Edison & Zigler, 1990). These factors include desire for social reinforcement, unconventional reinforcer hierarchies and low expectancies of success. While the authors' argument is applied to mentally handicapped children as a whole, such factors could possibly produce disproportionately low levels of motivation in children with autism. Koegel and colleagues (Koegel & Egel, 1979; Koegel & Mentis, 1985) suggest that children with autism do indeed suffer from a global lack of motivation, reflected in poor task performance and difficulties in acquiring and generalising skills, primarily as a result of frequently reinforced low success expectancy. Garretson, Fein and Waterhouse (1990) suggest that children with autism have an 'abnormal motivational framework', which corresponds to Zigler and Hodapp's notion of unconventional reinforcer hierarchies. Evidence of poor levels of motivation in autism also comes from suggestions that children with autism's spontaneous performance in other domains does not provide a fair reflection of their true capabilities. Gould (1986) argues that this is the case for reading, and notes that Bartak, Rutter and Cox (1975) found the same for children with autism's spontaneous use of speech (see also Koegel & Johnson, 1989; Koegel, O'Dell & Dunlap, 1988). However, there is no direct evidence for a motivational explanation of a lack of spontaneous symbolic (and functional) play in autism.

Baron-Cohen (1989d) argues that a problem of a motivational account of children with autism's lack of spontaneous pretend play, is that it fails to specify *why* children with autism are not motivated. He suggests that attempts to do this would result in an 'elaborate' (and presumably unparsimonious) theory. However explanations of a lack of motivation can be put forward (see above), and do not appear to require over-elaborate justification, whether they are framed in terms of global or specific failures of motivation. More problematic, as far as a global motivation account is concerned, is the fact that children with autism do not always appear to be unmotivated to perform. They perform well on certain aspects of intelligence tests, on tests of digit span and on block design for example. Ozonoff, Pennington and Rogers (1991) specifically note that the children with autism in their study were well motivated to perform the variety of tasks presented to them. While it is the true that this reflects motivation to perform on structured, rather than spontaneous assessments of abilities, Koegel's account does predict unmotivated task performance.

Few direct predictions are made by these motivational hypotheses regarding pretend play specifically. They would certainly appear to predict increased levels of pretend play in structured situations. Harris' suggestion of a specific motivational bias towards non-pretend play leads to the prediction that high levels of manipulative play would be seen in spontaneous play situations, but the majority of other accounts would predict this also.

3.32 Central Executive Deficit Hypothesis

Support for the notion of executive dysfunction has been outlined in chapter 2 (section 2.3), where it was noted that impaired executive functioning could lead to four types of impairment. These were a) failure to monitor and plan, b) failure to generate self-initiated behaviour, c) impulsivity, and d) perseveration. It is the third of these impairments, the inability to disengage from, or to override, externally salient reality that has been seen as a potential explanation of children with autism's failure to engage in pretend play. Harris (1993) notes that developmental trends in the normal acquisition of pretend play (decentration decontextualization and integration) reflect a shift from external, contextually driven and habitual schemas to flexible, internally generated and planned actions. He proposes that children with autism are impaired in their acquisition of this internal executive control and therefore have difficulty in the over-riding of contextual schemas that is necessary for flexible planned symbolic play. In other words, though internal executive planning also seems to play a part in this account, it is essentially the salience of external objects that makes pretend play difficult for children with autism. According to Harris (and following Russell's broader interpretations of children with autism's executive difficulties, Russell et al., 1991, Hughes & Russell, 1993; Hughes, Russell & Robbins, in press) children with autism cannot override the 'banana-ness' of a banana for example, and pretend that it is a telephone. This could be interpreted as a failure to decontextualize (see section 1.21), or, to follow Vygotsky, as a failure to emancipate meaning from object.

General criticisms of the executive dysfunction account of autism have already been covered (subsection 2.52). Of particular relevance here is Leslie and Roth's (1993) suggestion that children with autism can inhibit responses to salient states of affairs. As has been noted, the ability to pass a false photograph test (the example used by Leslie & Roth) does not necessitate inhibiting a response to one state of affairs which *simultaneously*, semantically contradicts another state of affairs. This appears to be where the difficulties lie in autism. To draw together Harris' (1991) simulationist account of the mechanisms of pretence, and his (1993) explanation of children with autism difficulties in pretend play, it is the inhibiting of a response made on the basis of the reality default settings that is problematic.

Harris (1993) notes that the executive dysfunction hypothesis makes three predictions about the pretend play of children with autism. The first two are common to all the various performance deficit hypotheses discussed here, these being firstly that children with autism will be impaired in their ability to show spontaneous symbolic play and secondly that they should be able to show symbolic play if prompted to do so. In terms of the central executive hypothesis, prompting aids the child with autism by moving the executive control "...back to the external contextual frame created by the adult..." (Harris, 1993). The central executive hypothesis is therefore well able to explain a lack of symbolic play in spontaneous situations, and also the increases in play in structured situations reported by Lewis and Boucher. The hypothesis is less consistent with the evidence reported by Riguet et al and by Sigman and Ungerer. The third prediction is that any symbolic play that is produced by children with autism will remain repetitive and stereotypical, reflecting an inability to shift to new play themes in the face of a familiar 'play context'. There is certainly good evidence for this (Wing et al. 1977; Wing, 1978; Atlas, 1990). A final prediction that would appear to follow from a central executive account, as interpreted above, is that functional play may not be impaired in autism. If it is an object's function that is particularly salient, and hence prevents symbolic play from being produced, then children with autism should be expected to be able to use objects in functionally appropriate ways. This is not to say that such use would not be stereotyped and repetitive. This prediction is at odds with the suggestions of impaired spontaneous functional play emerging from section 3.1. However it could be argued that a child with autism might not see an object's 'function', and consequently its salient use, in the same terms as a psychologist. In particular miniature 'functional' toys may be objects to handle, manipulate, spin and suck as far as a child with autism is concerned.

3.33 Generation Of Access And Retrieval Strategies Hypothesis

A final possible performance hypothesis that will be considered, is that children with autism have difficulty in generating flexible retrieval strategies for accessing internal representations or schemas (even when not, ostensibly, perseverating in response to external cues). Boucher and Lewis (1989; Lewis & Boucher, 1991) have suggested that impaired generation of these strategies could underlie the pervasive lack of creativity and originality which is a key feature of autistic behaviour, including the lack of pretend play. Evidence for this form of impairment comes from a number of domains, though there is little direct support for its influence in pretend play. In memory, Boucher has shown impaired long term free recall but unimpaired cued recall (Boucher, 1981; Boucher & Warrington, 1976; see also Tager-Flusberg, 1991). Impaired word fluency has been demonstrated for generation of miscellaneous words, but not for words within a semantic category (Boucher, 1988). These results suggest that information is stored in memory, but not strategically accessed by children with autism. When external strategies are imposed children with autism are unimpaired in their generativity. Finally Lewis and Boucher (1991) found that children with autism's drawings showed a greater degree of inter-relatedness than did those of controls, which they took to imply 'restricted use of generative strategies'.

A generative hypothesis, like the central executive hypothesis, is consistent with the majority of findings on play summarised at the end of section 3.1. This is not surprising since these two hypotheses appear to be mirror images of each other: the central executive hypothesis suggests that internal representations are not accessed because of a failure to inhibit attention to the more salient external world; the generative hypothesis suggests that pretend play does not occur because the internal representations needed for creativity and flexible planning are not readily accessed. Few specific criticisms have been levelled at the generation of access and retrieval strategies account, almost certainly because it has not been stated explicitly until recently (Jarrold, Boucher & Smith, 1993). However, it is not clear that a generation of retrieval strategies hypothesis would necessarily predict impaired spontaneous functional play in autism, since functional objects would presumably provide external cues for functional play.

3.4 Other Hypotheses

Clearly there are a number of possible theories that can be advanced to explain children with autism's difficulties in symbolic play. The ones considered above are the major, most explicit hypotheses, but this list is certainly not exhaustive. It is conceivable that other general cognitive or social impairments associated with autism could impinge on the area of symbolic play development. For example Mundy and Sigman (1989a, 1989b) have put forward an interactive cognitive-affective model in an effort to account for joint-attention deficits which they see as being of fundamental importance in autism. This account has been criticised by a number of authors (Baron-Cohen, 1989e; Leslie & Happé, 1989; Harris, 1989b; Hobson, 1989a) and is not specific about the resultant implications for symbolic play ability, but serves to indicate the room for further interpretations of children with autism's difficulties in symbolic play.

It is also possible that the apparent problems in pretence exhibited by children with autism reflect the combination of a number of the impairments discussed above. For example children with autism might have a socio-affective deficit which results in the delayed acquisition of symbolic (rather than metarepresentational skills), which is exacerbated by executive deficits which impinge on their ability to over-ride the salient functions of objects. A related point is that a number of the accounts described above overlap to an extent. Hobson's and Rogers and Pennington's theories could be seen as explanations of the route to a metarepresentational deficit in autism. As was noted in section 2.4, a metarepresentational deficit could lead to, or could indeed by caused by, executive dysfunction. A preference for object related play as opposed to pretence (one of the suggested motivational accounts) could reflect an executive failure to disengage from the salient features of external objects. These examples show the importance of not focusing too narrowly on the distinctions between competing accounts. They also emphasise the point made in section 3.16, namely that the distinction between performance and competence deficits, though a useful tool for thinking about whether children with autism can or cannot pretend, becomes less helpful when one tries to be specific about the reasons why they can or cannot pretend.

3.5 Conclusions

3.51 What Is There To Determine Regarding Pretend Play In Autism?

Having considered important and relevant issues regarding pretend play, and concerning autism, experimental studies of pretend play in autism have now been reviewed, and crucially, a number of possible explanations of impairments in pretence in autism have been identified. Clearly the prime aim of this thesis is to decide between these accounts. It may of course be necessary to propose alternative hypotheses, but the theories described in this chapter provide a useful starting point. The fact that these theories can be usefully divided into two groups, competence deficits which predict that children with autism cannot pretend, and performance deficits which predict that they can pretend, means that they need not all be pitted simultaneously against each other. The first step of the research which is about to be described, is to decide between competence or performance deficit accounts. Only once this has been accomplished need the research move on to the second stage of deciding between specific hypotheses.

It is clear that both of these two stages do need to be addressed. It is not possible to eliminate either of them on the basis of the review of empirical research in this area conducted in section 3.1. This review showed firstly, that very few studies have adequately matched participant groups in examinations of relative pretend play abilities in autism. Of those that have adopted verbal MA matching, only two have addressed the question of competence or performance deficits by examining structured pretend play (Riguet et al., 1981; Lewis & Boucher, 1988). The findings from these two studies differ, and so no firm conclusions can be drawn either way, this stage of research has to be tackled and the following two chapters will describe how this was done.

An analysis of the specific explanations of a pretend play deficit has also failed to eliminate or confirm any particular hypothesis, presumably because of the lack of relevant empirical evidence to judge them against. There is therefore little to suggest that a particular performance hypothesis, or a particular competence hypothesis, is more likely to prove correct than its counterparts. There are a number of potentially important questions which remain to be addressed, and which will provide ways of separating various accounts. These include the status of any impairment to functional play in autism, the role of social and motivational factors in determining levels of pretend play, and the importance of the functions of objects in pretence. However, only when the broad distinction between competence and performance deficits has been investigated will it be possible to tell which of these questions is particularly relevant.

3.52 What Can Autism Teach Us About Pretend Play?

Chapter 1 outlined a variety of different psychological analyses of the mechanisms governing pretend play in normal children. Though a new analysis was proposed as a result of these discussions, this was arrived at chiefly by theoretical reasoning and on the grounds of parsimony. An examination of the pretend play of children with autism is therefore potentially able to provide empirical evidence for, or against, this and other theories of pretence.

The first question that could be addressed is whether individual pretend play requires the ability to process metarepresentations. Should it be concluded that a pretend play impairment in autism takes the form of a competence deficit this would be support for Leslie's theories. However if it is found that children with autism can produce individual pretend play under certain circumstances then the metarepresentational deficit theory must be wrong on one count at least.

Either individual pretend play cannot be metarepresentational, or children with autism can process metarepresentations.

A subsequent question which could be examined, is whether social pretend play (or to be specific, complex social pretend play) is metarepresentational. If children with autism were shown to be able to produce individual and not social pretend play, then the analysis of pretence proposed in subsection 1.42 would be strongly supported. If, on the other hand, they were able to produce both forms of pretence one would have to conclude that understanding social pretence does not require metarepresentational understanding, or again, that children with autism are not metarepresentationally impaired. One could then adopt a simulationist position similar to that taken by Harris (1991), and argue that pretend play and theory of mind understanding require the setting aside of default settings, rather than the processing of metarepresentations.

3.53 What Can Pretend Play Teach Us About Autism?

If a particular deficit is hypothesized as being fundamental to autism, then it must impinge on the area of pretence. The various specific accounts outlined above show that the broader deficits outlined in chapter 2 have the potential to explain a pretend play impairment in autism. It is therefore obvious that pretend play provides a testing ground for fundamental deficit theories, support for a competence deficit in pretend play would count against the primacy of executive dysfunction, and support for a performance deficit would argue against the primacy of a theory of mind deficit.

Pretend play also provides a means of sharpening up these broader theories. If support is obtained for a central executive explanation of pretend play impairments in autism, this may well tell us more about the specific executive functions which might be particularly impaired in autism (impulsivity or planning for example). Similarly it is possible that a metarepresentational deficit explanation is supported, and in addition it is found that children with autism are particularly impaired at human-based pretence. This could potentially be interpreted as evidence for Leslie's notion of a domain-specific ToMM.

Chapter 4
Can Children With Autism Pretend?

4.1 Introduction

The review of previous investigations into pretend play in autism carried out in the preceding chapter reveals that the underlying cause of children with autism's difficulties in pretence, and indeed the extent of these difficulties, is still unclear. What is essentially required as a first step towards a clearer understanding is a conclusive means of deciding whether these difficulties are the result of a competence deficit or of a performance deficit. It is worth briefly considering how this might best be achieved. In order to prove an impairment in performance in pretend play one would need to demonstrate unimpaired (or relatively less impaired) pretence in structured play. Conversely one could discount a performance explanation if one showed equally impaired structured pretend play. However both sets of accounts predict impaired spontaneous pretend play in autism. Two predictions can therefore be spelled out:

Competence prediction: Impaired spontaneous and impaired structured pretend play.

Performance prediction: Impaired spontaneous, but unimpaired structured pretend play.

Of the experiments reviewed in the previous chapter, Lewis and Boucher (1988) is the one that comes closest to providing an adequate test of these predictions. However, as noted (subsection 3.15) there are a number of criticisms of this experiment that limit the support that it provides for a performance account. Perhaps most importantly, the authors failed to demonstrate a significant spontaneous pretend play impairment in their group of children with autism. As previously described, this was possibly the result of floor effects in the control groups and is therefore easily explained. However there are three reasons why a replication, demonstrating such an impairment is necessary. Firstly an absence of spontaneous pretend play in autism is a well established research finding, failure to show such an impairment must therefore cast doubt on the homogeneity of the autistic participant group or, as in the case of Lewis and Boucher (1988), on the methodology employed. Secondly if either the nature of the participant groups, or the methodology of the experiment have been called into question in this way, the validity of the results from any assessment of structured play must be also undermined. Finally, though failure to demonstrate impaired spontaneous play does not separate performance or competence accounts in any way, it is inconsistent with the predictions made by both sets of hypotheses. Whatever the findings regarding structured pretend play, such a set of results can not provide firm support for either a performance or competence account. A replication of Lewis and Boucher's findings was therefore required. This chapter describes attempts made to provide such a replication.

4.2 Experiment 1

4.21 Introduction

In addition to failing to find a spontaneous pretend play impairment in their group of children with autism, a second limitation of Lewis and Boucher's experiment, is that it involved a group of 'relatively able' children with autism. These children had a mean chronological age of 11 years, 10 months and a mean verbal mental age of 5 years, 9 months. It could be argued that, even if suffering from a delay in the acquisition of the pretend systems necessary for carrying out pretence, children of this mental age may have developed, albeit at a retarded rate, to a stage at which they were able to play symbolically (Baron-Cohen, 1989d).

A third criticism of Lewis and Boucher's study is that made by Baron-Cohen (1990), who suggested that at least some items in Lewis and Boucher's instructed play tasks could be performed successfully by guessing what to do when only one junk object is available as a prop. Boucher and

Lewis (1991) argued strongly, and convincingly, that this was not the case. However it would be desirable to assess whether children with autism still perform as well as controls when they have to make a choice from available play materials in an instructed play condition.

A final limitation of Lewis and Boucher's experiment is that although it demonstrated relatively normal 'physical pretence' in the children with autism, including doll play involving physical actions, it did not provide firm evidence of an ability to act out human emotions or social interactions (Harris, 1989a). A paucity of social interaction is a key feature of autism, and there is evidence to suggest that recognition and understanding of emotion is impaired in autism (subsection 3.22). It is therefore important to determine whether children with autism can produce pretend play representing social and emotional behaviour, in addition to producing pretend play representing physical actions.

This initial experiment attempted to provide a methodologically valid replication and extension of Lewis and Boucher's findings. The pretend play of children with autism and matched children with moderate learning difficulties was assessed under free, elicited and instructed conditions. The criticisms and limitations of Lewis and Boucher's experiment outlined above were taken into account. Care was taken to ensure that the toys used were not functional, in an effort to reduce functional play to a minimum, and to promote free pretend play in controls. A developmentally younger group of children with autism were assessed. When instructions to pretend were given children were always presented with a range of props from which to choose an appropriate substitute. Finally children with autism's ability to produce social and emotional as opposed to physical pretence was directly tested. The experiment therefore aimed to address the following questions:

1. Is the pretend play of children with autism impaired in spontaneous play conditions?
2. Is the pretend play of children with autism similarly impaired in structured (elicited and instructed) play conditions?
3. Is the ability to produce emotional and social pretence specifically impaired in autism?

4.22 Method

Participants

Two groups of participants were assessed. These were a group of 14 children with autism and 14 children with moderate learning difficulties (MLD). The autistic group contained 3 girls and 11 boys while the MLD group included 5 girls and 9 boys. The children with autism were selected on the basis of a diagnosis of autism, and all met the criteria for autism laid down by Wing and Gould (1979) and more recently Gillberg (1990b), namely the characteristic triad of impaired language development and use, impoverished social interaction and repetitive and stereotyped behaviour. The children with moderate learning difficulties were all attending special schools for children with learning disabilities.

The two groups were individually matched using the Derbyshire Language Scale (DLS) (Knowles & Masidlover, 1980). This test measures the child's language comprehension ability in terms of their actual level of comprehension, (e.g. one word, two words), rather than in terms of verbal mental age. Children scoring above the upper level of the test were excluded from the experiment as were children at the one word level and below, as it was felt that the verbal demands of the experiment would be beyond these children. One disadvantage of the DLS is that it does not provide a mental age equivalent score on the basis of language comprehension ability. The British Picture Vocabulary Scale (BPVS) was given to the majority of the participants in this experiment. These measures were taken after the present experiment had been carried out, but within a period of six months. Details of the participants, including BPVS verbal mental ages are given in table 4.1. Though not matched for BPVS scores the two groups did not differ significantly in their verbal mental ages (P=0.74, t-test); neither did they differ significantly in chronological age (P=0.29; t-test).

Table 4.1. Mean, SD and range of chronological age (CA) and range of Derbyshire Language Scale (DLS) level.

Group	n		BPVS Score (months)	CA (months)	DLS Level
Children with Autism	14	mean	49.5*	101.7	-
		SD	25.7	25.6	-
		range	13-89	67-147	2:4-10:22
Children with MLD	14	mean	46.5#	96.4	-
		SD	19.0	13.0	-
		range	27-93	72-121	2:4-10:22

*Two of the children with autism were unavailable for BPVS testing.

#One of the children with MLD was unavailable for BPVS testing.

Materials

Three sets of materials were used, doll figures, lego blocks and a doll with junk objects. The doll figures set consisted of nine figures in all, three dolls-house type dolls, three 'Playmobile' figures and three 'Fisher-Price' figures. In each case a male, a female and a child figure were used. Dolls were chosen in order to specifically investigate children's ability to engage in 'human-based' pretence. The Lego blocks were included as pilot work had indicated that children with autism were both motivated and reasonably competent in their play with Lego. Finally the doll and junk objects set was made up of a dolls-house type-figure plus a ball of blu-tac, a matchbox covered in silver foil, a piece of sponge, a piece of tissue paper, a freezer bag tie, a cylindrical pen top, a picture hook, a paper clip, two small plastic rods and a small plastic adapter (used to inflate footballs).

All three sets were designed to be 'non-functional' in nature, in other words they contained toys that were not conducive to purely functional play. When props were introduced, in the form of junk materials, the fact that they were by their very nature non-functional, ensured they could not encourage functional play. Similarly the lego pieces used were predominantly large blocks with no obvious function, the only exception being two sets of wheels which were added during the elicited play phase. The inclusion of wheels was seen as justified (though see below) as children with autism are commonly interested in cars, trains, planes and other vehicles and it was thought that if a child built a vehicle from a number of pieces of lego then this would constitute pretend play rather than functional play.

Procedure

Pretend play was assessed in two consecutive play sessions. The doll figures and lego blocks were presented in the first play session, which lasted for around twenty-five minutes, while the doll with junk materials were used in the second shorter play session of approximately fifteen minutes in length. Children were assessed individually, usually in a quiet room with only the experimenter present. However in four cases it was not possible to take the children to another room and these children were tested in a quiet corner of their classroom. Play sessions were videotaped for later analysis.

Three testing conditions were employed with each set of toy materials: a spontaneous play condition, an elicited play condition and an instructed play condition. In the spontaneous play condition the child and the experimenter sat together at a table on which the toys were placed, and the child was told that they could play with the toys while the experimenter did some writing. No input was given from the experimenter except for non-specific encouragements to continue playing if the child turned to the experimenter for guidance. In the elicited play condition the child and the experimenter sat together at a table on which the toys were placed and prompts to play were given by the experimenter. Specifically the child was asked "What can you do with these?" and "Show me what you can do with these?" whenever they stopped manipulating the toys. Finally in the instructed play condition specific instructions to pretend were given. With the doll figures set of materials only, the instructions were of three different types, *physical, social,* and *emotional,* designed to test participants' ability to produce these forms of pretence. A detailed list of the specific instructions used are given in table 4.2. Both the spontaneous and elicited play conditions lasted a maximum of five minutes, but were terminated earlier (after a minimum of two minutes) if the child clearly lost interest in what they were doing or showed signs of distress. The instructed play conditions were not timed.

Play Coding Scheme

For both the spontaneous and elicited play conditions the videotaped record of the child's behaviour was scored using five exhaustive and mutually exclusive categories: Symbolic Play, Intermediate Symbolic Play, Functional Play, Manipulative Play and No Play. The time spent in each form of play, and the number of acts falling into each category were recorded. The play categories were defined as follows:

Symbolic Play: Object substitution, attribution of absent properties or imaginary objects present; e.g. using matchbox as a car, saying doll is wet, doll eats imaginary food.

Intermediate Symbolic Play: Play that *could* be symbolic but that cannot confidently be inferred as such due to ambiguity in the actions or a lack of verbalisation.

Functional Play: Appropriate play with materials; e.g. doll walking.

Manipulative Play: Sensorimotor play, e.g. sucking, rolling, twiddling; and Ordering play, lining up / stacking toys.

No Play: Child has toys available, but is not actively playing with them.

In the instructed play conditions each response to an instruction was rated as one of the following: Pass, Intermediate Pass (response could constitute a pass but cannot confidently be said to be successful) and Fail.

Table 4.2. Instructions given for each play set

Toy Set	Instructions
Doll Figures *Physical*	Show me how he jumps up and down
	Show me how he runs around
	Show me how he lies down
	Show me how he rolls over
Social	Show me how he shakes hands
	Show me how he has a cuddle
	Show me how he waves bye-bye
	Show me how he has a fight
Emotional	Show me how he can be sad/unhappy
	Show me how he can be angry/cross
	Show me how he can be happy/excited
	Show me how he can be scared/frightened
Lego:	Make a motorbike
	Make a person
	Make a table
	Make a dog (using table from previous instruction)
	Make a tree like this (Lego tree presented for comparison)
Doll + Junk:	Show me how he wears a hat
	Show me how he walks with a stick
	Show me how he sits on a chair
	He's very tired, what does he do? (i.e. make him go to bed)
	Show me how he drives a car like this (Fisher Price car presented)

Four randomly selected videotapes, two of children with autism and two of MLD children, were coded by an independent rater in order to determine the reliability of the coding schemes used. The rater was given the category definitions outlined above. The inter-rater reliability, comparing agreement on the categorisation of each play act in spontaneous and elicited play sessions, was satisfactory (Cohen's Kappa=0.70), as was the inter-rater reliability for coding of the instructed play acts (Cohen's Kappa=0.73).

4.23 Results

The average length of each individual play assessment for all three sets of toys in both spontaneous and elicited play conditions was 191.8 seconds (sd 45.0s) for the children with autism, and 221.5s (sd 36.2s) for the MLD children. The difference in length of play condition is almost significant (F=3.70, df=1, P=0.07). Both groups of children played for shorter periods with the doll figures alone than with the lego and the doll plus junk material (F=7.28, df=1, P=0.02); the average length of play with the doll figures was 183.8s (sd 51.5s), with Lego 211.4s (sd 55.7s), and with the doll plus junk 224.8s (sd 55.7s). The children with autism spent significantly less time playing with the doll figures than did controls (F=7.19, df=2, P=0.01).

A Note About The Analysis

Despite employing three sets of materials, and assessing play in three conditions, the analyses presented below will consider children's performance with only two of the toy sets, in only two of the conditions. Having carried out the experiment, it became apparent that the use of the Lego toy set was open to criticism (Marion Sigman, personal communication). It could be argued, and the argument is a strong one, that constructing an object from Lego does not necessitate pretence. Constructional activity of this kind need not involve symbolic object substitution. A further problem concerns the introduction of wheels in the elicited play condition with Lego. Not only does this alteration invalidate a comparison with play with the other two toy sets, which were not altered or added to throughout each condition, and with the spontaneous play with Lego, but it is also certain to increase levels of functional play amongst children. Given these methodological problems the Lego play was omitted from the analysis of spontaneous and elicited play behaviour outlined below. However details of levels of particular play behaviours with the Lego toy set are presented in Appendix 1.

A second methodological problem concerned the instructed play condition. Upon consideration, the appropriateness of some of the instructions used is questionable. In particular it is doubtful whether the physical and social doll alone instructions necessitate a symbolic act as a response. Instructions such as "Make the boy jump up and down" (physical), and "Show me how he waves bye-bye" (social) may instead by adequately carried out functionally. To overcome these important problems, a second experiment was carried out in an attempt to properly determine children with autism's relative ability to carry out instructed symbolic acts (Experiment 2, see below). An analysis of the results to the current instructions will therefore not be presented here, but is given in Appendix 1.

Two analyses will be presented however, comparing children's play with the doll figures and with the doll plus junk materials, in spontaneous and elicited conditions. The first will examine time spent in each type of play behaviour, though as the groups spent varying lengths of time playing with the different materials, the length of time spent in any particular kind of play activity was calculated as a percentage of assessment time rather than in absolute terms. A second analysis examines number of acts of each play type produced by children; again to take into account differences in lengths of time spent in each condition, rates of act production are considered.

A final point, which is relevant to all the experiments to be presented here, concerns the form of statistical analysis employed. Where possible, group performances are compared using a repeated measures design, rather than treating the groups as being independent. Such an approach is valid, given the fact that children are always matched individually across groups. This procedure will emphasise any group differences that might emerge, though it should be noted that all the data presented here has also been analysed using an independent groups design, and in no case was there a substantial or notable difference in the form of the results obtained.

Analysis of Percentage Time

The percentage of total time spent by each child in symbolic play, symbolic and intermediate symbolic play combined, functional play, manipulative play, and no play, was analysed using a three factor Anova. The factors were Group (children with autism or MLD; repeated measures), Condition (spontaneous and elicited; repeated measures) and Toy Type (doll figures and doll plus junk; repeated measures). In view of previous research findings indicating impaired symbolic and functional play in autism, the Group effects arising from analyses of these play types were subject to one-tailed tests; one tailed values for the Group effects in the manipulative and no play analyses were also employed, it being hypothesised that children with autism should spend more time in these behaviours if not engaging in symbolic or functional play. Otherwise significance levels are based on two-tailed tests.

The means for each play type by Group, Condition and Toy Type are given in table 4.3, and are shown graphically for each toy set in figures 4.1 and 4.2. The results of the Anova analyses for each play type are given in table 4.4.

Table 4.3. Means of percentage time spent in each play category

		Group			
		Children with Autism		Children with MLD	
		Condition		Condition	
Play Type	**Materials**	Spontaneous	Elicited	Spontaneous	Elicited
Symbolic	Doll Figures	1.0	13.2	2.5	7.9
	Doll + Junk	4.3	14.2	9.2	23.5
Symbolic + Intermediate	Doll Figures	5.8	19.1	9.0	16.9
	Doll + Junk	10.1	24.4	28.9	43.5
Functional	Doll Figures	17.2	20.5	29.8	30.3
	Doll + Junk	2.2	8.6	1.6	8.1
Manipulative	Doll Figures	57.1	38.6	49.5	40.3
	Doll + Junk	79.6	59.8	68.3	39.7
No Play	Doll Figures	19.9	21.9	11.6	12.5
	Doll + Junk	8.1	7.2	1.2	8.7

Figure 4.1. Distribution of play time with Doll Figures toy set.

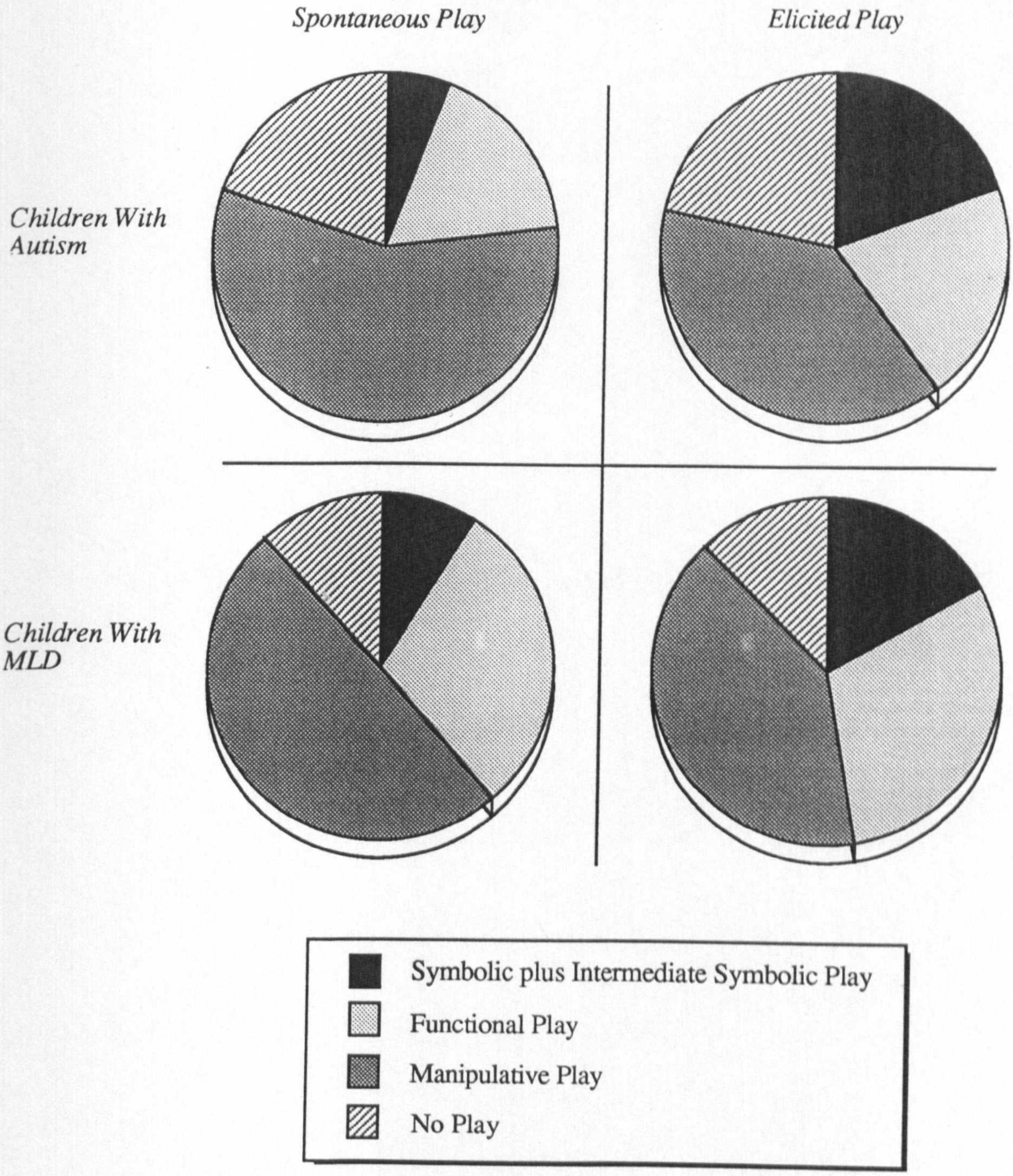


Figure 4.2. Distribution of play time with Doll Plus Junk toy set.

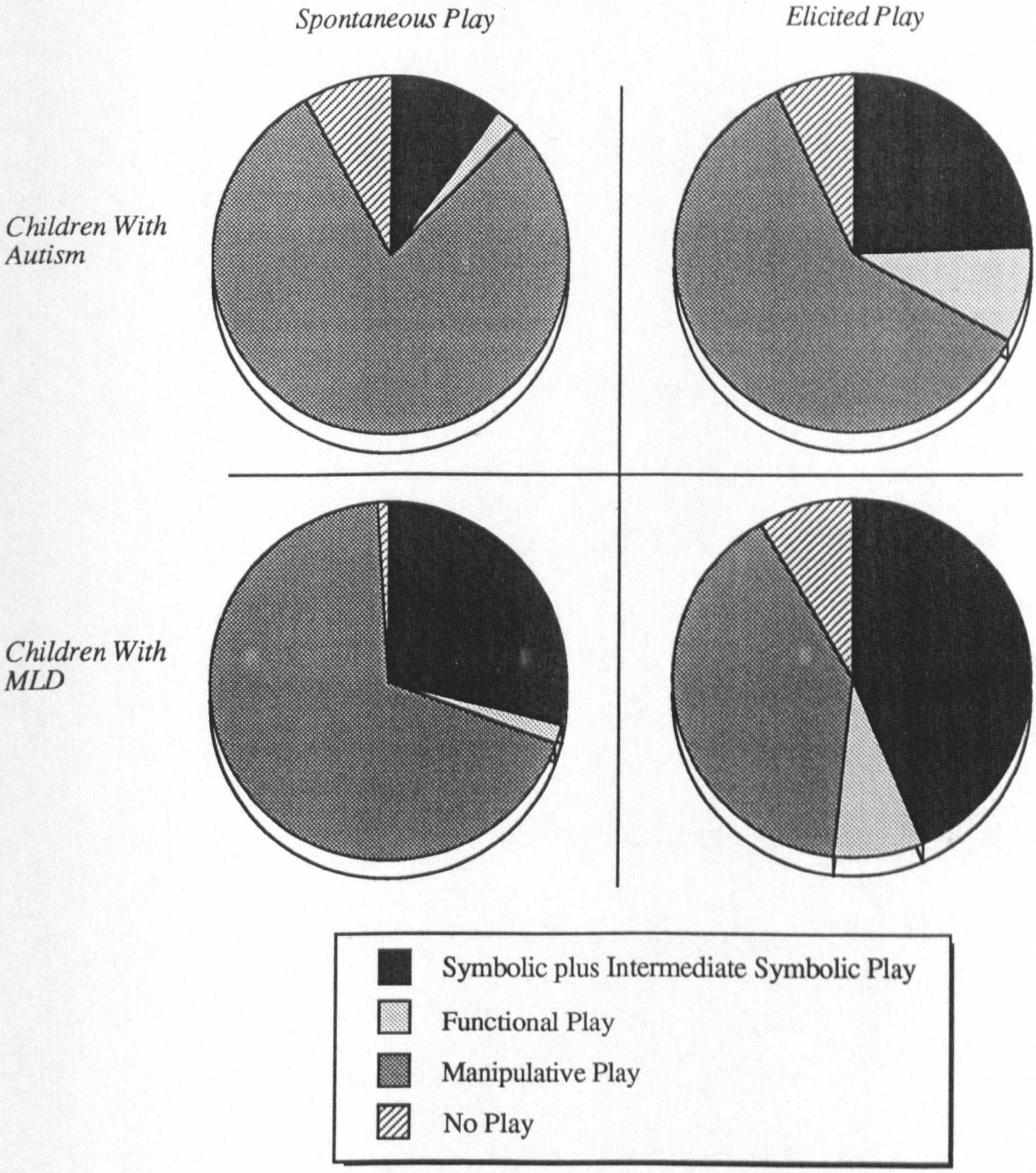


Table 4.4. Results of three-factor Anova analyses of percentage time.

