Examining the categorisation of imaginative play & repetitive behaviours in Autism Spectrum Disorders

Emma Jane Honey

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Imaginative Play & Repetitive Behaviours

in Autism Spectrum Disorders

Emma Jane Honey

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University of Durham

Department of Psychology

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Declaration

I declare that all of the material presented herein is original work, of which no part has been reproduced from elsewhere and which is solely the work of the author of this thesis.

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Abstract

It is well established that Autism Spectrum Disorders (ASD) are characterised by impairments in social interaction, communication and imagination and that impaired imagination is associated with repetitive behaviours (Wing & Gould, 1979). Although this view has influenced research and clinical practice for more than 25 years, the connection between imagination and repetitive behaviour has been completely unexplored in research and not been fully recognised by International Classification of Diseases-10 (ICD-10, 1993; World Health Organization, 1994) criteria for autism. The purpose of this thesis was to examine associations between imagination and repetitive behaviour and to develop two new methods to assess these abilities.

A review of the literature revealed that research on repetitive behaviours was limited and that while extensive research had been carried out on symbolic play in autism developmental considerations were lacking with research focusing instead upon the autistic nature of play i.e. its rigidity and flexibility. In order to first obtain a range of information about the association between these two abilities, a parent report questionnaire (Activities and Play Questionnaire-Revised) was developed and tested in a study of 141 typically developing children and children with ASD aged 2 to 8-years old. Results showed that children with ASD had more repetitive behaviours and less symbolic play than children of typical development (TD). Symbolic play in children with ASD was predicted by both expressive language ability and level of repetitive behaviours while symbolic play was predicted only by expressive language ability in TD children.

As the questionnaire method had limitations in its ability to fully test language and symbolic play, observational methods were used in subsequent studies. The repetitive behaviours and symbolic play of young children with ASD of limited verbal ability (N=75) were assessed using the Autism Diagnostic Observation Schedule – Generic (Lord, Rutter & DiLavore, 1996). Results confirmed associations found in Study 2 between level of repetitive behaviours and the level of symbolic play and showed that level of symbolic play was primarily influenced by expressive language ability.

Building upon these findings, a new rater-based observational method was developed using a model of typical play development. This measure allowed detailed examination of the sophistication of different aspects of symbolic play in ASD, something lacking in previous research and existing measures of play. The observational measure was found to be valid and reliable when used with typical and atypical populations. Subsequent use of the measure revealed that young children with ASD (N=60) had specific difficulties in engaging in play spontaneously and in using objects in play although play could be improved by an adult's use of prompts. This study confirmed the previous evidence of an association between repetitive behaviours and symbolic play in the ASD population and that this association is influenced by language ability.

This research has produced two new measures which may be used in future clinical and research work into repetitive behaviour and symbolic play in typical and atypical populations. The finding of an association between imaginative play impairments and repetitive behaviours in children with ASD supports Wing & Gould (1979) and suggests

Tables & Figures

Chapter 1

Introduction

"The majority of children with the triad of impairments...had no symbolic play at all...A minority played symbolically but in a rigid, repetitive, stereotyped fashion." (Gould, 1986, p200)

Symbolic play is considered to be highly associated with the restricted and repetitive behaviours which are a hallmark feature of autism (Wing & Gould, 1979). Gould's description above highlights that symbolic play, when found in children with autism spectrum disorders (ASD), tends to be repetitive and restricted. While repetition may be a distinctive feature of symbolic play in the few children with ASD who have symbolic play, it is not the only way of characterising their poor symbolic skills. Their symbolic play impairments extend beyond repetition to include difficulties such as an inability to use an object as something else. Repetitive behaviours in autism also go beyond play based activities to include such behaviours as an insistence on sameness, hand flapping, spinning and preoccupations with objects. To fully understand any associations which may exist between repetitive behaviours and symbolic play it is therefore important to examine these phenomena as separate entities, thus examining associations between the sophistication of symbolic play (regardless of its repetitiveness) and overall repetitive behaviours (play based or otherwise).

Currently, clinicians and researchers lack sensitive measures to be able to identify subtle differences in both the play of children with autism and in their repetitive behaviour

compared with typically developing children. One aim of the research reported in this thesis was to develop such a measure. We also currently lack knowledge about the nature of the proposed association between repetitive behaviour and symbolic play. Another aim was therefore to gain a greater understanding of repetitive behaviours in relation to the presence of symbolic play impairments. Gaining further understanding of the nature of symbolic play and repetitive behaviours and the relationship between them is important because excessive repetitive behaviours and impairments of imagination have been identified as possible early indicators of autism (Baron-Cohen, Allen & Gillberg, 1992 Charman & Baird, 2002; Stone, Hoffman, Lewis & Ousley, 1994). If early diagnosis is to be successful and stable, early markers of ASD must be established and accurately defined.

The first chapter in this thesis will outline current definitions of ASD providing a background to the question, 'how are repetitive behaviours and imagination associated in young children with ASD?', and outline the methodological approach to this thesis. The second and third chapters will review the current literature surrounding repetitive behaviours and symbolic play in typical children and children with ASD. This will be followed by a series of empirical studies that will examine repetitive behaviours and imagination in young children with ASD and how these behaviours may be associated. These chapters will also include the development and testing of two new measures; a parent report questionnaire of repetitive behaviours and play and an observational coding scheme for play.

1.1 Current Definitions of ASD

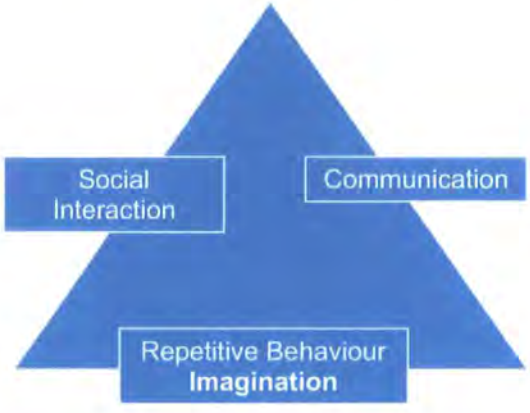
There are currently two descriptions of ASD. First, the triad of impairments proposed by Wing & Gould (1979) and second the diagnostic criteria of international classification systems, the International Classification of Mental and Behavioural Disorders (World Health Organisation, 1993) (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders - 4th Edition (American Psychological Association) (DSM-IV). Individually, each of these descriptions has formed the basis of some diagnostic tools for ASD and has been referred to extensively within the ASD literature. Although the two descriptions differ, surprisingly they have co-existed in the research and clinical literature without question.

Both the ICD-10 and Wing & Gould (1979) definitions of ASD require the presence of social interaction and communication impairments alongside excessive repetitive behaviours for a diagnosis to be made. However, the definitions differ in their placement of imaginative impairments which has implications for the way in which children might be diagnosed and the way that ASD is understood. Figure 1.1 shows the differences between these models.

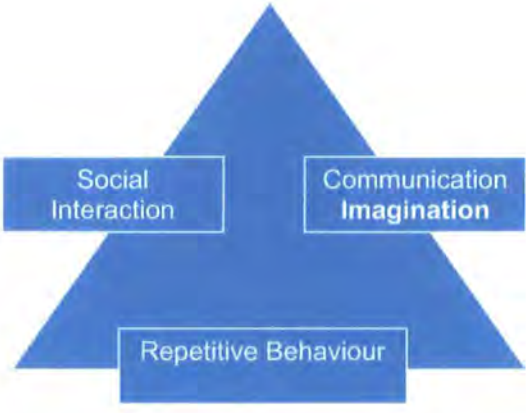
Wing & Gould (1979) identified imagination as one of the three main categories of impairment in ASD; furthermore, these impairments occurred in all children including those of a language ability at which symbolic play would typically be present. They also propose that we see "repetitive activities in place of imaginative symbolic interests" (p.26). This view of the triad of impairments, in which impaired imagination

is linked with repetitive behaviour, is widely accepted in autism literature and has provided the descriptive basis for theoretical accounts of autism for many years (see Frith, 1999, Happé, 1994). In particular it has guided much research on the social cognitive impairments of autism (e.g. Baron-Cohen, 1989a, 1989b, 1990a, 1995; Leekam & Perner, 1991; Leslie, 1987). This definition is also used in the algorithm for ASD within the Diagnostic Interview for Social and Communication Disorders (Leekam, Libby, Wing, Gould & Taylor, 2002).

Figure 1-1 *Descriptions of Autism*



Wing & Gould (1979) Triad of Impairments



ICD-10 & DSM-IV Description of Autism

In contrast, the diagnostic criteria provided by the international classifications of autism (DSM-IV and ICD-10) categorise impairments of imagination, notably as seen in symbolic play, as one of the seven communication impairments identified as associated with the disorder (See Appendix 1). No specific associations between repetitive behaviour and imagination are proposed. The placement of play with communication is in keeping with literature which has identified associations between language and play abilities (Bates, Benigui, Bretherton, Camaioui & Volatana, 1979; Charman, Baron-Cohen, Swettenham, Baird, Cox & Drew, 2000; Doswell, Lewis, Boucher & Sylva,

1994; Lewis, Boucher, Lupton & Watson, 2000; Lowe, 1975; McCune, 1995). ICD-10 criteria do not specify whether impairments of imagination also exist in children with advanced language and communication skills, furthermore, according to this definition impairments of imagination are not required for a diagnosis to be made. It is therefore in theory possible using ICD-10 or DSM-IV criteria for a child to be diagnosed with ASD with significant repetitive behaviours and impaired communication alongside good symbolic play skills. The ICD-10 description of ASD is used extensively in research and is the criteria used for diagnosis in the Autism Diagnostic Observation Schedule-Generic (ADOS-G; Lord, Rutter & DiLavore, 1996; Lord, Risi, Lambrecht, Cook, Leventhal & DiLavore, 2000) and the Autism Diagnostic Interview- Revised (Le Couteur et al., 2003; Lord et al., 1994).

Despite the proposed relationship between repetitive behaviour and imagination in ASD, there has been limited systematic examination of this. Furthermore, there are limitations in the research into these behaviours independently. This lack of research identifies a substantial gap in an important area of child development from both a research and clinical perspective. By attempting to explore the role of reported imaginative play and repetitive behaviour in both children with ASD and TD children, the research in this thesis may help to throw light on the validity of the Wing and Gould triad model in which impairment in imagination is a core feature of ASD.

1.2 What Does Research Tell Us About the Relationship Between These Behaviours?

Historically research into ASD has focused on the social and communication impairments of this disorder. Less attention has been paid to the impairments of repetitive behaviour and imagination. Despite recognition that more research into repetitive behaviours in ASD is required, few attempts have been made to resolve this issue (Evans, Leckman, Carter, Reznick, Henshaw, King et al., 1997; Evans & Gray 2000; Lewis & Bodfish, 1998; Rutter, 1996, South, Ozonoff & McMahon, 2005; Turner, 1999). Similarly, although international classification models of autism (DSM-IV and ICD-10) and the Wing & Gould (1979) triad of impairments identify impairments of imagination associated with autism to be evident through deficits in symbolic play, not enough is known about the nature of this impairment. Initial research on symbolic play including that by Wing and colleagues (Gould, 1986; Wing, Gould, Yeates & Brierley, 1977; Wing & Gould, 1979) has focused upon particular qualities of the play in terms of its 'autistic-ness', in particular its stereotyped nature. What has been missing so far is a systematic analysis of the developmental aspects of play behaviour drawn from developmental models of play taken from the study of typical development. As such we have little understanding of the developmental level of symbolic play abilities of those with ASD and this is argued to be relevant for gaining a greater understanding of impairments in imagination in autism and their association with repetitive behaviour.

In this thesis it is argued that to obtain an understanding of how repetitive behaviours and imagination may be associated these behaviours must first be correctly examined as independent behaviours. Furthermore, it is proposed that models of symbolic play

development taken from typical populations should be applied to the understanding of play in children with ASD.

1.2 How Should We Approach Research into Repetitive Behaviours and Imagination?

Research into ASD often takes a theoretical standpoint from the outset, that is it aims to describe and explain the disorder and its defining features in terms of a common underlying mechanism (Bishop & Norbury, 2005). For many years researchers have sought to identify underlying mechanisms which can explain core symptoms of ASD. Theories such as executive dysfunction (Ozonoff, 1997), theory of mind (Baron-Cohen, 1993; 2000; 2003) and weak central coherence (Frith & Happé, 1994) explain in detail the underlying cause of one key feature of autism yet fail to satisfactorily explain the entire triad, arguing that there is one core area of impairment primary to the disorder. For example, an underlying cognitive impairment such as theory of mind can be considered as a key explanation for the social deficits of autism and may explain some deficits such as symbolic play, however, other symptoms such as repetitive behaviours may be being considered as secondary or peripheral symptoms. Similarly executive dysfunction may satisfactorily explain the excessive repetitive behaviours characteristic of autism but not the communication or social impairments. This approach to autism theory has come under criticism as it becomes increasingly recognised that autism may have multiple causes (Goodman, 1989; Boucher, 1996, 2006; Charman & Swettenham, 2001) and be a result of interactions at the neurobiological, psychological and environmental level. Research must therefore move away from the idea of core or primary impairments that prioritise certain symptoms and sideline others (Coltheart & Langdon, 1998).

Ultimately, the goal of research is to understand; the successful attainment of this is reliant upon both the description and explanation of phenomena. Psychological research primarily focuses upon theory and the assumption that the goal of research is causal explanation (Davis & Rose, 2000; Kazdin, 2003). However, this need not be the case; description and explanation can co-occur within a single piece of research with description informing theory and theory ultimately explaining the phenomena described (Kazdin, 2003).

Examination of factors which may contribute to the emergence of ASD in an individual first requires a full description of the phenomena to be explained. As highlighted previously, we currently know very little about repetitive behaviour a defining characteristic of ASD. We have little knowledge of the nature of these behaviours, how they develop and how they are associated with other symptoms. There are also gaps in the literature surrounding the developmental level of symbolic play in individuals with ASD. Further documentation of these aspects of autism is therefore required. It is also necessary to examine how these behaviours may associate with one another and how this may vary within and between populations.