		Play Type									
		Symbolic		Sym + Int Sym		Functional		Manipulative		No Play	
Effect	**DF**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**
Group†	1	1.32	0.14	7.71	**<0.01**	4.00	**0.03**	2.98	**0.05**	5.60	**0.02**
Condition	1	17.43	**<0.01**	20.66	**<0.01**	1.23	0.29	59.34	**<0.01**	1.55	0.24
Group x Condition	1	0.02	0.88	0.24	0.63	0.00	0.98	0.00	0.96	0.28	0.60
Toy Type	1	14.34	**<0.01**	21.79	**<0.01**	27.68	**<0.01**	15.10	**<0.01**	11.20	**<0.01**
Group x Toy Type	1	14.34	**0.03**	8.59	**0.01**	3.68	0.08	2.42	0.14	0.58	0.46
Condition x Toy Type	1	0.24	0.63	1.06	0.32	0.46	0.51	1.78	0.21	0.40	0.54
Group x Condition x Toy Type	1	4.84	**0.05**	0.37	0.55	0.65	0.43	2.54	0.14	1.70	0.21

†One tailed values given for Group effects (see text).

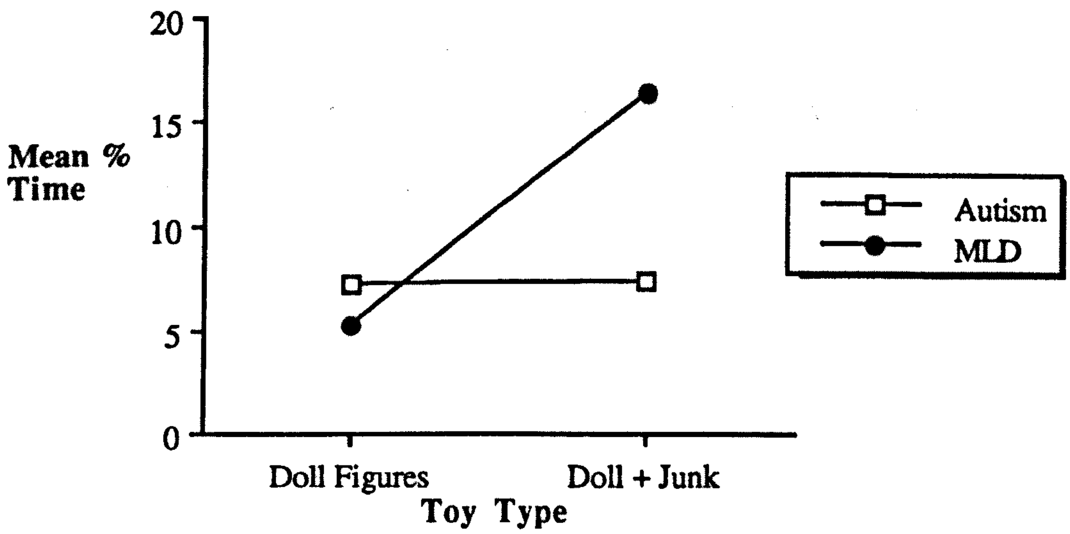
Symbolic play

The main effect of Group was not significant. There was a significant main effect of Condition, reflecting more symbolic play in the elicited conditions. The Group x Condition interaction was not significant.

The main effect of Toy Type was significant; more symbolic play occurred with doll plus junk objects than with doll figures. The Group x Toy Type interaction was significant, reflecting a significant effect of Toy Type for the children with MLD ($F=12.74$, $df=1$, $P<0.01$), but not for the children with autism. Similarly there was a significant effect of Group on the doll plus junk materials ($F=4.74$, $df=1$, P, 1-tailed=0.02), but not on the doll figures set. See graph 4.1.

The Condition x Toy Type was not significant, but a significant three way interaction emerged. This reflected the fact that the children with MLD alone experienced an effect of elicitation with the doll plus junk, but not with the doll figures (see values in table 4.3).

Graph 4.1. Percentage time spent in symbolic play: Group x Toy Type interaction



Symbolic plus Intermediate Symbolic play

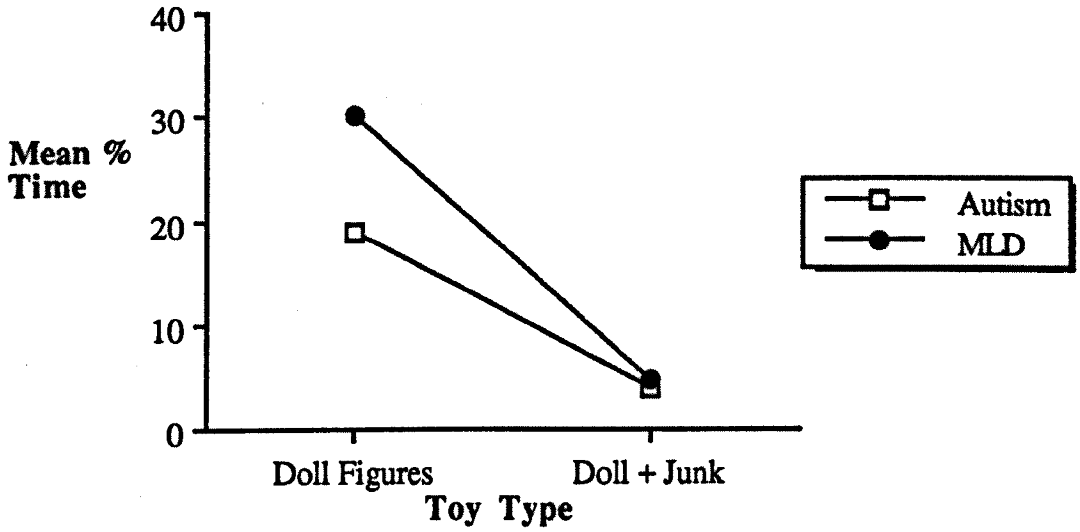
The results of the analysis of this combined category were similar to those obtained from an analysis of symbolic play alone. However in this case the main effect of Group was significant, children with MLD showing more of this type of play. Again there was a significant main effect of Condition due to the effect of elicitation increasing time spent in symbolic or intermediate symbolic play. The Group x Condition interaction remained non-significant.

The main effect of Toy Type was significant, more symbolic and intermediate symbolic play occurred with doll plus junk than with doll figures as before. The Group x Toy Type interaction was again significant, reflecting the same differential effect of Toy Type for the children with MLD ($F=21.37$, $df=1$, $P<0.01$), but not for the children with autism, and the same effect of Group on the doll plus junk materials ($F=15.23$, $df=1$, $P<0.01$), but not on the doll figures set. In this case no other interactions were significant.

Functional play

The analysis of percentage time spent in functional play revealed a significant main effect of Group; children with autism spent less of their time in functional play than did controls. There was also a significant main effect of Toy Type, due to more functional play with doll figures than with doll plus junk. Of the other effects only the Group x Toy Type interaction approached significance, reflecting the combination of these two main effects, see graph 4.2.

Graph 4.2. Percentage time spent in functional play: Group x Toy Type interaction



Manipulative play

The significant main effect of Group found in this analysis reflected the predicted higher levels of manipulative play amongst the children with autism. There was a significant main effect of Condition due to less manipulative play in elicited conditions, and there was a significant main effect of Toy Type, as more manipulative play occurred with doll plus junk than with doll figures. No interaction approached significance.

No play

The main effect of Group was significant; as predicted children with autism spent more time 'not playing' with the materials. The main effect of Condition was not significant, but there was a significant main effect of Toy Type, there being more 'no play' with doll figures than with doll plus junk materials. No interactions approached significance.

Analysis of Number of Acts

The children with autism spent less time playing in general than the children with MLD, significantly so with the doll figures, therefore any group differences in the number of acts produced could simply be the result of the different lengths of time spent playing. To overcome this disparity a measure of rate of act production was obtained - the number of acts produced was divided by the time spent playing. (This measure is more appropriate than a percentage measure of, for example, number of symbolic acts divided by total number of acts. If a child only produced one act in total, which was symbolic, they would then gain a highly unrepresentative score of 100%). Mean rates of act production for each Group, Condition and Toy Type are given in table 4.5. The rates of act production for each child were analysed in the same way as percentage time spent; the five categories of play type were used in three factor Anova analyses of the form described above. In addition the total rate of production of play acts (symbolic plus intermediate plus functional plus manipulative) was analysed. The results of the various three factor Anova analyses are summarised in table 4.6.

Table 4.5. Means of rates of act production for each play category and toy set (acts per minute).

		Group			
		Children with Autism		Children with MLD	
		Condition		Condition	
Play Type	**Materials**	Spontaneous	Elicited	Spontaneous	Elicited
Total Play Acts	Doll Figures	3.31	5.99	3.56	7.18
	Doll + Junk	2.51	3.59	2.88	5.36
Symbolic	Doll Figures	0.17	0.86	0.17	0.40
	Doll + Junk	0.29	0.58	0.42	1.18
Symbolic + Intermediate	Doll Figures	0.42	1.24	0.48	1.04
	Doll + Junk	0.65	1.15	1.30	2.23
Functional	Doll Figures	1.01	2.23	1.56	3.21
	Doll + Junk	0.30	0.47	0.16	0.86
Manipulative	Doll Figures	1.88	2.51	1.51	2.93
	Doll + Junk	1.55	1.96	1.42	2.26
No Play	Doll Figures	1.24	1.78	0.83	1.26
	Doll + Junk	0.53	1.00	0.11	0.94

Table 4.6. Results of three-factor Anova analyses of rate of act production.

		Play Type											
		Total		**Symbolic**		**Sym+Int Sym**		**Functional**		**Manipulative**		**No Play**	
Effect	**DF**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**
Group[†]	1	3.28	**0.05**	0.13	0.36	2.78	0.06	2.85	0.06	0.07	0.40	3.06	**0.05**
Condition	1	17.91	**<0.01**	18.43	**<0.01**	23.89	**<0.01**	4.72	**0.05**	17.92	**<0.01**	16.67	**<0.01**
Group x Condition	1	1.96	0.19	0.00	0.96	0.16	0.70	0.73	0.41	2.73	0.12	0.14	0.72
Toy Type	1	28.23	**<0.01**	4.15	0.06	13.30	**<0.01**	29.94	**<0.01**	4.32	0.06	19.21	**<0.01**
Group x Toy Type	1	0.16	0.69	5.55	**0.03**	6.06	**0.03**	2.82	0.12	0.03	0.87	0.73	0.41
Condition x Toy Type	1	2.73	0.12	0.12	0.73	0.01	0.93	2.53	0.14	2.41	0.14	0.40	0.54
Group x Condition x Toy Type	1	0.12	0.74	4.97	**0.04**	1.87	0.19	0.04	0.84	0.32	0.58	1.18	0.30

[†]One tailed values given for Group effects (see text).

Total Number Of Play Acts

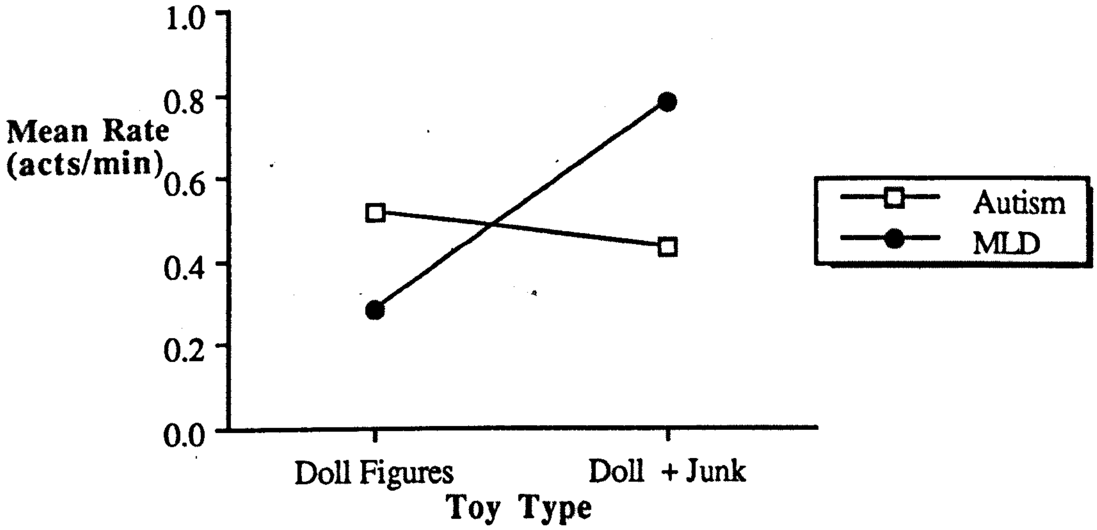
All three main effects were significant. The main effect of Group reflected a lower rate of total act production (symbolic, intermediate symbolic, functional and manipulative acts) amongst the children with autism. The main effect of Condition was due greater act production under elicited conditions, and the main effect of Toy Type reflected greater act production with the doll figures than with the doll plus junk. No interactions were significant.

Symbolic Play

There was no significant main effect of Group, but again there was a significant main effect of Condition, symbolic acts occurring more frequently under elicitation. The Group x Condition interaction was not significant.

The main effect of Toy Type was not significant, though there was a trend for more symbolic acts to be produced with the doll plus junk. The Group x Toy Type interaction was significant, reflecting a significant effect of Toy Type for the children with MLD ($F=27.93$, $df=1$, $P<0.01$), but not for the children with autism. Similarly there was a significant effect of Group on the doll plus junk materials ($F=3.95$, $df=1$, P, 1-tailed=0.03), but not on the doll figures set. See graph 4.3. The significant Group x Condition X Toy Type interaction reflects the fact that children with MLD alone experienced an effect of elicitation on their rate of symbolic act production with the doll plus junk materials, but not with the doll figures. The Condition x Toy Type interaction was not significant.

Graph 4.3. Rate of symbolic act production: Group x Toy Type interaction

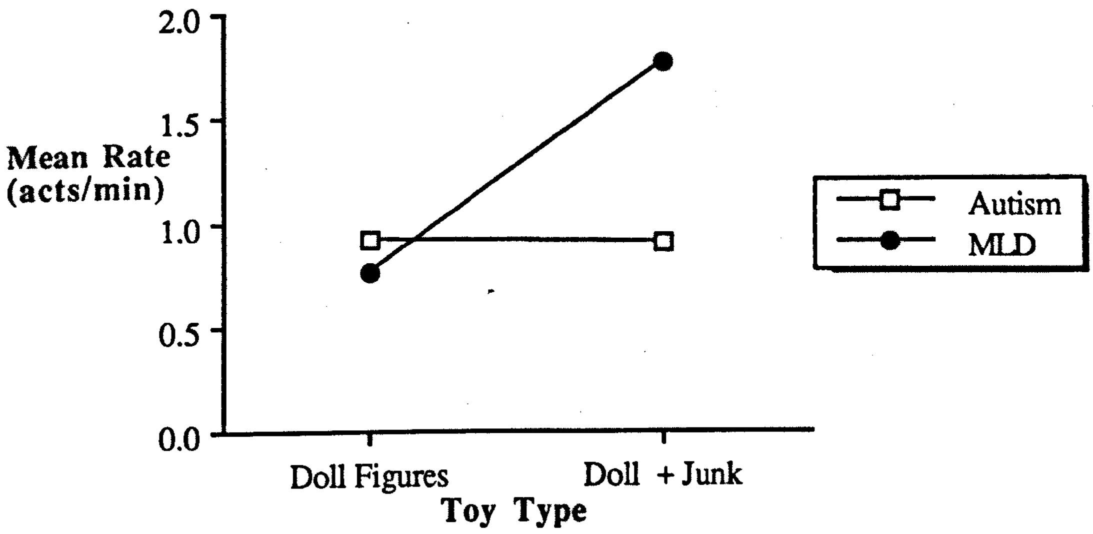


Symbolic plus Intermediate Symbolic Play

Including intermediate symbolic acts in the analysis increases the significance of the main effect of Group. In this case there is a trend towards an impaired rate of act production amongst the children with autism. As before there was a significant main effect of Condition, due to the effect of elicitation, but the Group x Condition interaction was not significant.

In this case the main effect of Toy Type was significant, less symbolic and intermediate symbolic acts were produced with the doll figures. The significant Group x Toy Type interaction was, as before, due to a significant effect of Toy Type for the children with MLD alone ($F=17.57$, $df=1$, $P<0.01$), and to a significant effect of Group on the doll plus junk materials alone ($F=9.02$, $df=1$, $P<0.01$). These differential effects are perhaps clearer in this analysis, see graph 4.4 (cf. graph 4.3). No other interactions were significant.

Graph 4.4. Rate of symbolic plus intermediate act production: Group x Toy Type interaction



Functional Play

The main effect of Group was not significant in this instance, though there was a clear trend for a lower rate of functional acts amongst children with autism. The main effect of Condition remained significant, again functional acts were produced more rapidly under elicitation. There was also a significant main effect of Toy Type; functional acts were produced over four times more frequently with the doll figures than with the doll plus junk. No interactions were significant.

Manipulative Play

The main effect of Group was not significant. The main effect of Condition was significant, due to a greater frequency of manipulative acts production in elicited play conditions. The main effect of Toy Type was not significant, but there was a trend for more rapid manipulative act production with the doll figures. No interactions were significant.

No Play

In this case the main effect of Group was significant, reflecting a greater rate of 'pausing' amongst the children with autism than the children with MLD as expected. The main effect of Condition was significant; surprisingly, pauses occurred more frequently under elicited conditions. This may reflect the fact that elicited play prompted the children into producing more acts of all play types, which were of relatively short duration, and consequently would be punctuated by more 'no play' episodes. The main effect of Toy Type was significant; 'pauses' occurred more frequently with the doll figures than with the doll plus junk. No interactions were significant.

4.24 Discussion

A clear pattern of results emerges from the two sets of analyses described above. Given the size of each analysis, and the number of findings presented, this pattern may not be entirely obvious, though it is worth noting that many of the effects described below can be picked out from figures 4.1 and 4.2. The trends and effects obtained will therefore first be summarised, before discussing their implications as regards the research questions outlined initially.

Comparing elicited with spontaneous play revealed that elicitation prompted children to spend more of their time in symbolic (and intermediate symbolic play), at the expense of manipulative play. There was no effect of Condition on time spent in functional or no play, though children did not spend a great deal of time in these behaviours generally. Therefore, in terms of time spent in each behaviour, elicitation was successful in shifting children away from manipulative behaviour, to symbolic activity. However, intriguingly, children produced acts of each play type more rapidly under elicited conditions, even showing more no play, or pauses, in elicited play. Elicitation therefore also increased general levels of activity amongst children. Children produced all types of acts more rapidly under elicitation. This is true even of manipulative and functional acts, but as children do not spend longer in these forms of play under elicitation, these act must be shorter, and must be punctuated with longer and more frequent symbolic acts. The observed increase in rate of pausing must reflect this pattern of more frequent shorter acts; the more acts are produced the more children will stop in between them. Once again, if these pauses are short, it is possible for the rate of pausing to increase in elicited conditions, while the time spent 'not playing' decreases. The absence of any Group x Condition or Condition x Toy Type interactions indicates that these effects are general and robust. All children, with both toy sets, show greater general activity under elicitation, coupled with a specific shift away from time spent in manipulative play, to time spent playing symbolically.

Clear and stable Toy Type effects were also seen. Children spent more of their time in functional play, and in no play with the doll figures. More of these types of acts occurred with the doll figures also. In contrast more time was spent in symbolic (and intermediate symbolic) and in manipulative play with the doll plus junk materials. There was also a greater rate of symbolic (plus intermediate act production) with this set. Again there was a general absence of Group x Toy Type interactions, reflecting the stability of these effects. It is worth noting that these results clearly indicate that the doll plus junk materials is the more suitable toy set for the purposes of this experiment, as it maximises symbolic play, and minimises functional play (compare figures 4.1 and 4.2). One of the potential problems of Lewis and Boucher's (1988) study was the high levels of functional play amongst controls. They found that controls spent on average 30.5% of their time playing functionally. In this case similar levels of functional play are seen with the doll figures (the children with MLD spent 29.8% of spontaneous play in functional play with them), but controls spent only 1.6% of spontaneous play time in functional activity with the doll plus junk. This toy set at least succeeds in removing the potential problem of high levels of functional play in control children. A doll plus junk objects would therefore appear to be an ideal choice of material for use in any further investigations of symbolic play deficits. Conversely, doll figures might be an appropriate toy set for a study of functional play deficits in autism (see graph 4.2).

Of crucial importance is the pattern of group differences which emerges from the findings. Children with autism differed from controls in that they spent more of their time in manipulative play and in no play. They did not produce manipulative acts more rapidly than controls, but did show a greater frequency of pausing. It was also suggested that children with autism might show less functional play. This suggestion was confirmed; children with autism spent significantly less time in functional play than did controls, and there was a trend for them to produce fewer functional acts also.

Children with autism also spent less time in symbolic plus intermediate symbolic play. This difference was not significant when symbolic play alone was examined, but the absence of a main effect in this case can be explained by floor effects amongst controls. The children with MLD spent approximately only 6% of their time in spontaneous symbolic play. These low levels are largely due to the inclusion of the doll figures toy set, which as described above prompted relatively large amounts of functional activity. This toy set appears to be subject to the problem that beset Lewis and Boucher's experiment, namely that high levels of functional play reduce levels of symbolic play, and mask a significant group effect. Including intermediate symbolic acts in the analysis raises levels of control children's symbolic play sufficiently to allow a global group difference to be seen. However, a Group effect does emerge from the symbolic play only analysis, when the doll plus junk toy set alone is considered. As discussed, this toy set is not subject to the same problems as the doll figures, and hence it allows a significant Group effect to be clearly seen (see graph 4.1). Exactly similar effects are seen for symbolic play act production (graph 4.3). A final important point is that the absence of any Group x Condition interaction indicates that Group effects persist across both conditions.

Having outlined the pattern of results, it is now important to consider the implications of these findings. This experiment was initially designed to provide answers to three important research questions. These were:

1. Is the pretend play of children with autism impaired in spontaneous play conditions?
2. Is the pretend play of children with autism similarly impaired in structured (elicited and instructed) play conditions?
3. Is the ability to produce emotional and social pretence specifically impaired in autism?

Clearly the fact that the instructed play data were not analysed here, because of the inappropriateness of the original instructions, means that this experiment is not able to address the third of these questions, and can only provide a partial answer to the second one, by comparing performance in the elicited condition with that observed in spontaneous play. Experiment 2, described below, fills these gaps with a more appropriate examination of instructed symbolic play performance.

It is clear that the answer to question 1 is a firm 'yes'; children with autism do show significantly less symbolic play than matched controls in spontaneous conditions. Though the analysis of percentage time spent in symbolic play alone does not reveal a significant main effect of Group, this reflects artificially low levels of symbolic play amongst controls with the doll figures toy set. When the more appropriate doll plus junk toy set is considered a significant impairment emerges. Similarly removing floor effect in controls by including intermediate symbolic play in the analysis allows the impairment to be seen.

To the extent that it addresses the second question, this experiment also indicates that children with autism's ability to produce symbolic play is also impaired in structured conditions. There is no suggestion of a Group x Condition interaction such as would indicate that the impairment seen in the children with autism does not persist into elicited play. In fact, if anything, there is a suggestion that the symbolic play of controls benefits more from elicitation. This is shown by the significant Group x Condition x Toy Type interactions which emerged from the symbolic play percentage time and rate of act productions analyses, and which suggest that there is a differential effect of elicitation upon the symbolic play of the children with MLD with the doll plus junk toy set. While this would appear, at first sight, to be a blow for performance hypotheses, the absence of the Group x Condition interaction which these accounts predict is perhaps not necessarily surprising. The procedural difference between the spontaneous play and the elicited play conditions in this experiment was quite slight. In both conditions the child sat at a table with the experimenter and was encouraged to play with the toys on the table. In the free play condition further encouragement to play was given if the child turned to the experimenter for guidance. In the elicited play condition prompts to continue playing were given if the child stopped playing. Thus, although nominally assessing spontaneous play the 'free' play condition is, in fact, quite structured. In addition, the elicited condition is not as structured as it could be by, for example, requiring children to carry out instructed play acts. These criticisms of the elicited play conditions employed heighten the importance of properly investigating performance under highly structured play conditions by assessing instructed play (see Experiment 2).

These results confirm that children with autism do produce less spontaneous symbolic play than matched controls. It also indicates why Lewis and Boucher failed to find such an impairment in their (1988) study, confirming that too high levels of functional play amongst controls can mask a symbolic play deficit. The use of the doll plus junk toy set in particular was responsible for lowering levels of functional play in this instance, and this in turn can explain why this study differed further from Lewis and Boucher's in that it showed an elicited symbolic play deficit amongst the children with autism, and a clear functional play deficit also. Another possible reason for these discrepancies is that Lewis and Boucher's group of children with autism had a verbal mental age of 69 months. It is possible that the amount of symbolic play produced by this group was sufficient to compound the floor effects amongst controls caused by the toys available. The mean verbal mental age of the children with autism employed in this study was approximately 49 months[1]. That a clearer deficit emerged in this instance could be taken to suggest that Lewis and Boucher's sample were of an inappropriately high developmental level for an adequate test of a performance account of pretend play difficulties in autism (Baron-Cohen, 1989d). However, it

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[1]In fact the mean verbal mental age of this group is certainly lower than this value. Two children with autism were unavailable for subsequent testing on the BPVS, and these children were the least developmentally able of the group.

would seem rather that it was the materials employed in the original study that were primarily responsible for the pattern of results obtained.

In summary, this Experiment provides a firm answer to the first research question outlined initially, indicating that children with autism do suffer from impaired production of spontaneous symbolic play. The results also show that this deficit persists into the slightly more structured elicited play condition. However it remains to determine whether children with autism are impaired in their production of symbolic play in *highly* structured conditions.

4.3 Experiment 2

4.31 Introduction

As instructed play abilities were not properly tested in Experiment 1, the study was only able to provide a partial answer to the second of the three important research questions under consideration, and failed to address the third of these questions. The aim of this second experiment was simply to clear up these loose ends by adequately assessing children with autism's ability to carry out instructed pretence.

To ensure that, in this case, the methodology employed was valid, all the instructions used were carefully designed to require a symbolic response. It was felt that none could be carried out appropriately using a functional play act. Further, given the doll plus junk toy set's success in reducing functional play in Experiment 1, a similar set of materials were employed in this instance. Baron-Cohen's (1990) argument about the possibility of children guessing responses to instructions to pretend was countered by ensuring that children were never presented with a single prop for object substitution. Where object substitution was required a number of props were always presented, and an appropriate choice of prop was required. Finally, to examine potential emotional and social symbolic play deficits (Harris, 1989a), specific instructions of these types were included.

4.32 Method

Participants

The same two groups of participants who took part in Experiment 1 participated in Experiment 2, with the addition of one extra matched pair of children. The groups therefore consisted of 15 children each (see table 4.7 for details). The autistic group contained 3 girls and 12 boys while the MLD group included 5 girls and 10 boys. As before the groups were matched individually on the basis of their scores on the Derbyshire Language Scale, though BPVS scores are again given. The two groups did not differ significantly in their chronological ages (P=0.80, t-test), or BPVS scores (P=0.74, t-test).

Table 4.7. Experiment 2: Details of participants.

Group	*n*		BPVS Score (months)	CA (months)	DLS Level
Children with Autism	15	mean	48.2*	98.1	-
		SD	25.0	28.4	-
		range	13-89	47-147	2:4-10:22
Children with MLD	14	mean	45.4#	96.0	-
		SD	18.7	12.6	-
		range	27-93	75-121	2:4-10:22

*Two of the children with autism were unavailable for BPVS testing.

#One of the children with MLD was unavailable for BPVS testing.

Materials

In all cases a dolls house figure was available to the children. The other materials used varied with the type of instructions: physical, social and emotional. For physical instructions some of the junk objects employed in Experiment 1 were used again; these were a piece of tissue, a ball of blu-tac, a plastic rod, a picture hook, a freezer bag tie and a small plastic football adapter. For 'social' instructions a dolls house 'mother' figure and a playmobile 'baby' figure were presented along with the usual 'child' figure. The materials used for 'emotional' instructions were a playmobile dog, a present (matchbox covered in wrapping paper) and a playmobile 'boy' figure.

Procedure

Each child was given twelve instructions, four physical, four social and four emotional. The instructions are shown in table 4.8. The instructions themselves were designed to elicit symbolic object substitution using these objects, and the non-functional nature of these materials ensured that any object substitution they appeared to be involved in could be assumed to constitute pretence. In order to ensure that appropriate responses to the social questions would necessarily involve pretence, another figure was presented in order to allow for the 'passage' of imaginary objects between the two actors.

The instructions were given one set at a time, but the order of presentation of each set was systematically varied. The order of presentation of the four instructions within each set was also randomised.

Table 4.8. Instructions used

Instruction Type	Instructions
Physical	Make the boy jump over a puddle
	Make the boy sit on a chair
	Make the boy throw a stone
	Make the boy eat a biscuit
Social	Show me how mummy feeds the baby
	Show me how mummy gives the boy a sweet
	Show me how the boy throws a ball to mummy
	Show me how the boy looks at a book with mummy
Emotional	Show me how the boy can be scared of the dog
	Show me how the boy can be excited about the present
	Show me how the boy can be sad about losing the present
	Show me how the boy can be angry with someone

Response Coding Scheme

The responses to each instruction were divided into three categories: pass, intermediate pass and fail. To pass the child had to perform an appropriate act that clearly involved pretence. Intermediate passes were those which did not clearly involve pretence or were not obviously appropriate to the instruction. If the child made an inappropriate response, or offered no response at all this was coded as a fail. The criteria used for rating each set of responses are given in table 4.9.

Table 4.9. Scoring criteria

Instruction Type	Rating	Criteria
Physical	Pass	Clear, appropriate action with object substitution
	Intermediate	Appropriate action without use of an object
	Fail	Inappropriate or no action
Social	Pass	Appropriate action with both figures employed
	Intermediate	Unclear use of both figures
	Fail	Only one figure used; inappropriate or no action
Emotional	Pass	Clear acting out of emotion or appropriate vocalisation
	Intermediate	Stating, e.g. "He's sad!"; unclear action
	Fail	Inappropriate or no action

Inter-rater reliability was obtained by an independent observer rating four randomly chosen videotaped sessions, two from each group of children, using the category definitions outlined above. The inter-rater reliability obtained was satisfactory (Cohen's Kappa = 0.72).

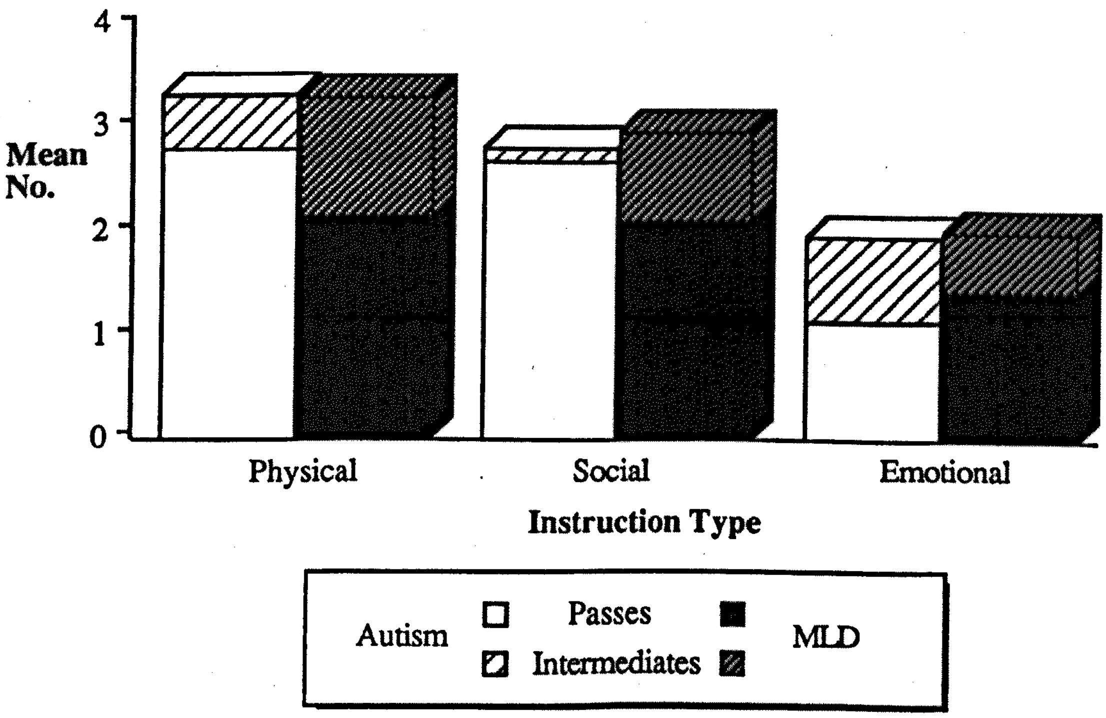
4.33 Results

Responses to the three types of instructions were analysed using two factor Anovas; the factors being Group (children with autism or MLD; repeated measures) and Instruction Type (physical, social or emotional; repeated measures). Two separate analyses were performed, one on the total number of pass responses, the other on the total number of passes plus intermediate passes. The mean number of responses in each category for each instruction type are given in table 4.10, and are also shown in graph 4.5.

Table 4.10. Mean number of responses

		Group	
Response Type	**Instruction Type**	Children with Autism	Children with MLD
Passes	Physical	2.80	2.13
	Social	2.67	2.07
	Emotional	1.13	1.40
Passes plus Intermediate passes	Physical	3.33	3.27
	Social	2.80	2.93
	Emotional	1.93	2.00

Graph 4.5. Group performances by Instruction Type



Number of passes

The analysis of number of pass responses yielded a significant main effect of Instruction Type ($F=8.92$, $df=2$, $P<0.01$). Emotional instructions were significantly harder to pass than physical or social ones ($P<0.01$; Tukey test). The main effect of Group was not significant ($F=1.69$, $df=1$, $P=0.21$), and in fact performance was superior amongst the children with autism (hence the use of 2-tailed P values), see table 4.10/graph 4.5. There was no significant Group x Instruction Type interaction ($F=1.49$, $df=2$, $P=0.24$).

Number of passes and intermediate passes

Including intermediate passes in the analysis made no difference to the form of the results. Again there was a significant main effect of Instruction Type ($F=14.62$, $df=2$, $P<0.01$), due to less success on the emotional instructions as before ($P<0.01$; Tukey test). The main effect of Group ($F=0.03$, $df=1$, $P=0.86$) and the Group x Instruction Type interaction ($F=0.08$, $df=2$, $P=0.92$) were not significant.

4.34 Discussion

The results of this second experiment show that the children with autism were not impaired in their ability to carry out instructed pretend acts, relative to the matched control group. In fact when passes alone are analysed the children with autism perform at a (non-significantly) higher level than the MLD children. This perhaps surprising finding is due to the MLD children producing more intermediate pass responses. When intermediate as well as clear passes are considered, there is essentially no difference in the performance of the two groups on any of the three types of instruction. The similarity in performance of the two groups cannot be explained in terms of 'guessing' responses; participants were forced to make an *appropriate* choice of prop from the selection before them. These results strongly suggest that the pretend play of children with autism is not impaired in highly structured situations.

The findings also appear to provide a clear answer to the question of whether children with autism have particular difficulties in producing social and emotional pretend play. The absence of

Group x Instruction Type interactions indicate that they do not have particular problems with these forms of pretence, at least not under highly structured conditions. This finding is consistent with the notion that emotion comprehension deficits are not seen in groups of autism matched to controls for verbal mental age, as are the children in this study (Ozonoff, Pennington & Rogers, 1990). It is also in line with suggestions that children with autism may be unimpaired in their recognition of simple emotions, but deficient in their understanding of more complex emotions such as pride and embarrassment (Capps, Yirmiya & Sigman, 1992). Baron-Cohen (1991b) has shown that children with autism are not impaired in their understanding of situations and desires as causes of emotion in the way that they are when beliefs are involved. The emotions acted out in this experiment are relatively simple ones, and do appear to be situational or desire-based. Similarly Baron-Cohen (1991c) has demonstrated that children with autism are unimpaired relative to controls in their ability to recognise basic social relationships and social reciprocity. It seems likely that this low-level social understanding provides the reason for the unimpaired performance on the relatively simple social instructions employed here.

It may be suggested that instructed play is not a test of pretend play ability but rather a test of language comprehension, and that since language matched groups were used in the present study unimpaired performance on an instructed play task was a foregone conclusion. However this would only be true if the psychological mechanisms underlying language acquisition and pretend play were identical, which they clearly are not. At the very least a child has to be able to select and substitute a lump of blu-tac for a toy ball, or a wrapped matchbox for a present, and enact an appropriate scenario utilising the substitute objects, over and above understanding the instructions "Show me how the boy throws a ball to Mummy" / "Show me how the boy can be sad about losing the present". Instructed play is maximally structured in that it does everything for the child except tell him or her how to carry out the pretence: it puts strong pressure on the child to play, it provides an idea for play, but it does not indicate how the instruction should be carried out with the available materials.