The formation of a detailed picture of repetitive behaviour and symbolic play in ASD is important on two levels: clinically and theoretically. Such information will enhance our understanding of the presentation of ASD and allow us to begin to assess the postulation by Wing & Gould (1979) that repetitive behaviours may occur in place of symbolic play

in children with ASD. This may impact upon the way which we seek to explain autism and how we diagnose and possibly aim to improve through interventions.

1.3 Conclusion

Research on repetitive behaviours and symbolic play is currently limited and to my knowledge there has to date been no systematic examination of any associations between these phenomena. As such it would be inappropriate to begin to explain these behaviours from a theoretical viewpoint without first developing a clear description of these behaviours. This thesis will therefore aim to gain a greater understanding of symbolic play and its relationship with repetitive behaviour in a manner which is not biased towards a specific theory of ASD. Due to the manner in which research into symbolic play in ASD has been conducted to date, a key part of this thesis will be to successfully develop measures in which true symbolic play abilities can be assessed in the ASD population in line with developmental models from typical development.

Chapter 2

Repetitive Behaviours

in Typical Children & Children with ASD

As discussed in the previous chapter excessive repetitive behaviours seen in those with Autism Spectrum Disorders (ASD) have been linked with impairments of imagination in autism (Wing & Gould, 1979). Current international diagnostic criteria for ASD (ICD-10 and DSM-IV) do not reflect this model, instead categorising repetitive behaviours as a separate set of criteria from imagination, which is categorised under the heading of communication. Excessive repetitive behaviours (Charman & Baird, 2002; Stone et al., 1994) and impairments of imagination (Baron-Cohen et al., 1992) have both been identified as possible early indicators of autism. If early diagnosis is to be successful and stable, early markers of ASD must be established and accurately defined. As such the aetiology and ontogeny of features of ASD should be considered in research and reflected in diagnostic criteria (Young, Brewer & Pattison, 2003).

Despite the necessity to understand repetitive behaviours and imagination in ASD we know little about these behaviours independently and I am not aware of any studies to date which examine associations between these behaviours. In this chapter I will discuss repetitive behaviours and in the following chapter imagination, in typical and ASD populations.

2.1 Repetitive Behaviours

Repetitive behaviours are not restricted to the repertoires of the ASD population. They are also seen in typical development (Bodfish, Symons, Parker & Lewis, 2000; Campbell, Locascio, Chorocco, Spencer, Malone, Kafantaris & Overall, 1990; Evans et al., 1997); despite this we know little about their development (Baron-Cohen, 1989c; Gabriels, Cuccaro, Hill, Ivers & Goldson 2005; Lewis & Bodfish, 1998; Shao, Cuccaro, Hauser, Raiford, Menold, Wolpert, et al., 2003; Turner, 1999). Furthermore, there is little consensus of the function of repetitive behaviours.

2.1.1 What is the Function of Repetitive Behaviour?

Repetitive behaviours have in the past been described as behaviours with no obvious goal or function (Hutt & Hutt, 1970). However, the most widely accepted explanation for their presence in the normative population is likely to be that of assimilation and accommodation which proposes that repetitive behaviours form part of an adaptive process in early childhood. Piaget (1952) proposed that children perform repetitive behaviours and rituals to enforce consistency on objects and people. As children mature they become more aware of causality, temporal relations and themselves and others as agents and repetition decreases. As such, as children develop an understanding of their environment and become able to act effectively upon it themselves they have less need for repetition.

Other explanations have been largely based upon research into excessive repetitive behaviours in atypical populations such as obsessive-compulsive disorder and autism. Repetitive behaviours have been described as operant behaviours which are maintained by the reinforcements which they provide such as sensory stimulation (e.g. touch or sound), social (e.g. attention) and negative reinforcement (e.g. avoidance of a situation). Repetitive behaviours have also been proposed as a response to anxiety; this explanation stems particularly from research into the OCD population, but can be linked with Baron-Cohens's (1989c) explanation for repetitive behaviours in autism. Baron-Cohen suggests such behaviours occur in reaction to high levels of anxiety which are a result of the child's inability to understand the mental states of others. Other explanations for excessive repetitive behaviours in autism include weak central coherence (Frith, 1999; Frith & Happé, 1994) in which repetitive behaviours are a result of a cognitive style in which the individual has a preference for local rather than global processing and executive dysfunction in which excessive repetition occurs as a result of deficits in generating, planning and controlling behaviours (Hughes, Russell & Robbins, 1993; Ozonoff, Pennington & Rogers, 1991). There are also explanations for repetitive behaviours in autism which propose that different types of repetitive behaviour have different causes. Carruthers (1996), for example, suggests that repetitive behaviours allow individuals with autism to withdraw from what is potentially a frightening social world. They go on to propose that insistence on sameness behaviours allow individuals to gain control over their environment whilst circumscribed interests occur as a result of an impaired social understanding which leads the individual to seek non-social activities.

It is evident that the function of repetitive behaviours in typical and atypical populations has not been clearly identified. Before a definitive answer can be sought it is necessary to attain a clear description of the behaviours to be explained. In the following sections I will outline the research evidence on repetitive behaviours in typical development and ASD. First, I will discuss the necessity to define repetitive behaviours; this will include the review of factor analysis studies which aim to identify categories of repetitive behaviours. This will be followed by a review of the research evidence for the development of repetitive behaviours in typical and ASD populations.

2.2 What are Repetitive Behaviours?

'Repetitive behaviour' is an umbrella term referring to a wide range of activities characterised by qualities of invariance, inappropriateness, repetition and rigidity (Turner, 1999). Such behaviours can include motor mannerisms, compulsions, sensory interests, an insistence on sameness and circumscribed interests (Bodfish et al., 2000; Lewis & Bodfish, 1998; Turner, 1996, 1999). Whilst it is widely accepted that repetitive behaviours are wide ranging in type, as yet there is no universally accepted categorisation system used to group types of behaviours together. It is important to determine whether categories of repetitive behaviours do exist in typical and atypical populations to allow a clear picture of their presentation to be attained.

Turner (1999) proposes that repetitive behaviours can be grouped into higher and lower level behaviours according to the required cognitive capacity. Lower level repetitive behaviours are motor repetitions and stereotyped behaviours including tics, repetitive

manipulations of objects, repetitive forms of self-injury and stereotyped movements. Higher level repetitive behaviours are those such as attachment to objects, maintenance of sameness, repetitive language and circumscribed interests. In recent years there has been a strong push for a two factor model of repetitive behaviours (Bishop, Richler & Lord, 2006; Cuccaro, Shao, Grubber, Slifer, Wolpert, Donnelly et al., 2003; Richler, Bishop, Kleinke & Lord, 2007; Shao, Cuccaro, Hauser, Raiford, Menold, Wolpert, et al., 2003; Szatmari, Georgiades, Bryson, Zwaigenbaum, Roberts, Mahoney et al., 2005). However, this should not be accepted without question as literature exists to suggest that more than two repetitive behaviour factors exist.

ICD-10 criteria for autism, for example, identifies the following four types of repetitive behaviour, of which two must be present for a diagnosis of autism to be made:

a) Encompassing preoccupations or circumscribed patterns of interest,
b) Apparently compulsive adherence to specific non-functional routines or rituals,
c) Stereotyped and repetitive motor mannerisms,
d) Preoccupations with part-objects or non-functional elements of materials.

Support for these categories was found in a study of 679 typically developing two year olds (Leekam et al., in press). Using the Repetitive Behaviours Questionnaire – 2 (RBQ-2) a four factor model was identified consisting of repetitive movements, adherence to routines, preoccupations with restricted patterns of interest and unusual sensory interests. A two factor model was also proposed in this study in which sensory and motor behaviours formed one factor and rigidity, routine and preoccupations with

restricted patterns of interest a second. These findings in a population of typically developing children support both the ICD-10 categories of repetitive behaviour in autism and the two categories of behaviour proposed by Turner (1999); suggesting that whilst higher and lower level behaviours may exist, they themselves may consist of a number of smaller categories of repetitive behaviour. The findings of Leekam and colleagues also support the notion that repetitive behaviours are a continuum seen in typical and atypical populations; this should encourage comparisons of repetitive behaviours seen in typical and atypical groups.

2.2.1 Factor Analysis Studies of Repetitive Behaviour using the ADI-R

ICD-10 criteria for ASD forms the basis of the Autism Diagnostic Interview-Revised (ADI-R) (Le Couteur et al., 2003; Lord et al., 1994), a semi-structured parental interview used in the diagnosis of Autism and ASD (see Section 4.2 for more details). The ADI-R contains 14 repetitive behaviour items, twelve of which are applicable to children of all abilities; circumscribed interests and repetitive language require a certain level of cognitive ability in order to be present. In recent years a number of studies examining the construct of repetitive behaviours using the ADI-R have been conducted. However, the studies conducted have differed in the ADI-R items they have included (See Table 2.2) and the suggested repetitive behaviour categories (See Table 2.3). The following section will examine the empirical evidence for categories of repetitive behaviour on the basis of these studies.

ADI-R data from 104 children aged 24 to 28 months with a diagnosis of autism, ASD or SLI were entered into a principal components analysis (Honey, McConachie, Randle, Shearer & Le Couteur, 2006a[1]). Only the twelve repetitive behaviour items applicable to all children were included in the analysis due to the limited language abilities of the cohort. Results revealed that these items formed three categories of repetitive behaviour which map directly onto the repetitive behaviours outlined in ICD-10 autism criteria and identified by Leekam et al. (in press), although in Honey et al.'s study sensory and motor behaviours are combined. The three factors extracted can be seen in Table 2.1, which lists items which had factor loadings over 0.4. Each component contains different types of repetitive behaviour with the exception of 'unusual fears' which appears in both the 'sensory motor' and 'resistance to change' components. This may be a reflection of the underlying natural history of unusual fears either as a response to sensory stimuli or to experiencing change.

Table 2-1 *Repetitive behaviour factors extracted by Honey et al. (2006a)*

Category	Circumscribed Interests (Interests/ICD-10 a)	Sensory Motor (Sensory Motor/ ICD-10 c and d)	Resistance to change (Resistance/ICD-10 b)
ADI-R Items	Unusual preoccupations Unusual attachment to objects	Repetitive use of objects Unusual sensory interests Unusual fears Hand and finger mannerisms Complex/stereotyped movements Self-injury	Difficulties with minor changes Compulsions/rituals Resistance to change Unusual fears Abnormal idiosyncratic responses

[1] Honey et al., 2006a – research for this paper was carried out independently to the research conducted as part of this PhD.

In the examination of the repetitive behaviours of 339 individuals with PDD (mean age = 100 months) as reported in the ADI-R, two repetitive behaviour factors were identified (Szatmari et al., 2005): insistence on sameness and repetitive sensory and motor behaviours and interests. Twelve items were included in this analysis with a number of differences to those included by Honey et al. (2006a). Whilst there were commonalities with the factors proposed by Honey et al., the model proposed by Szatmari and colleagues fails to incorporate all items selected into the final factor solution, i.e. attachment to objects and unusual preoccupations. This may suggest that a third factor to include these behaviours should be considered.

Two repetitive behaviour factors were also identified by Cuccaro et al. (2003): sensory and motor behaviours and insistence on sameness. Like Honey et al. (2006a) and Szatmari et al. (2005), they examined 12 repetitive behaviour items from the ADI-R; again the items included differed. With the exception of rocking, the items included in the repetitive sensory and motor behaviours factor were identical to those in Honey et al.'s and Szatmari et al.'s sensory motor factors. Similarly the items included in Cuccaro et al.'s second factor were also present in Honey et al.'s and Szatmari et al.'s resistance to change factors, suggesting some consistency between the factors proposed by the two models. As with the two factor model proposed by Szatmari et al., not all items identified for inclusion in the analysis by Cuccaro et al. loaded sufficiently to be included in the final model. Therefore, unusual preoccupations, attachments to objects and abnormal idiosyncratic responses are not included in the final model. Again such findings may indicate a necessity for a third category of repetitive behaviour.

Further support for a two factor model of repetitive behaviour comes from Shao et al. (2003). It should be noted that the samples used by Cuccaro et al. and Shao et al. overlap. However, once again the items included in the analysis differ from those included in previous studies. In particular, this study included circumscribed interests a factor excluded from all of the ADI-R studies previously described. Close examination of the two factor solution proposed by Shao et al. reveals the first factor 'repetitive sensory and motor behaviours and interests' to be almost identical to a collapsed version of Honey et al.'s circumscribed interests and sensory motor behaviour factors. The second factor is in keeping with the insistence on sameness factor found in the studies previously described. As with the studies by Cuccaro et al. and Szatmari et al., not all items selected for inclusion in analysis made the final factor solution; abnormal idiosyncratic responses were not incorporated into the final solution.

Table 2-2 *ADI-R items used in factor analysis studies of repetitive behaviour*

ADI-R Items (Item No.)	ADI-R Repetitive Behaviour Items Factor Analysis Studies					
	Bishop et al. (2006)	Honey et al. (2006a)	Szatmari et al. (2005)	Cuccaro et al. (2003)	Shao et al. (2003)	Richler et al. (2007)
Unusual preoccupations (71)	✓	✓	✓	✓	✓	✗
Unusual attachment to objects (76)	✓	✓	✓	✓	✓	✗
Repetitive Use of Objects (72)	✓	✓	✓	✓	✓	✓
Unusual Sensory interests (77)	✓	✓	✓	✓	✓	✓
Unusual fears (79)		✓	✗	✗	✗	✗
Hand and finger mannerisms (81)	✓	✓	✓	✓	✓	✓
Complex mannerisms (84)	✓	✓	✓	✓	✓	✓
Self-injury (90)		✓	✗	✗	✗	✗
Difficulties with minor changes in personal routine or environment (73)	✓	✓	✓	✓	✓	✓
Compulsions/rituals (75)	✓	✓	✓	✓	✓	✓
Resistance to trivial changes in the environment (74)	✓	✓	✓	✓	✓	✓
Abnormal idiosyncratic negative response to specific sensory stimuli (78)	✓	✓	✗	✓	✓	✗
Circumscribed interests (70)	✗	✗	✓	✗	✓	✗
Rocking (85)	✗	✗	✓	✓	✓	✗
Sensitivity to noise (36)	✓	✗	✗	✓	✓	✗

Table 2-3 *Categories of repetitive behaviour proposed in factor analysis studies of ADI-R*

Study	Sensory Motor	Insistence on Sameness (Rituals/routines)	Circumscribed Interests	Not included in final factor model	Sample
Honey et al. (2006a)	• **Hand & finger mannerisms** • **Repetitive use of objects** • **Unusual sensory interests** • **Complex mannerisms** • Unusual Fears • Self injury	• **Difficulties with minor changes in personal routine or environment** • **Resistance to trivial changes in the environment** • **Compulsions/rituals** • Unusual fears • Idiosyncratic negative responses	• Unusual preoccupations • Unusual attachment to objects		N = 104 Mean Age: 37.05 months Age Range: 24 – 48 months
Szatmari et al. (2005)	• **Hand & finger mannerisms** • **Repetitive use of objects** • **Unusual sensory interests** • **Complex mannerisms** • Rocking	• **Difficulties with minor changes in personal routine or environment** • **Resistance to trivial changes in the environment** • **Compulsions/rituals**		• Circumscribed interests • Unusual preoccupations • Unusual attachment to objects	N = 339 Mean age: 100.8 months
Cuccaro et al. (2003)	• **Hand & finger mannerisms** • **Repetitive use of objects** • **Unusual sensory interests** • **Complex mannerisms** • Rocking	• **Difficulties with minor changes in personal routine or environment** • **Resistance to trivial changes in the environment** • **Compulsions/rituals**		• Unusual preoccupations • Unusual attachment to objects • Idiosyncratic negative responses • Sensitivity to noise	N = 207 Mean Age: 108.7 months Age Range 29 – 254 months

Table 2.3 *Contd.*

Study	Sensory Motor	Insistence on Sameness (Rituals/routines)	Circumscribed Interests	Not included in final factor model	Sample
Shao et al. (2003)	• **Hand & finger mannerisms** • **Repetitive use of objects** • **Unusual sensory interests** • **Complex mannerisms** • **Rocking** • Unusual preoccupations • Unusual attachment to objects	• **Difficulties with minor changes in personal routine or environment** • **Resistance to trivial changes in the environment** • **Compulsions/rituals**		• Circumscribed interests • Sensitivity to noise • Idiosyncratic negative responses	N = 221 Age Range: 3 – 21 years
Richler et al. (2007)	• **Hand & finger mannerisms** • **Repetitive use of objects** • **Unusual sensory interests** • **Complex mannerisms** • **Rocking**	• **Difficulties with minor changes in personal routine or environment** • **Resistance to trivial changes in the environment** • **Compulsions/rituals**			N = 279 Age Range: 13-35 months
Bishop et al. (2006)	• **Repetitive use of objects** • **Unusual sensory interests** • **Complex mannerisms** • **Hand & finger mannerisms** • Unusual preoccupations	• **Difficulties with minor changes in personal routine or environment** • **Resistance to trivial changes in the environment** • **Compulsions/rituals** • Idiosyncratic negative responses Sensitivity to noise		• Unusual attachment to objects	N = 830 Age Range: 15mth. – 11y11mth. Mean Age: 58 mths.

A fifth factor analysis study (Richler et al., 2007) has also identified two repetitive behaviour factors from ADI-R scores. Like Honey et al. (2006a), Richler and colleagues examine very young children and include those with and without autism. In total the ADI-R scores of 165 children with autism, 49 children with Developmental Delay and 65 typically developing children aged 2 years were examined. Unlike the studies discussed previously, Richler et al. (2007) used confirmatory and not exploratory factor analysis selecting seven specific ADI-R repetitive behaviours which have been common to repetitive behaviour factors identified in earlier studies. The two factors identified in this research were repetitive sensory motor behaviours and insistence on sameness. These factors are also identical to those of all the studies discussed.

Finally, Bishop et al. (2006) also propose a two factor solution in their study of ADI-R repetitive behaviour items. Again, hand and finger mannerisms, repetitive use of objects, unusual sensory interests and complex mannerisms are common to the sensory motor factor; like Shao et al.'s model unusual preoccupations are also included. The second factor, insistence on sameness, also includes items common to all of the models discussed: this factor also included idiosyncratic negative responses and sensitivity to noise. Like those of Szatmari et al. and Cuccaro et al., Bishop et al.'s final factor solution excludes attachment to objects.

The factor analysis studies discussed have varied in the ADI-R items they have included and the categories of repetitive behaviour they have proposed. They have also differed

in the ability levels and ages of the populations examined (See Tables 2.2 and 2.3). As such comparisons of results should be conducted with caution. Each of the two factor solutions identified shows some support for the proposal of Turner (1999) that repetitive behaviours can be grouped into higher and lower level behaviours according to the required cognitive abilities. Examination of the studies has identified that unusual attachment to objects and abnormal idiosyncratic responses are not included in any of the two factor models proposed. However, these behaviours are present in the diagnostic criteria for autism and other descriptions of repetitive behaviour in typical and atypical populations such as Turner (1999), Honey et al. (2006a) and Leekam et al. (in press). Unusual preoccupations do not feature in all of the models; however, such behaviours have been identified as one of the most prevalent repetitive behaviours in young children with ASD (Young et al., 2003). Any model of repetitive behaviour which excludes these behaviours is therefore likely to lack completeness.

On the basis of the factor analysis studies reviewed it is suggested that the four categories identified by ICD-10 and confirmed by Leekam et al. (in press) provide a detailed description of repetitive behaviours. However, from evidence presented (Cuccaro et al., 2003; Honey et al., 2006a, Leekam et al., in press; Shao et al., 2003; Szatmari et al., 2005) it may be plausible to collapse some of the categories such as sensory and motor behaviours whilst maintaining valid and reliable factors. From the studies reviewed it is evident that a 'Circumscribed Interests' factor is likely to be necessary to account for unusual preoccupations and attachment to objects. It is also clear that the behaviours currently included under the heading of 'repetitive behaviours'

are not universally identified and that this is a matter which must be resolved in order for future research to be comparable.

2.3 Repetitive Behaviours in Typical Development.

Repetitive behaviours are seen throughout childhood in the normative population and are an important feature of development. Sensory and motor behaviours are present in early infancy when a large amount and variety of rhythmic and stereotyped behaviours are seen during the first year of life. Such behaviours include kicking, waving, banging, twirling, bouncing and rocking (Thelan, 1979). These behaviours begin to reduce after the child's first birthday and the progression through rhythmical stereotypies is considered transient and associated with the development of motor skills (Wolff, P., 1968), neuromuscular development (Thelan, 1979) and general central nervous system maturation (Sprague & Newell, 1996).

Within typically developing children, sensory and motor repetitive behaviours such as kicking and banging give way to higher level repetitive behaviours such as a need for sameness at approximately 2 years, i.e. 'the terrible twos'. In a study of 679 typically developing children aged 2 years, Leekam et al. (in press) examined parental reports of repetitive behaviours using the RBQ-2 (see section 2.2.1). It was found that at this age, 'fascination with specific objects' and 'carry special objects around' were reported as 'marked' behaviours in over 30% of the sample and 'mild' and 'occasional' in 40% and 28% of the sample respectively. Gessell and colleagues (1928, 1974) have demonstrated that at 2½ to 3 years typically developing children show compulsive

behaviours including preference for sameness, repetitive and ritualised behaviours, rigidity in likes and dislikes and acute sensory perception for minute details of toys and clothes.

In a parental-report study of 8 to 72 month-old typically developing children the frequency of ''compulsive-like'' behaviours was found to increase at 24 to 36 months of age (Evans et al., 1997). Evans et al. (1997) examined the developmental trajectory of two components of 'compulsive-like' behaviours, 'just right' behaviours, and 'repetitive behaviours & insistence on sameness'. Before considering the results of this study it is worthy of note that these behaviours were measured by parental report and therefore subjective interpretations of behaviours may be present. 'Just right' behaviours were lower level behaviours such as strict and circumscribed ways to arrange objects, the way clothes feel and the order of objects. These were found to occur significantly more in children aged 24 to 48 months than in children aged 12 months and 72 months who displayed similar lower levels of 'just right' behaviours. Children younger than 12 months demonstrated the lowest levels of these behaviours. 'Repetitive behaviours and insistence on sameness' which included higher level behaviours such as preference for the same daily routine, repetition of certain actions over and over, acting out the same sequence over and over in pretend play, were found to be present to a similar degree as 'just right' behaviour, although these behaviours emerged earlier and had a steeper increase over time.

By four years old all types of repetitive behaviour which a child may show begin to decrease, and by the time the child reaches school age, relatively few repetitive behaviours remain (Berkson & Tupa, 2000). Repetitive behaviours such as nail biting, pacing and keenly pursued hobbies may remain in the repertoires of some individuals (Baumeister & Forehand, 1973; Frith, 1999); however, these are not seen to be pathological, distinguishing them from behaviours seen in clinical populations such as children with autism and severe visual impairment (Frith, 1999).

The change in the type of repetitive behaviour seen in typical children has been attributed to cognitive maturation (Piaget, 1952) and the development of emotions and social communication (Berkson, 1983; Evans et al., 1997). Moreover, Evans & Gray (2000) report that repetitive behaviours follow the same developmental trajectory in children with cognitive delays as typically developing children when mental age is accounted for.

2.4 Repetitive Behaviours in ASD

Repetitive behaviours have been identified as a possible early indicator of ASD; however, they are rarely the primary concern of parents (Charman & Baird, 2002). Examination of repetitive behaviours in children aged 24 to 48 months (Honey et al., 2006a) revealed that repetitive behaviours were reported to be present in all children with autism and ASD even at 2 years. However, this would be expected as the presence of repetitive behaviours contributed to the best estimate clinical diagnosis of ASD in this study.

In a survey of 770 parents of children with autism and Asperger syndrome (Howlin & Asgharian; 1999), only 3% of parents of children with Autism and 6% of parents of children with Asperger syndrome reported repetitive behaviours demonstrated by their child as a principal concern prior to seeking a diagnosis. Similarly, Young et al. (2003) found that repetitive behaviours were not the most frequent concern for parents of children with autism. Early indicators of autism were examined in a sample of 81 children with autism under the age of 10 using retrospective parental reports and whilst repetitive behaviours were not the primary concern of parents it became clear that abnormal repetitive behaviours were evident in children with autism at a young age. The average age of a child when parents first noticed the presence of repetitive behaviours varied according to type; stereotyped movements, for example, were noted on average when the child reached 16.1 months of age, stereotyped/restricted interests were noted at 15.6 months and stereotyped behaviours-other at 21.7 months. Furthermore, when asked about 12 specific repetitive behaviours including 'purposeless rituals/routines', 'bothered by change', 'unusual way of moving hands', on average repetitive behaviours were found to emerge around 20-30 months of age. The earliest behaviour to emerge was 'played with toy in unusual way' with a mean age of 19.6 months. The most common behaviour reported by parents was unusual preoccupations, seen in 84% of children; however, no specific repetitive behaviour was reported to be present in all children with autism.

Unusual motor actions alongside paradoxical reactions to sound and excitability or passivity were identified as indicators of autism in a retrospective analysis of the infant movies of 12 children with a diagnosis of autism (Adrien et al., 1991). However, these

findings were not replicated in a later study of retrospective video evidence from birth to 1 year in typically developing children and children with autism (Adrien, Lenoir, Martineau, Perrot, Hameury, Larmande et al., 1993). In the latter study, repetitive behaviours did not feature in the five behaviours which distinguished between the groups: social attention, social smiling, appropriate facial expression, hypotonia and unstable attention. Supporting the findings of Adrien et al. are those of Baraneck (1999) who in a retrospective video analysis, found mouthing objects (object directed stereotypy) and posturing (motor stereotypy) discriminated between children with ASD and children with autism at 9-12 months of age. This study did not find evidence that repetitive behaviours were a useful predictor of autism in children this age.

It can be seen that whilst repetitive behaviours are present in infants with autism, these behaviours may not be the primary concern of parents. Lord (1995) found support for this, noting that whilst differences between ASD and more general developmentally delayed groups at 2 years of age include repetitive behaviours there are fewer distinguishing repetitive behaviours than social and communication behaviours. In addition, parents may show greater concern over the absence of specific developmental markers (such as eye contact or social smiling) than the presence of additional behaviours (such as repetitive behaviours). Alternatively or in addition to this, developmental abilities must also be considered. Children diagnosed with autism at a very young age are likely to have severe developmental delays and therefore may not have reached the mental capacity at which abnormal repetitive behaviours become apparent. That is, that repetitive behaviours are present at specific points of typical development and therefore the abnormal presence of such behaviours may not be

noticed until typically developing peers are no longer showing such behaviours. Or that the child has yet to develop sufficient abilities and skills to engage in particularly unusual repetitive behaviours such as repetitive language, routines and rituals or circumscribed interests. Despite these findings, a recent retrospective study (Lord & Luyster, 2006) has identified that the presence of repetitive behaviours at 2 years may be one of the best predictors of a diagnosis of ASD at the age of 9.

To gain a greater insight into repetitive behaviours in ASD, it is necessary to identify whether and when there are differences in the type and frequency of repetitive behaviours in ASD and repetitive behaviours in the typical population.