Even if language comprehension and carrying out a pretend play instruction used the same psychological mechanisms, ensuring that children with autism carry out instructed play as successfully as language matched controls, the impaired performance of children with autism in spontaneous play situations would still need to be explained.

4.35 A Comparison Of Performance Across Experiments 1 And 2

In order to compare children's performance on instructed play in this experiment with their performance on the free play test carried out in Experiment 1, the scores obtained by matched pairs of participants in both experiments (excluding the pair of children who only took part in experiment 2) were compared. For Experiment 1 the percentage time spent in symbolic plus intermediate symbolic play across both play conditions was taken as a measure of performance. For Experiment 2 the total number of passes and intermediate passes for each instruction type were compared. In each case pairs of children were divided on the basis of whether the child with autism had performed as well, or better than their matched control, or whether they had performed less well. The distributions obtained are shown in table 4.11, and were found to be significantly different (Chi^2=4.44, df=1, P=0.04), the children with autism improving significantly more over the two conditions than did controls.

Table 4.11. Comparison of matched pairs' performance across experiments 1 and 2

	Spontaneous & Elicited Play	Instructed Play	
Child with autism performs as well or better than control	3	9	*12*
Child with autism performs less well than control	11	6	*17*
	14	*15*	*29*

4.4 Conclusions

Three research questions were identified at the beginning of this chapter. These were:

1. Is the pretend play of children with autism impaired in spontaneous play conditions?
2. Is the pretend play of children with autism similarly impaired in structured (elicited and instructed) play conditions?
3. Is the ability to produce emotional and social pretence specifically impaired in autism?

Experiment 1 answered the first of these questions, showing that children with autism spent less time playing symbolically than did matched controls in spontaneous play conditions, and also produced a lower level of symbolic acts. It also attempted to address the second question, but in this case the implications of the various findings were less clear. There was no doubt that children with autism were significantly impaired in the amount of time they spent in symbolic play under elicited conditions. However, the degree of structure in what were essentially conditions of weak elicitation differed little from that in fairly constrained 'spontaneous' conditions. In retrospect this was unfortunate, and means that a comparison of spontaneous and elicited play is not a strong test of performance and competence predictions as it might be.

Experiment 2 was able to provide a stronger test, as it tested instructed play. The results of this experiment provide a clearer answer to the second research question, it appears that children with autism are not impaired in their production of symbolic play under highly structured conditions. It also addressed the third question and indicated that producing emotional and social pretence is not particularly problematic for children with autism.

These answers go some way towards separating performance and competence explanations of children with autism's characteristic difficulties in pretence. Recall that both sets of hypotheses predict impaired spontaneous pretend play in autism. This was found in Experiment 1. However a competence deficit account predicts impaired structured pretence, while a performance account predicts unimpaired structured pretend play. The results of the instructed play tests in Experiment 2 indicate that highly structured pretend play is not impaired in autism. In addition the comparison of performance in these instructed tasks with the results of the free play assessment in Experiment 1 indicate that children with autism benefit significantly more than language matched controls from being required to produce pretend play in a highly structured situation (see Table 4.11). This finding is striking in view of the fact that the 'free' play situation used in Experiment 1 was in effect already moderately structured. These findings therefore generally support the hypothesis that the lack of spontaneous pretend play regularly observed in children with autism relative to language matched controls does not result from a competence deficit.

Chapter 5
Comprehension Of Pretence

5.1 Introduction

Experiments 1 and 2, described in chapter 4, provided clear evidence of the expected deficit of impaired spontaneous pretend play in autism. They also provided some evidence against a competence explanation of this deficit, in that they indicated that instructed pretend play was unimpaired in autism. However this evidence was not as strong as it might have been. In particular, elicited pretend play, rather than being clearly unimpaired, was found to be significantly impaired. The failure to observe unimpaired elicited pretend play, as predicted by performance accounts, could be explained in terms of the relatively weak structure of the elicited conditions, (see previous chapter). However, it would be desirable to provide further support for a performance deficit, so as to be able to confidently progress to attempting to identify what form such a deficit might take. The purpose of Experiment 3 was to look further into the question of competence and performance to see if this support would be forthcoming.

5.2 Experiment 3

5.21 Introduction

The aim of the present experiment was to clarify the question of competence or performance deficits in pretend play in autism by attempting to tap directly into any pretend capabilities that might be present in children with autism. One thing that all studies of pretend play in autism have in common is the fact that they have all investigated *production* of pretend play. If children with autism do indeed have intact competencies for pretence that they find difficult to exhibit this may not be the best way to approach an assessment of these abilities. A more suitable strategy would be to investigate these children's understanding of pretence, thereby removing any problems that might be associated with production itself.

Harris and Kavanaugh (1993) have recently developed a method of assessing comprehension of pretend acts in young children (see subsection 1.24). With the aid of a 'Naughty Teddy' hand puppet, they acted out scenarios in which pretend substances were deposited on an unfortunate toy animal, and assessed understanding of pretence by questioning the children about the nature and consequences of Naughty Teddy's actions. Children as young as 3 years of age found this task relatively easy. Given the simplicity of this task it was decided that it would be an appropriate way in which to assess comprehension of pretence in children with autism. This study was designed with the help of Paul Harris, and builds on Harris and Kavanaugh's procedure.

5.22 Method

Participants

Groups of children with autism and of children with MLD were again assessed in this study. The groups consisted of 12 children each, all drawn from the groups employed previously in Experiment 2 (see table 5.1 for details). The autistic group contained 2 girls and 10 boys while the MLD group included 5 girls and 7 boys. As before the groups were matched individually on the basis of their scores on the Derbyshire Language Scale, though BPVS scores are again given. The two groups did not differ significantly in their chronological ages (P=0.51, t-test), or BPVS scores (P=0.90, t-test).

Table 5.1. Experiment 3: Details of participants.

Group	n		BPVS Score (months)	CA (months)	DLS Level
Children with Autism	12	mean	48.7	92.8	-
		SD	24.5	26.6	-
		range	22-89	47-135	2:11-10:22
Children with MLD	12	mean	49.9*	98.4	-
		SD	20.1	12.2	-
		range	30-93	84-125	2:11-10:22

*One of the children with MLD was unavailable for BPVS testing

Materials

The various play episodes all involved the pouring or tipping of a substance from an appropriate container (literally or non-literally) onto a target figure. (See below for full details). Two target figures were used, a dog and a horse. These were playmobile figures and were both brown in colour. The acts themselves were carried out by 'Naughty Teddy', a Sooty glove puppet. The containers used were orange squash bottles, tea-pots, flour bags, honey-pots, toothpaste tubes and squeezy tomato ketchup bottles. Two of each type of container were employed, one containing the appropriate substance, one empty.

Procedure

Testing was carried out in a single session. Children were assessed individually, usually in a quiet room with only the experimenter present. However in three cases it was not possible to take the children to another room and these children were tested in a quiet corner of their classroom. These sessions were videotaped for later analysis. The experiment itself consisted of six play episodes (see table 5.2). As mentioned above, each episode involved Naughty Teddy pouring or tipping a substance onto a target animal. The set of episodes were presented twice, once in pretend mode where the containers used were empty, and once in literal mode where the containers held the appropriate substance, which was actually poured over the target. A different target animal was used in each set of episodes. The order of presentation was varied, half of each group receiving pretend episodes first, the other half receiving literal episodes first. In addition the order of presentation of the six episodes in each set was randomized. The literal mode was included in the experiment to test children's ability to name the substances involved and to describe the results of Naughty Teddy's actions. It would obviously be important to show that if one group performed poorly on the pretend episodes then this was not simply due to a lack of appropriate vocabulary.

After each play act three questions were asked. The first was a *Substance* question, "What did Naughty Teddy put on the (target's) head?". This question was designed to test children's ability to comprehend the pretend act on the simple level of identifying the pretend substance poured from the container. The second was an *Outcome* question which varied depending on the substance used (see table 5.2). The purpose of the Outcome questions was to test a more complex level of understanding, specifically children's ability to understand the pretend consequences of the pretend act. Outcome questions took the form of a forced choice, for example in Episode A where orange is poured on the target, children were asked "Is the (target) wet or dry now?". The forced choice of alternatives was designed so that in the pretend mode children were given a choice between the pretend state of affairs (e.g. wet) and the target's literal physical state (e.g. dry). In episodes E and F this choice was based on colour, it was therefore important that both target animals were brown. Finally a *Mode* forced choice question was asked, "Did Naughty Teddy put *real* (substance) on the (target) or *only pretend* (substance)?". The purpose of the Mode questions was to test children's ability to reflect on the pretend status of the acts presented to them.

Table 5.2. Action, substance, container and Outcome question in the six play episodes

Episode	Action	Substance	Container	Outcome Question
A	Poured	Orange	Bottle	Wet/Dry
B	Poured	Tea	Tea pot	Hot/Cold
C	Poured	Flour	Bag	Messy/Clean
D	Poured	Honey	Pot	Sticky/Dry
E	Squirted	Toothpaste	Tube	White/Brown
F	Squirted	Ketchup	Bottle	Red/Brown

It was felt that if children failed to understand the forced choice questions, that they might simply resort to echoing the last of the two alternatives offered. In order to prevent this strategy allowing children to achieve a perfect score, the structure of these questions was varied so that in three episodes the appropriate pretend answer came first while in the other three it came second. In the case of the Outcome forced choice questions the appropriate pretend alternatives were second in episodes B, C and F. In the case of the Mode questions the appropriate pretend choices were second for episodes A, C and E.

The children's answers to the three questions posed following each episode were divided into three categories; Correct, Incorrect or No response. A Substance answer was rated as Correct if acceptably close to the actual substance, for example "Jam" was accepted for Honey (see table 5.3 for a list of acceptable Substance responses). It should be noted that neither response to an Outcome question following a pretend episode can be classed as being incorrect as such, a child who answers that the target is "dry" after having pretend orange poured over it is simply reporting the literal state of the target. However for the purpose of this investigation the pretend alternative was classed as being 'correct'. The total number of correct responses to each of the three question types (max. 6) was recorded for both the pretend and the literal episodes.

Table 5.3. Accepted Substance Responses

Episode	Accepted Responses
A	Orange, Juice, Water
B	Tea, Coffee, Water
C	Flour, Sugar, Powder
D	Honey, Jam, Marmalade
E	Toothpaste
F	Ketchup, Sauce

5.23 Results

The mean number of correct responses given by each group, for each episode mode, and for each of the three test questions are shown in table 5.4 below. The results were analysed separately for each of the three question types; in each case a four factor Anova design was employed. Factors were Group (Children with Autism or with MLD), Order of presentation (Literal first or Pretend first), Mode (Literal or Pretend) and Episode (A, B, C, D, E or F). The Order factor was included because it was suspected that children receiving the pretend episodes second would perform better on the pretend questions than those receiving them first, simply because they remembered the responses they had given in the preceding literal episodes. The Group and Order factors were independent[1], repeated measures were taken on the Mode and Episode factors. The results of the three separate analyses are summarised in table 5.5.

[1]It was not possible to employ repeated measures on the Group factor in this instance, as there were cases when a child's individual match in the other group did not receive the same order of presentation of conditions. Further, matches did not receive the same order of Episodes and therefore can only be treated as independent.

Table 5.4. Mean number of correct responses by group, for literal and pretend test questions.

	Literal Episodes			Pretend Episodes		
Group	Substance Q	Outcome Q	Mode Q	Substance Q	Outcome Q	Mode Q
Autism	5.00	4.50	3.75	3.50	3.00	3.00
MLD	5.17	4.58	3.83	4.58	3.17	3.33

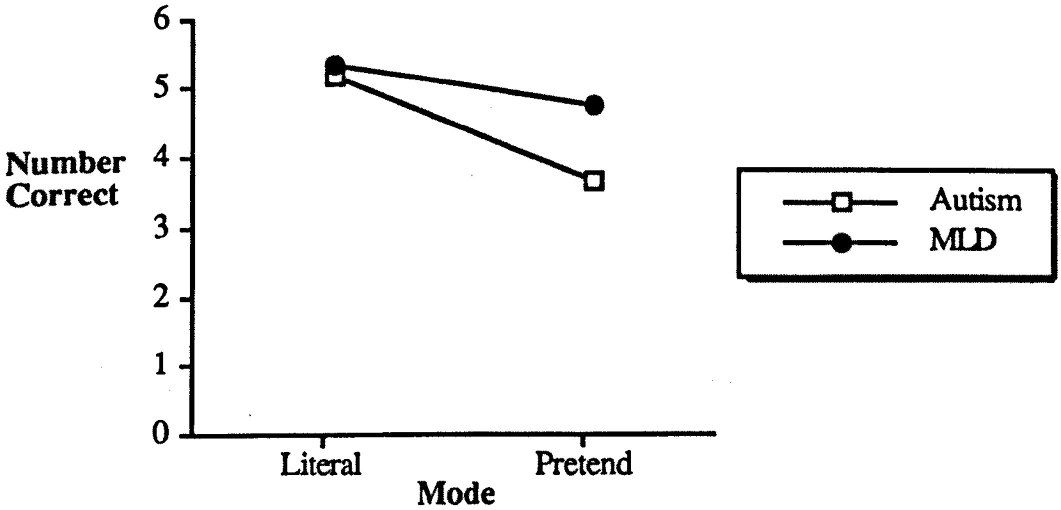
Table 5.5. Results of 4 Factor Anova Analyses for each Question Type

		Substance Q.		Outcome Q.		Mode Q.	
Source	**df**	F	P	F	P	F	P
Group (G)	1	0.70	0.41	0.04	0.85	0.093	0.76
Order (O)	1	1.29	0.27	2.90	0.10	4.29	**0.05**
GxO	1	0.39	0.54	0.03	0.86	1.48	0.24
Mode (M)	1	19.15	**<0.01**	15.61	**<0.01**	2.08	0.16
GxM	1	3.71	0.07	0.01	0.91	0.08	0.78
OxM	1	0.50	0.49	3.19	0.09	0.31	0.58
GxOxM	1	0.42	0.52	3.19	0.09	0.00	0.99
Episode (E)	5	0.22	0.95	3.43	**<0.01**	1.36	0.24
GxE	5	0.38	0.86	1.26	0.29	1.74	0.13
OxE	5	1.83	0.11	0.90	0.48	1.27	0.28
GxOxE	5	1.26	0.29	1.66	0.15	0.99	0.43
MxE	5	0.31	0.91	0.99	0.43	12.40	**<0.01**
GxMxE	5	0.49	0.78	0.55	0.74	0.38	0.86
OxMxE	5	1.70	0.14	0.52	0.76	0.40	0.85
GxOxMxE	5	1.21	0.31	1.52	0.19	0.12	0.99

Substance Question

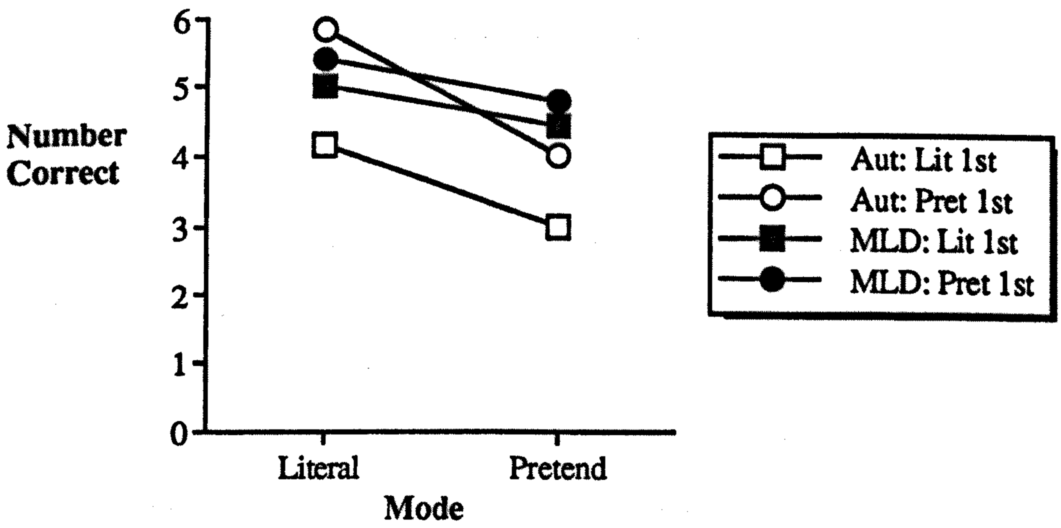
The analysis of number of correct responses to the Substance questions, "What did Naughty Teddy put on the (target's) head?", revealed a significant main effect of Mode, fewer correct responses were given to Substance questions following pretend episodes than those following literal episodes. The main effect of Group was not significant, but the Group x Mode interaction approached significance. Post hoc tests revealed that this reflected differential effects of Mode on the two groups ($F=19.86$, $df=1$, $P<0.01$, children with autism; $F=3.00$, $df=1$, $P=0.10$ for children with MLD). It should be noted however that the effect of Group on number of correct responses given in the pretend mode was not significant ($F=1.62$, $df=1$, $P=0.22$). The mean number of correct responses to the Substance questions for each group and mode are shown below in graph 5.1.

Graph 5.1. Mean number of correct Substance responses for each group and episode mode.



The main effect of Order of presentation of episodes was not significant, in fact there was a trend for performance on the pretend Substance questions to be better when the pretend episodes preceded the literal ones rather than vice-versa (mean responses: 4.40 pretend then literal, 3.61 literal then pretend) (see graph 5.2). There was also no main effect of Episode, and no other significant interactions.

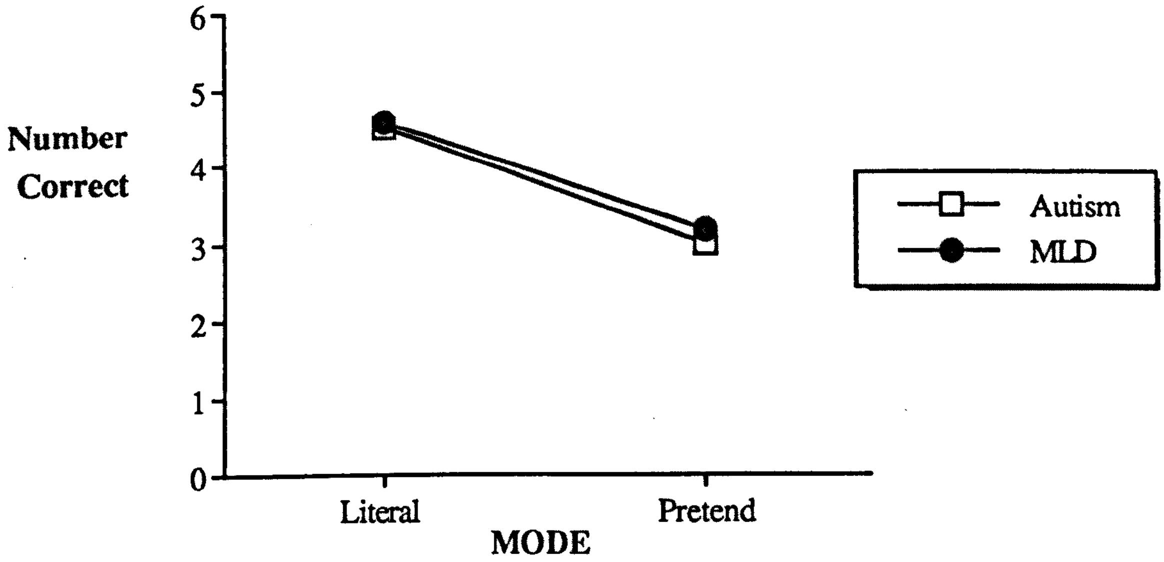
Graph 5.2. Effect of Order of presentation on responses to Substance questions, for each group and mode.



Outcome Question

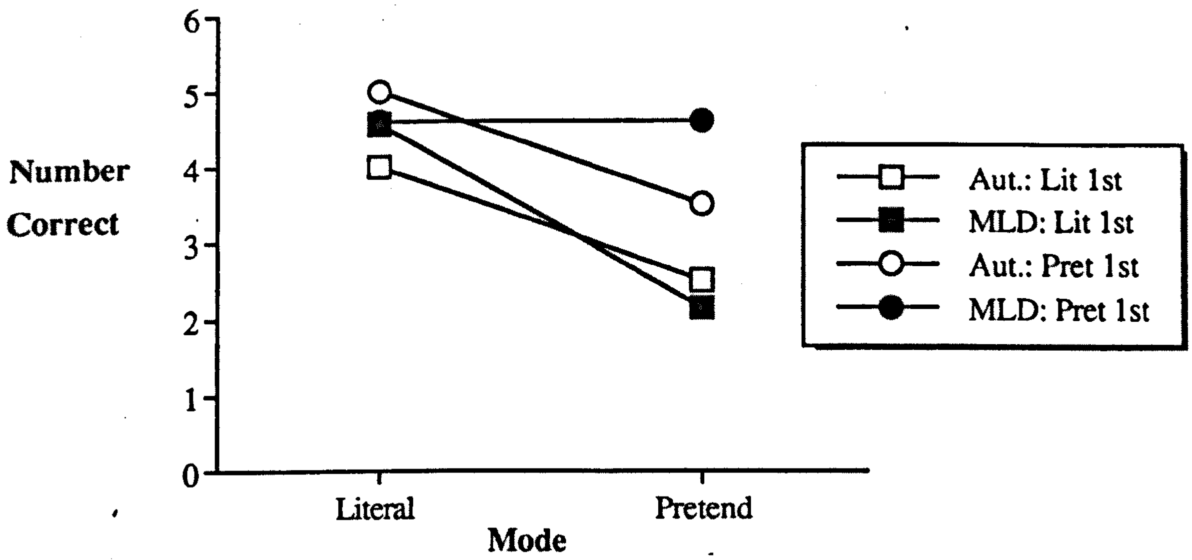
Analysis of the number of correct responses to the Outcome questions e.g. "Is the (target) wet or dry now?" again revealed a significant effect of Mode due to fewer correct answers to Outcome questions following pretend episodes. There was no significant main effect of Group and no significant Group x Mode interaction. The mean number of correct responses for each group and mode are shown below in graph 5.3.

Graph 5.3. Mean number of correct Outcome responses for each group and episode mode.



The main effect of Order of presentation of episodes approached significance, as did the Order x Mode and Group x Order x Mode interactions. These trends reflect an effect of Order on performance in the pretend mode; as before performance on the pretend questions tended to be better when the pretend episodes preceded the literal ones (mean responses: 4.00 pretend then literal, 2.31 literal then pretend). Interestingly, the effect of Mode (poorer performance in the pretend mode in general) was not apparent within the MLD group when the pretend questions preceded the literal ones. These potentially confusing trends are best illustrated graphically, see graph 5.4.

Graph 5.4. Effect of Order of presentation on responses to Outcome questions, for each group and mode.

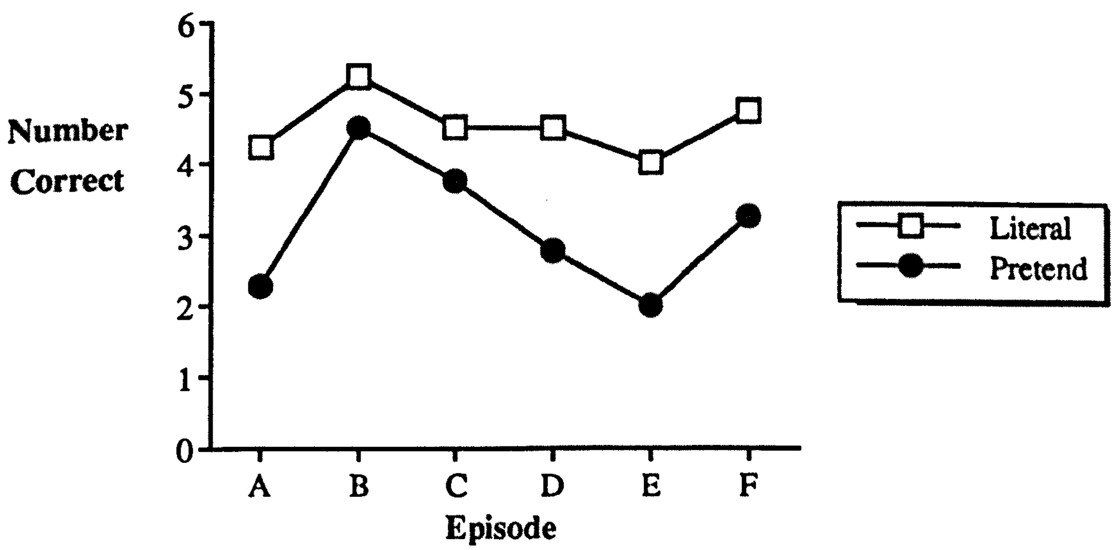


In this case the main effect of Episode was significant. This was due to significantly higher scores in Episode B (pouring tea) than in Episodes E (squeezing toothpaste) and A (pouring orange), ($P<0.01$, <0.05 respectively; Tukey tests).

It should be remembered that the Outcome question took the form of a forced choice. The order of the two options in the choice, literal outcome and pretend outcome, were alternated to ensure that a strategy of simply repeating either the first or the second alternative would not result in a score of 6 correct. However it is still the case that children who had no understanding of the consequences of the pretend act, and who resorted to guessing, would score 3 out of 6 simply by chance. As both groups are scoring at around this level on the pretend Outcome questions (see table 5.3, graph 5.3) it could be argued that this cannot be taken as a reliable indication of comprehension abilities in either group. Indeed if a score of 3 represented floor performance it is possible that a real disparity in ability that exists between the groups would be hidden because the less able group adopted a guessing strategy.

It was predicted that children might simply echo the second of the forced choices offered. The effect of Episode found in the analysis of responses to the Outcome questions indicates that this form of strategic guessing was occurring. The design of the experiment was such that the order of the forced choice for each episode remains the same for both modes, though the order is varied between episodes. A correct response in the literal mode (e.g. "wet") is also correct in the pretend mode. Therefore if children from either group consistently adopted a strategy of repeating the second of the choices offered, a significant Episode effect would be found. Those episodes with the correct answer placed second (here episodes B, C and F) would produce higher scores than the three episodes with the incorrect attribution second (episodes A, D and E). The Episode effect found reflects exactly this pattern of results, see graph 5.5. Therefore, though the effect of guessing appears limited in the literal mode, it cannot be ignored in the pretend mode. The lack of any Group x Episode interaction indicates that both groups were equally subject to this effect.

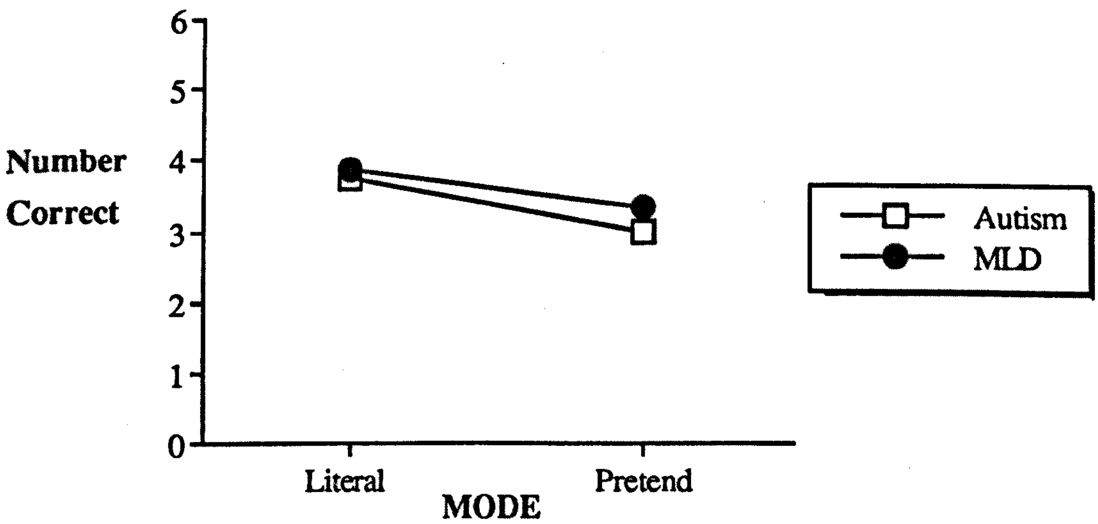
Graph 5.5. Effect of Episode on response to Outcome questions, for each mode (all groups)



Mode Question

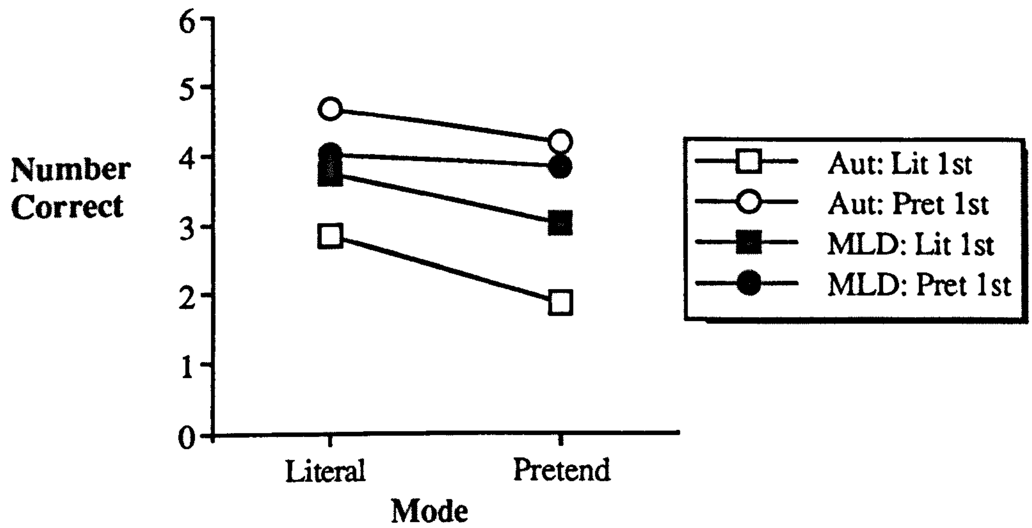
The analysis of correct responses to the final question "Did Teddy put real (substance) on the (target) or only pretend (substance)?" revealed no significant effects of Group or, in contrast to the previous two questions, of Mode, though there was a tendency for performance to be worse in the pretend mode. There was no significant Group x Mode interaction. The mean number of correct responses for each group and episode mode are shown in graph 5.6.

Graph 5.6. Mean number of correct Mode responses for each group and mode.



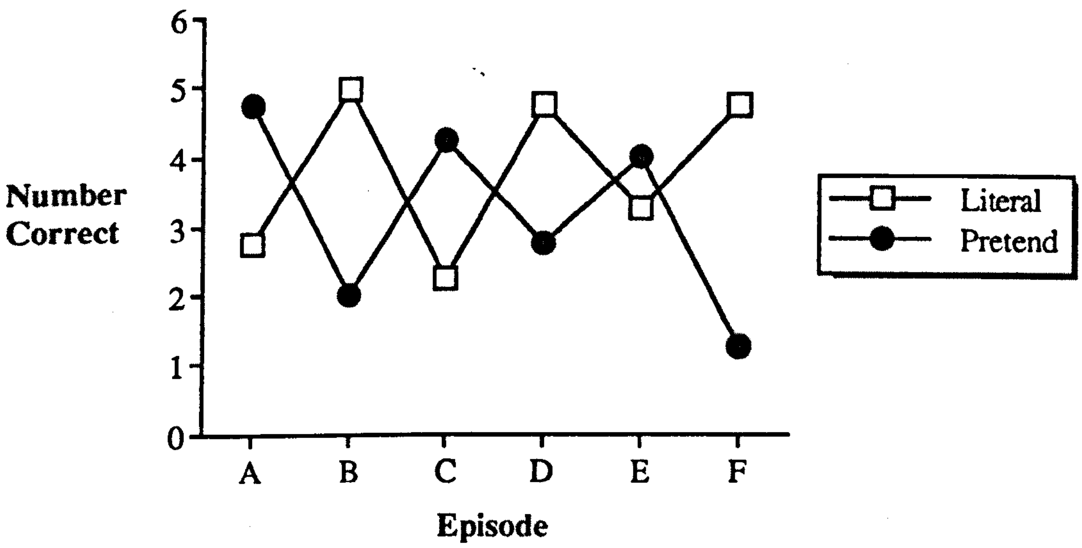
In this case the effect of Order of presentation was significant; children who received the pretend episodes first performed better than those receiving the literal episodes first (see graph 5.7). The effect of Episode was not significant, but there was a significant Mode x Episode interaction (See explanation below). No other interactions approached significance.

Graph 5.7. Effect of Order of presentation on responses to Mode questions, for each group and mode.



It was my firm impression that both groups of children had some trouble in understanding what was required by this particular question. It also seemed clear that children were often guessing their responses (graph 5.6 shows that scores deviate little from the chance value of three). It appeared that children were again employing an echolalic guessing strategy. As with the Outcome question the position of the forced-choice alternatives in the question structure was controlled for, however in this case a correct answer in the literal mode (e.g. "real orange") becomes incorrect in the pretend mode, and vice versa. In Episodes B, D and F the 'real' alternative came second, in Episodes A, C and E the 'pretend' alternative was second. Children responding echolalically would therefore be correct on Episodes B, D and F and incorrect on Episodes A, C and E in the literal mode. This pattern would be reversed in the pretend mode. Graph 5.8 shows that this reversal of the predicted pattern of results is exactly what emerged, and explains the Episode x Mode interaction found. Again the absence of a significant Group x Episode x Mode interaction indicates that both groups are equally reduced to guessing.

Graph 5.8. Effect of Episode on response to Mode questions, for each mode (groups combined)



5.24 Initial Discussion

The aim of this experiment was to provide evidence to support and strengthen, or to contradict and weaken, the findings of Experiments 1 and 2. Specifically it was intended that by focusing on comprehension, rather than production of pretence, this study would tap directly into underlying abilities for pretence, thereby removing possible performance difficulties. This allows us to predict that if children with autism do indeed suffer from some form of performance deficit, then there should be no difference between the groups in this study. Conversely if pretend play is impaired as the result of a competence deficit, then the manipulations in this experiment can do nothing to improve the performance of those participants with autism, and their understanding of pretence will be shown to be impaired.

What evidence emerges from the experiment to separate these two predictions? The first point is that two of the three experimental questions are clearly 'too hard' for both sets of children. Though it does appear that the outcome question is less difficult than the mode question, there is good evidence to suggest that an echolalic strategy is being employed by a number of children in each group. The similar patterns of performance of the two groups on these questions cannot therefore be taken as support for a performance deficit in pretend play in autism, though the children with MLD are equally as likely to guess their responses as the children with autism.

The only question which can therefore shed light on the question of performance or competence is the Substance question, and here the results are equivocal. The experiment necessarily included a test of participants' abilities to name the substances involved. Table 5.4 (and graph 5.1) indicate that both groups were equally able to describe the real substances used. This is an important result, as it implies that any impairment in either group in the pretend episodes cannot be attributed to a lack of appropriate vocabulary. Despite having, in a sense, controlled for these factors, we must still concentrate on comparing performance in the pretend mode of presentation. While no Group effect emerged from the analysis, it is really a Group x Mode interaction, reflecting impaired pretend but not literal comprehension, that would prove more interesting.

This interaction is clearly close to significant, and had a one-tailed test been employed (and many would argue for a predicted impairment in the group of children with autism) significance would be reached. It should be recalled that post-hoc examination of effects revealed that this interaction was not due to significantly poorer performance amongst the group of children with autism on the pretend Substance questions ($P=0.22$, 2-tailed), but the result of a greater effect of Mode on this group. In other words the children with autism suffered more from the change from literal to pretend episodes than the children with MLD. While it might be stretching a point to cite this result as support for unimpaired comprehension of pretence in autism, the mean score of 3.50 amongst the children with autism does reflect substantial competence, and does not seem consistent with a global inability to comprehend pretence. In no cases did the children with autism answer literally, by claiming for example that the bottle, or the bag, had been put on the target's head. It does seem that they were answering in pretend terms when they were able to. It cannot be argued that those children with autism who received the pretend mode of presentation second were succeeding in this mode by simply echoing responses made in the literal mode, because of the absence of an Order effect (and indeed a tendency for the opposite pattern to occur).

To conclude, the validity of the study described here is undermined by the inability of both groups of participants to understand the Outcome and Mode questions. The Substance question alone does not provide enough information to separate the competence and performance accounts, and the study therefore fails to achieve its stated aim.