2.4.1 Are Repetitive Behaviours More Prevalent in ASD than in Other Groups?

There has been limited research into repetitive behaviours overall and in particular into comparisons between repetitive behaviours in ASD and typical development. Repetitive behaviours occur significantly more frequently in individuals with ASD than in typically developing children (Bodfish et al., 2000) and children with developmental delay (Honey et al., 2006a; Lord, 1995). It has been noted that 75% of severely or profoundly mentally retarded individuals with autism displayed repetitive behaviours in comparison to only 7% of those without autism (Matson, Baglio, Smirlodo, Hamilton, Packlowsky, Williams et al., 1996). Furthermore, Bodfish et al. (2000) reported a greater number of topographies of stereotypies and compulsions in individuals with autism in comparison to those with mental retardation. However, there is evidence to suggest that children with autism may show similar levels and types of repetitive

behaviour to another atypical population; those with Prader-Willi syndrome (Greaves, Prince, Evans & Charman, 2006).

It is known that the frequency of repetitive motor behaviours in non-autistic populations is mediated by mental age, with frequency decreasing as age increases (Evans et al., 1997; Thelan, 1979); in comparison to age and ability matched controls autistic individuals demonstrate more frequent, severe and longer bouts of these behaviours. It has also been reported that whilst there are comparative levels of repetitive behaviour in autism and Prader-Willi syndrome, negative correlations between the presence of repetitive behaviours and developmental level are stronger in those with Prader-Willi than in those with autism (Greaves et al., 2006), thus reflecting the pervasive nature of repetitive behaviours in ASD.

In their epidemiological and classification study of autism, Wing & Gould (1979) examine the presence of repetitive behaviours in "socially impaired" children and a comparison group of "sociable severely mentally retarded" children. Repetitive behaviours in this study were called "elaborate repetitive routines" and defined as "stereotyped, repetitive activities involving the organisation of materials or people" (p 16). In addition a child's overall pattern of interest was examined and rated as either entirely repetitive unless closely supervised by an adult or partly stereotyped and partly constructive even without supervision from an adult. The results of this study revealed that 72% of the socially impaired children engaged in only repetitive interests in comparison to only 7% of the sociable severely mentally retarded children.

Furthermore, 23% of the socially impaired children had elaborate routines, whilst none of the sociable children showed this type of behaviour. These findings were examined more closely by further categorising the 'socially impaired' group of children into those with a history of autism and those without. A history of autism was defined as "currently or in the past, had shown both...social aloofness and indifference and elaborate repetitive routines."(p19). This revealed that those with a history of autism were more likely to engage in elaborate repetitive routines (94%) than those without (2%). In addition, 82% of those with a history of autism showed only repetitive interests in comparison to only 68% of those without. The findings of this study clearly indicate that in comparison to children with mental retardation there are more children with autism who engage in repetitive behaviours. This was also found to be true when children with autism were compared with children of similar social skills but without other features of the disorder. Such findings suggest that the greater the degree of autism a child has the more severe their repetitive behaviours. Furthermore, it may be inferred from this that there is a correlation between repetitive behaviours and other triad features. Supporting this are the findings of Barrett, Prior & Manjiviona (2004), who in a study of 37 children aged 4 to 7 years found repetitive behaviours to be more prominent in children with greater impairments in social interaction or pragmatic language than those with lesser impairments.

By definition of the disorder and empirical studies we know that children with ASD show more repetitive behaviour than typically developing children. However, important questions to be considered when seeking to develop a detailed picture of repetitive behaviours are the age at which differences in the repetitive behaviours of

typical children and children with ASD can be identified and whether any repetitive behaviours are autism specific.

2.4.2 At what Age do the Repetitive Behaviours of Children with ASD Differ to Those Seen in Typical Development?

Evidence suggests that it is possible to identify differences between the repetitive behaviours of children with ASD and children of typical development at an early age. Whilst limited to early childhood in the typical population repetitive motor actions and unusual sensory interests including taste, smell, feel, sound, spinning and self-injury are noted to persist and possibly increase in frequency in autism (Berkson & Tupa, 2000; Thelan, 1979). Berkson & Tupa (2000) note that although stereotyped behaviours are an aspect of typical development, abnormalities in these behaviours can be detected from birth to 3 years. During their first year typically developing infants demonstrate a great quantity and variety of rhythmical and highly stereotyped repetitive behaviours including: kicking, waving, banging, twirling, bouncing and rocking (Thelan, 1979). These behaviours peak at 2 years old when they begin to decline and are replaced with higher level repetitive behaviours such as preference for sameness and compulsions (Gessell, Ames & Ilg, 1974; Evans et al., 1997). These claims are supported in a 12 month follow up study of possible autism cases (Lord, 1995) where high frequencies of stereotyped movements at 2 and 3 years were common only in children who later went on to receive a diagnosis of autism. Lord (1995) assessed thirty four children identified to have delayed speech and language development with the ADI-R at 2 years and then at 3 years. At 2 years, hand and finger mannerisms and unusual sensory behaviours were amongst behaviours discriminating between those with ASD and general

developmental delay. At 3 years the groups differed amongst other things for preoccupations and whole body mannerisms. In another ADI-R study (Cox, Klein, Charman, Baird, Baron-Cohen, Swettenham et al., 1999), children with autism were found to have significantly higher ADI-R scores for the repetitive behaviour domain of the interview than children with a language disorder at 20 and 42 months of age. However, no specific ADI-R repetitive behaviour items were found to differentiate between the groups at these ages. Similarly, Richler et al. (2007) found group differences in repetitive behaviours in an examination of ADI-R scores for children with ASD, developmental delay and of typical development aged 2 years. According to ADI-R scores and a previous factor analysis (See Section 2.2.1) the prevalence of 'Repetitive Sensory Motor' behaviours, that is the number of different behaviours within this factor which a child showed, was found to be significantly higher in children with ASD than in children of typical development or children with a developmental delay. However, there were no significant differences in the prevalence of 'Insistence on Sameness' behaviours between the three groups. It is likely that the lack of differences between the groups for these higher level repetitive behaviours is a reflection of the young age of the sample, in that none of the children were yet to reach the developmental level where these behaviours would emerge.

2.4.3 Are any Repetitive Behaviours ASD Specific?

Evidence suggests some repetitive behaviours may be autism specific (Turner, 1999). It has been claimed that to determine between autism specific and non-specific repetitive behaviours behavioural content should be examined (McDougle, Kresch, Goodman, Naylor, Volkmar, Cohen et al., 1995). Bodfish et al., (2000) propose that the variety of

repetitive behaviours in autism has an elevated pattern of occurrence in relation to age, gender and intellectual functioning matched controls. Young children with autism are more likely to engage in body rocking, finger flicking and hand flapping (Abelson, 1993) and mouthing and unusual posturing (Baranek, 1999) than their typical peers. Agreeing with these findings, Lord (1995) identifies motor repetition as clearly recognisable in autistic children with hand and finger movements and unusual sensory behaviours discriminating between autistic and non-autistic populations. Frith (1999), however, claims whilst there are more stereotypies in autism than other clinical groups they are not distinctively different.

In a retrospective study of typically developing infants and infants with ASD (Werner, Dawson Osterling & Dinno, 2000), video tapes taken of the children at 8-10 months were examined, revealing no between group differences in the repetitive behaviours shown. Similarly, no differences were found in the repetitive behaviours of 11 typically developing children and 11 children with ASD in a retrospective video study of 1st birthdays (Osterling & Dawson, 1994). Rather, differences were found between social skills and joint attention. In a study of social communication and its relationship with the severity of autism, Tanguay, Robertson & Derrick (1998) spent some time examining repetitive behaviours. In their sample of 63 participants aged 3 to 16 years with autism, Asperger syndrome or PDD-NOS individual's scores for ADI-R repetitive behaviours items were examined. It was reported that few individuals demonstrated these behaviours, for example, 78% of cases did not use stereotyped movements. Those individuals who did show motor repetitive behaviour were reported to be the children with the most severe autism and mentally retardation. The most prevalent behaviours

were unusual preoccupations and circumscribed interests seen in 54 and 57 percent of cases respectively. However, these were described by the researchers as possible representations of problems in joint attention rather than stereotyped behaviours per se. The researchers went on to suggest that the requirement of repetitive behaviours for a diagnosis of ASD to be made may be questionable. However, it should be noted that statistics for each of the three diagnostic groups in this study are not reported and therefore differences between the groups with regards to the presence of repetitive behaviours are unclear. As such, those with autism may show significantly more repetitive behaviours than other populations or more importantly a specific type of behaviour.

In a large ADI-R study of typical developing children (N = 65), children with ASD (N= 192) and children with developmental delay (N = 22), Richler et al. (2007) examined group differences in specific repetitive behaviours. Of the twelve ADI-R items examined, no repetitive behaviour was found to be exclusive to the ASD population, with all behaviours seen in the typical and developmentally delayed groups to some extent. However, the prevalence of the behaviours did differ for the majority of behaviours. Most notably, over 70% of children within the ASD group showed unusual sensory interests and repetitive use of object, in comparison to less than 50% and 25% in the developmentally delayed and typically developing groups respectively. The only behaviour for which there was no significant difference between the ASD, developmentally delayed and typical groups was resistance to trivial changes in the environment; this is likely to be a reflection of the low prevalence rate across groups. There was also no significant difference between compulsions/rituals seen in the ASD

and typically developing groups, although the percentages of children showing these behaviours were 20.1 and 9.2 respectively indicating some differences between the groups.

The "intense desire for the perseveration of sameness" was noted by Kanner (1943) as common in autism. Other behaviours which are claimed to be frequent in autism include inventing routines, putting things in lines, insistence on an activity initiated by a parent being performed in the same way each time, attraction to certain objects such as holly leaves and tin foil, resistance to change and acting out sequences from television, films and stories over and over (Boucher, 1977), and unusual preoccupations (Williams, Allard & Sears, 1996). Wing & Gould (1979) go beyond these claims suggesting that some repetitive behaviours may be unique to autism. In their epidemiological study of autism, they identified only one child without autism who engaged in elaborate repetitive routines, claiming that such behaviours were unique to autism. These claims are supported by Frith (1999) who also claims that elaborate routines of long and complex sequences of thought, action and interest fixation are unique to autism.

Despite suggestions that some higher level repetitive behaviours such as elaborate routines are restricted to autism (Frith, 1999; Wing & Gould, 1979), Turner (1999) reports that evidence is varied and although higher level repetitive behaviours in autism are seen as common, difficulties in quantifying and assessing these behaviours includes differentiating between intense and restricted interests seen in the normal population and circumscribed interests in autism. In a study of 23 high functioning children with

autism and 12 children with Asperger syndrome (Ozonoff, South & Miller, 2000) the ADOS-G (Lord et al., 1996; 2000) and the Repetitive Behaviour Questionnaire (RBQ) (Turner, 1996) were used to compare observed and reported repetitive behaviours. No differences between the groups were reported with regards to their observed repetitive behaviours; however, reports of repetitive behaviour revealed that high functioning children with autism showed significantly more 'insistence on sameness' behaviours than the Asperger group. In addition, the Asperger group showed significantly more circumscribed interests than the high functioning autism group. Similar findings were reported in a comparison of repetitive behaviours seen in children with Prader-Willi and children with autism (Greaves et al., 2006). Whilst the pattern and level of repetitive behaviours reported were similar between the groups significant differences were identified in specific behaviour. Behaviours more common in children with autism were the lining up of objects, awareness of detail in the home and strong preferences for certain foods, whilst collecting or storing behaviours were significantly more common in the Prader-Willi group than in the autism group. In line with these findings are those of Richler et al. (2007) who found that there were no differences between children with ASD and typically developing children aged two years in the prevalence of two of the three ADI-R repetitive behaviour items representing 'Insistence on Sameness': compulsions/rituals and resistance to trivial changes in the environment. There were differences in the prevalence of compulsions/rituals seen in those with developmental delay and those with ASD at two years, with such behaviours being more common in the ASD group. As discussed previously, this may be a reflection of the young developmental age of the groups and the required cognitive skills to typically engage in such behaviours.

In a comparison of older children, Zandt, Prior & Kyrios (2007) examined repetitive behaviours in children with ASD (N = 19, mean age = 11 years), Obsessive Compulsive Disorder (N = 17, mean age = 12 years) and children of normative development (N = 18, mean age 12 years). Using the RBQ, four types of repetitive behaviour were examined: total repetitive behaviour, sameness behaviours, repetitive motor behaviours and repetitive language. There were found to be significantly higher levels of each type of behaviour in the OCD and ASD groups than in the typically developing group. In fact, there was no repetitive language in the typical group. Comparisons of the repetitive behaviours reported for the OCD and ASD groups revealed that the only significant difference between these groups were for repetitive language which was more frequent in those with OCD. The same study also examined types of obsessive and compulsive behaviours using the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) (Scahill, Riddle, McSwiggin-Hardin, Ort, King, Goodman et al., 1997). Results indicated that typical developing children showed significantly lower levels of obsessions and compulsions than the two clinical groups. Furthermore, those with OCD were found to engage in significantly more of these behaviours than children with ASD. Closer examination of the CY-BOCS results revealed that 7 of 9 identified compulsions including washing, checking, repeating and magical thinking were significantly more prevalent in the OCD group than the ASD group. Ordering compulsions and those which involved others, however, were comparable between the groups. Similarly, the majority of obsessions were more common for those children with OCD, with the exception of religious obsessions which were equivalent between the groups and miscellaneous obsessions which were more common in the ASD group. The results of this study suggest that the level of repetitive behaviours seen in children with ASD may not be distinguishable from those seen in OCD, another disorder

characterised by repetition. Furthermore, there were no behaviours specific to ASD, rather, there was a significantly higher presence of specific behaviours in those with OCD, such as washing, repetitive language, checking and magical thinking.

The evidence for autism specific repetitive behaviours is varied; research suggests that whilst some behaviours may be more likely to occur in specific diagnostic groups, they may not be diagnosis specific. It appears that the key to differences between repetitive behaviours in ASD and other populations is the presence of such behaviours beyond the developmental level at which they would typically cease to exist. It is therefore necessary to examine ways in which repetitive behaviours change with time in ASD and if possible identify what happens to repetitive behaviours beyond the point at which they disappear in typical development.