5.25 A Retest

There are essentially two weaknesses of Experiment 3, as described above. Firstly the Outcome and Mode questions were too difficult for the participant groups. A second problem was that results of the Substance question analysis were not entirely clear, a Group x Mode interaction approached significance. Two courses of action presented themselves in the light of these problems, the first was to redesign the experiment in an effort to simplify the questions involved, the second was to expand the initial test and to use the same methodology with developmentally more able children. The later option was adopted, as it seemed unlikely that simpler questions than those already employed could be devised without weakening the experiment's power to test true comprehension of pretence. As well as testing developmentally older children it was decided that the size of the groups should be enlarged in the hope that equivocal results such as the Substance question Group x Mode interaction would be clarified one way or the other. It was also decided to employ a control group of normal children in the retest. The extent of guessing in the initial run of the experiment was surprising in the light of Harris and Kavanaugh's (1993) work, so including a normal control group might indicate whether guessing reflected a particularly difficult procedure, or the use of developmentally disabled children.

5.26 Method 2

Participants

The number of children with autism assessed in the retest of Experiment 3 was increased to twenty four. This group consisted of 5 girls and 19 boys. As before, all the children met the criteria for autism laid down by Wing and Gould (1979) and more recently Gillberg (1990b), namely the characteristic triad of impaired language development and use, impoverished social interaction and repetitive and stereotyped behaviour.

In addition the experiment included three other participant groups. These included a group of children with moderate learning difficulties (MLD) and a group of normal mainstream school children, both individually matched to the children with autism on the basis of receptive verbal mental age as measured on the British Picture Vocabulary Test. A fourth group was made up of children with moderate learning difficulties individually matched to children with autism by expressive verbal mental age as measured by the Renfrew Action Picture Test (1972). Eleven of the children with MLD were included in both matching groups, though there were only three cases when a child with MLD matched the same child with autism on both language measures

Two groups of children with MLD were included because of possible problems in matching children with autism on either language test alone. The BPVS measures vocabulary comprehension, which is often more advanced than other aspects of language in autism (Paul, 1987), and using the BPVS may therefore selectively disadvantage children with autism (Lewis & Boucher, 1988, see also subsection 3.15). Conversely the Action Picture Test (APT) requires a degree of inferential understanding; an ability which is known to be impaired in autism. Matching on this test may selectively advantage children with autism (as noted in subsection 3.15). Consequently it is argued that equating participant groups using the BPVS provides a strong test of hypotheses predicting unimpaired performance in children with autism, whereas use of the APT provides a strong test of hypotheses predicting impaired performance. Details of the participant groups are given in table 5.6.

The mean chronological age of the children with autism was not significantly different to that of either of the two groups of children with MLD (P=0.22, MLD group matched for APT; P=0.31 MLD group matched for BPVS; t-tests), but was significantly higher than that of the normal children (P<0.01, t-test). The APT scores of the children with autism and MLD group matched for APT did not differ significantly. Similarly the groups matched for BPVS scores did not differ significantly in their mental ages compared to the children with autism. The fact that the mean chronological age and mean verbal mental age of the normal children were similar (60.0 vs. 54.4 months) indicates that this group was one of average, and representative verbal ability.

Table 5.6. Details of participants for retest of Experiment 3

Group	*n*		CA (months)	APT Score	BPVS Age (months)
Autism	24	mean	104.0	26.4	54.5
		SD	28.9	5.7	21.1
		range	47-154	17.5-35.5	33-94
MLD Matched by APT	24	mean	113.4	26.4	
		SD	23.5	5.8	
		range	75-149	17-35.5	
MLD Matched by BPVS	24	mean	111.7		54.2
		SD	20.2		20.7
		range	80-149		33-93
Normal	24	mean	60.0		54.4
		SD	13.9		21.0
		range	44-96		31-94

As before, participants in each of the four groups were assigned to one of two subgroups, based on the order of episode presentation. Twelve children in each group received the pretend episodes followed by the literal episodes, the other twelve received the two sets in the other order. The matching of these subgroups was satisfactory, there were no significant differences in their BPVS or APT scores, and the chronological ages of the autistic and learning disabled subgroups did not differ from one another. The two normal subgroups were significantly younger than the other subgroups ($P<0.01$; t-tests), but did not differ significantly from each other. Subgroup details are given in table 5.7.

Table 5.7. Details of participant subgroups (means given)

Group		*n*	CA (months)	APT Score	BPVS Age (months)
Autism	Literal then Pretend	12	106.3	27.1	56.8
	Pretend then Literal	12	101.7	25.8	52.2
MLD by APT	Literal then Pretend	12	112.3	26.3	
	Pretend then Literal	12	114.5	26.5	
MLD by BPVS	Literal then Pretend	12	112.8		51.8
	Pretend then Literal	12	110.6		56.6
Normal	Literal then Pretend	12	62.3		52.3
	Pretend then Literal	12	57.8		56.5

5.27 Results 2

The mean number of correct responses given by each group, for each episode mode, and for each of the three test questions are shown in table 5.8. The results were analysed as before, a four factor Anova analysis was performed for each of the three question types. Factors were Group (Children with Autism, children with MLD matched by APT, children with MLD matched by BPVS or normal children), Order of presentation (Literal first or Pretend first), Mode (Literal or Pretend) and Episode (A, B, C, D, E or F). The Group and Order factors were independent[2], repeated measures were taken on the Mode and Episode factors. Additionally, in this instance post-hoc Scheffe tests were used to determine whether the performance of the children with autism on each question differed from that of controls (considered as a whole), both across literal and pretend episodes, and on the pretend episodes alone. The results of the three separate analyses are summarised in table 5.9.

Table 5.8. Mean Scores for each Group and Question Type

	Literal Episodes			Pretend Episodes		
Group	Substance	Outcome	Mode	Substance	Outcome	Mode
Autism	5.67	5.04	4.13	4.42	2.67	3.67
MLD-APT	5.58	5.38	4.71	4.38	3.38	3.92
MLD-BPVS	5.71	5.08	4.46	4.38	3.38	4.21
Normal	5.50	5.63	5.46	4.58	3.54	3.88

[2] As before it was not possible to treat the Group factor as a repeated measure, as order of condition and episode presentation was not controlled for across individual matches.

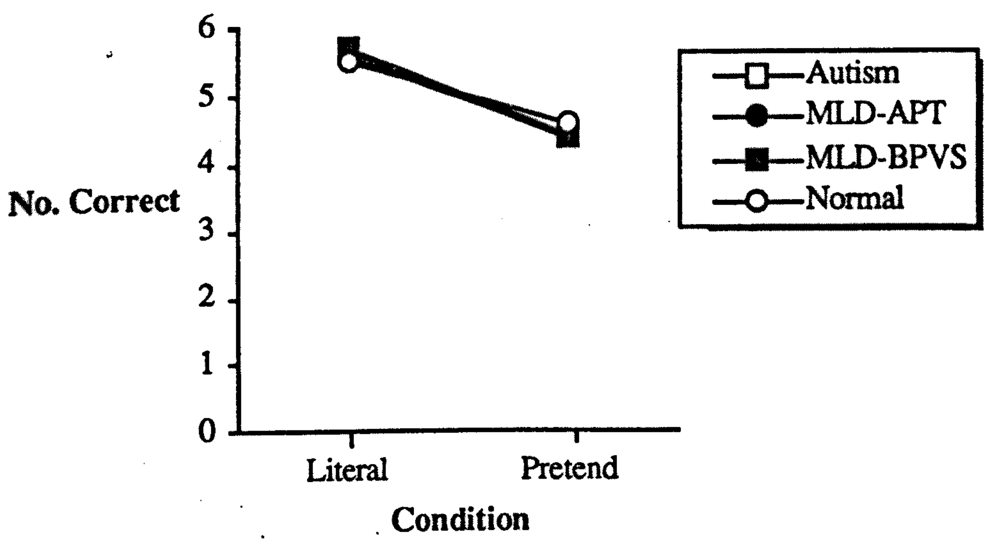
Table 5.9. Results of 4 Factor Anova Analyses for each Question Type

		Substance Q.		Outcome Q.		Mode Q.	
Source	**df**	F	P	F	P	F	P
Group (G)	3	0.02	0.99	1.36	0.26	1.12	0.35
Order (O)	1	1.17	0.19	6.93	**0.01**	3.41	0.07
GxO	3	0.06	0.62	1.55	0.21	1.24	0.30
Mode (M)	1	42.54	**<0.01**	77.93	**<0.01**	10.75	**<0.01**
GxM	3	0.25	0.86	0.35	0.79	1.55	0.21
OxM	1	0.40	0.53	6.49	**0.01**	0.13	0.72
GxOxM	3	0.89	0.45	2.15	0.10	1.68	0.36
Episode (E)	5	10.99	**<0.01**	0.89	0.49	1.63	0.15
GxE	15	1.15	0.31	0.84	0.63	2.48	**<0.01**
OxE	5	0.73	0.62	1.42	0.22	0.70	0.62
GxOxE	15	1.09	0.36	1.95	**0.02**	0.54	0.92
MxE	5	5.39	**<0.01**	3.69	**<0.01**	17.44	**<0.01**
GxMxE	15	1.43	0.13	0.95	0.51	1.06	0.40
OxMxE	5	1.94	0.09	0.38	0.86	1.21	0.30
GxOxMxE	15	0.60	0.87	0.64	0.85	0.66	0.82

Substance Question

The analysis of number of correct responses to the Substance questions, "What did Naughty Teddy put on the (target's) head?", revealed a non-significant main effect of Group. There was a significant main effect of Mode, fewer correct responses were given to Substance questions following pretend episodes. The Group x Mode interaction was not significant. Scheffe tests indicated that the children with autism did not perform significantly worse than controls on all episodes ($F(3,92)<0.01$, $P>0.99$), and on the pretend episodes ($F(3,92)<0.01$, $P>0.99$). The mean number of correct responses to the Substance questions for each Group and Mode are shown in graph 5.9.

Graph 5.9. Mean number of correct Substance responses for each Group and episode Mode.

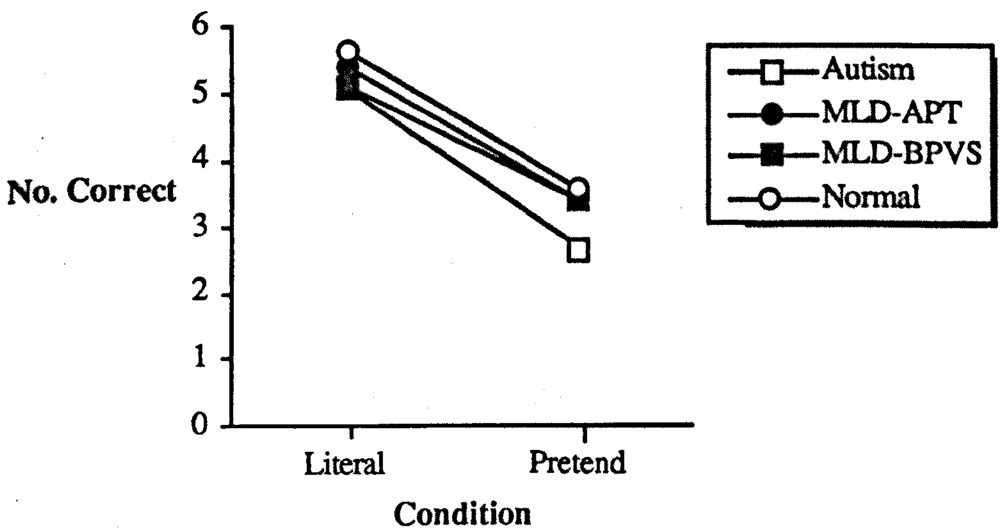


The main effect of Order of presentation of episodes was not significant, although there was a trend for performance to be better when the pretend episodes preceded the literal ones rather than vice-versa. There was a significant main effect of Episode; children found the substances particularly difficult to identify in Episode D (harder than episodes A, B, E and F, $P<0.01$, Tukey test) and in Episode C (harder than episode A, $P<0.01$, Tukey test). The Mode x Episode interaction was also significant, reflecting an effect of Mode (pretend episodes harder) in all cases except episode B. The Group x Mode x Episode interaction approached significance, indicating that the above Mode x Episode interaction was less marked in the group of children with autism. The Order x Mode x Episode interaction was also close to significance, this reflected the above order effect on certain episodes (E and F) in the pretend mode only. There were no other significant interactions.

Outcome Question

Analysis of the number of correct responses to the Outcome questions e.g. "Is the (target) wet or dry now?" again revealed a non-significant main effect of Group. The children with autism did produce the fewest correct Outcome responses. The normal children produced the most correct responses, but not significantly more than the children with autism. The main effect of Mode was significant; as with the Substance questions, fewer correct responses were given in the pretend mode of presentation. The Group x Mode interaction was not significant. Scheffe tests confirmed that the performance of the children with autism was not significantly different from that shown by all controls on all episodes (F(3,92)=1.06, P=0.37) or on the pretend episodes alone (F(3,92)=0.72, P=0.55). The mean number of correct responses for each group and mode are shown below in graph 5.10.

Graph 5.10. Mean number of correct Outcome responses for each group and episode mode.



The main effect of Order of presentation was significant. This effect mirrored the trend seen in the Substance question analysis, and was due to inferior performance when the literal episodes were presented first. The Order x Mode interaction was also significant, and indicated that this main effect of Order was more marked in the pretend mode. In other words performance on the pretend episodes was better if they were presented first, than if they succeeded the literal episodes. The Group x Order x Mode interaction approached significance, the above Order x Mode interaction was most marked amongst the two groups of children with MLD.

One of the major drawbacks of the initial run of the experiment was that children with autism (and the children with MLD) were scoring at chance levels. In that case this was due to strategic, echolalic guessing. Echolalic guessing was indicated by a significant main episode effect reflecting superior performance on those episodes where the 'correct' attribution came second (B, C and F), and inferior performance when it came first (A, D and E). Table 5.8 shows that the children in the retest were still scoring at around chance levels on the pretend Outcome questions. This low level of performance is partly caused by the Order effect described above, the subgroups of children receiving the literal episodes first performed particularly poorly on the subsequent pretend outcome questions. However, in the case of the children with autism for example, even those children receiving the other, less problematic order of presentation were still not performing at levels much above chance (mean score for this subgroup = 3.17, compared to 2.17 for the other subgroup of children with autism). It is therefore still important to investigate whether echolalic guessing was occurring in the retest, as it was in the original run of the experiment.

In this case the main effect of Episode emerging from the analysis was not significant, but there was a significant Mode x Episode interaction. This was due to an effect of Mode (worse performance in pretend mode) on all episodes except episode B, and importantly, was not due to an effect of Episode in one mode but not in the other. The Group x Episode interaction was not significant, and neither was the Group x Mode x Episode interaction. However the Group x Order x Episode interaction was significant. This three way interaction represented differential Group x

Episode interactions for the subgroups receiving the two different orders of episode presentation. This Group x Episode interaction was non-significant for the four subgroups who received the pretend episodes first and the literal episodes second (F=1.03, df=15, P=0.43) but was significant for the other subgroups who received the literal episodes followed by the pretend ones (F=1.76, df=15, P=0.04). In the latter case this was due to a significant effect of Episode amongst the group of children with MLD matched by the APT (superior performance on Episode A, inferior performance on Episode B) and also to inferior performance by the children with autism on Episode A. No other significant interactions emerged from the analysis.

These results suggest that very little strategic echolalic guessing is occurring. The Episode effect that would be expected if such a strategy were adopted is not found in the retest when taken as a whole, nor in either of the two modes of presentation. Nor is it evident in any of the four groups, when their performance as whole groups is considered. The only evidence for an Episode effect is amongst subgroups receiving different orders of episode presentation. Only those children receiving literal episodes followed by pretend episodes showed a significant (sub)Group x Episode interaction. The subgroup of children with autism did perform significantly less well on Episode A than the other subgroups, but not on Episodes D and E as would be predicted were they guessing echolalically. Even then this subgroup of children with autism did not show the expected Episode effect.

However the fact that children are not adopting a guessing strategy does not necessarily mean that they are not guessing responses at all; they could be doing so randomly. This does seem unlikely given the considerable evidence to suggest that they readily adopt an echolalic strategy when confused by the questions. However, to check whether random guessing was occurring children's performance on individual episodes across modes was investigated. If it was the case that children were scoring at around 3 out of 6 simply because some episodes were too hard to understand, it would be expected that children would be consistently incorrect on certain episodes (wrong in both literal and pretend modes) and consistently correct on others. Conversely if they were simply guessing responses the most likely pattern would be inconsistency across modes. The observed levels of consistency were compared with those predicted by random guessing using a Chi^2 goodness of fit test, see table 5.10. Two possible expected distributions were tested. One assumed random guessing for both literal and pretend episodes (probability of success = 0.5 in both cases), the other assumed guessing in the pretend mode only and used the mean scores actually obtained in the literal mode as the probability of success in that mode (e.g. 5.04/6 for children with autism, see table 5.8). The observed distributions were significantly different from those predicted by random guessing in both modes of presentation ($P<0.01$ for all groups). But only the normal children showed a pattern of responses that was significantly different from that predicted by guessing in the pretend mode alone ($P<0.05$[3]).

[3]Note one of the expected frequencies for the normal group in this case <5, however the observed distribution is still significantly different from the expected one if this cell is excluded.

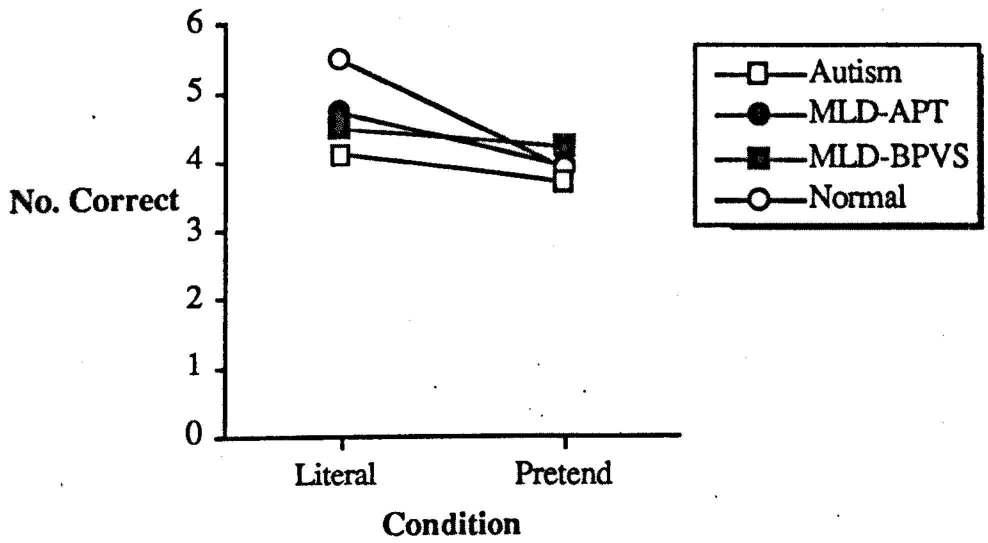
Table 5.10. Distribution of consistent and inconsistent responses to literal and pretend Outcome questions

Group	Distribution Type	Performance Across Modes (for each episode)		
		Consistently Correct	Inconsistent	Consistently Incorrect
Children with Autism	Observed	58	69	17
	Expected, guessing in both modes	36	72	36
	Expected, guessing in pretend mode	60.48	72.00	11.52
Children with MLD (APT)	Observed	76	60	8
	Expected, guessing in both modes	36	72	36
	Expected, guessing in pretend mode	64.56	72.00	11.52
Children with MLD (BPVS)	Observed	71	61	12
	Expected, guessing in both modes	36	72	36
	Expected, guessing in pretend mode	60.96	72.00	11.04
Normal Children	Observed	82	56	6
	Expected, guessing in both modes	36	72	36
	Expected, guessing in pretend mode	67.56	72.00	4.44

Mode Question

The analysis of correct responses to the final question "Did Teddy put real (substance) on the (target) or only pretend (substance)?" revealed no significant main effect of Group. As in the case of the previous two questions the main effect of Mode was significant, again due to poorer performance in the pretend mode. Once again post-hoc Scheffe tests indicated that the children with autism were not performing significantly worse than controls on all episodes ($F(3,92)=0.82$, P=0.48), or on the pretend episodes only (F(3,92)=0.16, P=0.93). There was no significant Group x Mode interaction. The mean number of correct responses for each group and episode mode are shown in graph 5.11.

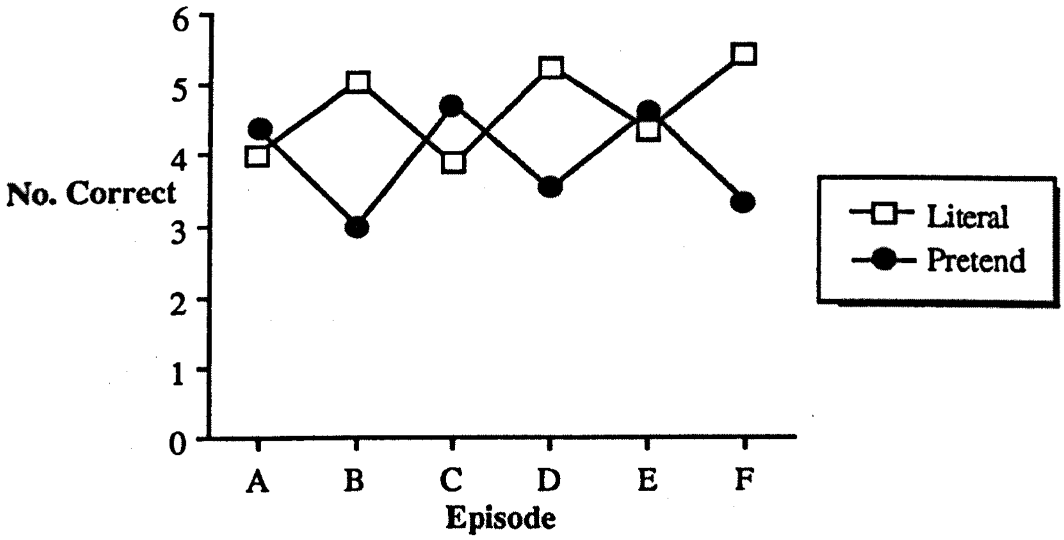
Graph 5.11. Mean number of correct Mode responses for each group and mode.



In this case the main effect of Order of presentation was not quite significant (P=0.07), but once again those children receiving the literal episodes first performed less well than those receiving the pretend episodes initially. The main effect of Episode was not significant, but there was a significant Group x Episode interaction. This was due to the children with autism performing significantly worse than the other three groups on Episode F.

As in the original run of the experiment the Mode x Episode interaction was significant. Again this was due to echolalic guessing amongst all groups. The interaction is caused by superior performance on Episodes B, D and F in the real mode and inferior performance on these episodes in the pretend mode (for these episodes the 'real' alternative comes second in the forced choice). Similarly for Episodes A, C and E where the 'pretend' alternative was second children perform well in the pretend mode and poorly in the literal mode, because they consistently select the second choice. Graph 5.12 shows that this reversal of the predicted pattern of results is exactly what emerged. The absence of a significant Group x Mode x Episode interaction confirms that all groups were equally likely to adopt this pattern of guessing. No other interactions approached significance.

Graph 5.12. Effect of Episode on response to Mode questions, for each mode (groups combined)



5.28 Discussion Of Retest

The major failings of the original run of the initial experiment were that children were reduced to guessing responses to the Outcome and Mode questions, and that the results of the Substance question could not clearly be interpreted as support for either a competence or a performance account. The aim of the retest was to circumvent these problems by using larger, developmentally more able groups of children. The size of each group was therefore increased from 12 to 24, the average verbal mental age of the groups was raised from around 4 years to 4 years 6 months, and three control groups as opposed to just one were employed. The extent of guessing in the original run was somewhat surprising. A control group of normal children was therefore included in the retest, partly to investigate whether the performance of the developmentally handicapped groups was in any way deviant for children of their verbal mental age.

The results of the retest show that the modifications made to the participant groups were partially, though not wholly, successful. The problematic Group x Mode interaction emerging from the original analysis of responses to the Substance question is now clearly non-significant ($P=0.86$). Further, guessing is no longer occurring in response to the Outcome questions. However, children are still forced to guess their answers to the Mode questions.

The fact that the normal control group's performance, across all three sets of questions, mirrors that of the other three developmentally handicapped groups indicates that these three non-normal groups are performing as expected for children of their developmental level. When guessing occurs in response to the Mode questions, the normal children are as likely to adopt this strategy as the other groups. This suggests that the surprising extent of guessing observed in response to the Outcome questions in the original run of the experiment was not itself 'non-normal'. Clearly this conclusion is inferred rather than proved: normal children were not used in the original run, but the inference is a strong one and raises questions about the differences between the current procedure and Harris and Kavanaugh's methods (see discussion below).

5.29 General Discussion

The main aim of this experiment was to build on the findings of Experiments 1 and 2, and further separate competence or performance accounts of impaired pretend play in autism. This was attempted by focusing directly on comprehension of pretence, with the intention that this would tap directly into underlying pretend abilities. As noted above this removes any possible 'performance' deficits which might be associated with the physical production of pretence. Therefore if children with autism do indeed suffer from some form of performance deficit, then there should be no difference between the groups in their ability to comprehend pretence. However if a competence deficit underlies children with autism's problems with pretence, their comprehension as well as their production of pretence will be impaired.

The retest of the experiment removed a number of problems emerging from the original run, and provides much clearer evidence to separate performance and competence accounts; so it is the results of the retest that will be discussed here. The first question to address is whether the children with autism employed in this study were impaired on any of the questions presented to them. The answer to this question must be a clear 'no'. In all three analyses, whether of responses to Substance, Outcome or Mode questions, no significant main effects of Group emerged to indicate impaired performance in the group of children with autism. More importantly, no significant Group x Mode interactions were found to indicate impaired performance in the crucial pretend mode. The use of post-hoc Scheffe tests to compare the performance of the children with autism on the pretend episodes with that of the combined set of controls confirms the general absence of group differences. In fact the only significant interactions involving Group effects were the Group x Order x Episode interaction in the Outcome analysis (indicating impaired performance in a subset of children with autism on one Episode only - see above) and the Group x Episode interaction in the Mode question analysis (due to impaired performance amongst children with autism on one Episode). These minor effects cannot really be taken as evidence of impaired comprehension of pretend play in autism.

A further point is that though children were clearly guessing their responses to the Mode question (the possibility that guessing was occurring in response to the Outcome question will be discussed further below), all children showed exactly the same pattern of guessing. The performance of children with autism in this experiment therefore mirrors that of controls extremely closely.

This similarity in performance of the groups cannot be explained in terms of superior vocabulary amongst children with autism compensating impaired pretend understanding, since the groups do not differ in their performance on the literal episodes either. Indeed the use of the BPVS to match two control groups guards against differences in vocabulary. Nor can it be the case that giving half of each group the literal episodes before the pretend ones artificially raised the performance of these subgroups on the pretend episodes, through the carrying over of responses, so as to prevent Group differences from being demonstrable. The fact that performance was generally worse when literal episodes preceded pretend episodes counters this suggestion.

This study therefore provides no firm evidence to suggest that the comprehension of pretence shown by children with autism is in any way deficient, relative to controls. However, this does not necessarily imply that comprehension of pretend play in autism is unimpaired. There are three criticisms that might be advanced to argue against drawing such an inference. Firstly, it might be claimed that unimpaired performance on the type of tasks employed here does not implicate the ability to comprehend pretend play 'proper'. Secondly, it might be argued that this study has failed to show competence amongst the children with autism anyway, given the extent of guessing seen amongst all groups in response to the Mode questions, if not also to the Outcome questions. A final, related, claim is that the poor performance seen in control groups on the Outcome and Mode questions, which is surprising in the light of previous research, raises questions about the particular methodology employed here which limit the conclusions that can be drawn from this study. These three potential criticisms will now be addressed in turn.

Fundamental to this experiment is the assumption that assessing comprehension of pretence removes potential production problems that might be present in autism. If this study is successful in demonstrating unimpaired comprehension of pretend play in autism, then it would seem that the characteristic absence of spontaneous pretend play seen in autism is due to some form of performance deficit. However, this conclusion is only valid if these two forms of pretence, the form assessed here, and that not seen in spontaneous conditions, amount to one and the same thing. Indeed it might be argued that this study taps something other than 'pretend play' as properly defined.

In particular, it could be argued that in answering the Substance question, children need not engage in pretence at all. They may be able to respond correctly by simply associating the container with its usual contents. The fact that receiving the literal Substance questions before the pretend ones did not do anything to increase performance on the latter set, suggests that the extent of any 'associative labelling' of this nature is limited; presumably the link between container and content would be stronger if it had already been demonstrated explicitly to the child. However, this particular criticism also begs questions about the nature of everyday pretence. Presumably children must take some account of the identity of the container if they are to ascribe an appropriate pretend substance to it. In other words 'proper' pretend play (and the imagination of absent objects is defined by Leslie, 1987, as one of three fundamental forms of pretence), must rest on a degree of associative linkage between real and pretend identities - few would argue that a child who 'imagines' that an empty cup contains tea (to borrow an example from Leslie) is not engaging in pretend play. A further point is that children were free to say that 'nothing' had been poured onto the target animal. If they were fixating on the container, which in the majority of cases could be clearly seen to be empty, rather than entering into a 'pretend mode of thinking', then this would appear to be the most likely response.

In theory the same criticism could be applied to the Outcome questions, after all a child presumably associates a teapot with 'hot' contents. It seems unlikely that anyone would claim that the ability to attribute non-literal properties such as 'wetness' to the target animal would not constitute comprehension of pretence, which further serves to indicate that associations must necessarily form a part of the normal experience of pretence.

Even if one accepts that the questions employed in this experiment are valid tests of the ability to comprehend pretend play, one need not conclude that the unimpaired performance on these questions seen here indicates unimpaired comprehension of pretence in autism. It is of course possible that children could answer the Outcome and Mode questions successfully without an understanding of the pretend situation, simply by guessing their responses. Obviously this criticism does not apply to the Substance question, which was open-ended, but it is clear that echolalic guessing occurred in response to the Mode questions. The fact that children with autism were unimpaired on the Mode questions cannot then be taken as support for an ability to distinguish between pretend and literal situations.

What is less clear is whether guessing occurred in response to the Outcome questions, where mean scores for the pretend episodes were around 3 out of 6 for all groups. The effect of Order of presentation in part explains these low levels of performance, children did do particularly poorly if they received the pretend episodes second. However even for those children who receive these episodes first, pretend outcome scores are not much above 3. The absence of Episode effects in all but two minor cases indicates that strategic, echolalic guessing is not being adopted, and further analysis shows that none of the groups are guessing randomly in both modes. It is still possible that children (from the non-normal groups at least) are randomly guessing their pretend outcome responses if not their literal outcome answers. Against this suggestion, the fact that all groups readily adopt an echolalic guessing strategy when confused by the Mode questions suggests that they would presumably adopt a similar strategy if they found the Outcome questions difficult.

More problematic than the possibility of random guessing in response to Outcome questions, however unlikely this may seem, is that while other research clearly indicates that children as young as three years of age have a firm understanding of pretence, the control children assessed in this study performed relatively poorly on the Outcome and Mode questions, despite having mean verbal mental ages of above four years. The review of studies conducted in subsection 1.24 indicated that by three years of age, children are capable of making pretend-real distinctions (Flavell, Flavell & Green, 1987; Woolley & Wellman, 1990). At around three years of age children also begin to contrast real and pretend identities in their spontaneous speech (Woolley & Wellman, 1990), and are able to recall past object substitutions and imagining of absent objects (Gopnik & Slaughter, 1991).

While it is therefore clear that children as young as three years of age are capable of distinguishing between pretend and real identities, the poor performance of children on the Mode question employed here (which tested this ability) can potentially be explained in terms of task difficulty. Both Flavell et al. (1987) and Woolley and Wellman (1990) tested children's ability to contrast pretend and real identities in object substitution. In these instances children are aware of the real identity of the object, which has some form of instantiation before them. In addition this object is being used in a way that is clearly inappropriate given this real identity. However in the Mode question used here, children have are asked about the status of the imaginary substance 'poured' onto the target animal. In the pretend episodes this substance has no actual instantiation before the child, and the actions involved are therefore not so obviously inappropriate. Children are therefore not presented with such an explicit contrast of pretend and real states on which to base a judgement. It seems likely that making a distinction in this case might be more difficult for young children. Support for this view comes from Lillard's (1993a) experiment, in which four- and five-year-old's incorrectly affirmed that a character who was ignorant of the existence of a certain animal, could pretend to be such an animal. Again in this case there is no clear instantiation of the 'real identity' to serve as a basis from which to distinguish a pretend identity, and no inappropriate 'action component' to aid a distinction.

Children's poor performance on the Mode questions are therefore not necessarily as surprising as they might first seem. However the low levels of performance in response to the Outcome questions require further explanation. This is especially true given that Harris and Kavanaugh (1993) found high levels of performance amongst normal three year olds using exactly the procedures adopted here (see their experiment 6, subsection 1.24). While they did not include a Mode question in their protocol, they did ask a Substance question (their question 2) and a forced-choice Outcome question (their question 4). Table 5.11 compares the performance of their two groups of participants, 16 children aged 28 months and 16 aged 34 months, with that shown on the pretend episodes by the normal control children in this study. Means are converted to percentage scores as Harris and Kavanaugh (1993) presented 4 episodes rather than 6.

Table 5.11. Comparison of performance of normal children on pretend Substance and Outcome questions.

			% Performance (pretend episodes only)	
Study	N	Age (months)	Substance Questions	Outcome Questions
Harris & Kavanaugh (1993)	16	28	75.0%	83.3%
	16	34	81.3%	87.5%
Experiment 3 Retest	24	60	76.3%	59.0%

In the present study, children's problems with these questions were clearly compounded if they received the literal episodes before the pretend ones (this effect of Order was significant for the Outcome questions, and approached significance for the Substance questions). This perhaps surprising effect of order of presentation can be explained in terms of the effect it had on the pretend episodes. Children who had already received the literal episodes may well have been biased towards a literal reading of subsequent acts (children were not actively discouraged from adopting a literal interpretation of the pretend acts; saying that 'nothing' had been tipped on the target for example). The fact that half the children in each group received this confusing order of presentation would appear sufficient to account for levels of performance on the pretend Substance questions, which are comparable to those seen (albeit in a younger sample) by Harris and Kavanaugh. However this effect alone cannot explain the poor performance observed in response to the Outcome questions. Even those children who received the pretend episodes before the literal ones performed relatively poorly on these questions.

The procedure employed by Harris and Kavanaugh did differ from that used here in one important respect however. They employed a warm-up period prior to each experiment, the aim of which was to engage children in preliminary pretending. Harris and Kavanaugh emphasise the importance of these sessions, claiming that they served to alert children to the playful and non-literal context of the subsequent tests. It is possible that the absence of warm-up sessions in the current study lowered the likelihood of children adopting a 'pretend reading' of the pretend episodes. Instead they may have been more disposed to assess the situations literally.

The poor performance of all the children, including controls, on both the Outcome and Mode questions can therefore be explained, but this does not explain away the *problem* of low levels of performance. It could be argued that the experiment has shown that all groups failed to comprehend the pretend situation, and that this was due to the methodology employed (it is certainly the case that the inclusion of literal episodes confused a large number of the children). It might be further argued that the controls' performance might be being artificially lowered as a result, and that floor effects amongst these groups are masking a potential deficit amongst the children with autism.

This is an important criticism, and one that can not be dismissed lightly. It certainly holds for the Mode questions, where there is clear evidence of strategic guessing amongst all the groups. However it is not valid in the case of the Substance questions, where guessing is not possible and where the children with autism perform relatively well. I would also claim that it is not relevant to the case of the Outcome questions. Though it can not be proved that children with autism did not randomly guess their answers to this question in pretend episodes, it seems highly unlikely that they would resort to random guessing when it is clear that they adopt strategic guessing when confused in other cases.

Is it then fair to say that the experiment has demonstrated true comprehension of pretence in autism? The children with autism performed well on the substance question, which would appear to indicate some, albeit perhaps low-level, understanding of pretend acts; the children appreciate that when a container is tipped 'in pretend fashion', its 'pretend contents' emerge. As noted above a criticism of this interpretation is that children could pass the Substance questions simply by a form of associative labelling, realising that 'tea always comes out of tea-pots'. Reasons to doubt that this was occurring have already been outlined, however it is worth returning to the point that this must be, in a sense, what occurs in everyday pretence. When a normal child sees mother tip pretend tea on an animal (for example) they can only reason through this action by assuming that the tea-pot is meant to contain tea. Success on the substance question therefore does appear to implicate a degree of comprehension of pretence, but possibly at a fairly basic level.

More sophisticated comprehension would be evidenced by success on the Outcome questions. Here children with autism do less well (though as well as controls), and it is therefore probably reasonable to say that the evidence for sophisticated comprehension is limited. Of course this does not mean that children with autism cannot be sophisticated pretenders, normal children presumably are, and they performed similarly on these questions.

Before moving on to consider how these results tie in with those outlined in the previous chapter, it is worth noting that though the evidence for global comprehension of pretence in autism is not unequivocally provided by Experiment 3, the results obtained do stand at odds with what would be expected if children with autism had no ability to understand the pretend acts. As mentioned above, it would seem likely that children with autism who failed to comprehend the scenario would very readily avow that 'nothing' had been tipped on the animal in response to Substance questions. They would also be expected to adopt an echolalic guessing strategy to both the Outcome and Mode questions. As they do neither of these two things it seems fair to credit them with some level of comprehension. As a result I would cautiously argue that while aspects of the experiment hinder a clear interpretation of the results, further aspects indicate that methodological problems are masking true abilities in all groups, rather than hiding a deficit amongst the children with autism.

5.3 Conclusions

The purpose of Experiment 3 was to shed further light on the question of whether competence or performance deficits mediate an absence of pretend play in autism. Experiments 1 and 2 investigated spontaneous, elicited and instructed play. The degree of structure involved in these conditions increases from spontaneous to elicited play, and from elicited to instructed play. A purely performance deficit account, which assumes that the greater the structure the less the child has to 'perform' themselves, predicts decreasing levels of impairment as structure increases. This was broadly what was observed. Though there was no difference in the extent of children with autism's impairment in spontaneous and in elicited pretend play, however there was a clear improvement in performance in instructed pretend play. Comprehension of pretence, as tested in Experiment 3, provides an even more structured testing situation in that the child has to produce no pretend play at all. If children with autism's deficits are purely due to problems in performance, then they should be unimpaired on this task. Again this was broadly what was found. While a degree of caution must be exercised before claiming unimpaired performance in Experiment 3, it is fair to say that the extent of relative impairment observed in these studies does diminish with increasing structure as a performance account predicts.

What is perhaps clearer is that these results are inconsistent with a competence deficit account, which must predict impaired pretend play amongst children with autism, in all situations. It appears that children with autism can pretend in certain situations, contrary to the claims of competence hypotheses. Having said this, there are four possible reasons to question this suggestion. One possible reason for discounting this interpretation is that the groups of children with autism might not have been representative of children with autism as a whole. There is no reason to believe that this is the case. All children with autism were selected on the basis of showing the three characteristic impairments associated with autism, and selection was made after careful consultation with teachers who knew the children well, and in the majority of cases, after referring to the child's statement of special needs. With the exception of 4 children in Experiments

1 and 2, and one child in the retest of Experiment 3, all the children attended schools for children with autism. If any doubt was expressed about the validity of a diagnosis of autism that child was excluded from the investigations (similarly if any of the control children were thought to have 'autistic-features' then they were excluded). In the context of this argument it is important to remember that impaired spontaneous pretend play was found in the children with autism assessed in Experiment 1, as expected.

Secondly it could be argued that as the group of children with autism eventually used in Experiment 3 was not the same as that used in the first pair of experiments, that results cannot be generalised across all three experiments. The majority of children with autism used in the first two experiments also participated in Experiment 3, so this criticism is not entirely valid. The children who were added in the retest of Experiment 3 were all from the same schools as children already participating in the research, and were all selected in an identical way as those assessed originally. Neither group was entirely homogeneous, indeed given the extent of variety of abilities and developmental profiles amongst children with autism this was not to be expected, but there was nothing to suggest that one group was more, or less, homogeneous than the other. Clearly it is still the case that not all the children in the retest of Experiment 3 were assessed in Experiments 1 and 2. I would wish to argue that the children finally used in Experiment 3 would behave in an exactly similar way to those used initially, and that a valid comparison can be drawn across experiments. However even if one did not accept this assurance, one is still faced with one group of children with autism who show impaired spontaneous pretend play and unimpaired instructed pretend play, and another who show unimpaired comprehension of pretence. Even at this level this must surely be compelling evidence against a competence interpretation.

A third conceivable criticism is that those tasks in which children with autism were unimpaired do not actually assess pretend abilities. It could be argued that the instructed play conditions used in Experiment 2 do not require a child to pretend, and similarly that true comprehension of pretence is not required to perform well on Experiment 3. These arguments have been outlined and discussed previously (see discussion of Experiment 2, general discussion of Experiment 3). The instructions used in Experiment 2 do explicitly give the child the scheme for pretence, however the child still has to produce the actions *appropriate* to that scheme. The design of the experiment ensured that the child could not simply select the correct prop by guessing, and in addition the child was still required to perform an appropriate action with the toys. Experiment 2 therefore suggests that children with autism may be impaired in generating schemes for pretence. It is conceivable that some form of associative labelling strategy could be used to answer the Substance questions in Experiment 3. However the results suggest that this form of strategy is not being employed. What it is fair to say is that evidence has only been provided for the ability to engage in low-level pretence amongst children with autism. There is no evidence of flexible, creative pretend play, or of sophisticated understanding of subtle aspects of a pretend situation.

A final criticism is that matching children for language comprehension abilities 'matches away' competence deficits that might exist in the children with autism. While it is certainly true that there are parallels between pretend play and language in both normal children and children with autism (see subsection 1.22), there is little reason to assume that they are directly related in the way that the above criticism implies. If it was the case that matching for language comprehension at the same time matches for pretend play ability, why is it that children with autism still show impaired production of pretend play when matched in this way (Baron-Cohen, 1987, Riguet et al., 1981)? The fact that the children with autism assessed in Experiments 1 and 2 showed impaired spontaneous symbolic play yet unimpaired instructed play shows that pretend play deficits in autism cannot be attributed to delayed language acquisition in this way, as these children were matched to controls on the basis of language comprehension abilities.

On the basis of the results of these first three experiments I would therefore wish to claim that children with autism's failure to produce pretend play is not the result of some form of competence deficit. In other words, pretend play (at least at a basic level) is something that children with autism *can* do, but is something that they *don't* do spontaneously. In this sense, children with autism's difficulties in pretence would appear to be the result of some form of performance deficit. However, as noted in subsection 3.16, the notion of a deficit in performance (relative to verbal mental age matched controls) is a potentially confusing one. While it may be the case that children with autism simply don't choose to pretend, it is more likely that a failure of competence in some other domain impinges on the ability to produce pretence. Having accepted that children with autism can pretend in certain circumstances, the following chapter will describe work carried out in an effort to determine why they don't pretend in all circumstances. Though this will be done by focusing on the proposed 'performance' deficits outlined in section 3.3, it must be remembered that any so-called performance deficit may result from a deficit of competence which prevents children with autism from exhibiting their apparently intact ability to pretend.

Chapter 6
Why Do Children With Autism Not Pretend?

6.1 Introduction

The two previous chapters have provided evidence to suggest that children with autism can pretend under certain circumstances. This suggests that the spontaneous failure to produce pretence commonly seen in autism, and observed in Experiment 1, is not due to an inability to pretend per se. The question that must therefore now be addressed, in the light of this suggestion, is that of why children with autism do not pretend. Three potential explanations of a deficit in 'performance' were proposed in section 3.3. These were a Motivational hypothesis, a Central Executive Deficit hypothesis (CED), and a Generation of Access and Retrieval Strategies hypothesis (GARS). The purpose of this chapter is to describe the work which was undertaken in an attempt to decide between these three accounts. Two experiments will be described in this chapter, Experiment 4 (section 6.2) and Experiment 5 (section 6.3). Before turning to the first of these, it is worth recalling the precise details of the three hypotheses that are to be tested here (see also section 3.3).

The motivational account predicts that children with autism do not spontaneously engage in pretence because they are not motivated to do so. This impairment could take the form of a general lack of motivation, it could be due to a specific aversion to pretend play, or it may reflect a preference for other forms of (non-symbolic) play. This account makes few testable predictions beyond suggesting that the extent of pretend play seen in autism should increase with the degree of structure provided by the play situation. The CED hypothesis is really one of a number of executive deficit accounts which could be put forward in order to explain an absence of spontaneous pretence in autism; for example it might instead be suggested that a failure to plan behaviour prevents free pretend play. However, the particular proposal to be considered here is that of a failure to inhibit a response to the external functional features of an object. To borrow Harris' terminology (Harris, 1993), it is hypothesized that children with autism are unable to 'shift the locus of executive control', and override these externally salient features with intact internal pretend schemes. Finally, the GARS hypothesis suggests that pretend play does not occur spontaneously in autism because the internal representations needed for creativity and flexible planning are not readily accessed. These representations are presumably intact, but the child with autism is impaired at generating the means for retrieving them.

While there is certainly evidence for impaired generation of retrieval strategies in autism, and while motivational deficits may well be associated with the disorder, there is arguably stronger support for executive dysfunction in autism. The CED hypothesis also appears to make more explicit and more easily testable predictions regarding pretend play than the other two accounts. It was therefore decided that an examination of why children with autism do not pretend should begin by testing the validity of the CED account.

6.2 Experiment 4

6.21 Introduction

The purpose of Experiment 4 was to provide a direct test of the hypothesis that a failure to produce pretend play in autism is the result of specific executive dysfunction in autism. If it is the case that children with autism produce little spontaneous pretend play because they are unable to impose their own play schemas on objects which possess their own, well defined function, as suggested above, these children should be particularly impaired in their ability to use such objects in pretend object substitution. The present experiment attempted to test the CED hypothesis by looking at the effect of 'functionality' on object substitution in autism.

Before turning to the methodology employed, it is therefore necessary to think back to investigations of object substitution in normal children (reviewed in subsection 1.21). In addition to noting the developmental trend of decontextualization, a move from object substitution with realistic prototypical items to the use of inappropriate dissimilar items, a distinction was drawn between *perceptual* and *functional decontextualization* in object substitution. Ungerer, Zelazo, Kearsley and O'Leary (1981) found that the majority of 18 month old children preferred to use objects with no clear function as props in substitution, rather than use functional objects. Further Jackowitz and Watson's (1980) results provide evidence of both functional and perceptual decontextualization, and suggest that these two effects are of similar strength and are roughly additive.

In an investigation of object substitution in young normal children, Golomb (1979) presented children with a selection of different props for substitution, noted their choice of prop, then removed it and asked the child to choose again. By doing this she was able to order the props in terms of substitutability as seen by the child. The present experiment borrows from this method. Children were asked to select a prop to stand as a substitute for a certain target object. In order to determine how readily children with autism would select a prop with a well defined function, we presented them with an object whose function differed from that of the target, a counter-functional object (CF). So as not to confound problems of perceptual decontextualization with effects of function, the CF was perceptually similar to the target object. Four other props were also presented. These were non-functional (NFs), they had no clear function of their own. However they did differ from each other in terms of their perceptual similarity to the original target object. The first of the NF props had the same form as the target (and therefore, as the CF), the others were systematically less perceptually similar.

On the basis of the evidence of both perceptual and functional decontextualization discussed previously, it was hypothesised that non-autistic control subjects would choose the first NF prop initially, and show a steadily decreasing preference for the less appropriate NF props. Some small effect of function was expected, but as the CF was perceptually similar to the target, it was expected that it would be selected relatively early on. However it was predicted that children with autism would choose the CF prop significantly later than controls, because of its counter-functionality, and because of their proposed difficulty in imposing external executive control on salient external objects. In other words, if Harris is correct in supposing that such a problem hinders the production of spontaneous pretend play in autism, we would expect to see increased effects of functional decontextualization amongst these children. We would predict that perceptual decontextualization would be unimpaired.

6.22 Method

Participants

In essence the participant groups assessed in Experiment 4 were the same as those employed in the retest of Experiment 3; the two investigations were in fact run concurrently. Therefore four groups were tested, children with autism, children with MLD matched for BPVS and for APT scores and mainstream children matched on the BPVS (for a justification of the use of the BPVS and the APT see subsection 5.26). However the groups did differ slightly from those used in the retest of Experiment 3 as one child with autism who suffered particularly from behavioural problems refused to co-operate in Experiment 4 . Also a child with autism who had been tested in the first run of Experiment 3 was not available for testing at the time of this experiment. Therefore, as before, twenty four children with autism participated in this experiment, 4 of whom were girls 20 of whom were boys.

As a result of these slight alterations the chronological and verbal mental ages of the groups do differ slightly from those given in table 5.6. A further factor which alters the ages is that a number of the children with autism and with MLD were in fact tested on the initial run of Experiment 3 rather than on the later retest. Details of the participant groups as employed in this experiment are given in table 6.1.

The mean chronological age of the children with autism was not significantly different to that of either of the two groups of children with MLD (P=0.30, MLD group matched for APT; P=0.33 MLD group matched for BPVS; t-tests), but was significantly higher than that of the normal children (P<0.01, t-test). The APT scores of the children with autism and MLD group matched for APT did not differ significantly. Similarly the groups matched for BPVS scores did not differ significantly in their mental ages compared to the children with autism. As before, the fact that the mean chronological age and mean verbal mental age of the normal children were so similar (59.3 vs. 54.0 months) indicates that this group was one of average, and representative verbal ability.

Table 6.1. Details of participants in Experiment 4.

Group	*n*		CA (months)	APT Score	BPVS Age (months)
Autism	24	mean	107.1	26.6	54.2
		SD	28.2	5.9	20.7
		range	58-154	17.5-37	33-94
MLD Matched by APT	24	mean	115.0	26.6	
		SD	23.5	6.1	
		range	75-149	17-37.5	
MLD Matched by BPVS	24	mean	114.0		53.8
		SD	20.3		20.2
		range	80-149		32-93
Normal	24	mean	59.3		54.0
		SD	13.8		20.3
		range	44-96		31-94

Materials

The figures used in the procedure (see below) were made out of cardboard, and were approximately 40cm tall and 28cm wide. Five gender-appropriate figures were used with each child. The majority of children were Caucasian, but eight were Afro-Caribbean or Asian and racially appropriate figures were used with these children.

Five object sets were used. Each set contained a real item (R), a counter-functional item (CF) and four non-functional items (NF_1-NF_4). For example the 'toothbrush' object set consisted of a miniature yellow toothbrush (R), a yellow pencil of the same thickness and length (CF) and four lengths of yellow doweling ($NF_{1\text{-}4}$). All the items in a particular set were the same colour, and all NF items were made of the same material. Items R, CF and NF_1 were designed to be as perceptually similar as possible, having the same size and shape. Items NF_2, NF_3 and NF_4 were varied on one dimension (e.g. length, width) systematically, so that they became less perceptually similar to the R, CF and NF_1 items.

It was important that particular care was taken in designing the materials to be used in the experiment. In order to provide 'room' for a potential reluctance amongst children with autism to choose the CF prop, it was vital that control children picked the CF prop for each object set relatively early on. It was also desirable to design the sets so that perceptual decontextualization could be seen. It could be argued that manipulating the materials too drastically, simply to show the expected pattern of prop choices in controls, might produce artificial performance amongst all participants. However in the light of extensive previous research showing that perceptual decontextualization was an established phenomena, it was felt that it would be reasonable to question the use of object sets that failed to produce this pattern of choices in control children.

Extensive piloting of potential materials was therefore carried out in an effort to obtain materials that allowed for perceptual decontextualization, and gave low CF scores. The procedure used for these sessions was essentially that used in the experiment proper (see below for details). Normal nursery-age children were employed, and were drawn from a different school than the normal children who finally participated in the experiment. Four separate sessions took place, each one testing slightly different sets of materials. The number of children used in each session ranged from six to ten, and the ages of the children ranged from 45 to 57 months. To avoid repeating a great deal of less relevant details only the set of objects that was finally arrived at after these pilot session is given here (see table 6.2).

Procedure

Children were tested in a single session, lasting about five minutes. Testing took place in a quiet room, in which only the participant and experimenter were present. One of the five appropriate figures was placed on a table in front of the child. The experimenter then repeated the following information, using the appropriate R prop in each instance:

"This is Jenny/John. I want to show you what Jenny/John does when s/he gets up in the morning. First of all s/he cleans his teeth." (Experimenter 'brushes' the figure's teeth with the toothbrush). "Then s/he eats her/his breakfast, s/he eats pizza for breakfast". (Experimenter 'feeds' the pizza to the figure). "After a pizza s/he eats a sweet". (Experimenter 'feeds' the sweet to the figure). "Then s/he puts on her/his long scarf". (Experimenter puts scarf around the figure's neck). "Then s/he takes her/his small book ..." (experimenter 'gives' the book to the figure), "... and goes off to school". (Figure is removed).

The five R props were then placed to one side, though still in full view of the participant. A second figure was placed upon the table, and the following instructions were repeated: "This is Mary/Matthew. I wonder if you can show me how Mary/Matthew gets up in the morning. First of all can you show me how s/he cleans her/his teeth?". The four remaining 'toothbrush' props (CF and NFs1-4) were then placed in a line in front of the child. Care was taken to ensure that the props were ordered randomly. The prop which the child selected as a substitute for the toothbrush was noted, and removed. The remaining three props were also removed, but were kept together for future presentation. The child was then sequentially asked to demonstrate how Mary/Matthew ate their pizza and their sweet, how they put on their scarf and how they took their book to school.

Table 6.2. Specifications of object sets

Set	R	CF	NFs			
			NF1	NF2	NF3	NF4
Toothbrush	Yellow plasic toothbrush, 84mm long x 8mm	Yellow pencil 84mm long, 8mm diameter	Yellow dowling, diameter 8mm, length varied:			
			84mm	63mm	48mm	21mm
Pizza	Dark brown plastic 'pizza', 26mm diameter	2 pence coin, 26mm diameter	Wooden shapes, approx 26mm across, no. of sides varied:			
			Circle	7 sides	6 sides	5 sides
Sweet	Yellow sweet, 13mm cube	Yellow plastic die, 14mm cube	Yellow wooden blocks, 14 mm cross-section, length varied:			
			14mm	21mm	28mm	35mm
Scarf	White cloth doll's scarf, 212 x 33mm	White sweet wrapper, 212 x 33mm	White pieces of paper, 33mm width, length varied:			
			212mm	159mm	106mm	53mm
Book	Small white book, 75 x 40 x 15mm	White eraser, 75 x 40 x 15mm	White wooden blocks, 75 x 40 mm, width varied:			
			15mm	21mm	28mm	35mm

Once all five actions had been carried out, the figure was removed and replaced with a new one. The procedure was repeated using the props that had not yet been chosen from each set. This continued until all but one of the props in each object set had been chosen (a total of five figures, including the original one were therefore presented).

Each prop in an object set was given a score from 1 to 5 based on the sequence of choices made by the participant (e.g. prop chosen first = 1, etc., prop left eventually unchosen = 5). Of particular interest were the scores for the CF props, and a TOTAL CF score was obtained simply by adding the five individual CF scores from each object set, for each child. The possible range of the TOTAL CF score was 5 to 25.

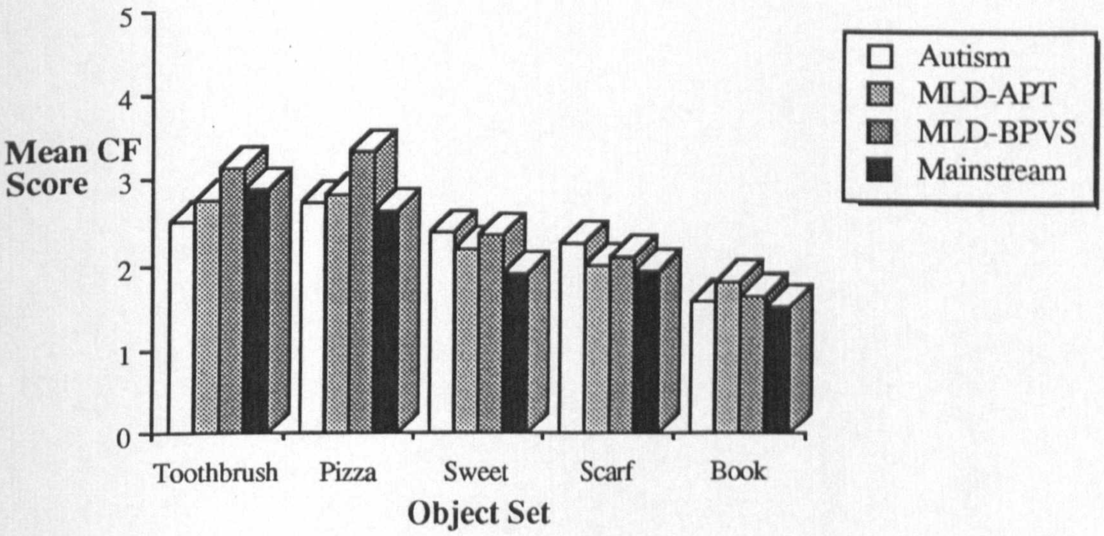
6.23 Results

The CF scores for each object set, and mean TOTAL CF scores for each group of participants are shown in table 6.3, and the CF scores for each object set for each group are shown in graph 6.1. A two factor Anova analysis of the CF scores was performed, the factors being Group (repeated measures, 4 levels), and Object Set (repeated measures, 5 levels). The analysis revealed no significant main effect of Group ($F=0.83$, $df=3$, $P=0.48$). A post-hoc Scheffe test confirmed that the children with autism's mean CF score did not differ from that of the combined controls ($F(3, 23)=0.02$, $P>0.99$). There was a significant main effect of Object Set ($F=16.31$, $df=4$, $P<0.01$), but no significant Group x Object Set interaction ($F=0.76$, $df=12$, $P=0.69$). The Object Set effect was due to significantly higher CF scores for the toothbrush and pizza sets than for the other three sets ($P<0.01$, Tukey test), and to a significantly higher CF score for the sweet set than for the book set ($P<0.05$, Tukey test).

Table 6.3. Mean CF scores by Group.

	Group			
CF Scores	**Autism**	**MLD-APT**	**MLD-BPVS**	**Normal**
Toothbrush	2.50	2.75	3.13	2.88
Pizza	2.71	2.83	3.33	2.63
Sweet	2.38	2.17	2.33	1.88
Scarf	2.25	2.00	2.08	1.92
Book	1.58	1.79	1.63	1.50
TOTAL	11.42	11.54	12.50	10.79

Graph 6.1. Mean CF Scores



A second analysis was performed to look at decontextualization effects within each group, and for each object set. This took the form of a three factor Anova analysis of the scores for each of the props, CF and NFs_{1-4}. The factors were Group (independent measures[1], 4 levels), Object Set (repeated measures, 5 levels) and Prop Type (repeated, 5 levels - CF and NFs_{1-4}). Clearly, as each prop had to be picked at some point, no main Group, Object Set or Group x Object Set effects could emerge from this second analysis (each object set would produce a score of 15 for each child, 1+2+3+4+5, regardless of the order of their choices).

This analysis revealed a main effect of Prop Type ($F=131.13$, $df=4$, $P<0.01$), due to significantly higher scores for NFs2, 3 & 4 than for CF and NF_1 props. In other words, physical decontextualization was occurring, with little clear sign of functional decontextualization; children were initially picking either the CF or the NF_1 prop, and then moved on to the less physically appropriate props. There was a significant Object Set x Prop Type Interaction ($F=10.13$, $df=16$, $P<0.01$), but this reflected differential effects of Object Set on particular prop types; a clear decontextualization effect still occurred for each object set. The Group x Prop Type and Group x Object Set x Prop Type interactions were not significant ($F=0.74$, $df=12$, $P=0.72$; $F=0.75$, $df=48$, $P=0.90$ respectively). This second analysis therefore reveals similar decontextualization effects amongst all groups. The mean scores for each prop type (averaged across all object sets) are shown for each group in table 6.4, and reproduced in graph 6.2. This graph shows details for two of the groups only, children with autism and the children with MLD matched for BPVS scores; as performance across all four groups are so similar including more than two groups would confuse the graph. Mean scores for each prop type and for each object set (averaged across all groups) are given in table 6.5 and shown in graphs 6.3 and 6.4.

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[1]In this instance it was not possible to take repeated measures of the Group factor, as the subsequent analysis is too large for any statistical package to compute.

Table 6.4. Mean Prop Type scores by Group.

	Group			
Prop Type	Autism	MLD-APT	MLD-BPVS	Normal
CF	2.28	2.31	2.50	2.16
NF1	2.13	2.23	2.03	1.98
NF2	3.00	2.99	2.97	2.98
NF3	3.60	3.45	3.41	3.74
NF4	3.99	4.02	4.13	4.13

Graph 6.2. Decontextualization effects by Group (children with autism and MLD, BPVS matched only)

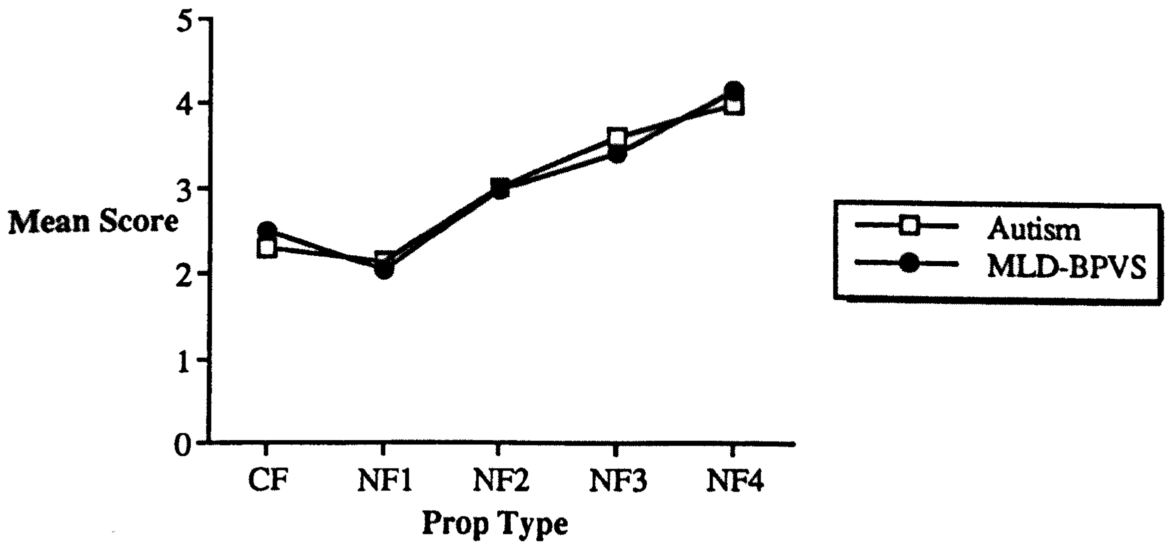
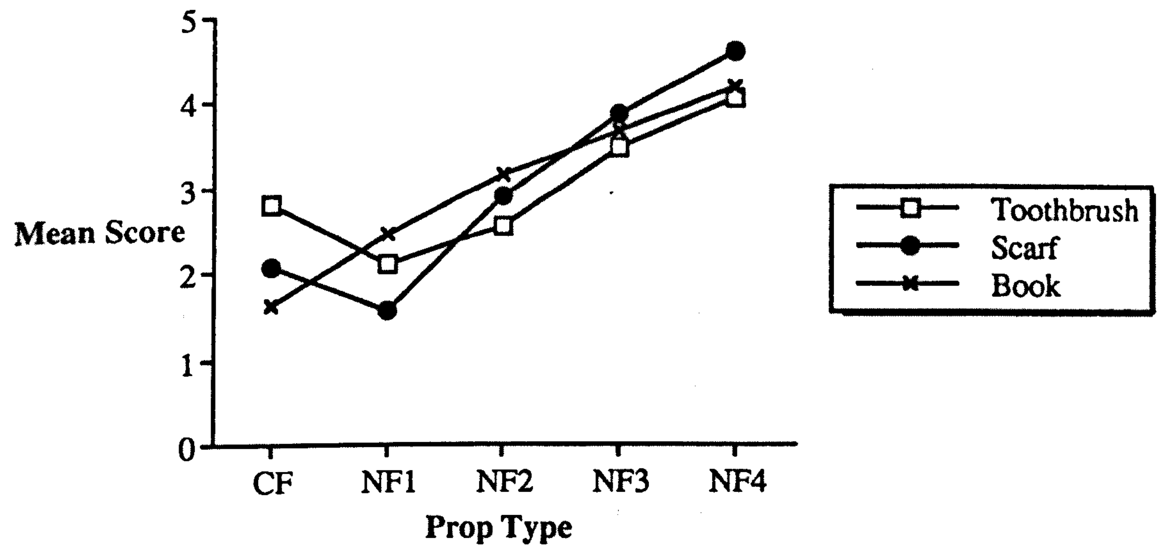


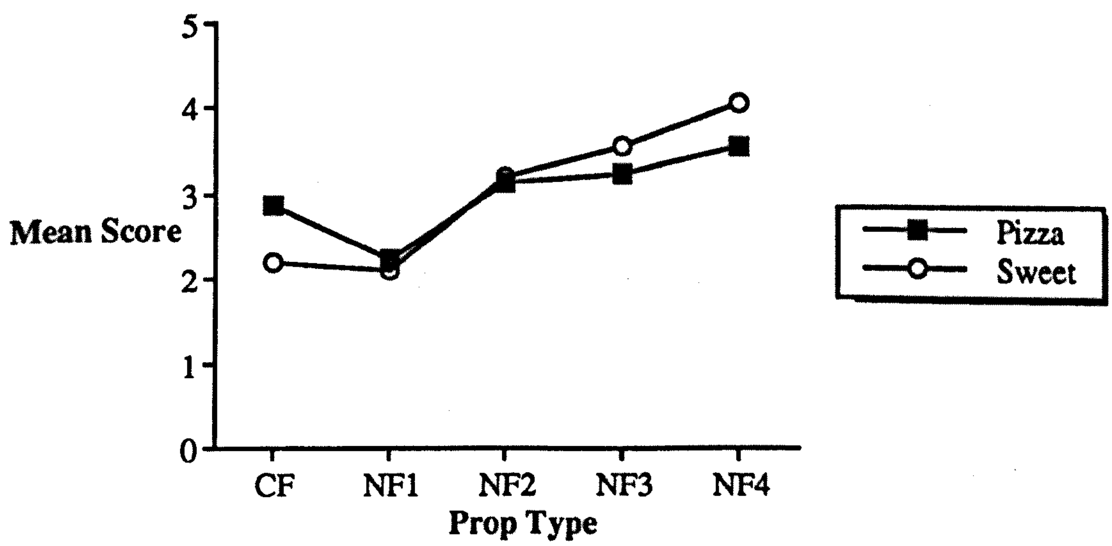
Table 6.5. Mean Prop Type scores by Object Set.

	Object Set				
Prop Type	**Toothbrush**	**Pizza**	**Sweet**	**Scarf**	**Book**
CF	2.81	2.88	2.19	2.06	1.63
NF1	2.11	2.23	2.09	1.57	2.45
NF2	2.56	3.11	3.17	2.91	3.15
NF3	3.47	3.23	3.52	3.85	3.67
NF4	4.04	3.55	4.03	4.60	4.16

Graph 6.3. Decontextualization effects by object set (for Toothbrush, Scarf and Book sets)



Graph 6.4. Decontextualization effects by object set (for Pizza and Sweet sets)



The results of the second set of analyses shown in the tables and graphs above emphasise the effect of perceptual decontextualization amongst all groups. In every case, whether the effect of Prop Type is examined by group (across all object sets) or by object set (across all groups) the mean score for the NF props increases with perceptual dissimilarity to the target object, doing so steadily as predicted ($NF_1<NF_2<NF_3<NF_4$). In fact when this effect of Prop Type is examined across both groups and object sets, the perfect pattern of perceptual decontextualization is found in 17 out of 20 cases[2].($P<0.01$[3])

However, in addition the tables and graphs also provide an indication of limited functional decontextualization. Though the mean scores for the CF and NF_1 props do not differ significantly, scores for the NF_1 props are consistently lower than those for the CFs. When group mean scores are examined for each object set, NF_1 scores are lower than CF scores in 16 of 20 cases. This distribution differs significantly from that which would be expected if children were equally likely to pick either of these two props initially ($P<0.01$, binomial probability test)[4].

In the earlier review of studies of decontextualization in normal children (subsection 1.21) it was tentatively suggested that functional decontextualization might be subject to an age effect, specifically it was hypothesised that older children might be more effected by functional dissimilarity than younger participants. The analyses described so far provide no way of testing

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[2]This effect is also evident on an individual level of performance. 64% of children (groups combined) show a significantly greater number of perfect patterns of decontextualization than could be expected by chance

[3]If children were equally likely to adopt either this pattern or a different one, this distribution would be significant at the 1% level (binomial test). However it is clear that the probability of adopting a perfect pattern of physical decontextualization is well below 0.5, and hence the distribution is clearly significant at this level. In fact if each NF prop were equally likely to be chosen, the probability of producing a perfect pattern at random would be 0.042, the probability of this then occurring in 17 out of 20 occasions is clearly minute.

[4]This effect does not persist to an individual level of analysis.

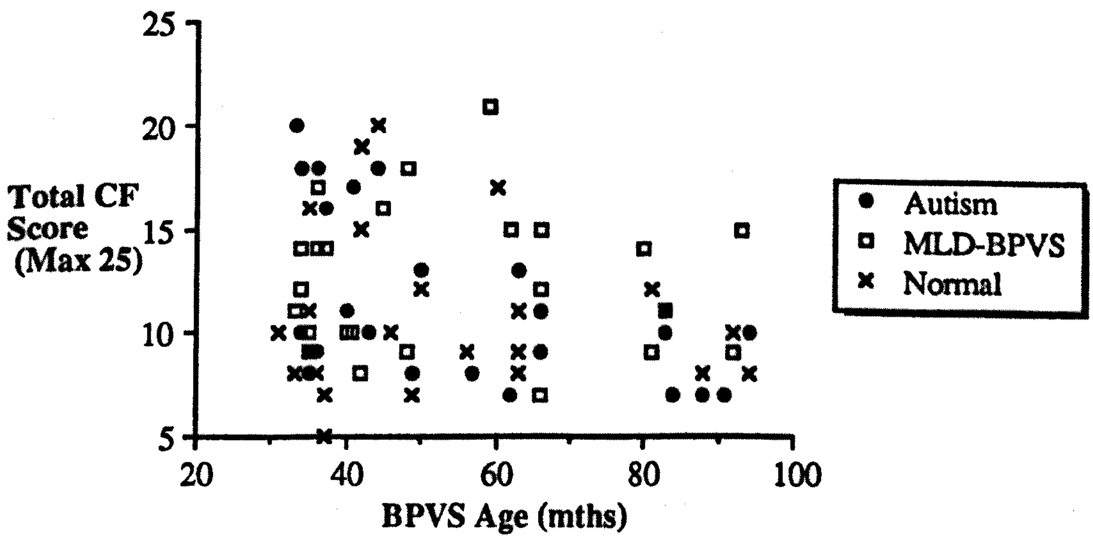
this suggestion, however it is clearly worth investigating. Two final analyses will now be described which attempt to evaluate the possibility of age effects on functional decontextualization.

If older children are more susceptible to functional dissimilarity we would expect them to show higher CF scores than younger children. Correlations of CF score and verbal mental age (as measured by the BPVS) were made for each group except the children with MLD matched for APT, clearly no BPVS measures were available for this group. The results of this correlational analysis are given in table 6.6 and a scatter-plot of the data is shown in graph 6.5.

Table 6.6. Correlation of Total CF score to Verbal Mental Age

Group	Correlation Coefficient (r)	P
Autism	-0.53	<0.01
MLD-BPVS	-0.03	0.90
Normal	-0.10	0.64

Graph 6.5. Plot of Total CF score against Verbal Mental Age



This analysis reveals an intriguing result. There is a significant (inverse) relation between verbal mental age and Total CF score for the children with autism, but not for the other two groups. This could be taken to suggest that children with autism are, in fact, especially susceptible to counter-functionality as originally hypothesised, but that the inclusion of older children in the groups has masked this effect in the earlier analyses A careful examination of the scattergram (graph 6.5) suggests that this is unlikely. Rather than the younger children with autism producing larger CF scores than the younger controls, it is the older controls producing larger CF scores than the older children with autism that seems to account for this finding. In other words we appear to be looking at a failure to accept the CF as a prop in older controls rather than a failure to do so in younger children with autism.

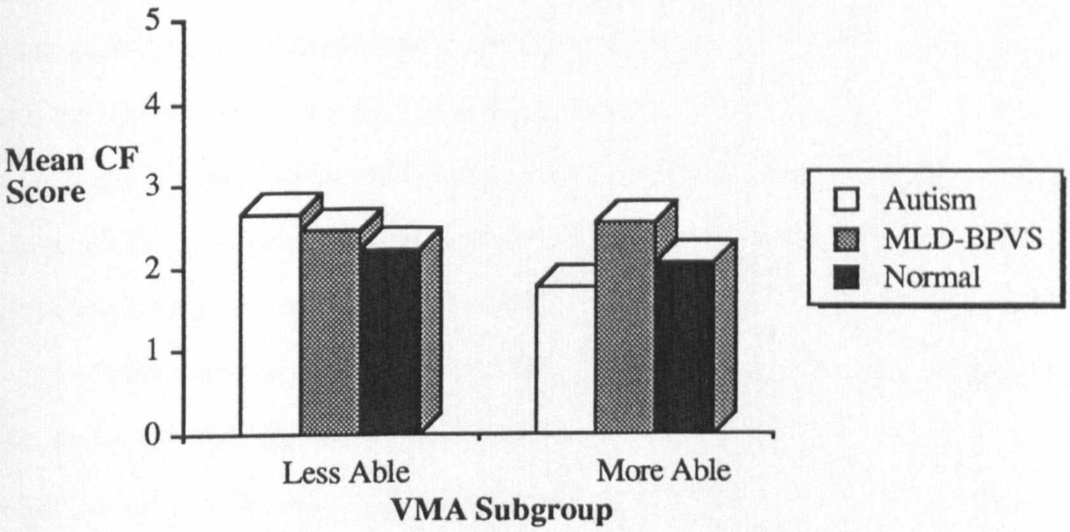
To check that this is in fact the case a second age-related analysis was performed. Each of the three groups matched on the BPVS was divided into a subset of fourteen children with a verbal mental age of 50 months or below, and a second set of ten children with a verbal mental age of 57 months or above. (Clearly the choice of how to divide the groups is an arbitrary one, this particular division was chosen as it corresponded to a gap in the range of BPVS scores of the participants, and also would appear to ensure a fair reflection of the children with autism's pattern of performance as suggested by the scatter-gram. Exactly similar results emerge from an analysis which splits the groups in half, see Jarrold, Smith & Boucher, submitted).