2.4.4 How do Repetitive Behaviours in ASD Change with Chronological Age?

The amount and pattern of repetitive behaviours which an individual with ASD may show is noted to change with age. Within the autism population repetitive behaviours seen in the second and third years of life are reported to be less consistent than at 4 to 5 years of age (Cox et al., 1999; Stone, Lee, Ashford, Brissie, Hepburn, Coonrod et al., 1999). In a longitudinal examination of children referred for interaction and communication difficulties Moore & Goodson (2003) examined twenty children at 2 years and re-assessed them at 4 to 5 years using the ADI-R. Whilst social interaction and communication skills showed little change over time, repetitive behaviours were subject to age related changes becoming more apparent with time. Similarly, repetitive

behaviours as measured by the ADI-R algorithm at 24 to 48 months and then 1 year later in children with autism and ASD were found to increase with age. However, the increase was only significant in children with ASD. Furthermore, the examination of additional ADI-R items, that is the twelve repetitive behaviour items which are applicable to all children (See section 2.2.1 for more details), revealed that the severity of repetitive behaviours decreased with age. However, it should be noted that repetitive interests (unusual preoccupations and attachment to objects) increased with age in those children of relatively higher cognitive ability. Consideration of this evidence alongside findings from typical development (Evans et al., 1997; Gessell, 1928; Gessell et al., 1974) suggests that the developmental point at which repetitive behaviours would typically change in type or cease is key in the examination of repetitive behaviours in ASD. Therefore, it could be that as children with ASD develop we would expect to see a decrease in some repetitive behaviours such as sensory motor behaviours and an increase in others such as routine and circumscribed interests, due to an increase in ability. It is not possible from the information presented by Moore & Goodson to identify a specific age at which change occurs.

As in typical development, age related changes occur in the repetitive behaviours of those with autism (Bishop, 1989). Kanner (1943) reports that by 5 to 6 years of age, "the repetitiousness assumes the form of obsessive preoccupations". Young children with autism rarely show resistance to change, perseveration and preoccupations (Dahlgren & Gillberg, 1989; Rapin, 1996; Tanguay et al., 1998). In typical development, repetitive behaviours usually disappear by school age, with the exception of nail biting and pacing. However, in the ASD population, repetitive behaviours

remain a pervasive feature of the disorder. In a classic study of 63 children with 'infantile psychosis' at 5 and then 15 years of age (Rutter, Greenfeld & Lockyer, 1967), it was reported that repetitive behaviours continue into adolescence although there was evidence of individuals becoming more flexible. A retrospective study of changes in triad features by Piven, Harper, Palmer & Arndt (1996), did not show consistent improvement in repetitive behaviour in autism with age. Using the ADI-R, the current behaviours of 38 high functioning adults and adolescents with autism (mean age = 17.6 years) were compared with the behaviours they showed at 5 years of age. Here, repetitive behaviours were found to improve in only 50% of the sample. Using the same methodology changes in the triad features of 28 children and adults were examined (Fecteau, Mottron, Berthiaume and Burack, 2003). Results of this study identified more positive changes in repetitive behaviours over time, although not as great as those seen for social and communication impairments. The greatest improvements were in the repetitive use of objects. Of 17 children who engaged in the repetitive use of objects at 4 to 5 years of age, 76.5% of them showed a decrease in these behaviours with age. No behaviours got worse over time, with the exception of verbal rituals, for which an increase over time was reported for 7.7% of children. This may be explained by an improvement in verbal ability with age and thus an increase in the number of children able to engage in such behaviours. Despite using the same methodology the findings of Piven et al. and Fecteau et al. differ. Examination of their samples reveals that the age gap between the 'current' behaviours and those reported to be present at 4 to 5 years of age differ between subjects in each study. In the case of Fecteau et al.'s study this age gap varied from 2 to 18 years. Furthermore, reports of behaviours present at 4 to 5 years of age in each study are taken retrospectively and

therefore the validity of the data should be considered carefully, particularly in those cases where a large period of time has passed since the child was 4 to 5 years old.

To accurately determine how repetitive behaviours change with age it is necessary that the time between assessment points is consistent across subjects. The age gap between assessment points should also be large enough to allow change to be seen but small enough to allow meaningful interpretation. Furthermore, should the age at which repetitive behaviour typically cease to exist in typical development be key to identifying differences in repetitive behaviour in ASD and typical populations, examination of early to mid childhood would be highly appropriate.

Changes in the ADI-R domain scores of 29 children with ASD were tracked by Charman, Taylor, Drew, Cockerill, Brown & Baird (2005) revealing that repetitive behaviours were found first to increase between the ages of 3 and 4 to 5 years before decreasing around the age of 7 years. These findings can be linked with typical development in which repetitive behaviours increase in frequency before later decreasing (Evans et al., 1997). A study of the stability of autism diagnosis from 2 to 9 years of age (Lord, et al., 2006) examines the way in which repetitive behaviours change with age. Their sample of 172 children with autism, PDD-NOS and non-spectrum developmental delay was assessed at 2 and 9 years of age with the ADI-R and ADOS-G. Repetitive behaviours as measured by the algorithm scores of the ADI-R were found to increase in autism in all groups with age. However, according to the ADOS-G repetitive behaviour algorithm scores, children with autism and PDD-NOS

were reported to show a decrease in repetitive behaviour with age whilst those children with a non-spectrum developmental delay were reported to show an increase in such behaviours. These findings were based upon diagnoses made at 2 years and it was known that some children at 9 years no longer fit these criteria; therefore the age related changes were also examined according to diagnostic groupings at 9 years of age. Results remained the same with the exception of the non-spectrum group who showed no changes in repetitive behaviours rather than an increase with age. Supporting Charman et al. (2005) and Fecteau et al. (2003), Lord et al. (2006) found repetitive behaviours when measured by the ADI-R decreased with age in children with ASD. However, these findings contradict the findings of observations using the ADOS-G; it is possible that the type of repetitive behaviour which a child engages in has changed over time and is more accessible through the ADOS-G as children get older and thus repetitive behaviour scores increase. Behaviours which may have increased and would explain this proposal would be circumscribed interests which would be easily identified through conversations which take place as part of the ADOS-G protocol. Unlike Fecteau et al., Lord and colleagues do not examine nor report the specific types of repetitive behaviours measured and therefore such postulations cannot be examined further.

Evidence for changes in repetitive behaviour with age in ASD is inconsistent. Research suggests repetitive behaviour in ASD and in typical development will change over time. In typical development, chronological and developmental age are parallel, however, in children with ASD developmental delay is common. Therefore, it is necessary to consider the developmental level of children with ASD when examining changes in

their behaviours. The following section will examine evidence for a relation between repetitive behaviour and developmental ability.

2.4.5 How do Repetitive Behaviours Change with Developmental Age in ASD?

To validate findings on repetitive behaviour and their universality to the ASD population it is important to account for varying symptomatology. Behavioural profiles need to be set against a child's overall developmental level for strong indicators or markers of autism to be identified (Charman, 2000). It is essential then that in any study of repetitive behaviours a measure of ability be taken and used in analysis.

Repetitive behaviours are proposed to be related to developmental age (Schultz & Berkson, 1995). Negative correlations have been found between IQ and repetitive behaviours in severely developmentally delayed populations (Berkson & Tupa, 2000). As a result the influence of ability upon repetitive behaviours must be considered in all populations. Szatmari, Bartolucci & Bremner (1989) found circumscribed interests to be significantly more prominent in autistic individuals of normal intelligence (86%) compared to those with Asperger (37%) and outpatient controls (9%). However, Kerbeshian, Burd & Fisher (1990) report that 31% of high functioning autism and 92% of Asperger demonstrate circumscribed interests. Many studies subdivide children into predefined groups according to intellectual functioning or specific abilities; the autistic population is often subdivided into high and low ability individuals according to intellectual functioning, with an IQ of 70 as the cut off point (Wing & Potter, 1999). The split between abilities is seen to reflect the type of repetitive behaviours

demonstrated. Linking with ideas of Piaget (1952) some suggest higher level repetitive behaviours such as circumscribed interests and routines are more common in high functioning autism as they require a higher level of ability (Prior & Macmillan, 1973).

Support for a decrease in repetitive behaviours in ASD with age is presented in a comparison of ADI-R scores at mid childhood (approximately 12 ½ years of age) and adolescence (approximately 19 years of age) (Piven et al., 1996). Results from the study revealed a significant decrease in the reported severity of repetitive behaviours over time. Unlike the previous studies discussed, Piven et al. also examined within-group differences according to ability. When split according to IQ, it was revealed in comparison to those with an IQ below 70 that the greatest decrease in repetitive behaviours with age was for those with an IQ over 70. Whilst Piven et al. and Fecteau et al. (2003) like others find a decrease in repetitive behaviours in ASD there are differences in their subsequent in-depth results. Piven et al. find that the greater the cognitive capacity of an individual the greater their decrease in repetitive behaviours with age. Fecteau et al. on the other hand, found an increase with age in the repetitive behaviour which requires greatest cognitive capacity - verbal rituals. However, they do not report whether the more able individuals, i.e. those engaging in verbal rituals, showed an increase or decrease in repetitive behaviours with age. If Piven et al.'s findings were correct it would be suggested that the more able children whilst showing an increase in one specific repetitive behaviour would show a greater decrease in repetitive behaviours overall. Such disparity in the methods of reporting findings inevitably causes difficulties in the review of research.

2.4.6 How do Different Types of Repetitive Behaviour Change with Developmental Age in ASD?

Szatmari, Bryson, Streiner, Wilson, Archer & Ryerse (2000) suggest repetitive behaviours may be common in young or severely developmentally delayed children as a result of the required cognitive sophistication, for example, to notice changes or to plan and anticipate the performance of a ritual. In support of this it has been found that insistence on sameness is more likely to be seen in individuals with autism with a low cognitive ability than in those of average intelligence. Furthermore, those of average intelligence are more likely to show ritualistic behaviours (Bartak & Rutter, 1976). Similarly, sensory and motor behaviours were found to be more likely to occur in individuals of low intelligence, whilst complex repetitive activities or speech were more common in individuals of high intelligence (Militerni, Bravaccio, Falco, Fico & Palermo, 2002). Support for these findings was proposed in a retrospective study of repetitive behaviours in PDD (Carcani-Rathwell, Rabe-Hasketh & Santosh, 2006). 319 individuals aged 1 to 18 years with an ICD-10 diagnosis of PDD (some with and some without mental retardation) and 119 individuals with only mental retardation were assessed with the Maudsley Item sheet. Two factors of repetitive behaviour were examined: high and low order. Both high and low order behaviours were found to be more frequent in those with a diagnosis of PDD (with and without mental retardation) in comparison to those with only mental retardation. More specifically, low order repetitive behaviours were more common in those with a lower developmental age and less autism specific, whilst high behaviours were significantly associated with autism features.

Using the Mullen Scales of Early Learning (Mullen 1995), Vineland Adaptive Behaviour Scales (Sparrow, Balla & Cicchetti, 1984) and ADI-R, poor language and adaptive behaviours in young children with ASD, autism and speech and language delays were found to be associated with higher levels of repetitive behaviour (Honey et al., 2006a). However, one group of relatively able children were found to have higher than expected levels of repetitive behaviours. Examination of the types of repetitive behaviours shown by these children revealed a greater volume of resistance to change behaviours than in other groups of children. This supports the suggestion of Berkson & Tupa (2000) and Szatmari et al. (2000) that certain types of repetitive behaviour may be mediated by mental functioning.

In a study of repetitive behaviours in autism (Gabriels et al., 2005) participants were split into high and low non-verbal intelligence groups according to their Leiter International Performance Scale – Revised (Roid & Miller, 1997) test scores. Results identified a significantly higher prevalence of 'sameness' in individuals of low ability in comparison to those of high ability. A negative correlation was found between adaptive behaviour as measured by the VABS and repetitive behaviour when controlling for non-verbal IQ. Such a finding suggests that repetitive behaviours may interfere with adaptive functioning regardless of cognitive ability. Alternatively, inverse relationships have been found between ability and some repetitive behaviours such as resistance to change and rituals (Piven et al., 1996; Starr, Szatmari, Bryson, Zwaigenbaum, 2003). As discussed it is possible in these cases that this may be because the child requires a certain level of developmental understanding in order to perform a particular behaviour (Szatmari, 2000).

A recent study examined the effects of non-verbal IQ and chronological age upon repetitive behaviours in ASD (Bishop et al., 2006). The repetitive behaviours of 830 children with ASD aged 15 months to 11 years and 11 months were examined using the ADI-R. The study examined the prevalence and severity of thirteen repetitive behaviours, that is whether behaviours were present or not and the level to which a behaviour interferes with daily life. Analysis of the data revealed significant improvements in the prevalence of some repetitive behaviours with age including sensitivity to noise, circumscribed interests, difficulties with changes in routine and resistance to trivial changes in the environment. On the other hand, the repetitive use of objects and unusual sensory interests were found to increase significantly in prevalence with age. Non-verbal IQ was examined and found to have a significant negative effect upon the prevalence of a larger number of behaviours including the repetitive use of objects and only had a significant positive effect upon the presence of circumscribed interests. The increase in circumscribed interests with age can be linked with proposals that certain repetitive behaviours require higher levels of cognitive maturity (Evans et al., 1997; Turner, 1999).

Bishop et al. (2006) also examined the effects of the interaction between the non-verbal IQ and age upon repetitive behaviours. The negative effect of non-verbal IQ upon the presence of the repetitive use of objects, resistance to changes, compulsions/rituals and unusual attachment to objects was found to increase with age. Furthermore, the interaction effects were significant for more behaviours as children got older. This is likely to be a reflection of the necessity to reach a required cognitive level for higher levels of behaviour particularly those requiring language for behaviours to emerge. By

3 to 6 years of age most repetitive behaviours were found to be more common in those with low non-verbal IQ, with only circumscribed interests and compulsions/rituals being more prevalent in those of higher non-verbal ability. Children aged 7 and above were found to have the strongest associations between the presence of repetitive behaviours and non-verbal IQ. The only exception to these findings was for compulsions/rituals which at 7 years of age were no longer associated with ability. This suggests that at this age these behaviours are equally as likely to be present in those of higher and lower ability. No significant interactions were found at any age between non-verbal IQ and sensitivity to noise, abnormal idiosyncratic responses, difficulty with changes in routine and resistance to change in the environment; however, these behaviours were all relatively low frequency in comparison to the other behaviours examined. In addition to the presence of repetitive behaviours Bishop et al., also examined the severity of repetitive behaviours. Unlike chronological age, there were no positive interactions between the severity of repetitive behaviours and non-verbal IQ.

The findings presented by Bishop et al. (2006) suggest that the relationship between ability and repetitive behaviours in ASD becomes more pronounced as children get older. Whilst those repetitive behaviours which are common within the ASD population may decrease with age, the ability level of an individual is also likely to impact upon the presence and severity of repetitive behaviours; that is, as children get older those of lowest ability are more likely to engage in repetitive behaviours than their more able peers. Furthermore, the ability levels of a child with autism appear to be more influential upon the presence of a behaviour than its severity.

It has been shown in the review of research examining repetitive behaviour, age and ability that repetitive behaviours are pervasive in those with ASD. However, the extent to which repetitive behaviour manifest themselves, is likely to vary with chronological age, developmental level and the normative presence of that behaviour. Evidence suggests that whilst overall repetitive behaviours may decrease in the ASD population with age they are likely to remain more prevalent in those of lower ability.

2.5 Conclusion

In this chapter I have reviewed the literature surrounding repetitive behaviours in typical development and ASD. The methodologies used in the studies are limited and primarily reliant upon parental report through the ADI-R. The reliance upon retrospective memories means that there is likely to be some variation in the reliability of accounts, in particular for those individuals where childhood data is being collected up to 18 years later. The ADI-R also codes behaviours not by frequency but by severity/impairment. This adds a second level of subjectivity to parental reports, as rather than asking how often a specific behaviour occurs, its disruption or intensity is rated. As individual circumstances and experiences vary, interpretations of severity will too. Furthermore, the changes which have been examined are across a range of time spans and with children and adults of varying ages and abilities. There is also a lack of consistency across studies with regards to the types of repetitive behaviours which are examined. It is therefore difficult to draw any firm conclusions so far as to the way which repetitive behaviours may change within children with ASD.

The findings of changes in repetitive behaviours with age in ASD suggest an increase in the cognitive abilities of an individual may be important in defining the pathway which repetitive behaviours take. That is, that whilst repetitive behaviours will by definition remain prevalent in autism throughout life, those children with greater cognitive capacity may show lower levels of repetitive behaviour than their less able peers.

Throughout this chapter there has been little consistency in the ages at which repetitive behaviours have been examined in individuals with ASD. It is known that within the typically developing population repetitive behaviours are present until around the age of 4 years (Berkson & Tupa, 2000), with changes occurring in type and frequency around the age of 2 years (Evans et al., 1997; Gessell et al., 1974). Whilst evidence of change from childhood to adolescence and adulthood are useful in our understanding of ASD, results from such studies do not allow for comparison with normative populations as repetitive behaviours in typically developing children are present at best for around 4 years. It is suggested then that examination of a small time frame of changes in young children with ASD should be conducted in order to allow comparison between typical and atypical populations.

The present chapter has reviewed the literature on repetitive behaviours. In the following chapter literature on symbolic play in typical development and ASD will be reviewed before we consider the relationship between the two.

Chapter 3

Symbolic play

in Typical Children & Children with ASD

Impairments in imagination associated with ASD are defined in both the triad of impairments (Wing & Gould, 1979) and international diagnostic criteria (DSM-IV and ICD-10) in terms of symbolic play. In line with the Wing & Gould description that symbolic play in autism is either absent or repetitive and stereotyped, a large amount of research examining imagination in autism has focused upon the repetitiveness or flexibility of play. To gain a clearer understanding of symbolic play in autism it is necessary to go beyond this analysis and to separate out the level of sophistication of symbolic play from its repetitive quality. The following chapter reviews the literature on symbolic play in typical children and children with ASD; first outlining the theories of play before focusing upon the development and presence of symbolic play in these populations.

3.1 *What is Play and Why do Children Do It?*

Play is a complex behaviour, which can appear deceptively simple (Stagnitti, 2004). The term 'play' is elusive (Boucher & Wolfberg, 2003; Fein, 1981) and definitions are neither agreed upon nor precise (McCune-Nicolich, 1981). There are a number of reasons why play is so difficult to define. First, it covers a wide variety of activities, including rough and tumble, construction, sand and water play, team games, sport and representational play (Boucher & Wolfberg, 2003). Second, it is difficult to distinguish

what is play from what is not play (Boucher & Wolfberg, 2003) and finally, play is researched by a number of disciplines (psychology, primatology, anthropology, sociology) (Boucher & Wolfberg, 2003; Smith, Takhvar, Gore & Vollsteadt, 1985) each of which define and describe play differently. Despite difficulties in agreeing a universal description, researchers have deemed play an important behaviour to examine and a number of theories have been proposed to describe the benefits and necessity of play.

It has been proposed that humans may be genetically primed to play (Boucher & Wolfberg, 2003). Not purely a source of pleasure, play has serious implications and developmental purposes. Moreover, it has been described as central and essential for typical development (Vygotsky, 1966) and a medium which allows advancement in a variety of areas including: cognitive, social and social-cognitive skills (Saltz & Brodie, 1980), creativity and divergent thinking (Pepler, 1982), aesthetic appreciation (Dansky, 1980; Lieberman, 1977 and Singer, 1973) and cathartic development (Hall, 1920 as cited in Stagnitti, 2004).

There are a number of interpretations as to the role of play and these are almost certainly important to all studies of play, in the development of research and in the interpretation of results. Modern and classical theories have identified a number of ways that play may advance developments in emotional, social and cognitive skills in children (Verenikina, Harris & Lysaght, 2003). The following sections will briefly outline some of these theories.

3.1.1 Classical Theories

Developed before the late 19th and early 20th century (Dockett & Fleer, 1999), classical theories of play focus upon the motivation behind play, its instinctive and physical properties; many of these theories form the basis of modern play theories. Table 3.1 summarises some classical theories of play which propose that play is a way of spending surplus energy, that it allows us to replay our evolutionary past, that it prepares our cognitive and intellectual functioning for adulthood or that it helps us to relax. Whilst these classical theories of play have been the basis for more recent theories, modern theories of play differ greatly in terms of the ways in which play benefits the psychological development of the individual. The following section will summarise these.

Table 3-1 *Classical theories of play*

Theory	Description
Surplus Energy (Schiller, 1875 as cited in Rubin, 1982)	Play is an "aimless expenditure of exuberant energy" (Schiller, 1878). Children are motivated to play to release surplus energy. As they grow older and become involved in work and survival activity play decreases. Expending energy provides balance in the body.
Recreation/Relaxation (Lazarus, 1883 as cited in Stagnitti, 2004)	Play occurs because children need to restore energy or relax from the stress of daily life.
Recapitulation (Hall, 1906 as cited in Stagnitti, 2004)	Play is a product of an evolutionary biological process. In play we relive our evolutionary development. Children enact 'animal', 'savage', 'nomad', 'agricultural' and 'tribal' stages of evolution. Through play children are able to express their primitive instincts which in turn are weakened.
Pre-exercise (Groos, 1898, 1901 as cited in Stagnitti, 2004)	Play is unique to children and prepares us for adulthood. Play is adaptive, in that it develops physical and mental capacities required in adulthood.

3.1.2 Modern Theories of Play

There are a number of modern theories of play; in the following section I will outline psychodynamic, optimal arousal, socio-cultural and cognitive theories. Psychodynamic theories put forward by Freud, S (1959), Erikson (1985) and Freud, A (1968) examine play as a mechanism for emotional development. In these models play is seen as cathartic; children are able to express negative emotions associated with situations over which they have no control. By incorporating stressful situations into their play, children can repetitively act out the situation and express emotions safely; in doing this a sense of control/mastery over stressful situations is nurtured. Optimal Arousal theories also view play as an aid in emotional development; these theories claim that play occurs to maintain a pleasurable emotional state (Berlyne, 1960; Ellis, 1973; Hutt, 1985). Play raises or lowers stimulation levels depending upon whether the child is under or over stimulated. Early versions of Optimal Arousal theories claimed exploration of objects increases arousal when the child is under aroused or reduces arousal in novel situations. Later models, however, identified exploration and play as separate entities with 'exploration' defined as occurring novel objects when a child asks "What can this object do?", and 'play' as occurring with familiar objects when a child asks "What can I do with this object?". Bruner (1983) identifies play as a mechanism for the promotion of creativity, flexibility and exploration. Rather than focusing upon the final product of play, Bruner examines play as an activity. Play is viewed as adaptively useful and linked to narrative thinking; more specifically the reconstruction of experiences and imagination.

Moving beyond emotion, Bateson (1976) proposes play as a skill necessary for functioning in daily life. During social play children share an understanding of the focus of a play scenario and are able to communicate this through their use of character and props. This development of a shared understanding and strategies to communicate is termed 'metacommunication'. It is this metacommunication which allows children to develop self-reflection in communication and an awareness of associated rules and strategies. Similarly, Mead (1934 as cited in Stagnitti, 2004) also proposes a socio-cultural theory of play viewing play as a form of socialisation. In this theory, role taking in social play is proposed as a mechanism which allows children to learn and practice social rules, norms and values. Furthermore, play allows children to develop a sense of self and learn to see themselves as an individual.

A third group of theories are the cognitive theories which propose that play is a voluntary activity contributing to cognitive development, problem solving, and creative thought. Piaget (1962), in his theory of play identifies symbolic play as important in the development of abstract thinking and mental representation (Verenikina et al., 2003). He claims that in order for a child to learn, 'adaptation' must occur through a balance of 'assimilation' and 'accommodation'. Symbolic play is described by Piaget as 'assimilation' (thought polarised by a preoccupation with individual's satisfaction), in which the child takes something and makes it fit their understanding. Once the child is able to 'accommodate' reality, symbolic play begins to decline. A second cognitive theory comes from Vygotsky (1978). For Vygotsky, play has a crucial role in social, emotional and cognitive development. Furthermore, he claims that the most significant cognitive achievements occur during play. Vygotsky identified the 'zone of proximal

development' (ZPD) which represents the difference between the child's potential and actual developmental level and claimed it as crucial for development. During play and particularly symbolic play, a broad ZPD is created in both cognitive and socio-emotional development; such that the child is performing above their own cognitive, self-regulatory and deliberate behavioural abilities. Vygotsky also identified symbolic play as the first step in the development of abstract and verbal thinking; by pretending children are able to separate meanings from objects. Furthermore, he proposed that the roles which children enact in symbolic play are seen to be culturally determined, allowing children to gain a mental representation of social norms and values and in turn acquiring the meaning of their culture. A third cognitive theory of play is that of Sutton-Smith (1967). This theory stipulates that children need to be flexible in their problem solving and that this is achieved by experiencing different play scenarios. Three concepts underpin Sutton-Smith's theory: symbolic transformation, adaptive potentiation and adaptive variability. These factors respectively mean that play enhances the child's mental flexibility for later adaptive purposes, allows the child to consider alternative ways to manage environmental challenges and finally places play as key to human development in the way in which behavioural and physiological variables are key to evolution.

It can be seen from the theories outlined that there are a range of beliefs surrounding the reasons for engaging in play and the benefits it brings. Furthermore, of the theories described only those of Piaget and Vygotsky were specifically related to symbolic play. The following sections of this chapter will focus specifically upon the emergence of symbolic play in typical development.

3.2 When does Symbolic Play Typically Emerge?

Symbolic play has been described as the earliest indicator of true imagination (Rusher, Cross & Ware, 1995; Wing, 1996). As with theories of play, the process by which symbolic play emerges has been subject to much research and a variety of preceding play types have been proposed by researchers.

Piaget (1962) identified three types of play, functional play, symbolic play and games with rules, whilst others identified exploratory, functional and symbolic play (Leslie, 1987; Libby, Powell, Messer & Jordan, 1998; Schuler, Prizant & Wetherby, 1997). Larger numbers of play categories have also been proposed; six types of play (active, exploratory, imitative, constructive, make-believe and games with rules) were identified by Schuler et al., (1997) and Belsky & Most (1981) identify twelve categories. Whilst descriptions of play's key developmental markers differ, research generally recognises three broad types of play: exploratory, functional and symbolic play.

3.2.1 Exploratory Play

Exploration, manipulation or sensorimotor play is often considered to be the earliest form of play (Leslie, 1987; Libby et al., 1998; Schuler et al., 1997). Emerging at approximately 3 months of age, this type of play is the integration of gross and fine motor skills and sensory functioning into meaningful experiences (Sheridan, 1977). An apparent motivation to control the physical environment has been attributed to this type of play (Schuler et al., 1997). Toys often used at this stage are household objects,

building blocks, toys to grasp and sound making instruments. Toys are not manipulated in an object-specific manner, rather the child will mouth, bang, shake, look at and line up toys (Belsky & Most, 1981; Schuler et al., 1997). Simple manipulation such as waving, banging, stacking, lining up objects and examining objects closely are reported to occur as early as 6 months (Sigman & Sena, n.d.). Despite clear recognition as a precursor to more complex forms of play, such as functional and symbolic, it has been claimed that exploratory play should not be mistaken for play (Smith & Cowie, 1994; Rusher et al., 1995) but viewed only as a predecessor to playful behaviour (Hutt, 1985; Nunally & Lemond, 1973).