The analysis that was carried out with these subgroups was essentially the same as that used initially. Results that mirror those of that earlier analysis (those not associated with the effect of age, for example Group and Object Set effects) will not be mentioned here unless they differ from those found initially. Firstly a three factor Anova design was employed the factors being VMA Subgroup (independent measures, 2 levels), Group (repeated measures, 3 levels), and Object Set (repeated measures, 5 levels). The main effect of VMA Subgroup approached significance ($F=4.04$, $df=1$, $P=0.06$), due to the fact that the more able children showed lower CF scores. The Group x VMA Subgroup interaction was not significant ($F=2.28$, $df=2$, $P=0.11$). The more able children with autism did show significantly lower CF scores than their less able counterparts, (F=7.73, df=1, P<0.01; post-hoc test), as would be predicted given the negative correlation found earlier. However the CF scores of the less able children with autism were not significantly greater than those of less able controls, nor were the CF scores of the more able children with autism significantly lower than those of more able controls (see table 6.7 and graph 6.6). This was confirmed by post-hoc Scheffe tests, comparing the performance of each subset of children with autism with the combined performance of the appropriate control subgroups (F(2, 13)=0.57 P=0.58, less able subgroups; F (2, 9)=3.08, P=0.10, more able subgroups). The VMA Subgroup x Object Set and Group x VMA Subgroup x Object Set interactions were not significant (F=0.99, df=4, P=0.42, F=0.69, df=8, P=0.70 respectively).

Table 6.7. Mean CF scores by Group and VMA Subgroup

	Group		
VMA Subgroup	**Autism**	**MLD-BPVS**	**Normal**
Less able	2.64	2.46	2.23
More able	1.78	2.56	2.06

Graph 6.6. Mean CF scores by Group and VMA Subgroup



As before a second test was performed to investigate the effects of Prop Type. In this case a four factor Anova design was employed. The factors were VMA Subgroup (independent measures, 2 levels), Group (repeated measures, 3 levels), Object Set (repeated measures, 5 levels) and Prop Type (repeated, 5 levels - CF and NFs_{1-4}). Again it must be remembered that as every prop had to be picked at some point, only *interactions* with Prop Type can be examined with this design. The VMA Subgroup x Prop Type interaction was clearly significant (F=8.01, df=4, P<0.01). This was not due to a differential effect of Prop Type on the two subgroups, in other words the pattern of choices made by the subgroups were similar. However there were significant effects of VMA Subgroup on various prop types. The more able subgroups produced lower NF1 scores (F=12.22, df=1, P<0.01), and higher NF3 and NF4 scores (F=16.20, df=1, P<0.01; F=11.06, df=1, P=0.01 respectively, post hoc effects). There was also a strong tendency for the more able subgroups to give lower CF scores (F=4.04, df=1, P=0.06). This could be seen to suggest that the more able children are less susceptible to counter-functionality, indicating that in fact functional decontextualization might reduce with age counter to predictions. However, graph

6.7 (and table 6.8) which shows mean prop scores for each subgroup, indicates that these effects are in part due to a clearer pattern of performance amongst more able participants. The extent of perceptual decontextualization is more marked in the more able group, while the degree of functional decontextualization (the slope between CF and NF1) is certainly comparable to that shown by the less able children. It could in fact be argued that there is evidence of increased functional decontextualization with increased developmental level. The difference in the mean NF1 scores is relatively larger than the difference in the mean CF scores. The VMA Subgroup x Group x Prop Type interaction was not significant (F=1.40, df=8, P=0.20).

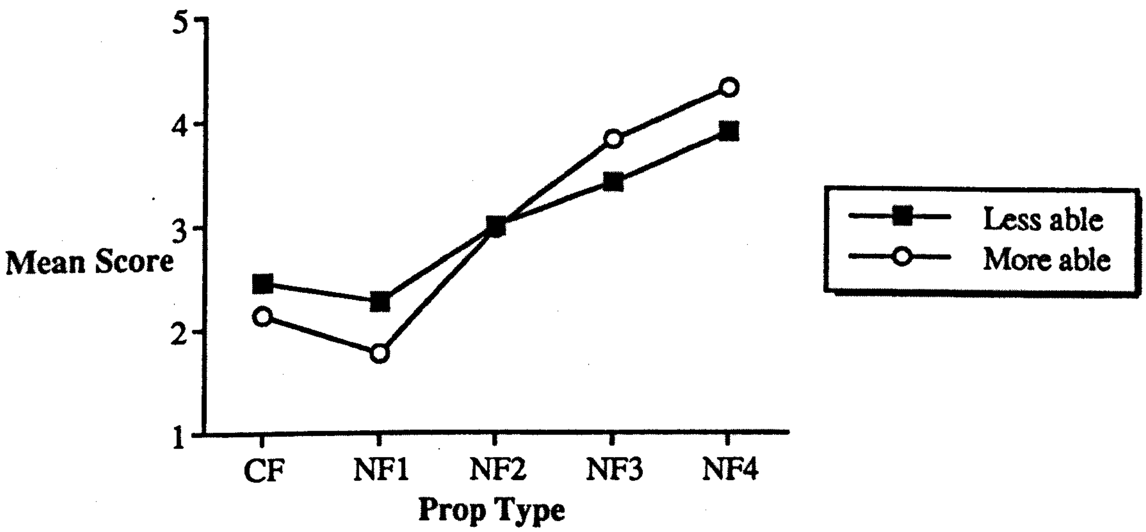
The VMA Subgroup x Object Set x Prop type interaction approached significance (F=1.51, df=16, P=0.09). This trend was again due to clearer patterns of performance amongst the more able subgroups of children. The Object Set x Prop Type interaction was significant (F=7.22, df=16, P<0.01), as in the initial analysis, but the differential effects of Object Set on decontextualization patterns (see graphs 6.3, 6.4) were more limited in the more able children. The four way interaction was non-significant (F=0.87, df=32, P=0.68).

Table 6.8. Mean Scores by VMA Subgroup and Prop Type (across Groups)

	Prop Type				
VMA Subgroup	CF†	NF1**	NF2	NF3**	NF4*
Less able	2.44	2.25	3.00	3.40	3.90
More able	2.13	1.75	2.95	3.83	4.33

Effect of VMA on scores for each prop type: †P<0.10, *P<0.05, **P<0.01

Graph 6.7. Mean Scores by VMA Subgroup and Prop Type



6.24 Discussion

The main purpose of this investigation was to provide a specific test of a central executive explanation of children with autism's pretend play difficulties. This account (as formulated here) suggests that children with autism do not engage in pretend play because they are impaired in their ability to impose internal pretend schemas on external objects. This problem arises because of a failure to override externally salient functions of the props typically available for pretence. The results of this experiment show that children with autism have no particular difficulties in overriding prop functionality: they are not impaired in their ability to select the CF props when appropriate as would be expected.

A failure to demonstrate such an impairment cannot be attributed to the methodology of the experiment. A sufficiently large choice of alternative non-functional props was available to allow for a bias against the counter-functional prop to be clearly seen. It might be argued that the majority of the non-functional props (NFs2,3 & 4) are so dissimilar from the target object as to bias against their choice even for children with autism. In other words children with autism might face a struggle between counter-functionality and perceptual dissimilarity, and the NF2,3 & 4 props might be so perceptually dissimilar as to overcome a counter-functionality effect, which itself might still be non-normal. The smooth patterns of decontextualization present in all groups, and with all object sets, provides evidence against this argument. There is nothing to suggest that NF2 is especially inappropriate as a substitute; the score for each successive NF prop seems to rise steadily, rather than in a step-wise fashion.

The difference in CF scores for the five object sets does not constitute a methodological problem for the experiment either. In fact the slight variety in the strength of 'counter-functionality' amongst the five individual CF objects serves to emphasise the absence of any Group effect in the experiment. The lack of any impairment in the group of children with autism, on any of the object sets, or in general, can not therefore be attributed to over-strong counter functionality causing floor effects in controls. Neither can it be explained by excessively weak counter-functionality which might not impair executive function.

That the five object sets gave different mean CF scores is not necessarily surprising. The scores for the book and the scarf sets may have been lowered by the fact that the procedure stressed the length of the scarf and the small size of the book. This will have focused attention onto the need to select an adequate substitute prop, and biased against choosing the shorter or larger non-functional items. The higher CF scores for the toothbrush and pizza object sets can also be explained. It is possible that the 'counter-functionality' of the pencil (the CF for the toothbrush set) was especially emphasised because the figures used in the experiment were made of cardboard, a material which is well suited to being 'written upon'[5]. It is also conceivable that the CF for the

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[5]Results from earlier pilot work suggests that this may be the case; the CF scores for the identical set of toothbrush materials were lower when plastic dolls were used rather than cardboard figures. Clearly plastic is less conducive to the appropriate functional use of the pencil.

pizza set, the 2 pence coin, stood out from the other non-functional props because it was made from a different material. This may again have biased against choosing it.

Perhaps the most striking feature of the findings emerging from this experiment is the degree of similarity amongst the performance of the children with autism and controls. In fact the only group difference that emerges from the analysis is that the children with autism's Total CF scores correlate with verbal mental age, while those of the two control groups matched on the BPVS do not. The analysis of performance by age subgroup reveals that this is not due to especially high CF scores amongst the younger children with autism. Therefore if anything the children with autism assessed in this experiment respond to the effects of object functionality 'more normally' than do controls, the older control children do not appear to be able to pick the CF as readily as they should. (Though it should be noted that the older children with autism do not produce significantly lower CF scores than the older controls; see table 6.7 and graph 6.6).

Having considered the analyses of CF choices, it is worth focusing briefly on the results of the broader analyses of patterns of decontextualization. It is clear that children do engage in perceptual decontextualization, as they reliably pick the non-functional props on the basis of their perceptual similarity to the target object. This is shown in the fact that mean choice scores for the NF_1 props are significantly lower than those for the NF_2, NF_3 and NF_4 props. Further, group mean scores for these props are consistently ranked in exactly the order that would be expected ($NF_1<NF_2<NF_3<NF_4$), indicating that perceptual decontextualization is not simply a matter of always picking the most appropriate prop first, but a trend that continues right throughout the series of choices. This finding is striking considering that only perfect patterns were allowed as evidence of perceptual decontextualization. This is a very conservative criterion, we would probably want to say that a child who picked props in the following order for example: $NF_1<NF_2<NF_4<NF_3$ was also exhibiting decontextualization.

While the evidence for perceptual decontextualization is overwhelming, the support for functional decontextualization is limited. Group mean scores for the CF props were not significantly greater than for the NF1 props as measured by parametric analysis, as would be expected were functional decontextualization occurring. However a non-parametric analysis revealed that these group means were consistently greater for the CF props. This suggests that children are indeed less likely to pick the CF prop, but that this effect is only a very weak one, and not large enough to make mean scores differ significantly.

There are three important implications of these findings regarding decontextualization, firstly the extent of perceptual decontextualization adds weight to the validity of the experiment. It is consistent with the large range of experiments which have shown this effect. This can be taken as evidence that the present study is effectively tapping the processes that are normally involved in object substitution. A critic might argue that all we are really seeing in this instance is that children are able to match objects which look alike, not a very sophisticated achievement.

A second important point is that though evidence of functional decontextualization is limited, where it exists it is at least consistent with what would be expected. It was hypothesised that children would prefer the NF1 prop to the CF prop, and the results are consistent with this suggestion, if not unambiguously so. A final, third, point regarding decontextualization effects is that very tentative evidence emerges to support the suggestion that older children are (relatively) more subject to the effects of functionality. Though their CF scores are lower than younger children, their NF_1 scores are proportionately lower still. This could be the result of a heightened awareness of the functionality of the CF prop, albeit coupled with an increased ability to override this functionality, or it could simply be a reflection of a clearer pattern of performance across the whole range of props. The experiment does not provide a means of separating these two possibilities, and it would be wrong to infer too much from any of the trends of functional decontextualization noted here.

The methodology employed appears therefore to have been generally successful in eliciting appropriate physical and functional decontextualization amongst all groups of participants. However, it might be argued that though the absence of Group differences seen here indicates that object functionality does not impair children with autism's ability to engage in object substitution, this does not necessarily imply that executive deficits of this kind do not impinge on other areas of such children's pretend play. Object substitution is after all, only one of three fundamental forms of pretence identified by Leslie (1987), the other two being imagining absent objects and attributing absent properties. Two points are of relevance here; firstly it is not easy to see how one might test the effect of object function in the case of imagining absent objects. Secondly, and relatedly, it must be remembered that this study provides a direct test of Harris' (1993) proposals. If it is the case that inhibiting reference to salient functions is at the root of children with autism's difficulties in pretence, one must predict an impairment in object substitution (in fact this is the most appropriate testing ground for the theory).

The same point is sufficient to counter an alternative criticism, namely that it is not valid to generalise the results of a highly structured test to the creative and flexible domain of spontaneous pretend play. In other words it might be argued that this task does not really tap ability to engage in 'pretend play proper', especially as the experimenter provides the ideas for pretence and the child simply has to choose an appropriate prop. This may be true to an extent, though, as noted above, the patterns of decontextualization observed suggest that this study examines the processes that have been investigated in other studies of object substitution. This aside, the more important point is that Harris's suggestions still imply that children with autism should be impaired on this task.

A more sophisticated criticism would be that the use of a structured testing environment removes the executive demands normally placed on a child in free play, and therefore alleviates potential executive difficulties present in autism. The problem with this suggestion is it conflates a number of potentially separable executive functions. This experiment has not shown that executive dysfunction has no part to play in explaining children with autism's problems in pretence, simply that a failure to inhibit salient reference does not seem to be important.

A final counter-argument might centre on the question of developmental suitability of the task employed here. While the evidence of executive dysfunction in autism reviewed in subsection 2.33

suggests that such deficits might persist in well-recovered adults, it could be argued that it is unlikely that a spontaneous pretend play deficit would still be evident. In other words it only makes sense to look for potential causes of a pretend play impairment amongst those participants who could be expected to show such an impairment. Some of the children with autism assessed in this study were relatively able, and it is therefore possible that they might have little difficulty on this task despite problems amongst less able members of the group.

A stronger rejoinder to this criticism comes from the analysis of developmental subgroups presented above. Though the more able subgroups still contain a relatively broad spread of abilities, the less able subgroups are much more coherent. A significant impairment in the spontaneous pretend play of the less able children with autism (whose VMAs range from 33 to 50 months) would surely be predicted, and therefore the absence of subgroup differences in CF scores emerging from this analysis provides extremely strong evidence against Harris' claim.

Overall then, this experiment provides clear results which indicate that children with autism are not specifically impaired in their ability to use counter-functional objects as substitutes in pretence. This in turn suggests that if deficits in pretend play are of a performance kind, then they are not due to problems with inhibiting reference to the salient functions of objects as Harris proposes. It therefore remains to test the other two performance deficits which were put forward as potential explanations of an absence of spontaneous pretence in autism, the Motivational and GARS hypotheses. Experiment 5 attempted to decide between these two accounts, and will now be described.

6.3 Experiment 5

6.31 Introduction

Having made an explicit test of the CED hypothesis, and having found no support for it, there remained two other hypotheses to address, the Motivational account (which in fact subsumes a number of potential hypotheses) and the GARS hypothesis. Experiment 5 made a strong test of the GARS account, and in doing so also made a test, albeit a weaker one, of Motivational explanations.

The GARS hypothesis explains a lack of pretend play in autism by suggesting that children with autism have difficulty in accessing retrieval strategies necessary for bringing pretend schemas into use. Implicit in this suggestion is the assumption that external cues have the potential to aid the retrieval of these schemas, while the absence of suitable external cues is what typically hinders children with autism's attempts to pretend. One way of testing this hypothesis is therefore to examine the effect of available cues on children with autism's ability to generate pretend acts. The present study attempted such a test, comparing ability to generate acts with props available to cue pretence, with the hypothetically harder task of generating acts in the absence of any props. This should provide a strong test of the GARS hypothesis, as children with autism should find generating pretend acts especially difficult when there are no props available to them.

Intriguingly this point highlights a crucial difference between the CED and GARS hypotheses. The CED account sets the locus of difficulty in the *external* world to an extent, and predicts that pretend play in the absence of props should be unimpaired in autism, and must become more difficult as functional props are added to the play situation. In contrast the thrust of the GARS hypothesis is that the impairment in autism is more *internal.* Consequently pretend play should be especially difficult in the absence of props according to this account, and should become easier as props are introduced; as the presence of props provides crucial cues to facilitate the retrieval of pretend schemes. These two accounts therefore make opposing predictions regarding children with autism's ability to pretend in the absence of props. Consequently the proposed experiment makes a strong and concurrent test of these two explanations. As an aside, an alternative way of viewing this asymmetry, is in terms of a distinction between activation and inhibition. The CED account centres on a failure to inhibit inappropriate responses, while the GARS account would appear to be based on a failure to activate appropriate retrieval strategies. This distinction will be returned to in the following, concluding chapter.

A simultaneous, but less stringent test of the Motivational hypothesis was provided by ensuring that the children were motivated to perform in both conditions - 'With Props' and 'Without Props'. This ensured that all three accounts under consideration (setting aside the fact that Experiment 4 provides strong support against the CED hypothesis) made different predictions as to children with autism's performance in the two experimental conditions (see table 6.9). In theory it would have been possible to ensure that children were unmotivated to perform. However it had been noticeable throughout the series of previous experiments that the children with autism had enjoyed taking part in the studies, and therefore motivation levels would have had to have been actively lowered. This would clearly have been unethical.

It was decided that a Without Props condition would have to precede a With Props condition. There is clearly a danger of children 'carrying over' pretend acts performed in the first condition into the second. Not only would this appear to be less likely if the easier, With Props condition were second, but the crucial test of the GARS hypothesis is really provided by the Without Props condition. It is therefore important that this condition comes first if the study is to be a valid test of this hypothesis.

Table 6.9. Predictions of relative impairment amongst children with autism made by the three competing hypotheses

	Condition	
Hypothesis	**Without Props**	**With Props**
GARS	Impaired	Unimpaired
Motivational	Unimpaired	Unimpaired
CED	Unimpaired	Impaired

6.32 Method

Participants

The children who participated in Experiment 5 were drawn from the groups that had been assessed previously in Experiment 4 and in the retest of Experiment 3. Smaller groups were employed however, as sufficient time had elapsed to invalidate a number of the BPVS scores used to match participants. It was felt that the current matching of the groups was particularly accurate, an interpretation backed up by the extent of similarities in performances in Experiment 4. Rather than disrupt these groups by large scale retesting, smaller participant groups were therefore adopted. One child with autism was not included in the study as it would not have been possible, given the policy of the school which they attended, to remove them to a separate room for testing. Unlike the previous studies, in this case it was of vital importance that children were tested in a secluded environment.

Given the similarity in the performances of the two groups of children with MLD over the previous two experiments, it was also decided that there was little need for the MLD-APT matched control group. Therefore only three groups were assessed in this study, children with autism, with

MLD and normal children, all matched individually on the BPVS. There were 15 children in each group. Full participant details are given in table 6.10.

The mean chronological age of the children with autism was not significantly different to that of the group of children with MLD (P=0.46, t-test), but was significantly higher than that of the normal children (P<0.01, t-test). The groups did not differ significantly in their mental ages.

Table 6.10. Details of participants in Experiment 5.

Group	*n*		CA (months)	BPVS Age (months)
Autism	15	mean	109.60	56.67
		SD	29.81	22.85
		range	60-156	33-94
MLD	15	mean	116.73	56.60
		SD	21.61	22.28
		range	82-144	33-93
Normal	15	mean	62.53	56.60
		SD	16.43	22.75
		range	47-99	31-94

Materials

In certain cases large white sheets were used to cover up objects that could not be removed from the room in which the child was being tested (see procedure). The only other apparatus employed in the Without Props condition were four strips of card, 1 metre in length and 20 cm thick which were used to mark out a square for the children to occupy. Eight props were used in the With Props condition. Experiments 1 to 4 had all investigated pretence using relatively small or miniature props. In an attempt to move away from this level of toy-play, and to broaden the scope of the research as a whole, it was decided that in this case larger props would be used. It was hoped that this would lead to more self-oriented rather than toy-oriented behaviour. The particular props employed were a candle, a football scarf, a plastic colander, a plastic serving spoon, a clear plastic ruler, a blue plastic card index box, a small cylindrical metal tub and a large metal cake tin.

Procedure

Children were tested in a separate room, in the presence of the experimenter alone. Care was taken to ensure that anything that might prompt children, or provide suggestions for a pretend act was removed from the room or hidden from sight. Any pictures or posters were removed from the walls of the room, and if necessary white sheets were draped over objects that could not be removed or hidden. The only objects that were left visible were standard pieces of furniture such as tables and chairs (these were in fact present in every room). The actual testing took place within a square marked out by strips of card on the floor, to prevent the child from roaming around and using furniture as props.

A number of measures were taken to ensure that children were motivated to perform. There was a clear danger that during twelve minutes of a potentially difficult task, children might become bored or frustrated. Before commencing, children were shown a selection of toys, and were told that they would be able to choose a toy for themselves should they 'play the game well'. After the first condition all children were allowed to select one of these toys, and told that they would then have another chance to win one (all children were given this second choice after the second session). Children were also told that they would have a limited time in which to produce as many pretend acts as possible, and were given feedback on the number of acts they had produced as the sessions progressed.

The Without Props condition was always presented first, followed by the With Props condition. Both conditions lasted a maximum of six minutes, but were terminated earlier under certain circumstances (see below). Each condition started with the experimenter modelling three pretend acts for the children. These acts were the same in both cases, and were: cleaning one's teeth, washing the windows, and putting on a hat. In the With Props condition the experimenter used one of the props in each case (the ruler, the scarf and the colander respectively).

When the child suggested a pretend act the experimenter encouraged them to act it out if they did not do so spontaneously with the words "show me how you pretend to do that". In the without props condition the experimenter joined in the acting out of the act once the child had first shown it satisfactorily. This was done to reduce potential embarrassment that might arise form performing pretend acts before a passive observer. The experimenter did not 'join in' in this way in the With Props condition as this would have required them to take props away from the children, and by this stage children were quite comfortable with the experiment.

After the child successfully performed an act the experimenter would encourage them to continue by saying "Good, that's X pretend things, what else can you pretend to do?", where X was the number of acts produced up to that point. Not only did this serve to keep the experiment flowing (pilot work showed that without this comment from the experimenter children would rush on and produce a number of ill-formed acts very quickly before becoming bored), but it served to further motivate children to perform, by providing a constant feedback of their score.

Typical pretend acts consisted of a verb and object pairing, for example pretending to kick the ball. It would clearly have been possible for children to produce a large number of acts simply by varying one of these pairings. As it was felt that this would not be a fair reflection of true generative ability, children were only allowed to use the same object or the same verb twice. Once they had, for example, kicked a ball and thrown a ball they would be told "Now we've done lots of things with balls, let's have no more. What else can you pretend to do?". In the same way, after kicking a ball and kicking a stone the experimenter would tell them "Now we've done lots of kicking, lets have no more. What else can you pretend to do?". In certain instances children produced acts that were functional in nature, for example a child might suggest that they could "pretend to jump up and down" while actually jumping. In these cases the experimenter would say

"Good, but that's not really pretending is it? You are actually jumping up and down. What else can you *pretend* to do?".

If a child did nothing for 15 seconds, or said that they had run out of ideas, the experimenter prompted them by modelling the pretend act of reading a book, then asked them what else they could pretend to do. If this situation arose again a second prompt of shooting a gun was used. Finally if, for a third time the child refused to produce any further acts, the session was ended. These two modelled prompts were included to ensure that a fair reflection of children's generative performance was obtained. It was felt that some children might need some time to get 'into the swing' of the game, and that it would be incorrect to end a session the first time they stopped generating ideas.

Rating Scheme

Each condition was videotaped for subsequent analysis. This involved rating each act that the child produced, and noting the time at which it occurred. The length of sessions that ended before six minutes had elapsed, because children refused to continue or produce more acts, was also noted.

Credit was given for each different pretend act, exact repetitions of an act (e.g. kicking a ball twice) were not scored. Repetitions of the three initial model acts, or of any subsequent prompts from the experimenter were not scored. Children were allowed to use a verb or an object twice only (as described above), credit was not given for a third use of either a verb or an object. This sometimes required careful interpretation of the nature of the child's suggestions. For example a child might put on a shoe, put on a sock and put on the television. Clearly though the child has used the same verb in each instance (to put on), they are really using two different verbs (to wear, and to switch on). Often this strategy of replacing the child's verb with a synonymical one was useful in determining whether they were repeating themselves or using a particular verb more than twice. Acts were not classed as pretend acts if they were clearly functional in nature. Acts were also only classed as pretend acts if the child adequately acted out their own suggestions, if it was felt that the action was not an appropriate one credit was not given. However for the most part acts were clearly of a pretend nature, and scoring them was a relatively simple operation.

Three videotaped sessions, one of a child from each group, were chosen randomly and scored by an independent rater to ensure the validity of the coding employed. The inter-rater reliability was satisfactory (Cohen's Kappa=0.80).

6.33 Results

The mean time spent in each condition, by children from each group, are given in table 6.11. Also shown are the number of children who stopped before six minutes had elapsed. The majority of children did last for the full duration of the experiment, conditions were terminated early in only 18 out of 90 cases. The differences between lengths of time spent in each condition by children with autism and by controls are not significant (Without Props: P=0.55, P=0.93; With Props P=0.44, P=0.80, vs. children with MLD and normal children respectively; t-tests).

Table 6.11. Mean lengths of conditions (plus number stopping before 6 minutes)

	Condition	
Group	**Without**	**With**
Autism	335.5s (2)	340.2s (2)
MLD	319.7s (4)	323.2s (5)
Normal	333.5s (3)	344.7s (2)

Though the lengths of time spent in each condition by the children with autism do not differ significantly from the time spent by controls, there is clearly a danger in just comparing the total number of acts produced by each group. Not only will this selectively advantage the groups who do play for longer, albeit by a small amount that could perhaps be justifiably overlooked, but the major problem is that one cannot be certain that children of the same developmental ability drop out from each group. For example, it is possible that the 2 children with autism who dropped out early from the Without Props condition, were relatively high functioning children who might have been expected to produce a relatively large number of acts had they continued. In contrast the children dropping out from the control groups may have been low functioning individuals, who may not have produced many more acts had they continued with the experiment.

It is therefore clearly important to control for these factors in some way. This was done by taking a measure of rate of act production, which was used to extrapolate the performance of the children who did drop out early in order to estimate the number of acts they would have produced had they continued. Firstly a *Simple Rate* estimate was calculated (by dividing the acts produced by the proportion of the 360 seconds used) However a Simple Rate clearly assumes that children who stop would carry on at the same rate of production. This is unlikely as the very fact that these children are stopping suggests that they are running out of ideas. Hence a Simple Rate is, if anything, an over-estimate.

Therefore a *Complex Rate* was calculated in order to take into account cases where the rate of act production slowed down over time. This was done as follows: In the cases of children who did stop before six minutes, the number of acts which they produced was plotted as a cumulative frequency graph. To take into account any length of time spent between the production of their final act and their refusal to continue, a simple cumulative frequency was not used. Rather a child was only credited with an act upon the production of the next one, or in the case of their final act, upon termination of the session. For example a child might have produced a pretend act at 30, 60 and 120 seconds, and refused to continue at 180 seconds. Crediting this child with 3 acts in 120 seconds clearly over-estimates their performance, instead one would want to credit them with 3 acts in 180 seconds.

Having plotted this form of corrected cumulative frequency for each child, regressions were fitted to this data. Three were attempted, a simple linear regression and quadratic and cubic polynomial regressions. Using the equations produced by these regressions the extrapolated number of acts at 360 seconds was calculated (if necessary the turning point of the regression was calculated by differentiation and used to provide a maximum value). In each case the value predicted by the regression which accounted for most of the variance in the data (highest r) was adopted, with the following provisos. Values were not accepted if the regression did not account for at least 95% of the variance in the data ($r^2>0.95$) or if they were less than the score actually obtained by the subject at the point of termination (possible for the polynomial regressions) or if they were greater than the value predicted by a Simple Rate calculation (again, possible for the polynomial regressions). If none of the predicted values met these criteria then the Simple Rate estimate was adopted.

These manipulations produced a 'Rate Corrected' estimate of performance for each child, though it should be remembered that the majority of children lasted for the duration of each condition, and many of those who stopped early lasted for most of the time available. Means of the corrected values for each group are shown below in table 6.12, and shown diagrammatically in graph 6.8. A two factor Anova analysis was carried out with the Rate Corrected Acts data, the factors being Group (repeated measures, 3 levels), and Condition (repeated measures, 2 levels). The main effect of Group approached significance (F=2.68, df=2, P=0.08) reflecting lower scores for the children with autism than both sets of controls (P=0.06 vs. children with MLD, P=0.08 vs. normal children; paired t-tests). The main effect of Condition was not significant (F=0.54, df=1, P=0.48), and nor was the Group x Condition interaction (F=0.99, df=2, P=0.38).

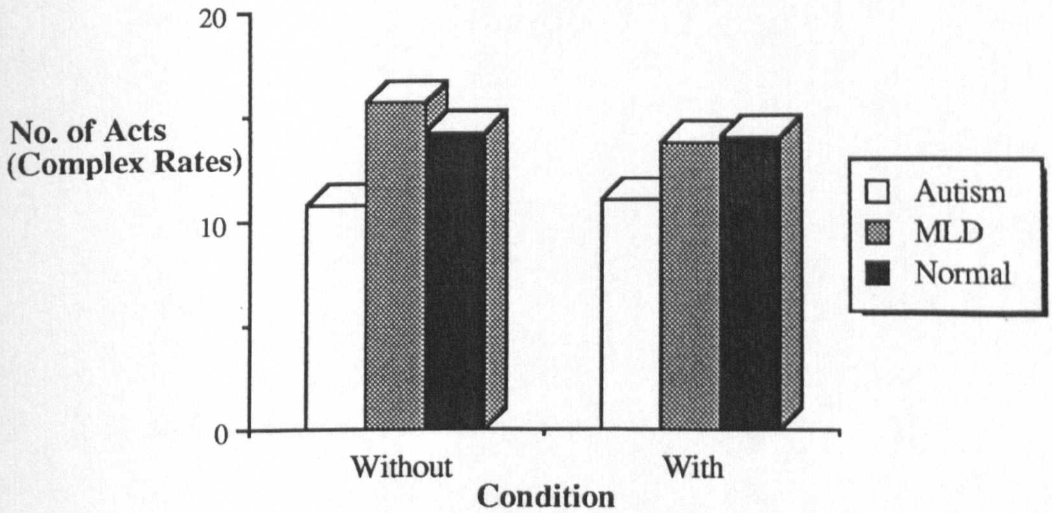
To check that the corrected rate analysis provided a reasonable assessment of the data, a second analysis was performed on the uncorrected total number of acts. To control for the fact that some children did not last for the full six minutes in each condition, these children were not considered in this analysis. The three groups, made up therefore of only those children who lasted the full duration of both conditions, consisted of 13 children with autism (mean VMA=53.54 months, sd=22.57), 10 children with MLD (mean VMA=57.90 months, sd=21.93), and 12 normal children (mean VMA=62.08 months, sd=22.20). These groups were matched, though not individually, for VMA (P=0.65, children with autism vs. children with MLD; P=0.35, children with autism vs. normal children; P=0.66, children with MLD vs. normal children; unpaired t-tests). Mean total act scores for these reduced groups, in both conditions, are shown in table 6.12. A two factor Anova analysis of the form used initially (though with independent Groups due to the absence of individual matching in this case), revealed a significant main effect of Group (F=6.37, df=2, $P<0.01$), due to lower scores amongst the children with autism than amongst controls ($P<0.05$ vs. normal children, $P<0.01$ vs. children with MLD; Tukey tests). As before the main effect of condition was not significant (F=0.28, df=1, P=0.60), and nor was the Group x Condition interaction (F=0.28, df=2, P=0.76).

Table 6.12. Means number of pretend acts by Group

Group	Condition	Rate Corrected Acts (all children)	Total Acts (children lasting duration of both conditions)
Autism	Without Props	10.74	9.62*
	With Props	10.95	10.00*
MLD	Without Props	15.68	18.60#
	With Props	13.74	17.5#
Normal	Without Props	14.21	16.67†
	With Props	14.05	16.08†

*N=13, #N=10, †N=12

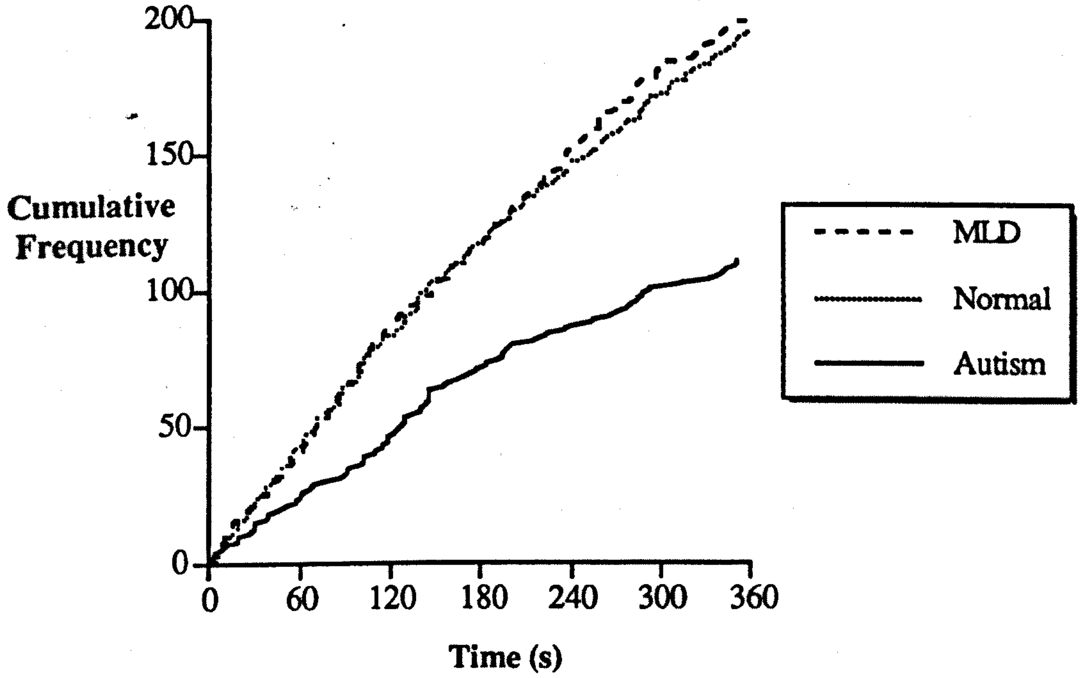
Graph 6.8. Mean number of pretend acts, Complex Rates



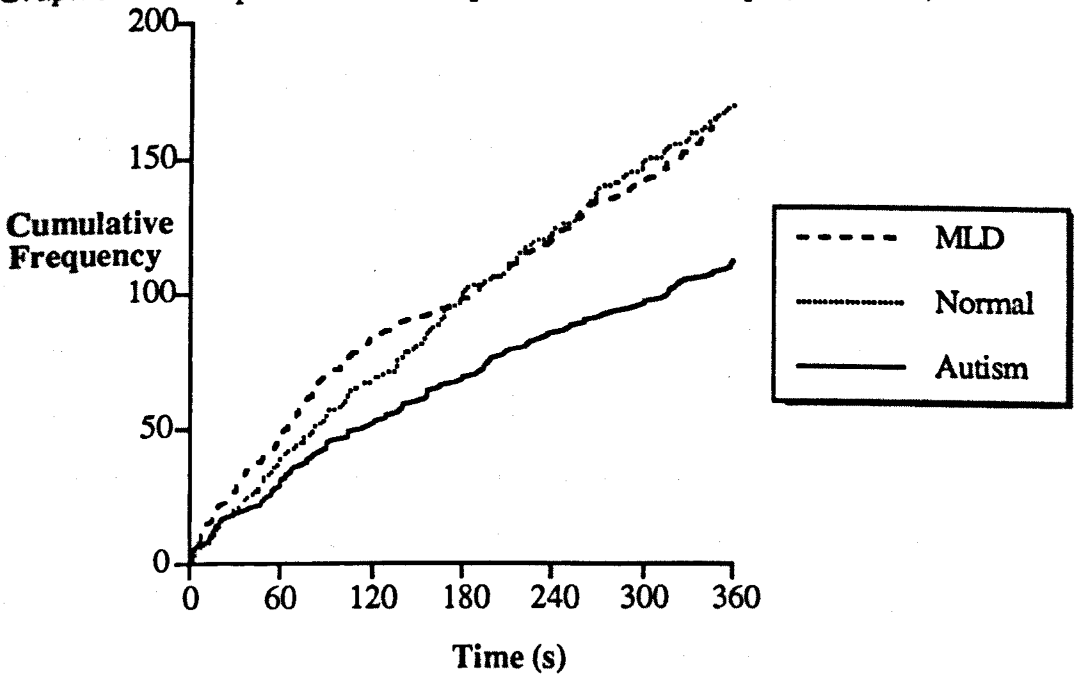
For the children within each group, and for each condition, correlations were calculated between number of Rate Corrected Acts produced and verbal mental age. Significant correlations were obtained for each group in the Without Props condition (Pearson's r=0.59, P<0.05, children with autism; r=0.64, P<0.05 children with MLD; r=0.80, P<0.01 normal children). In the case of the Without props condition, correlations were significant for the children with autism (r=0.53, P<0.05), but not for the children with MLD or the normal children (r=0.20, r=0.49 respectively). All correlations were positive, indicating greater rates of act production amongst developmentally more able children.