3.2.2 Functional Play

Following exploration, children progress to more complex and meaningful interactions with toys in which behaviours are modified to fit with the specifics of the object (Belsky & Most, 1981), this is termed functional play. Children are reported to have developed functional play by approximately 18-20 months (Baron-Cohen, 1987; Lord & Paul, 1997; Lowe, 1975). A child at this stage of play will use objects appropriately or as intended by the manufacturer, for example, pushing a toy car along or using miniature utensils for their correct purpose. Some models of play development report a direct shift from exploratory to functional play while others identify intermediate categories. In a cross-sectional observational study of 40 typically developing infants aged between 7 ½ and 21 months (Belsky & Most, 1981) children were reported to 'functionally manipulate' objects (playing with them as the manufacturer intended) around 12 months, then move on to 'relational play' (bringing two or more objects together and integrated in a way not intended by the manufacturer) at approximately 13 ½ months

before engaging in 'functional relational' play (materials are brought together and integrated as intended by the manufacturer) at around 15 months.

3.2.3 Symbolic Play

As play develops further, children stop simply discovering the properties of an object and begin to use pre-existing knowledge when manipulating them. Meaningful play sequences begin to emerge and meanings become detached from particular and immediate situations, persons and objects (Fein, 1979). This type of play is termed symbolic or pretend play due to the requisite skill of using an object as a symbol of something else. It is widely accepted that developmentally, symbolic play follows functional play; however, the age when such play emerges is a debated issue. Some researchers identify symbolic play at 12-14 months (Belsky & Most, 1981; Bretherton, 1984), whilst others claim it is not present until around 18 months (Fenson & Ramsay, 1980; Fein, 1981). One explanation for the differences in these research findings is the definition of symbolic play the researchers have used (Baron-Cohen, 1987). It is therefore essential to clearly define symbolic play and how it differs from other types of play.

3.3 How does Symbolic Play Differ to Other Play Types?

Symbolic play is distinctively different from its predecessor functional play and it is important that this is reflected in research and theory (Baron-Cohen, 1987; Leslie, 1987; Rusher et al., 1995; Williams, Reddy & Costell, 2001). As the name suggests

functional play is the use of toys and objects in play for their conventional function, for instance pushing a toy car or putting a miniature cup to the mouth. Whilst functional play may show a quality of delayed imitation in which actions may include simple pretence (e.g. puts teacup to mouth, puts brush to hair, connects train section and pushes train, arranges pieces of furniture in doll house, constructs a building with blocks), true symbolic play is underpinned by more complex representational systems (Williams et al., 2001).

Symbolic play has widely been defined by the presence of object substitutions; that is when an object is used to stand for something which it is not, for instance using a shell as a telephone or attributing life like qualities to an inanimate object such as a doll or a teddy. In symbolic play the object is treated as though it has other properties or identities, for instance walking a doll or using a sweeping brush as a horse. When symbolic play first emerges it is relatively simple in form, and as the child matures it becomes more elaborate (Belsky & Most, 1981; Fenson & Ramsay 1980). Children learn to deliberately invent increasingly complex make-believe situations in which to practice and enjoy skills and insights which they have learned. As toddlers begin to conceptualise abstract relations between symbols and objects, symbolic play becomes clearer. By 3 years symbolic play is consolidated into play repertoires and is evident in sequences of events which are acted out. By 4 years pretence has evolved into the creation of elaborate fantasies involving imaginary characters and animals in which a child or doll takes on multiple roles (Lord & Paul, 1997; Nielsen & Dissanayake, 2000).

3.4 How does Symbolic Play Develop?

It is well documented that symbolic play typically becomes more elaborate as a child matures. There are a number of developmental models of play which discuss the progression towards and development of symbolic play. Much of this research follows Leslie's (1987) proposal that symbolic play can be distinguished from other play forms on the basis of the representational abilities which they require. Pretence occurs on two levels, first order representations, in which a child is able to substitute a toy for a real object, although symbolic representations are not made, and second order representations, in which the child is aware that pretend objects are different to that which they are used in reality. Symbolic play requires first and second order representations. Leslie goes on to define symbolic play as requiring the presence of one of either 1) object substitution, 2) attribution of false properties, or 3) use of imaginary objects. The description put forward by Leslie accounts for the use of objects in symbolic play; however, it fails to take into consideration other key characteristics of play. Play is not only made up of objects but also people and scripts, it is therefore important to recognise the development of skills in each of these dimensions of play.

Piaget produced one of the earliest discussions of symbolic play and his findings continue to influence today's research. Piaget (1962) describes symbolic play as developing hierarchically, becoming more complex over time. In its early stages, play consists of familiar acts being performed out of context towards the self (e.g. sleeping, eating, washing). As symbolic play develops the child begins to use either a doll in place of the self or to direct behaviours seen in others towards the self. This can be seen in play schemes where the child for example, washes up, cleans up or puts a doll (as

child) to bed. Further development of symbolic play skills sees the child incorporate object substitution into play either through pretending to be someone else or using an object to stand for something else. Finally, Piaget notes a development in the sequencing of acts and the child's increasing ability to combine single acts to create meaningful sequences. Piaget's description of symbolic play identifies three dimensions of play development which have remained at the centre of play research: the role of the child, the use of objects and the forming of sequences of action. Three models of play which reflect these dimensions of play are that of Bretherton (1984), McCune-Nicolich (1981) and Fenson (1984).

Bretherton (1984) describes symbolic play as having three strands; 'role', 'action' and 'object' representations (Bretherton, 1984). Whilst Leslie's definition of symbolic play is reflected in the strand 'object representations' additional elements of symbolic play are introduced. 'Role representations' refer to the developmental progression from the child representing themselves to the child representing the behaviour of others, to the child using others as passive recipients, using dolls or other replicas as active agents and finally through to using dolls as active partners in role play. Finally 'action representations' describe a process whereby children's play develops to become increasingly more elaborate in terms of the temporal and spatial relationship between play schemes. The first level is that of single schemes where one scheme (e.g. drinking) is applied to one individual (self or other). The second is the combination of single schemes (e.g. hugging then kissing a doll), the third is ordered multi-schemes in which schemes follow-an increasingly 'real-world' rather than random order and the final level involves 'episode combinations' (e.g. feeding a doll then bathing the doll).

A hierarchical model of play development proposed by McCune-Nicolich (1981) shares a number of features with Bretherton's (1984) three strand description of play. This model also ties in closely with Piagetian ideas of play, describing play which becomes increasingly decentred from the child's sensorimotor experiences until play behaviours are sufficiently abstract from reality to be referred to as symbolic. McCune-Nicolich goes on to describe the development of play schemes. Initial play acts are single unconnected schemes, the child then begins to combine these single schemes by performing the same scheme to different participants, finally different schemes are combined to form a sequence; for example, a child may wash the doll and then put it to bed). Finally, McCune-Nicolich describes play as becoming 'internally directed'. One example of internally directed play is object substitution, her description of the development of such play mirrors the meta-representational requirements for symbolic play described by Leslie (1987).

Despite similarities with the Bretherton (1984) model of play, differences remain in the developmental timescale proposed in the models. In the McCune-Nicolich (1981) model of play it is implied that the process of decentration (similar to Bretherton's 'role representation') emerges prior to multi-scheme play (similar to Bretherton's 'Action'). However, Bretherton argues that a trade-off may occur by which a child at an early developmental level may be able to perform combinations of simple, non-abstract schemes or a single more abstract scheme, but not a combined sequence of a number of abstract schemes. Similarly, Fenson (1984) describes decentration, decontextualisation and integration as three parallel trends in the development of play. Decentration is defined as an increasing tendency to include players other than the self into his or her

play and can be compared to McCune-Nicolich's description of decentration and Bretherton's 'role representation' strand. Decontextualisation is defined as the "the child's decreasing reliance on prop typicality for the identification and use of objects in play activities" (Fenson, 1984, p.250). This process involves the progression from functional play to McCune-Nicolich's highest level of play (internally directed play such as object substitution) and Leslie's (1987) definition of pretend play involving object substitution, attribution of false properties and use of invisible objects. Decontextualisation also mirrors Bretherton's description of 'object representation'. Finally, integration refers to an increasing ability to combine play actions into coordinated sequences. This process has obvious parallels with McCune-Nicolich's description of combinational play and Bretherton's 'action representation'.

3.5 How do the Dimensions of Symbolic Play Develop?

The three dimensions of symbolic play, decentration, decontextualisation and integration have been the subject of much research into developmental changes in symbolic play. Few researchers, however, have examined all three dimensions in their work. For example, whilst Leslie (1987) acknowledges that there are three developmental dimensions of symbolic play he defines pretence by decontextualisation only. The following sections will discuss the developmental process of each of the dimensions of symbolic play in turn.

3.5.1 Decontextualisation – The Use of Objects.

The use of objects in play and more specifically the use of object substitution has been subject to a large amount of research into symbolic play (Belsky & Most, 1981; Fenson, Kagan, Kearsley & Zelazo, 1976; Nielsen & Dissanayake, 2000). In a cross-sectional study the free play of 22 children aged 7 to 20 months was examined (Fenson et al.; 1976). A set of standardised toys was used and the use of objects during play was examined. The use of objects to represent eating, drinking, pouring, spooning or stirring was deemed to represent symbolic play. Findings revealed that at 8 months only 8% of children demonstrated symbolic play, compared to 77% of children at 13 months and 100% of children at 20 months. These results suggest that the decontextualisation dimension of symbolic play begins to emerge soon after the child's first birthday. The findings may, however, be exaggerated due to the failure to distinguish between functional play and symbolic play, highlighting Baron-Cohen's (1987) call for clear differentiations between these play types. In this study for example, a child using a cup 'functionally' by putting it to their mouth was interpreted as playing symbolically; clear evidence of the symbolic act such as the child making drinking noises or reference to a drink was not required, thus potentially coding a functional behaviour as symbolic.

A number of studies have been conducted in which the developmental process of decontextualisation has been examined. An observational study of play in children aged 7 ½ to 21 months (Belsky & Most, 1981) identified two categories of decontextualisation: 'object substitution' and 'double substitution'. In keeping with the findings of Fenson et al. (1976) the ability to use objects as something else (object

substitution) was reported to emerge around the age of 13 ½ months, after which this behaviour increased in frequency with age. 'Double substitutions' refers to the use of two object substitutions during a single play act, for example, using a block as a car and a box as a garage and driving the car into the garage. This type of play was rarely seen in children at any age in this sample, suggesting this behaviour would emerge after 22 months of age. Two alternative levels of decontextualisation - object substitution and invention – were assessed in an examination of symbolic play in children aged 2 to 6 years (Lyytinen, 1991). These types of decontextualisation were shown to increase linearly in frequency with age in children aged 2 to 6 years. At 2 years of age, children were reported to show significantly less decontextualised actions than children aged 3, 4, 5 and 6 years. It should be noted, however, that in this study a possible third category of decontextualisation, 'object directed play', was examined, although it was categorised as an element of decentration (role of the child). This type of play was found to increase in frequency with age between 2 and 5 years before decreasing at 6 years.

It has been shown that decontextualisation begins to emerge in the child's second year, becoming more frequent and more elaborate with age. However, it should be noted that decontextualisation continues to develop in complexity and can be infrequent and fragile until later in the second year (Fein, 1981).

3.5.2 Decentration – The Role of the Child

The role that a child takes in play has also been examined in a number of studies. It is generally agreed that as decentration skills develop the child becomes able to direct play away from themselves and towards other participants (Belsky & Most, 1981; Fenson & Ramsay, 1980; Lowe, 1975; Watson & Fisher, 1977).

In a cross-sectional observation of 244 typically developing children aged 12 to 36 months, four sets of standardised toys were used to assess play abilities (Lowe, 1975). Initially play was found to be directed towards the self, however, as children developed play became directed toward dolls, first as passive then as active participants. Similar findings were reported in a study of 36 children aged between 14 and 24 months (Watson & Fischer, 1977). This study resulted in the development of a four step model of decentration; initially play acts are directed towards the self, then towards a passive doll, an object and finally an active doll. A study of children aged 13, 19 and 24 months (Fenson & Ramsay, 1980) reported similar findings of decentration becoming more complex with age and proposed an alternative four step model of decentration to that of Watson & Fischer. The model proposed by Fenson & Ramsay differs only in the placement of object directed play with this type of play now categorised as the highest level of decentration as opposed to play directed to active dolls. At 19 months of age the majority of children directed play towards themselves, a passive doll and an object. By 24 months 70% of children directed play towards an active participant. The Fenson & Ramsay model of decentration was examined in a study of 90 typically developing children aged between 2 and 6 years. A linear increase was reported in the frequency of play directed towards a passive other and an active other. However, self directed play

was found to decrease in frequency with age and by 6 years of age was absent in all children. As discussed in the previous section (section 3.6.1), 'object directed play' may not necessarily be a reflection of decentration abilities and may be better categorised as a type of decontextualisation, which is specifically related to the use of objects in play.

Unlike the studies described above, Belsky & Most (1981) in their study of play development identify only two categories of decentration; 'pretend self' and 'pretend other'. 'Pretend self' is when a child directs symbolic play acts to themselves, for example, raising the telephone to their ear and vocalising. This type of play was reported to be present from 12 months, becoming more frequent with age. By the age of 18 months the majority of children were demonstrating this behaviour. 'Pretend Other' refers to play which is directed towards other participants, this type of decentration was reported to be evident from 13 ½ months and was seen to be reliant upon the successful attainment of 'pretend self' play behaviours. Supporting these findings McCune (1993) identifies self-pretend play acts to be evident from 12 months whilst decentred play acts only begin to emerge around 15-20 months of age.

It can be seen that the role which a child takes in play changes with age, and that as a child matures play begins to move away from the child and is directed to other animate and inanimate participants. The changes in decentration like decontextualisation occur in typical development around the child's first birthday. On the assumption that object directed play should be categorised as an element of decontextualisation and not

decentration, it is suggested that as children's decentration skills develop, their play becomes less egocentric and more sociable. It can be inferred from this that decentration skills have close links with the development of social skills.

3.5.3 Integration – Creating Stories.

To create stories or scripts children must combine single play schemes in a meaningful and ordered way. Researchers have examined the developmental trajectory of this process (integration) and like other dimensions of symbolic play have revealed a hierarchical pattern of complexity.