To provide a final, further way of looking at the data, Group cumulative frequencies were plotted for each condition. Clearly this necessitates using the total number of acts produced, rather than rate corrected data, so it must be remembered that some of the children 'drop out' before six minutes. Nevertheless the frequencies (see graphs 6.9 and 6.10) show how the performance of the group of children with autism is markedly inferior to that of controls across the whole range of each condition.

Graph 6.9. Group Cumulative Frequencies for Without Props (Total Acts)



Graph 6.10. Group Cumulative Frequencies for With Props (Total Acts)



6.34 Discussion

The purpose of Experiment 5 was to provide a firm test of the validity of the GARS hypothesis as an explanation for children with autism's problems in pretend play. An advantage of the design employed was that it provided a further strong test of the CED hypothesis (though this hypothesis received no support from Experiment 4) and a less stringent but nonetheless important test of Motivational explanations of an absence of pretence. The actual pattern of predictions made by these three hypotheses were outlined in table 6.9. The only possible pattern of performance which would not fit one of these three accounts would be for children with autism to be impaired in their production of pretend acts in both conditions. Ironically this is exactly the pattern of performance that emerged.

The analysis of rate corrected act production reveals that the children with autism generally produce fewer acts than controls. Though the main effect of Group is not strictly significant there is a clear trend for impaired performance amongst the children with autism. The absence of a clearly significant Group effect is argueably the result of fatigue effects amongst controls in the second, With Props condition. Table 6.12 and graph 6.8 show that the performance of the children with autism remains constant across the conditions, while that of controls drops. That this might reflect fatigue effects, rather than differential group responses to differences in condition difficulty, is indicated by the correlational analysis described above. This revealed a significant correlation for the children with autism in both conditions suggesting that these children perform at a level commensurate with their ability in both cases In contrast the correlations for controls are only significant in the initial, Without Props condition, and drop somewhat for the With Props condition. This suggests that they are not performing as well as they might in the second condition, where their performance is less representative of their ability as predicted by their VMA. A final way in which these fatigue effects can be shown is by overlapping the cumulative frequency graphs for the two conditions (graphs 6.9, 6.10). Doing this reveals that children with autism's number of acts rises at the same rate in both conditions. However in the With Props condition the children with MLD's total rises at the same rate as in the Without Props condition for the first two minutes, before increasing at a slower rate, while the normal children begin at the Without Props rate, but slow down after only one minute. In the light of these points, and bearing in mind the extent of the Group differences seen anyway, it would appear fair to suggest that the rate corrected analysis provides evidence that children with autism are impaired in their generation of acts, relative to controls.

This suggestion is strengthened by the second analysis which considered the total number of acts produced by those children lasting for the duration of both conditions. This analysis is not as tightly controlled as the first, as children are not individually matched across groups, and because it cannot account for the fact that children of different abilities might drop out from different groups. However the reduced groups employed in this case do not differ significantly in their verbal mental ages, and can therefore still be said to be matched, albeit more loosely. This analysis necessarily uses an independent group design, which has less power to reveal a Group effect. The fact that such a clear difference is seen between the performance of the children with autism and of controls is therefore striking.

An interesting point emerges from a comparison of the two types of act production measures employed here. Table 6.12 clearly shows that while the children with autism produce a similar number of total and rate corrected acts, both sets of controls show higher levels of performance when total, rather than rate corrected acts are considered. This effect can also be seen be comparing graph 6.8 with the final cumulative scores seen in graphs 6.9 and 6.10. This indicates that the children who are dropping out from the control groups must be producing relatively few acts before they stop playing. Consequently a rate correction results in a extrapolated figure which is still relatively low compared to those of other members of the group. Including such a child therefore suppresses average group performance, while omitting them increases mean levels of production. Does this affect the proposed interpretation of a group difference advanced here? Not at all. If anything it might be argued that these control children should be omitted from the analysis, as they are likely to be those children who performed poorly due to low levels of motivation, or because of embarrassment.

Importantly, the absence of a significant Group x Condition interaction in both analyses indicates that the generativity impairment proposed here persists across conditions, contrary to the predictions of the GARS hypothesis. There is no evidence to suggest that children with autism's relative problems in generating acts is alleviated to any extent by the introduction of props in the second condition.

One might readily accept that this experiment has shown impaired production of acts amongst children with autism, but still argue that this does not imply that their generative abilities are similarly impaired. This argument could be based on the assumption that condition lengths of six minutes might disadvantage the children with autism, who might not be motivated to continue to produce acts for this length of time. An examination of graphs 6.9 and 6.10 shows that the children with autism's rate of act production does fall off with time, and hence it could be claimed that they might be showing fatigue (within a condition). If one were to compare the groups after only two minutes one would probably not find any impairment. However the control children show exactly the same pattern of 'within condition fatigue'; their rate of act production also drops. It is not surprising that children's rate of act production slows as they produce more acts, and presumably have to spend longer thinking of each new act. This situation is clearly one in which there is a trade off between this task demand and the need to provide room for an impairment to be seen. That the children with autism are indeed impaired as regards their *rate of production* can be seen by looking again at graph 6.9, for example, and drawing tangents on the plots to determine the level of performance groups would achieve were they to continue at their initial rate for six minutes. Doing this roughly by hand reveals that children with autism would produce a total of approximately 150 acts, while controls would produce around 260!

A further possible argument against assuming impaired generative abilities in the children with autism is that this group might, as a result of their characteristic perseverative behaviour, be hampered in their production of different acts by a preference for performing the same act repeatedly. While this raises interesting questions about the relationship between generation and perseveration, it can be dismissed as an argument. There was no evidence to suggest that children with autism repeated acts more than controls. In fact the experiment was highly successful in reducing repetitions of the same pretend verb-object pairing. When these repetitions did occur it was at the end of a session when the child was beginning to forget what they had done at the start of the test.

This study therefore provides good evidence to suggest that children with autism are impaired, relative to controls, in their ability to generate pretend acts, both in the presence and in the absence of props. This finding hammers another nail into the coffin of the CED hypothesis which claims that children with autism's difficulties in pretence are due to the functionality of the objects around them. By this account children with autism would find pretence in the absence of props relatively easy, as there would be no salient functional action prompted by the environment for them to have to strive to override. In this sense the findings of the present study are consistent with those obtained from Experiment 4.

The results also cast some doubt on a Motivational account, which would predict unimpaired performance in both conditions if motivation levels were high. It could of course be argued that the observed impairment across both conditions is due to a lack of motivation amongst the children with autism, and that the results therefore indicate only that the manipulations employed to raise motivation in this group were unsuccessful. Two pieces of evidence counter this suggestion. The first is that children with autism spent as long playing in each condition as did controls. The design of the experiment allowed children to end the session if they wished to, but table 6.11 shows that the children with autism did not drop out particularly often or particularly early. A further counter-argument is that the results show that children with autism, unlike controls, retain their motivation to perform in the second With Props condition. The correlation between their verbal mental ages and the number of acts that they produce remain constant across both conditions, indicating that they perform at a level which reflects their developmental abilities in the second condition. This is also seen in the rate of rise of their cumulative frequency plots, which is constant across conditions. There is therefore no evidence to suggest that levels of motivation drop in the With Props conditions. Though this could still be taken to suggest that the children with autism are not motivated in either condition it seems likely that children who were not motivated in the first condition would become even less motivated in the second, faced with another relatively long period of testing.

The remaining hypothesis that the experiment set out to test, and the one that it principally addressed, was the GARS hypothesis. This states that children with autism have particular problems in generating the strategies required to access appropriate play schemes. This account would suggest that children would find play without props especially difficult, as this situation provides very few cues to aid their retrieval processes. Conversely play with props should be easier as the props themselves should provide clues for pretence. The results from the current study do not fit with these predictions either, as the children with autism showed no differential effect of prop presence. The findings therefore count against this particular account. However a generative hypothesis must not be dismissed too readily given the clear problems in generating pretend acts shown by the children with autism. There is obviously some impaired generative ability within this group, but it does not seem to be mediated by the presence or absence of external cues, as initially suggested.

In summary this experiment succeeds in part in its aim to test the three hypotheses outlined initially. Relatively clear findings emerged, suggesting that children with autism are impaired in their ability to generate pretend acts both with and without props. However while the experiment tests these accounts, by comparing their predictions with the actual results, it fails to provide explicit support for one of them as they all fail to account for the observed pattern of performance in the children with autism.

6.4 Brief Conclusions

The purpose of this chapter was to describe the work that was undertaken in an attempt to answer the question of why children with autism do not pretend, given the evidence from chapters 4 and 5 to suggest that they can pretend in certain circumstances. Three potential explanations of a failure to pretend spontaneously were outlined in chapter 3, and these were addressed here. Experiment 4 provided a stringent, and I believe well controlled test of the CED hypothesis. The results of this experiment failed to support this account, as children with autism had no difficulty in employing counter-functional props in object substitution as would be predicted by this hypothesis. Neither did the CED hypothesis receive support from Experiment 5. In this case children with autism were clearly impaired in their ability to engage in pretend play without props, a finding at odds with the predictions made by the CED account. The results of Experiment 5 also count against a Motivational explanation of children with autism's difficulties in spontaneous pretend play. In this case children with autism were impaired despite clearly being motivated to engage in pretence.

This leaves the GARS hypothesis, which again was not fully supported by the results of Experiment 5. As formulated initially this account predicts unimpaired production of pretend play in the With Props condition, but the findings indicated a generativity impairment which persisted across both conditions. However, as noted above, it is clear that children with autism's difficulties appear to lie in the *generation* of pretend acts. Therefore with appropriate modification, a reformulation of the GARS hypothesis may provide an adequate explanation of the results of Experiment 5, and hopefully of Experiments 1 to 4 also. A potential reformulation of this hypothesis will be described and critically evaluated in the following chapter.

Chapter 7
Conclusions

7.1 Summary Of Findings

The final section of this final chapter (section 7.6), will describe the thesis, or theoretical position reached as a consequence of this research. The penultimate section (section 7.5) will outline areas for further research in this area that arise both from questions which have been raised by the work described here, and from questions which it has left unanswered. Before tying these threads together in this way, this initial section will draw together the findings obtained from Experiments 1 to 5. A summary of the major findings is also given at the end of the section in table 7.1. This section will be brief, as these results have been discussed in detail in the preceding chapters. However, it is important that the theoretical conclusions drawn later in this chapter, regarding pretend play in autism (section 7.2), and also the more general areas of pretend play, and of autism (sections 7.3 and 7.4 respectively) are based on a clear and measured evaluation of all the empirical findings obtained in this research.

7.11 Experiments 1 And 2

Experiment 1

The main aim of Experiment 1 was to address two questions crucial to the issue of whether pretend play deficits in autism result from a competence deficit, or global inability to pretend. These were whether children with autism are impaired in their production of spontaneous pretence, and secondly, whether they were similarly impaired in structured (elicited and instructed) conditions. An additional question of interest concerned the extent to which the ability to produce emotional and social pretence might be specifically impaired in autism. However, given methodological failings inherent in the design, the analysis that was conducted was relevant only to the two main questions outlined above, and not to the issue of particular emotional and social pretend play deficits.

Two separate analyses were performed on the results of Experiment 1. The first examined percentage time spent in various forms of play in both spontaneous and elicited play conditions, while the second investigated rates of production of various play acts in these two conditions. The groups did not differ significantly in percentage time spent in spontaneous and elicited symbolic play. However, there was a clear trend towards impairment, and the fact that a Group effect did emerge with the doll plus junk materials suggests that floor effects amongst controls with the other toy set masked a true symbolic play deficit. In support of this suggestion a significant impairment amongst the children with autism did emerge when intermediate symbolic play was also included in the analysis. Exactly similar results were seen in the rate of symbolic (and intermediate symbolic) act production analysis. No Group x Condition interactions were found for either analysis of symbolic or of symbolic plus intermediate symbolic play. In other words, there was no evidence to suggest that children with autism were unimpaired in elicited conditions, relative to spontaneous conditions.

Children with autism showed higher levels of manipulative play, and of 'no play', than did controls. As suggested they also spent less of their time in functional play than did controls. There was a trend for children with autism to produce functional acts at a slower rate than controls, and in fact children with autism were impaired in their rate of total act production.

Experiment 2

Experiment 2 provided a test of children with autism's relative ability to engage in instructed pretend play. It was carried out because there were a number of flaws present in the initial test of instructed play employed in Experiment 1. As well as investigating children's ability to produce pretence under these highly structured conditions, the question of specific impairments in the production of emotional and social pretence was addressed in this study.

The results of Experiment 2 showed that children with autism were not impaired relative to controls in their ability to carry out instructed pretence, whether by a conservative or by a liberal analysis. There was also no differential effect of Instruction Type on the performance of the children with autism; they performed similarly to controls on physical, social and emotional instructions.

7.12 Experiment 3

The purpose of Experiment 3 was to investigate children with autism's ability to understand pretend acts which were presented to them. The importance of this test being that it removes any potential difficulties in production that children might otherwise experience. Two versions of the same experiment were carried out, and both sets of analyses showed that children with autism were unimpaired in their ability to name the pretend Substance involved in a play episode. There was a trend towards a significant Group x Mode interaction in the initial analysis of the Substance question results, but this was not due to a differential effect of Group in the Pretend Mode, and did not persist in the second analysis.

Similar results were obtained from both analyses for the Outcome and Mode questions also. In both these cases no Group effects or Group x Mode interactions were observed. However as has been noted, this cannot be taken as evidence for unimpaired comprehension of pretence in the group with autism, especially in regard to performance on the Mode questions, where all groups adopted an echolalic guessing strategy. The evidence for and against guessing in response to the Outcome questions has been discussed (subsection 5.27), and as one cannot be completely certain that children with autism are not (randomly) guessing their responses in this case, these results can only be seen to indicate the absence of a deficit in this instance, rather than implicating the presence of general unimpairment.

7.13 Experiments 4 And 5

Experiment 4

Of all the studies described in this account, it is Experiment 4 that provides the most clear cut results. This is partly because it tested a particular explanation of children with autism's problems in pretence, the CED hypothesis, which made firm and easily verifiable predictions. The observed results clearly indicated that children with autism have no particular difficulties in carrying out object substitution with counter-functional objects, contrary to the predictions of the CED account. Specifically, children with autism showed no particular reluctance to adopt counter-functional props in substitution, relative to controls. They also showed exactly the same, expected pattern of decontextualization in their choices of non-functional props.

Experiment 5

In common with Experiment 4, the prime aim of Experiment 5 was to make an explicit test of a specific explanation of pretend play deficits in autism. In this case the GARS hypothesis was investigated, but the design of the experiment also ensured that the CED hypothesis and Motivational accounts were tested simultaneously. Children with autism's ability to generate pretend acts was examined, both in the absence of, and in the presence of props. The results of the experiment suggested an impairment in this ability in autism in both of these conditions. Though the effect of Group which emerged from the rate corrected Anova analysis was not strictly significant, there was a clear trend for the children with autism to produce fewer acts than controls. Further, it is argued that fatigue effects amongst controls, which appear to lower their levels of performance in the With Props condition, may be masking a significant deficit.

Strong support for a generativity impairment comes from the analysis of total acts, which shows that the children with autism produce significantly fewer total acts than controls. Though the matching of individuals in this second analysis is not as stringent as it might be, these groups are all of a similar level of verbal ability. The fact that neither analysis reveals a significant Group x Condition interaction indicates that the extent of any generativity impairment remains constant regardless of the presence, or absence, of props.

Table 7.1. Summary of findings from Experiments 1 to 5.

Experiment	Testing Conditions	Relative Performance Of Children With Autism
1	Spontaneous and Elicited Play	Impaired in terms of % time spent in symbolic play, and in rate of symbolic act production.
2	Instructed Play (Physical, Emotional, Social)	Unimpaired. (No differential effect of Instruction Type).
3	Comprehension of Pretence (Substance, Outcome, Mode)	Unimpaired (though all groups perform poorly on Outcome and Mode questions).
4	Use of Counter-Functional Props in Object Substitution	Unimpaired
5	Generating Pretend Acts: With and Without Props	Impaired (not strictly significant for rate corrected acts, clearly so for total acts).

7.2 Implications For Pretend Play In Autism

This particular section describes the implications of the findings summarised above as regards our understanding of pretend play in autism. This will be done in two ways, which mirror the themes which have run through this account. Firstly, the question of whether children with autism can indeed pretend under certain circumstances will be addressed (subsection 7.21), and secondly, specific explanations of children with autism's problems in pretend play will be by considered (subsection 7.22).

7.21 Can Children With Autism Pretend?

In section 5.3 it was claimed that the results of Experiments 1 to 3 indicated that children with autism's characteristic lack of spontaneous pretend play could not be due to a competence deficit in this domain. These results suggested that while children with autism were impaired in their production of spontaneous pretend play, they were able to pretend under certain circumstances (when pretend play was instructed, or acted out before them). These findings indicate that children with autism, rather than being globally unable to pretend, 'can but don't' engage in pretence.

Four arguments against this interpretation have already been outlined (see section 5.3). These were:

i) That the children assessed might not be representative of children with autism as a whole.

ii) That the use of different children in Experiment 3 might invalidate a comparison with Experiments 1 and 2.

iii) That the tasks employed may not actually assess pretend abilities as such.

iv) That matching for language comprehension may match away differences in pretend play abilities, if pretend play and language are functionally related.

Both criticisms i) and iv) are countered by the fact that a characteristic deficit in time spent in spontaneous pretend play was observed amongst the children with autism, and criticism ii) is not a strong one as there is no real reason to suspect that a radically different subset of children were added to the sample between the studies. The third criticism is more subtle, and while arguments against it were advanced in section 5.3, it will be returned to later.

The importance of the pattern of findings obtained up to and before the start of Experiment 4, was that they were generally at odds with the predictions made by the various competence hypotheses outlined in section 3.2. In contrast, they were broadly consistent with those made by the performance hypotheses formulated in section 3.3. However, Experiments 4 and 5, though not aimed at the question of competence or performance specifically, provide further evidence which is potentially relevant to this question. It is therefore important to re-evaluate this conclusion in the light of the findings of these later studies.

One thing that children with autism appear to be able to do, from the evidence of Experiments 1 to 5, is to engage in object substitution in a structured play situation. Experiment 2 showed that they are not impaired in their ability to carry out physical instructions to pretend, which required them to select an appropriate junk prop. Similarly, while the design of Experiment 4 was such that children were forced to choose a prop for object substitution, the pattern of choices shown by children with autism was strikingly 'normal'. Object substitution is one of the three fundamental manifestations of pretence put forward by Leslie (see subsection 1.22), the other two being 'attribution of absent properties' and 'imagining absent objects'; is there also evidence of these other two forms amongst the children with autism studied here?

In order to pass the social instructions used in Experiment 2 children would appear to have to imagine an absent object, for example a ball that was thrown between the two figures, as no junk props were included in these cases. In the case of the emotional instructions, a correct response necessitated the ascription of an emotional state to the protagonist, and its consequent enactment, which could be construed as attribution of absent properties. The children with autism were not impaired relative to controls on these subsections of Experiment 2. However, it might be argued that the social, and perhaps even the emotional instructions could be passed by carrying out an appropriate action such as 'throwing or 'crying'. While this would appear to still be pretence of a sort, it is not clear where this type of play would fit into Leslie's scheme.

A better place to look for evidence of the ability to attribute absent properties is the analysis of responses to the Outcome questions posed in Experiment 3. Here children were required to appreciate that an animal who had had pretend tea poured on them would be hot. As described above, caution must be exercised in interpreting the absence of an impairment amongst the children of autism on this question as evidence of true comprehension, but the results are loosely consistent with the suggestion that the attribution of pretend properties is something children with autism can perform and understand. Experiment 3 also indicates that children with autism can imagine absent objects, as they are unimpaired on the Substance questions used in this experiment, which required them to imagine an empty tea pot as containing tea. The criticism that these questions could be answered by a process of associative labelling has been addressed, but cannot be dismissed entirely. It is therefore clear that children with autism can engage in object substitution, and it appears as if they can also imagine absent objects and attribute absent properties.

These points confirm that Experiments 1 to 5 have demonstrated that children with autism are able to engage in pretend play in some instances, contrary to the predictions made by competence deficit accounts. Does this imply that all the problems in pretend play seen autism are the result of a performance deficit? Not necessarily. Firstly it should be noted that within the framework for pretend play development outlined previously (subsection 1.25), what has been demonstrated in autism is the ability to carry out, or understand, solitary symbolic play. No attempts have been made to study potential impairments in social pretend play, and it may be that children with autism are globally unable to carry out or understand this type of pretence. In other words there may not be a competence deficit in solitary pretend play, but there may be one in social pretend play. Reasons for suspecting that this might be the case will be discussed in section 7.3.

A second caveat concerns the use of the term 'performance deficit'. In subsection 3.16 it was noted that a failure to perform in one domain may well be due to a lack of competence in some other domain. A quintessential performance deficit implies intact ability to perform coupled with a failure to perform which is not mediated by any other competence deficit. My *choosing* not to speak French, despite being fluent in the language is a (hypothetical) example of this. If the absence of spontaneous pretence seen in autism was the result of such a deficit, one would predict that children with autism would have no difficulty in producing pretence provided that they were sufficiently motivated to do so by the experimental conditions. However, in the elicited play condition employed in Experiment 1 children with autism spent less time in pretence than did controls. The methodology employed in Experiment 5 also directly elicited pretence. In this case children with autism appeared to be motivated to perform, yet their ability to produce pretend play was significantly impaired.

It does seem as if the locus of difficulty for children with autism lies at the level of production of pretence, rather than at that of the psychological mechanisms involved in pretence. However, it is clearly not the case that simply increasing the structure of a play situation enables children with autism to produce pretence. The prediction that elicited pretend play would be unimpaired in autism has clearly not been supported. In discussing Experiment

1 it was noted that the difference in the degree of structure of the spontaneous and elicited play conditions was not as great as it might have been. Even so, the performance hypotheses outlined in section 3.3 were taken to predict that *any* increase in structure would result in a corresponding decrease in the extent of children with autism's deficits. In Experiment 1 no evidence of any differential improvements across conditions was observed. Children with autism's failure to produce pretend play spontaneously is therefore not the result of a 'quintessential performance deficit'; in other words it is not the case that they can pretend but simply choose not to do so. While they have the ability to produce pretend play under certain highly structured conditions, they have problems in producing pretence in other conditions, even when pretend play is clearly called for. Therefore, while it is fair to reject competence deficit explanations of pretend play deficits, it is perhaps inappropriate to talk purely in terms of performance deficits in the pretend play of children with autism. Rather than embracing this potentially misleading distinction, the following subsection will discuss reasons why children with autism do not pretend in all circumstances, given that they can pretend in some circumstances.

A final point concerns whether this research has shown that children with autism can truly engage in 'pretend play'. A critic might argue that what has really been demonstrated is that children with autism are capable of selecting objects that resemble other target objects, that they can then use them appropriately; and that they can name substances and outcomes that are usually linked with actions (whether literal or pretend) that they will be familiar with. This, it might be argued, is nothing like pretend play, which almost by definition is creative, flexible and unpredictable.

As far as one defines pretend play in these terms, these criticisms hold. This work has not shown evidence of very creative or particularly imaginative pretend play in children with autism, but has shown that children with autism are capable of producing and understanding pretend play, in that they are able to substitute one object for another and act as if absent objects and properties are present. The claim is not that children with autism are normal pretenders, but rather that the psychological mechanisms on which the production of pretend play rests, appear to be intact. It might be fairer to say that children with autism can pretend, but may not be able to pretend *play*.

7.22 Why Do Children With Autism Not Pretend?

Specific explanations of children with autism's deficits in pretence were outlined in sections 3.2 and 3.3. The three competence hypotheses detailed in section 3.2 were the metarepresentational theory of Leslie (subsection 3.21) and the social theories of Hobson and of Rogers and Pennington (subsection 3.22). All three of these accounts are 'competence deficits' because they explain an absence of spontaneous pretend play in autism by proposing that the psychological mechanisms for engaging in pretence are not present or functional in autism. As noted above, aspects of Experiments 2, 3 and 4 indicate that this explanation is incorrect; children with autism do appear to have intact the mechanisms for pretence (or at least for solitary symbolic play).

Of the three performance deficits proposed in section 3.3, these being the CED, the Motivational, and the GARS hypotheses, it is the latter that received most support from Experiments 4 and 5, which were aimed at separating these accounts. Experiment 4 provided clear evidence against the CED hypothesis, and in addition the results of Experiment 5 did not fit the pattern predicted by this account. A final 'nail in the coffin' of this hypothesis is the finding of impaired functional play in autism which emerged from Experiment 1 (see subsection 7.11 above). As formulated the CED account would seem to predict that children with autism would have no problems in using toys in a way appropriate to their function.

The Motivational hypothesis was not tested as stringently as the other two accounts, but this is partly due to difficulties inherent in tying such an account down and making a direct test of its predictions. However Experiment 5 was designed in such a way as to allow for a more indirect test of this hypothesis, and provided evidence against it. Children with autism were impaired in their ability to produce pretend play despite being motivated to do so. Children with autism's performance did not decline in the second condition employed in this study, in the way that the performance of controls did, and this could be indicative of high levels of motivation. Further, this account struggles to explain why the elicited pretend play of children with autism was impaired in Experiment 1. While the nature of the elicitation employed in this experiment has been previously criticised, the one thing it should have achieved would be to increase levels of motivation in children. A final point is that it was my impression throughout testing, that motivation to perform was not a problem for children with autism. It did seem that they often preferred other forms of play, as suggested by Harris (1989a) but this form of motivational account cannot explain impaired performance without props in Experiment 5. As noted in the previous subsection, the pattern of results obtained in elicited play conditions (Experiments 1 and 5) indicates that children with autism do not suffer from a 'quintessential performance deficit'. It is not the case that they can pretend, but simply choose not to do so.

In contrast to the other two accounts the Generation of Access and Retrieval Strategies hypothesis is able to explain why children with autism were impaired in elicited pretend play in Experiment 1. The methodology employed in this condition did nothing to aid the accessing of pretend acts, as it did not provide any cues to elicit the retrieval of pretend schemas. The GARS account could also easily be interpreted to predict impaired functional play in autism, if it is hypothesized that a failure to access play schemas applies to all creative play acts rather than symbolic acts alone. However while Experiment 5 indicated a clear problem in generating ideas for pretence, the GARS account did not receive total support from this experiment. It was predicted that children with autism would be impaired in their ability to generate pretend acts without props, but not with props. While the study provided reasonable evidence of impaired ability to generate pretend acts in autism, it undoubtedly showed that the extent of any such impairment was not affected by the presence of external cues.

The GARS hypothesis therefore needs to be reformulated if it is to be of use in explaining the set of results obtained in these experiments. The original account predicted that props would cue the generation of appropriate retrieval strategies, but this does not appear to occur. In fact if the presence of props did cue access of pretend schemas it would be difficult to explain the clear impairment seen in spontaneous pretend play in the presence of props (Experiment 1). It therefore seems that the locus of children with autism's difficulties in generating pretend acts is very much an internal one. It cannot simply be that they fail to perceive and utilise appropriate cues that are inherent in props, because if this were the only cause of a With Props deficit, they would be unimpaired in generating acts in the Without Props condition.

The suggestion of some form of internal generation deficit fits in well with the majority of findings observed in this research. What separates the tasks in which children with autism were unimpaired from those which demonstrated an impairment is whether the idea for pretence was given by the experimenter or not. In Experiments 2, 3 and 4 the pretend act was either specified or demonstrated for the child. Children with autism (broadly speaking) were able to act out a specified act, or comprehend a demonstrated act as well as controls. Conversely, in Experiments 1 and 5 the child had to generate the idea for pretence themselves, and it is here that the children with autism struggled. A benefit of viewing the tasks in these terms is that it explains the failure to find unimpaired elicited pretend play in Experiment 1. In this condition children were encouraged to pretend, but no cues or suggestions of potential acts were provided. The child was left to generate pretend acts themselves.

Further, strong support for this proposed deficit comes directly from the evidence of impaired rates of symbolic act production seen in Experiment 1 (see subsections 7.11, 4.24). These findings replicate those of Sigman and Ungerer (1984a), who specifically found that children with autism produced significantly fewer symbolic acts than controls (see subsection 3.14). It therefore appears that children with autism fail to produce normal levels of pretence in spontaneous play, not because they are unable to pretend, but because of an impaired ability to *generate* pretend acts. This is not to say that they are totally unable to generate acts; they clearly produce some pretence, even in spontaneous play conditions. Instead they appear to be unable to produce pretend acts at the same rate as controls.

The hypothesis that children with autism are impaired at generating pretend acts is important in that it provides a potential explanation of the results of all five experiments reported here. It might be argued that this hypothesis amounts to little more than a description of what is already well established, after all the starting point of this research was the claim that children with autism spontaneously produce less pretence than controls. This criticism is partly countered by the fact that a deficit in pretend act generation fits well with other evidence of impaired generativity in autism (described in subsection 3.33). However, it is still important to ask *why* children with autism might struggle to generate pretend acts. Though firm conclusions cannot be drawn without conducting further research to addresses this question directly, the hypothesis needs to be fleshed-out somewhat.

Accepting that children with autism show a slower rate of pretend act generation than controls implies one of two things. Either they prefer not to generate acts, or they find the generation of acts somehow 'harder' than do controls. While a motivational explanation has the power to explain a reduced rate of act production in spontaneous play, it is ruled out by the findings of Experiment 5 which indicate that children with autism are still impaired in their generation of pretence when motivated to produce pretence. It therefore appears that generating pretend acts is something children with autism find intrinsically more difficult than do controls. There appear to be at least three potential explanations for this difficulty. These will now be outlined and discussed.

Failure To Habituate Hypothesis

It is possible that children with autism might not generate pretend acts because they fail to habituate to the non-symbolic use of objects around them, or to the non-symbolic nature of the current context. There is considerable evidence to suggest that children with autism are abnormally slow to habituate to repetitive stimuli (see Dawson & Lewy, 1989a). This is not only shown by studies which have found a reduced rate of autonomic habituation to the presentation of repetitive auditory stimuli, but by evidence of an abnormal electrophysiological response to the presentation of novel stimuli in autism. The presentation of novel stimuli typically produces a characteristic peak in brain activity, or Event-Related Potential (ERP), as measured by electrodes upon the skull. This particular section of the ERP, which is known as the P3 component, has been found to be abnormally reduced in autism (Courchesne, Kilman, Galambos & Lincoln, 1984; Courchesne, Lincoln, Kilman & Galambos, 1985; see also Dawson & Lewy, 1989b; Lincoln, Courchesne, Harms & Allen, 1993). This suggests that children with autism do not respond to novelty as strongly as do other individuals, which in turn may suggest that they do not habituate to familiarity as readily as others.

It is therefore possible that children with autism are not driven to change their behaviour, or to generate new behaviour, in the way that other children appear to be. Children's play seems to be characterised by a need to explore the possibilities provided by the environment, and indeed by the imagination. Normal children when presented with an object might first manipulate it, then move on to using it in functionally appropriate ways, before finally using it in pretence. In contrast children with autism might never habituate to the manipulative use of an object; they may never be driven to use it functionally or symbolically. Dawson and Lewy (1989a) suggest that "Autistic children often become fascinated with certain objects (presumably with the manipulation of those objects) - a fascination that can lead to overly focused attention on the object, to the exclusion of the rest of the environment.". It is therefore possible that this abnormal attentional response, or the lack of the normal bias away from the repetitive and familiar, prevents children with autism from generating pretend acts.

Having said this, there are a number of problems inherent in this account. At first sight it seems very reminiscent of the motivational hypotheses that were outlined in section 3.31, notably Harris' (1989a) suggestion that children with autism might not engage in pretence because of an active preference for manipulative play. As noted above, motivational accounts are not sufficient to explain the range of findings observed in Experiments 1 to 5, and in particular the evidence of impaired generation of pretence in Experiment 5, where children were motivated to perform. However the processes that are implicated by this 'Failure to Habituate' hypothesis would appear to be at a lower level than those referred to by Harris. They are autonomic, automatic and presumably unconscious, and would therefore not be open to influence by motivational factors.

A more serious criticism of this hypothesis is that it is based on a selective sampling of the wide literature on attentional deficits and sensory processing impairments in autism. The P3 component is only one aspect of the ERP, other parts of which have also been seen to be abnormal in autism (see Dawson & Lewy, 1989b). In a sense focusing on these findings alone represents cutting one's cloth unfairly. A further key point is that the evidence of P3 deficits in autism is not entirely conclusive. While there is good support for a reduced P3 component in response to novel auditory stimuli, the evidence for a similar effect with visual stimuli is equivocal (see Courchesne et al., 1985; Strandburg, Marsh, Brown, Asarnow, Guthrie & Higa, 1993). The empirical support for this account is therefore not as strong as it might be, but the important point is that there do appear to be definite deficits in habituation in autism, which could conceivably explain a failure to generate pretend acts, and the findings obtained here.

Contextual Shifting Hypothesis

A second explanation of a generativity impairment in pretence is that children with autism have difficulties in switching from one behaviour to another. To borrow Sandson and Albert's (1984) terminology (see subsection 2.31), children with autism may be 'stuck in set', and have difficulty shifting from using an object in one context (manipulatively), to using it in another (symbolically). Clearly there are parallels between this suggestion and the Failure to Habituate hypothesis outlined above. A failure to habituate would lead to apparent difficulties in switching, and impaired ability to switch attention would be reflected in delayed habituation to stimuli. The evidence for abnormal habituation in autism described above could therefore be taken as support for this account. Courchesne, Akshoomoff and Townsend (1990) argue that "...ERP studies, plus recent neurobehavioural studies, strongly suggest that autistic children have significant dysfunction in the neural mechanisms that underlie a human being's ability to capture, maintain and shift attention".

Further support for this suggestion comes from direct evidence of impaired ability to shift attention in autism. Wainwright-Sharp and Bryson (1993) have shown that high-functioning adults with autism are impaired on Posner's (1978) visual orienting task. In this task participants indicate whether a target stimulus appeared in the left or right of their visual field. Before the target stimulus is presented a cue stimulus is shown indicating which location the target will subsequently appear in. The cue may be valid or invalid, and normal participants show delayed ability to respond to the target's location when the cue is invalid. A similar, but abnormally large effect was observed in the adults with autism, suggesting that they had difficulty in shifting their attention to the target's location, when prompted to attend to another location.

Of course the failure to switch attention could easily be linked to an executive dysfunction account. Though Experiment 4 provided conclusive evidence that children with autism can inhibit a salient response to an object, this was only one of four executive functions identified in section 2.3. Of the others, a failure to generate self-initiated action could be seen as a potential cause of impaired contextual switching. Children with autism might have difficulty in consciously and actively guiding their behaviour, and fail to switch from one context to another as a result. In these terms impaired generation of pretend acts would not be the result of an executive failure to inhibit a salient response, but rather would result from a failure to activate a novel response.

Interestingly, though Harris' executive dysfunction-based explanation of children with autism's problems in pretence highlights problems in inhibition, it also includes this 'failure to activate' aspect of contextual shifting (Harris, 1993; see subsection 3.32). Harris writes: "...the autistic child is more reliant on the schemas evoked by the current context, *and has great difficulty in guiding his or her behaviour* ... according to an internally conceived plan that over-rides these..." (my italics). However, the fact that Harris account includes, and perhaps muddles, these two aspects of executive control raises the question of whether it is valid to explain a failure to shift attention in terms of activation deficits alone. It may not be possible to separate the activation of appropriate behaviour from the inhibition of inappropriate behaviour. As Wainwright-Sharp and Bryson (1993) note, their results show only that individuals with autism "... appear to have difficulty disengaging and/or shifting attention ...". Experiment 4 showed that children with autism can disengage from the salient aspects of objects, is it possible that they have separate problems in shifting behaviour?

As a deficit in contextual switching has the potential to tie in with both a failure to habituate and executive dysfunction, it is possible that habituation impairments are the direct result of executive deficits. If this were the case then the support for an executive explanation of impaired generativity of the form outlined here would be greatly enhanced. However, electrophysiological studies of patients with frontal lobe damage reveal a pattern of ERP abnormalities that differ from those seen in autism (Knight, 1991). It therefore seems unlikely that frontal lobe dysfunction could lead to both executive impairments and abnormal habituation responses in autism. A Contextual Shifting deficit could therefore arise from one of two sources. It might be attentional, or executive in nature.

Social Paucity Hypothesis

A further potential explanation of impaired ability to generate pretend acts is that children with autism might simply have less ideas for pretence than other children. In particular it might be argued that the characteristic failure to interact socially with parents and peers seen in autism might lead to a reduced pool of ideas from which to draw on. This suggestion mirrors that of Rogers and Pennington (1991), who argued that children with autism's impaired imitation and theory of mind abilities might lead to them having "too little knowledge of the social world to act it out in play" (subsection 3.22). There is evidence to suggest that a child's level of sociability is linked to their rate of social pretend play development (Connolly & Doyle, 1984; Howes & Matheson, 1992), and to suggest that play partners can play a facilitatory role in production of social pretence (Dale, 1989; Fiese, 1990). Whether these effects reflect greater creativity and generativity, or relate to some other aspect of pretend play ability is not clear. However, Haight and Millar (1992) have found that 30% of a two-year-olds' utterances in pretence are reproductions of their mothers previous 'pretend talk', suggesting that social pretence may be a significant source of themes for pretend play.

A further problem for this form of account concerns the question of what it means to say that a child lacks ideas for pretence. Children with autism's ability to carry out pretend play instructions (Experiments 1 and 4), and to comprehend pretend acts (Experiment 3) suggests that they do have some form of representation of these acts. These children know what it means to 'wear a hat', to 'clean teeth with a toothbrush', and to 'pour tea from a tea pot'; hence these schemas must be intact at some level. Their typical failure to produce these acts in spontaneous pretence would appear to be due to impaired ability to access or select these schemas in a symbolic context (as implied by the previous two accounts). Having said this, can we claim that children with autism do have ideas for pretence if they are not accessible? Would one want to claim that knowledge of this kind might be implicit? These questions will only be answered satisfactorily by more explicit definitions and descriptions of the notions of ideas, schemas and acts, and of the relations between them in the domain of pretend play.

Tentative Conclusions

Few firm conclusions can be made as to the relative merits of the three accounts outlined above. The Failure to Habituate and Contextual Shifting hypotheses are supported by direct evidence from studies of attentional deficits in autism, and the Contextual Shifting hypothesis could also be tied in with the considerable evidence of executive dysfunction in autism. The Social Paucity hypothesis is more vague, and in particular fails to address the question of why children with autism don't produce pretend play acts despite having the knowledge of these particular acts. Though there are problems associated with each account, all three would, in principle, appear to lead to an impairment in the ability to generate pretence of the form proposed here, and are therefore able to explain the results of Experiments 1-5.

It is important to remember that these hypotheses have not been proposed in an attempt to make definitive claims about the processes underlying an apparent generativity impairment in autism. Instead they have been advanced to show that a generativity hypothesis has the scope to be expanded and fleshed out, and is much more than a description of what we already know about pretend play in autism. The purpose of this research project was to provide a plausible explanation for why children with autism do not pretend spontaneously. The generativity hypothesis is just such an explanation. The question of why children with autism do not generate pretend acts is a separate one, and one that must be properly addressed in further research. Possible avenues for further research of this kind will be discussed in section 7.5.

7.3 Implications For Pretend Play

A key question which emerged from the discussion of the development and definition of pretend play in chapter 1 was whether pretend play could be considered to be metarepresentational. Subsection 1.35 proposed a distinction between individual pretend play, which was thought not to be metarepresentational, and social pretend play, which was seen to involve metarepresentational understanding. As noted in subsection 3.52, a study of children with autism's ability to pretend provides a means of validating this hypothesis, for if children with autism are shown to be able to engage in individual or social pretence then either that behaviour cannot rest on metarepresentational processes, or children with autism must have some form of metarepresentational understanding.

As discussed in subsection 7.21, the results of Experiments 2, 3 and 4 indicate that children with autism can produce, or understand, individual pretence. This amounts to empirical support for the proposed model of individual pretence. Children with autism would not be able to produce or understand solitary pretend play if it were metarepresentational, given their clear problems in the metarepresentational attribution of mental states to others (subsection 2.33). The fact that they can produce and understand this type of pretence supports the view that it is non-metarepresentational.

Unfortunately children with autism's ability to engage in complex social pretend play has not been investigated in any of the studies described here. Indeed, given children with autism's characteristic aversion to social interaction with peers, it is difficult to see how social pretend play might be studied in autism (see subsection 7.53 below). It might be argued that while Experiment 3 did not strictly involve children in a social play situation, it required them to understand pretence in another (Naughty Teddy), and therefore provides a test of ability to compute an 'M-representation'. However, as discussed in subsection 1.35, there is no real reason to suppose that understanding this form of pretence necessitates this level of understanding. The children are not asked whether Naughty Teddy is pretending, nor are they asked questions which require an appreciation of Naughty Teddy as a 'pretender'. Instead all they need to do is read off the pretend behaviour for themselves. Therefore Experiment 3 is almost certainly a test of ability to engage in individual pretence, and is clearly not a test of ability to understand complex Social Pretend Play, at which point metarepresentational understanding can confidently be inferred.

Therefore the only support for the proposal that (complex) social pretend play is metarepresentational comes from theoretical considerations outlined previously and the fact that Howes' work suggests that this behaviour appears in normal children at around the time at which success on theory of mind tasks begins to emerge.

A final point is that accepting that individual pretend play is non-metarepresentational somewhat undermines the 'singular' nature of pretence. Many would intuitively argue that pretend play is qualitatively different from other forms of play behaviour, and that its 'as if' character separates it from other, non-symbolic behaviours. This distinction is implicit in a metarepresentational theory of pretence, and rejecting this account raises the question of whether pretence really is such a unique activity. Of the three hypothesis put forward to account for a generativity impairment only the Contextual Shifting account has the power to capture this notion of the 'singular nature of pretence'. In functional play available objects provide cues which can guide behaviour directly. In symbolic play objects may provide cues for pretence, but they cannot provide a direct behavioural prompt. For example, a pencil might prompt 'writing', but it would not directly prompt 'cleaning teeth as if it were a toothbrush'. To marry two of Harris' suggestions, pretence involves 'as-if' counter-factual reasoning (Harris, 1991; subsection 1.34), and also an active shift of context (Harris, 1993; subsection 3.32). Because the representations involved in the process of pretence are counter-factual, they have no direct instantiation in the world, which might otherwise guide behaviour, and aid this contextual shifting.

However it might be argued that this difference is only one of degree, as some objects guide functional behaviour more explicitly than others, and that there is no need to posit a fundamental distinction between functional and symbolic play. Two sets of evidence appear to support this view. Firstly the analysis of the development of pretend play outlined in section 1.2 indicated that pretence does develop gradually, and that there is not a discrete boundary between non-symbolic and properly symbolic activities. Secondly the results of Experiment 1 confirmed the suggestion inherent in previous studies, that children with autism may be equally impaired in their production of spontaneous functional and symbolic play. In particular, though children with autism spent significantly less time in functional play than controls, there was also a trend for them to produce fewer functional acts. This trend may have been more marked had levels of functional play been higher in the experiment. If children with autism's problems in pretence extend to both of these 'creative play' behaviours, then they would appear to be directly related.

7.4 Implications For Autism

The larger part of chapter 2 focused on attempts to outline the fundamental cause of the symptoms seen in autism (if indeed it is reasonable to search for a single underlying deficit, see subsection 2.43). In particular two specific accounts were outlined, though others were mentioned more briefly. As noted in the subsequent chapter (subsection 3.53), if a deficit is to be *truly* fundamental then it must necessarily impinge on pretend play in autism. The findings obtained in Experiments 1 to 5 therefore have the potential to inform about the relative merits of these accounts. The implications of these results, and of the hypotheses proposed in the subsections above, will now be considered in this light.

7.41 Reconciling The Findings With A Theory Of Mind Account

As noted in subsection 7.3 above, if children with autism are able to pretend, albeit only when the ideas for pretence are provided for them, then they must either be able to process and manipulate metarepresentations, or individual pretend play must not be metarepresentational. To claim that children with autism have metarepresentational understanding flies in the face of the large and consistent body of research which clearly indicates that they have severe difficulties in imputing mental states, which also requires metarepresentational competence[1].

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[1]A simulation theorist would argue that the failure to pass theory of mind tasks seen in autism is not due to a failure to process metarepresentations. However, a simulationist would also argue that individual pretend play is non-metarepresentational (see subsection 1.34).

However there are strong reasons for supposing that individual pretend play is not metarepresentational, and it is therefore quite possible, and indeed quite parsimonious, to argue that children with autism are both metarepresentationally impaired and able to pretend. Strong support for this view would come from any investigation of complex social pretend play in autism which found an impairment in this domain.

The results of the studies described here are therefore not inconsistent with the theory of mind hypothesis of autism, though they are at odds with certain strong interpretations of it (e.g. Leslie's). They do not provide any explicit support for the hypothesis as such; they might have had the production of emotional and of social pretend play been impaired in Experiment 2, though this is not necessarily predicted by a theory of mind account (see subsection 4.34). Further, it is not clear whether a metarepresentational account has anything to say as regards a generativity impairment. It might be argued that a failure to engage in Contextual Shifting could be mediated by a lack of metarepresentational competence, provided one accepted a reflexive theory of consciousness which explains executive dysfunction, and hence impaired contextual shifting, in terms of a failure to metarepresentationally reflect on ones own thinking (see subsection 2.41). However, whether such a long-winded explanation is plausible is far from clear. Essentially accepting that individual pretend play is not metarepresentational greatly limits the relevance of this research to the question of the primacy of theory of mind deficits in autism.

7.42 Reconciling The Findings With An Executive Dysfunction Account

In contrast, the studies conducted in this project are far more relevant to the proposal of executive dysfunction in autism. Experiment 4 was a straight test of whether a lack of executive control impinged directly on children with autism's ability to engage in object substitution. The fact that children with autism had no problems in using counter-functional props in pretend play, as the CED hypothesis predicted, appears at first sight to severely undermine the notion of executive dysfunction as an explanation of pretend play deficits in autism. However, what it really indicates is that children with autism were able to over-ride the salience of the functionality of the CF props, and inhibit a response that would appropriate to their usual function rather than to the desired pretend function. As noted in subsection 7.22, this is only one of (at least) four potential executive deficits, and a failure to generate self-initiated action has the power to has explain a generativity impairment, especially within the framework of a Contextual Shifting deficit.

Though an executive failure to activate novel behaviour, rather than a deficit in inhibiting salient behaviour, has the power to explain the pattern of pretend play deficits seen in autism in these studies, there are arguably reasons for rejecting an executive explanation. If executive deficits are at the root of children with autism's problems with pretence, is one not forced to predict a failure to inhibit salient responses in Experiment 4? Not necessarily; if executive control can be fractionated into a number of separate functions, as was proposed in subsection 2.31, then it is theoretically possible for one of these functions to be selectively impaired. However, the hypothesis of executive dysfunction in autism rests largely on evidence of a failure to inhibit salient responses, so the criticism remains a strong one. Rather than posit separate impairments to separate systems, it is more appropriate to think in terms of a general executive impairment, which might manifest in different ways depending upon the situation in which it is being examined. For example, if children with autism have reduced executive resources then one might see different impairments depending on what aspects of executive control particular tasks were tapping. In the same way, a flat battery in a car will make it difficult to start on a cold morning, and will be reflected by dim headlights at night. It is therefore important to ask what it is about pretence that makes it 'executively difficult'. It may be that pretend play itself is more about guiding behaviour with reference to counter-factual representations (section 7.3) than it is about inhibiting pre-potent responses. To return to Harris' terminology, providing the idea for pretence in Experiment 4 'shifts the contextual frame' for the child, and so removes the normal executive demands associated with pretend play.

A further criticism is that a Contextual Shifting hypothesis can also be explained by non-executive attentional deficits. As noted in subsection 7.22, a deficit in shifting attention could result from a failure to habituate, which in turn results from damage to areas other than the frontal lobes. While an executive account may therefore be a sufficient explanation of a generativity impairment in autism, it is not necessarily the only valid explanation.

7.43 Reconciling The Findings With Other Accounts

Space has prevented detailed descriptions and criticisms of a number of worthwhile hypotheses, most notably Hobson's socio-affective account, though this and other hypotheses were discussed briefly in regard to their implications for pretend play in chapter 3 (sections 3.2, 3.3 and 3.4). It is important to consider the implications of these findings for these accounts. In particular there seems to be room for a consideration of the possible implications of social deficits in autism for the hypothesized deficit in pretend play outlined here. Both Hobson's and Rogers and Pennington's accounts (see subsection 3.22) attempt to explain children with autism's apparent inability to manipulate metarepresentations by emphasising the role of social interaction in the development of this ability. The assumption that individual pretend play is not metarepresentational means that these accounts have little to say as far as children with autism's apparent ability to engage in the mechanics of pretence is concerned. However, they are broadly consistent with the Social Paucity hypothesis advanced above, emphasising as they do the fundamental nature of social deficits. Though it is not clear whether Hobson would want to argue that a failure to interact socially leads directly to fewer ideas for pretence, this suggestion is explicitly made by Rogers and Pennington.

Another hypothesis which was outlined in chapter 3, and which is clearly relevant to these discussions, is Boucher and Lewis' suggestion of an impairment in generating flexible retrieval strategies for accessing internal representations. The GARS hypothesis, which arose directly from this suggestion has been tested explicitly in this research, and the results of this test indicated that a generativity impairment could not be overcome by the presence of external cues, as this account predicts. Therefore, though these results are in line with Lewis and Boucher's (1991) finding of reduced creativity in children with autism's drawings, they are not fully consistent with the evidence of impaired 'free generation', but unimpaired 'cued generation' in autism (Boucher, 1988; Boucher & Warrington, 1976; Tager-Flusberg, 1991). However, the points made in section 7.3 about the 'special nature' of pretence, raise the intriguing question of whether objects can ever cue pretend play in the way that they are able to cue other play behaviours. As pretend play is counter-factual, or non-literal, objects may fail to cue pretend actions in the way that presenting a semantic category directly cues word recall. If this is the case (though arguments against this suggestion were raised in section 7.3) then perhaps Boucher and Lewis are correct in proposing impaired strategy generation, rather than simply arguing for impaired generativity per se.

7.5 Areas For Further Research

Clearly any work of this kind leaves certain questions unanswered, and fails to answer other questions satisfactorily. While the conclusions proposed in this chapter are based on reasoned evaluation of the empirical findings obtained, there is bound to be a degree of uncertainty in the interpretations made. This section will discuss ways in which the hypothesized deficit of a failure to generate pretend acts could be supported, and will outline ways of attending to the interesting questions which follow from this work and which have yet to be addressed.

7.51 Strengthening The Support For The Generativity Hypothesis

The studies carried out in the period of this research could be improved and modified to give more clear cut and easily interpretable results; the exception perhaps being Experiments 2 and 4 which did provide clear findings. A minor flaw in Experiment 1 was that a significant deficit in children with autism's ability to engage in spontaneous symbolic play (alone) was not observed in either the analysis of percentage time or of rate of act production. The absence of group effects in these cases are easily explained in terms of floor effects amongst controls, and this explanation could be confirmed by a subsequent investigation which employed only the doll plus junk material toy set, or a similar set of materials.

Similarly Experiments 3 and 5 could both be improved upon. Despite a retest with relatively able children, aspects of the results of Experiment 3 were inconclusive (though less so than in the original run). The extent of the confusion in participants of this level was surprising, and was partly due to the inclusion of a counter-intuitive literal testing session before the pretend session for half the children. Another attempt at tapping comprehension abilities could dispense with the literal condition, as there was no evidence of impaired ability to describe these episodes amongst the children with autism. Whether this alone would make the procedure understandable to the majority of children is debatable however, as even the children who received the pretend episodes initially performed relatively poorly on this task. It may be more profitable to devise alternative ways of testing comprehension. One way to approach this would be to investigate children with autism's ability to carry on a pretend act - for example a child might be shown how pretend toothpaste is squeezed onto a pencil, and then be asked to show what they should do with the 'pencil'. Presumably they would pretend to brush their teeth rather than try to draw with it.

Finally while Experiment 5 provided reasonable evidence of impaired ability to generate pretend acts amongst children with autism, group differences were not quite significant. This may well have been due to fatigue effects amongst controls, and it would therefore be valuable to attempt a test of generativity of pretence in which separate conditions were presented in isolation.

There is certainly room to strengthen the support for the other side of the account, namely that children with autism possess intact the mechanisms necessary for pretence. This could best be done by specifically testing their ability to engage in instructed pretend play which required imagining absent objects and absent properties, as well as object substitution. The studies carried out here provide firm support for the ability to engage in object substitution, but more tangential evidence in the other two cases.

7.52 Addressing Unanswered Questions

Why Is There A Failure To Generate Pretend Acts In Autism?

Three potential explanations of a generativity impairment have been advanced here, all of which are tentative, and deserve further consideration. The Social Paucity hypothesis could perhaps be most easily tested, by examining correlations between children with autism's sociability and pretend play abilities. Clearly those children who interact more with parents and peers should have more ideas for pretence. The Failure to Habituate hypothesis could conceivably be tested in a similar way, by correlating rates of habituation with levels of pretend play. A problem with this suggestion though, is that the nature of the link between habituation deficits and pretence is less clear in this case. The Contextual Shifting hypothesis is harder still to test, partly because it is more vague. It is not obvious how one would obtain a pure and relevant measure of ability to guide one's own behaviour.

An alternative approach would be to alter the pretend play situation to remove the difficulties proposed by each account. For example the Social Paucity account would predict that modelling play would facilitate pretence, and the Contextual Shifting hypothesis might be seen to suggest that certain props would be better cues for pretence, or that certain experimental cues might be differentially effective in shifting a child into pretend play. However it is not clear how an experimental situation could be modified so as to prevent a child from habituating to a particular object use, or to simply doing nothing, in order to test the Failure to Habituate hypothesis in this way.

Understanding Social Pretend Play In Autism

Perhaps the most important question not tackled in this research is the question of whether children with autism are impaired in their ability, not only to engage in, but also to comprehend social pretend play. Given children with autism's characteristic failure to engage in spontaneous individual pretend play, and their resistance to social interaction in general, it is almost certain that their spontaneous production of social pretend play will be impaired. What is less clear is whether the comprehension of social pretend play would be impaired, and this is a crucially important question to address. If, as suggested above, the comprehension of complex social pretend play necessarily requires metarepresentational understanding (while understanding individual pretend play does not), one would predict an impairment in this area, given the general support for a metarepresentational impairment in autism. In fact there can be no doubt that if a child were able to understand Leslie's M-representation, and compute the informational relation 'Mother Pretends of the banana that it is a telephone', that they must be able to process and manipulate metarepresentations.

Therefore if the comprehension of social pretend play of this kind were found to be impaired in autism, this would amount to strong evidence for the proposed analysis of pretence.

Conversely unimpaired comprehension of complex social pretend play would weigh heavily against the metarepresentational hypothesis of autism. Having said this, it is hard to imagine what type of account would be able to explain an ability to understand social pretend play in others, but not false beliefs. Harris' view that both of these abilities do not rely on metarepresentational competence, but instead on the setting aside of default settings could be invoked, if one could argue that the latter test requires a greater degree of 'simulation'.

What is also unclear is exactly how one might go about testing this ability in young children. Harris and Kavanaugh's (1993) experiments mirror Experiment 3, in that they really only test ability to comprehend individual pretend play. Lillard (1993a) has claimed to have looked at social pretend play in young normal children, but the validity of this claim is doubtful. Her experiments (subsection 1.24) really only amount to a test of the ability to understand the language of pretence. In order to properly test comprehension of complex social pretend play one would need to ensure that the child was required to compute Leslie's M-representation. In other words they must understand that someone else pretends that something is something else, and not be able to pass test questions by 'running their own pretend scheme'. This might best be done be looking at the ability to ascribe two different pretend identities to an object in pretend substitution. For example the child might be presented with character X who pretends that a pencil is a toothbrush, and character Y who pretends that the same pencil is a telescope. A third protagonist Z would then be introduced, and would ask one of the other characters, chosen at random, what they were playing with. In order to succeed on this task children would have to keep track of two different 'pretences' and respond appropriately depending on which character was questioned by Z. It would therefore (theoretically) be easy to determine whether a group of children's responses were due to chance guessing.

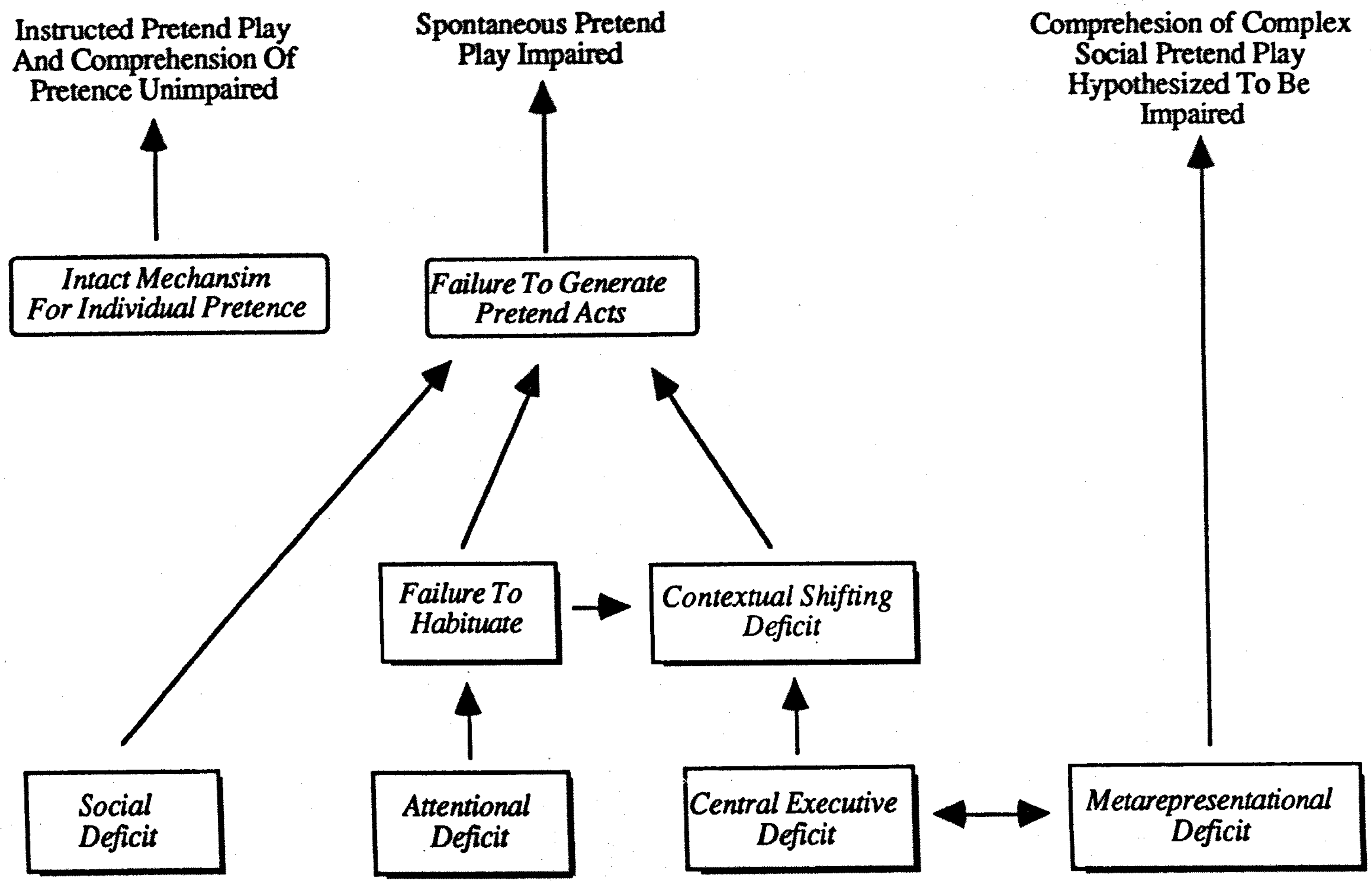
7.6 The Thesis

Though there are necessarily loose ends which this research has left untied, and while there is clearly room to strengthen the findings obtained, it is still possible to propose fairly firm conclusions as a result of this work. The results of the studies carried out in this project suggest that children with autism do have intact the mechanisms necessary for carrying out pretend play. They appear to be able to engage in object substitution, in imagining absent objects and in imagining absent properties, provided the ideas for pretence are given to them. In this sense the observed absence of symbolic play seen in spontaneous play conditions cannot reflect a competence deficit, as children with autism *are able to pretend.* However children with autism appear to be impaired in their ability to generate pretend play acts.

This failure to generate may be the result of a failure to interact socially with others, which leads to a reduced pool of ideas for pretence from which to draw on. Alternatively it might reflect a deficit in habituation in autism, which results in a preponderance of non-symbolic activity. A third possibility, which follows on from a failure to habituate, is that children with autism might be impaired in their ability to shift the context of activity. Such a failure to shift could also, though not simultaneously be explained in terms of executive dysfunction in autism. Figure 7.1 outlines these proposals, highlighting the potential links between particular explanations.

At present it is not possible to decide between these three suggestions. I would tentatively argue that the notion of a failure of Contextual Shifting, though vague and in need of further description, fits best with the data presented here. This is because it has the power to explain why children with autism find generating pretend acts difficult even when objects are present, while their ability to generate other behaviours appears to be susceptible to cueing. By its very nature pretend play is non-literal, and therefore objects may well provide poor and indirect cues for pretence. Objects may therefore do little to shift the child's contextual frame, in contrast to a direct prompt from an experimenter which has been seen to be effective in shifting children with autism to pretence.

Figure 7.1. Explanations of findings, and potential links between them



Accepting that children with autism can pretend does not necessarily mean that they can manipulate metarepresentations. Adopting Leslie's analysis of pretence would force such a conclusion, but there appears to be no need to do this. It is both justifiable and parsimonious to propose that the production and comprehension of individual pretend play is non-metarepresentational in nature. These findings are therefore not inconsistent with the widely held view that children with autism suffer from an impaired ability to manipulate metarepresentations, and indeed I would predict that children with autism would be impaired in their ability to comprehend pretend play in others, an ability which would require metarepresentational understanding.

Neither do the findings contradict the view that autism reflects a failure to exercise executive control. This account can conceivably explain why children with autism fail to generate ideas for pretend play, via the Contextual Shifting Hypothesis. The fact that children with autism have no difficulty in inhibiting salient responses to objects in pretence suggests that executive dysfunction may not a globally pervasive problem in autism, but the particular executive demands of pretence need to be determined before such a conclusion can be fully accepted. It should also be noted that some would argue that executive dysfunction in autism is the result of more fundamental metarepresentational deficits, and indeed that others would argue the opposite.

In sum, children with autism do appear to be able to pretend under certain circumstances, though it may be that they never produce flexible and creative pretence. It would seem that their failure to produce spontaneous pretend play reflects impaired ability to generate pretend acts, but it is not clear what the cause of such an impairment might be. Further research should aim to elucidate the nature of this proposed deficit, and to determine whether children with autism can engage in social pretend play as well as in individual pretence.

Epilogue

I would imagine that it is all too easy, when carrying out research with people who are disadvantaged in whatever sense, to dehumanise the problems of these people by converting them into numbers and statistics. I have been fortunate to work in an area in which all other researchers I have met have had an honest and genuine concern for the children whom they come into contact with. This only emphasises the need for me to do the same. By its very nature this research has been more theoretical than practical, as my supervisors and I have been primarily concerned with finding out what is going wrong in autism, rather than attempting to put it right. Having said this, I would argue that this is a necessary and prerequisite step to designing appropriate intervention programs or approaches which stand a chance of improving the quality of life of children and adults with autism.

It is still possible to say a few words about the practical implications of the findings of this research, as I interpret them. If I am correct in thinking that children with autism can pretend under certain circumstances, then it is worthwhile encouraging these children to pretend. All teachers I have met do this to some extent, and it is to be encouraged. If it is the case that children with autism lack the ideas for pretence, then encouraging them to engage in less sophisticated social play with peers, may well be of benefit to them, and lead on to improved pretend play skills.

A final point is that a number of children with moderate learning difficulties also participated in these studies. These experiments have nothing to say as regards practical steps which might be taken with these children. This is an unfortunate consequence of the nature of this research, and one that I acknowledge.

Appendix 1
Addenda To Experiment 1

i.1 Lego Toy Set Results

Table i.1. Experiment 1: Percentage time spent in various play categories with Lego Toy Set

	Group			
	Children with Autism		Children with MLD	
	Condition		Condition	
Play Type	Spontaneous	Elicited	Spontaneous	Elicited
Symbolic	5.8	19.1	9.0	16.9
Symbolic plus Intermediate	51.7	50.7	61.2	65.2
Functional	16.6	13.7	9.9	8.9
Manipulative	27.0	30.7	15.9	15.8
No Play	4.7	4.9	13.0	10.1

Table i.2. Experiment 1: Means of rates of act production in various play categories with Lego Toy Set (acts per minute)

	Group			
	Children with Autism		Children with MLD	
	Condition		Condition	
Play Type	Spontaneous	Elicited	Spontaneous	Elicited
Total Play Acts	1.92	2.68	1.52	2.58
Symbolic	0.17	0.52	0.47	0.89
Symbolic plus Intermediate	0.49	1.41	0.71	2.25
Functional	0.44	0.47	0.35	0.47
Manipulative	0.99	1.39	0.47	0.81
No Play	0.40	0.72	0.35	0.77

i.2 Instructed Play Results

i.21 Analysis Across All Three Toy Sets

Details of the mean number of responses in each category for each material set are given in table i.3. Two separate analyses were performed on the data, one of percentage pass responses the other of percentage intermediate and pass responses. A two factor ANOVA design was employed for each analysis, the factors being Group (children with autism or MLD; repeated measures) and Toy Type (doll figures, lego or doll plus junk; repeated measures).

Table i.3. Means of percentage responses

		Group	
Response Type	**Material**	Children with Autism	Children with MLD
Passes	Doll Figures	55.9	71.1
	Lego	45.7	51.4
	Doll + Junk	64.3	77.1
Passes plus Intermediates	Doll Figures	72.6	86.2
	Lego	60.0	74.9
	Doll + Junk	71.4	84.3

Percentage passes

The analysis of percentage of instructions passed with each set of materials showed a significant main effect of Group, (F=3.40, df=1, P, 1 tailed=0.04), due to impaired performance amongst the children with autism. There was also a significant main effect of Toy Type (F=9.18, df=2, P<0.01). Post-hoc tests revealed this to be due to there being more passes with doll plus junk objects than with doll figures or with Lego (P<0.05; Tukey tests). The Group x Toy Type interaction was not significant (F=0.42, df=2, P=0.66).

Percentage passes and intermediate passes

Including intermediate pass responses in the analysis made little difference to the observed pattern of results. The main effect of Group remained significant (F=3.39, df=1, P, 1 tailed=0.04). The main effect of Toy Type was not significant (F=2.79, df=2, P=0.08) but remained as a strong trend. In this case performance on the Lego instructions was relatively poor. The Group x Toy Type interaction was again not significant (F=0.02, df=2, P=0.98).

i.22 Analysis of Doll Figure Instruction

As described in subsection 4.22 the doll figure instructions were divided into three types, physical, social and emotional. Details of the mean number of responses in each category for each instruction type are given in table i.4. This data was analysed using a two factor ANOVA design, the factors being Group (children with autism or MLD; repeated measures) and Instruction Type (physical, social or emotional; repeated measures). Again both passes and passes plus intermediate pass responses were analysed separately.

Table i.4. Mean number of responses to Doll Figure instructions

		Group	
Response Type	**Instruction Type**	Children With Autism	Children With MLD
Passes	Physical	3.14	3.57
	Social	2.57	3.29
	Emotional	1.00	1.64
Passes plus Intermediates	Physical	3.71	3.64
	Social	2.86	3.79
	Emotional	2.14	2.71

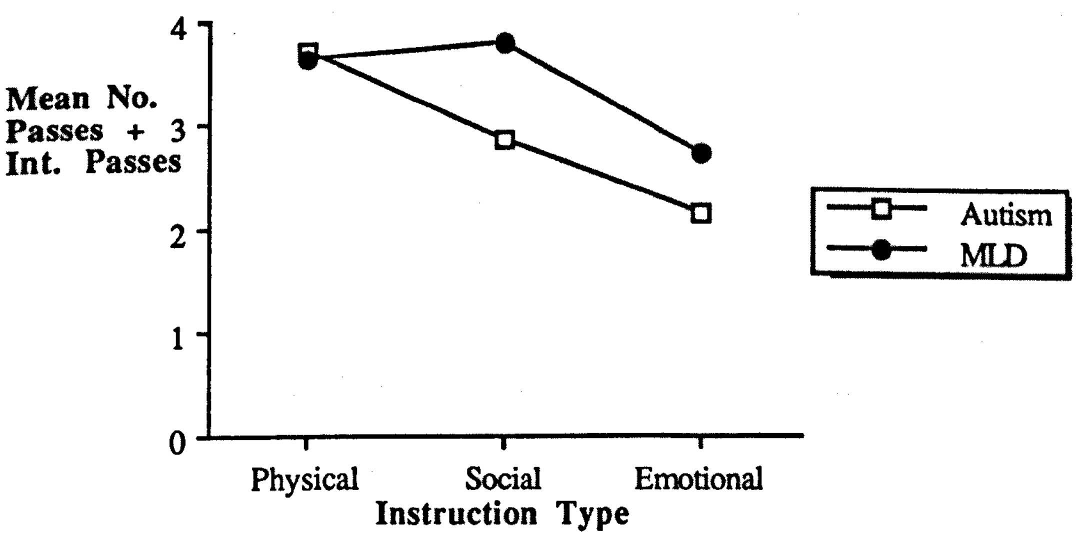
Number of passes

The analysis of number of pass responses for each type of doll figure instruction yielded a significant main effect of Group (F=4.77, df=1, P, 1 tailed=0.03), as the children with MLD passed more instructions than the children with autism.. The main effect of Instruction Type was significant (F=52.96, df=2 P<0.01); the emotional instructions were significantly harder to pass than the physical or social ones (P<0.01; Tukey test). The Group x Instruction Type interaction was not significant (F=0.29, df=2, P=0.75).

Number of passes and intermediate passes

Including intermediate passes in the analysis did not affect the significant main effect of Instruction Type (F=19.53, df=2, P<0.01), again the emotional instructions were 'harder'. However the main effect of Group became slightly less marked (F=2.70, df=1, P, 1 tailed=0.06). There was a significant Group x Instruction Type interaction (F=3.40, df=2, P=0.05). This was found to be due to the fact that the children with MLD produced significantly more pass and intermediate responses than the children with autism for the social instructions (F=5.828, df=1, P, 1-tailed=0.02), but not for the physical or emotional instructions; see graph i.1.

Graph i.1. Passes plus intermediate passes to doll plus junk instructions: Group x Instruction Type interaction



i.23 Brief Discussion

The children with autism were generally impaired in their ability to carry out the instructions employed in Experiment 1. A significant deficit is observed both across the three toy types, and amongst the doll figure instructions alone, and regardless of whether a liberal or conservative analysis is used in each case. There is a suggestion that the children with autism might be specifically impaired in their ability to answer social doll figure instructions, but graph i.1 indicates that it may be ceiling effects on the physical instructions which are the main cause of a significant Group x Instruction Type interaction.

This pattern of impairment stands in contrast to the unimpaired performance of children with autism seen in Experiment 2. It must be remembered that a number of the instructions employed here, unlike those used in Experiment 2, are unlikely to require a 'symbolic' response. The difficulties experienced by children with autism in this case are arguably due to the fact that a large number of these instructions require a creative response (e.g. 'He's very tired, what does he do', making objects with Lego). In particular the social and emotional instructions employed in this instance did not provide such specific cues as those used in Experiment 2, and may therefore not provide a clear idea for pretence (e.g. 'Show me how he can be scared/frightened' vs. 'Show me how the boy can be scared of the dog'). It is therefore possible that the difference in performance seen across the two sets of instructions reflects a failure to generate appropriate behaviour in Experiment 1, in line with the hypothesized pretend play deficit described in chapter 7.

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