Analysing the play of five typically developing girls, Nicolich (1977) reports that a child first combines single schemes of play before combining schemes which are variations of one another (e.g. comb own hair then dolls hair, or comb doll's hair with two different combs) and then combining different schemes (e.g. combing the dolls hair and then putting them to bed). These changes are proposed to occur between 15 and 24 months of age (McCune, 1993). Fenson & Ramsay (1980) support these findings in their study of play in typically developing 13, 19 and 24 month olds. Three levels of integration, single scheme combinations, multi scheme combinations and ordered multi scheme combinations, were identified. Single scheme combinations were when the same action was directed to two or more recipients consecutively, for example, giving a cup to a doll and a cup to mum. Multi-scheme combinations were defined as the combination of two different types of actions performed to the same recipient with no logical order to events, for example, putting the doll to bed and then combing the dolls

hair. Finally, ordered multi-scheme combinations were when two or more play actions were combined in a logical order, for example, combing the dolls hair and then putting the doll in front of a mirror. Results revealed an increase in the presence of single and ordered schemes with age in young children. Furthermore, single scheme combinations were found to emerge earlier than ordered multi-scheme combinations, being seen at 13 and 19 months respectively. The hierarchical nature of this progression is evident in the finding that 90% of single scheme combinations and 85% of ordered multi-scheme combinations seen at 24 months were seen as single schemes at 19 months of age. This research also found that unordered multi-schemes were uncommon and were in fact seen only in 16% of 24 month olds and less than 1% of 13 and 19 months olds. It is suggested therefore that unordered sequences may not be a key feature in the development of integration within symbolic play. In a study of play in typical development only two categories of integration were identified (Belsky & Most, 1981), 'sequence pretend' and 'sequence pretend substitution'. 'Sequence pretend' (similar to single scheme combinations identified by Fenson & Ramsay, 1980) represents the child's repetition of a single pretend act with minor variation whilst 'sequence pretend substitution' refers to the additional inclusion of object substitution. 'Sequence pretend' was the only type of integration seen in children under the age of 21 months; however, this was not consistent across the sample as it was found in only 3 out of 20 children between 15 and 21 months of age. These findings suggest that before they are able to create meaningful sequences of play, a child must first be able to perform each component of the sequence as a single scheme. Such developments occur between the child's first and second birthdays.

An alternative developmental model of integration was proposed in a study of the development of pretend play in ninety typically developing children aged 2 to 6 years (Lyytinen, 1991). Four increasingly complex levels of integration were defined: single schemes, short sequences, events and episodes. Age related changes in integration were examined and 4 to 6 year olds were found to show significantly more events and episodes than 2 and 3 year olds. There were no age related changes reported for short sequences and single schemes, suggesting that once developed a child will continue to demonstrate these types of play schemes.

It is evident that integration develops at a later age than decentration and decontextualisation in typical development. Single schemes will by definition be evident at the initial stages of symbolic play development to allow children to practice and develop decentration and decontextualisation skills. However, unlike decentration and decontextualisation, which are relatively complex around 12 to 13 months of age, integration does not begin to increase in sophistication until mid way through the child's second year. It is proposed therefore that only once decentration and decontextualisation skills have developed will the child begin to combine schemes. Furthermore, single schemes will remain part of a child's play repertoire as a mechanism by which play techniques from other symbolic dimensions can be mastered.

3.6 Play and Language

The symbolic abilities required to develop and engage in symbolic play are also considered to be those required for the development of language (Piaget, 1967). In

play, symbolic skills are required to make one object stand for something else, such as a brick as a car. In language symbolic skills are required to make a word stand for an object, situation or person. On the basis of these similarities it has been proposed that play and language develop in parallel (Bates, 1976; Fischer, 1980) and that the simultaneous emergence of language and symbolic play are a reflection of a child's increasing ability to recognise semantic differences between the self and others in play and objects and action in language.

Before associations between symbolic play and language are discussed further it should be recognised that the methodologies and measures used to study these abilities differ greatly between studies. For example, studies of play have focused upon the development of play overall (Belsky & Most, 1981; Ungerer and Sigman, 1984), the development of symbolic play (McCune, 1995), the examination of solitary play (Ungerer & Sigman, 1984), structured and unstructured play (Carter, 1990). Similarly in language studies the focus of interest has ranged from language age equivalents (Lewis et al., 2000; Ungerer & Sigman, 1984), vocabulary size (Tamis Le Monda & Bornstein, 1994), examination of single words and word combinations (McCune, 1995), the examination of parent reports of language (Bornstein, Vibbert, Tal & O'Donnell, 1992, Tamis Le Monda & Bornstein, 1994) and standardised tests of language (Charman et al., 2000; Lewis et al., 2000; Ungerer and Sigman, 1984). Furthermore, language consists of two components: expressive and receptive. Expressive language is a person's ability to use language to convey messages (thoughts, wants, and needs) and receptive language their ability to understand language from others. Each of these components has been examined in different studies and findings for associations

between expressive and receptive language and symbolic play have differed. The following sections will review studies of symbolic play and associations with language in children of typical development.

3.7.1 Are Symbolic Play and Language Associated in Typical Development?

As discussed previously (see Section 3.3), play typically becomes more complex with age, moving from the manipulation of single objects to play with a number of different objects and finally complex play scenarios. Similarly, language becomes more complex with age, beginning with the emergence of single words, then longer utterances and eventually meaningful sentences. The developmental timings of play and language and associations between these skills have been examined in a number of studies. For example, Lowe (1975) identified that the emergence of decontextualisation in the second year occurs in parallel to that of language. Furthermore, in an examination of symbolic play and language, Bates et al. (1979) identified that symbolic play was the best predictor of language at 9 and 13 months.

Associations between symbolic play and language in typically developing children aged 3 to 6 years were examined using the Warwick Symbolic Play Test (an early version of the Test of Pretend Play) (Doswell et al., 1994). Significant associations were found between play and both expressive and receptive vocabulary in children up to the age of 5 years. In keeping with these findings are those of Lewis et al. (2000) who examined the play and language skills of 40 typically developing children aged between 1 and 6 years. Results revealed significant correlations between play and language. Functional

and symbolic play were measured using the Lowe and Costello Symbolic Play Test (Lowe & Costello, 1988) and the Test of Pretend Play (ToPP) (Lewis & Boucher, 1997) respectively and language was measured using the Preschool Language Scales - 3 (Zimmerman, Steiner, Pond, Boucher & Lewis, 1997). When chronological age was partialled out, functional play was found to be correlated only with expressive language. Symbolic play was found to be correlated with both expressive and receptive language. The weakest correlation between symbolic play and language was with receptive language. Such findings may suggest that a child's understanding of language becomes more closely associated with play with age. It may also be interpreted that it is the ability to use language (expressive) which is most closely linked to play overall and more specifically symbolic play; that is that the child's ability to use symbols in play and language are associated. However, it is not possible from the information provided in the paper to determine if either of these proposals is correct. To do so would require the partialling out of chronological age and expressive language and chronological age and receptive language to determine whether the effects of either component of language held. It may be the case that expressive and receptive language are too closely correlated to establish this. Furthermore, whilst both the Doswell et al. and Lewis et al. studies examined symbolic play using the ToPP it must be noted that this test examines only the decontextualisation dimension of symbolic play (object substitution) (See Section 4.6.2 for more details) and therefore does not provide a complete insight into associations between each of the three dimensions of symbolic play and expressive and receptive language.

Ungerer and Sigman (1984) assessed children at 13 ½ and 22 months and found symbolic play and language to be associated. In addition to other behaviours, integration and three types of symbolic play were assessed during a free play session: object substitution, the use of a doll as an independent agent and the use of invisible object. Symbolic play was scored according to the total number of different symbolic play acts recorded and integration according to the number of related play acts performed in a meaningful sequence. Language abilities were assessed using the Gesell scales (Knobloch & Pasamanick, 1974), the Receptive and Expressive Emergent Language Scale (REEL) (Bzoch & League, 1971) and the Beckwith & Thompson (1976) receptive language measure. At 13 ½ months there were no significant associations between symbolic play and language. Integration abilities were found to be associated with the Gesell language development quotient at this age. At 13 ½ months we know that symbolic play is unlikely to be fully developed in the typical population and this may therefore explain the lack of association between symbolic play and language at this age. However, it was found that functional play was associated with language at this age; suggesting that play and language are associated. At 22 months symbolic play was found to be positively correlated with receptive, expressive and overall language abilities as measured by the REEL and the Gesell language development quotient. This finding suggests that only once symbolic play has developed is it possible to examine associations between this play type and language. Examination of the predictive relationship of symbolic play and language considered associations between these behaviours further. It was found that symbolic play abilities and integration abilities at 13 ½ months were predictors of language at 22 months as measured by the Gesell scales. This may suggest that play facilitates language in the normative population. Alternatively it may be that there is a strong relationship

between the early stage of language (before play can be measured) and later language and together these behaviours predict symbolic play abilities. It should be noted that the significant associations reported in this study are between symbolic play and language overall, no significant associations were found for expressive and receptive language independently. In addition, this study does not focus upon the sophistication of symbolic play per se; that is, that symbolic play was measured according to the variety of symbolic acts a child showed as opposed to the relative developmental level of the act. Furthermore, as decentration (independent agent), decontextualisation (object substitution and invisible objects) and integration were all included in this study it would be beneficial for these dimensions to be examined separately to examine the relationship between symbolic play and language further.

The relationship between the expressive language and symbolic play abilities of typically developing children has been examined in a number of studies. In a cross-sectional study of 102 typically developing children aged between 8 and 24 months the developmental pathways of language and spontaneous symbolic play were examined (McCune, 1995). A relationship between vocabulary size and single pretend acts to the self was identified. At around 12 to 15 months of age both single words and self-related pretend play acts such as eating or drinking were found to emerge. Furthermore, no child who showed decentred play acts such as cleaning or feeding a doll had not yet produced their first words. By 24 months children were reportedly becoming more able to combine acts of symbolic play and make word combinations, these skills were found to be significantly associated. Furthermore, the point where a child began to use more word combinations than single words coincided with the development of planned

pretend play. On the basis of these findings it was suggested that the transition between levels of symbolic play precedes the occurrence of the related language ability, although no causal relationship was implied in this study. In keeping with the associations found between symbolic play and language (McCune, 1995), Bates, Bretherton & Snyder, (1988) identified that around 13 to 20 months of age, first words, enactive naming during play and single symbolic play schemes are significantly correlated.

A longitudinal study of typically developing children (Charman et al., 2000) examined possible associations between play and language in the child's second year. The play, imitation and joint attention abilities of 13 typically developing children was assessed at 20 and 44 months. At both ages play was coded as functional or pretend and a composite play score created (functional plus pretend) and language measured using the Reynell Developmental Language Scales (2nd Edition.) (Reynell, 1985). At 20 months the composite play score was found to be significantly correlated with expressive language. This was true when IQ was accounted for as well. There was no significant correlation between these variables at 44 months. It should be noted, however, that like Lewis et al. (2000) this study used the Baron-Cohen (1987) definition of symbolic play and therefore examined only decontextualisation, the use of objects. It should also be noted that these findings are for composite play and not for symbolic play alone.

As with expressive language, research has been conducted to examine associations between receptive language and symbolic play. In a review of their research into play and language, Bates & Thal (1991) report significant correlations between language

comprehension and single and multiple symbolic gestures in children aged 13 months. This correlation may represent a general ability to mentally represent objects (Bates & Thal). In interpreting the findings from this study it should be considered that a familiar play script was used and therefore children will have had the opportunity to practice play and possibly model play schemes. As such there may be an exaggeration in the play abilities of the sample. Support for the findings of Bates & Thal is proposed by Tamis Le Monda & Bornstein (1990) who found that at 13 months play and receptive language were significantly correlated. Examination of play and expressive language revealed no significant correlations. However, in this study, by 20 months of age there were significant correlations between play abilities and expressive language. In later studies Tamis Le Monda & Bornstein (1993; 1994) reported further findings of a relationship between language comprehension and play in young children. Forty one typically developing children were assessed at 13 and 20 months of age (Tamis-LeMonda & Bornstein, 1994) in an examination of different aspects of language and how they relate to symbolic play. The child's play with their mother was videoed for 15 minutes and then coded for each of sixty 15 second intervals according to the type of play shown. Play was measured on an 8 level scale, of which four levels reflected symbolic play abilities, which in ascending order of maturity were self-directed play, other directed play, sequential pretence and substitution pretence. For each interval the total number of different play levels was calculated, this was also done for symbolic play only. The totals for each interval were then summed to create a cumulative total play and cumulative symbolic play score. The comprehensive symbolic play measure used in the statistical analysis was the result of the comprehensive symbolic play being divided by the comprehensive total play score. With regards to language, the child's production and comprehension of words was measured at 13 months and at 20 months

productive vocabulary size, utterance length and semantic diversity were measured. Tamis-LeMonda & Bornstein found the overall language and play abilities of toddlers are not associated but that certain aspects of language are related to play. At 13 months only receptive language was found to have a concurrent relation with symbolic play, however, at 20 months only semantic diversity was associated with symbolic play. Examination of the predictive abilities of symbolic play and language revealed that expressive language at 13 months was a significant predictor of symbolic play abilities at 20 months, whilst symbolic play at 13 months is a significant predictor of semantic diversity at 20 months of age. The findings from this study are interpreted as a reflection of the importance of the use of meaningful language upon play abilities and not upon the quantity of words or length of utterances.

3.7 Summary

The preceding sections have discussed the development of symbolic play in typical development in three dimensions: decentration, decontextualisation and integration. By examining play across these dimensions it is possible to gain a detailed picture of the way which symbolic play emerges. It will allow the strengths and weaknesses of an individual's symbolic play to be evaluated and in the ASD population will focus assessments upon the symbolic nature of play and not the quality of its sociability and flexibility. The review of literature on play and language has indicated that whilst these abilities develop in parallel in the typical population, the direction of this relation has not been established. Furthermore, the role which language plays in each of the dimensions of symbolic play is not clear.

3.8 Symbolic Play in ASD

In their 1979 epidemiological study of autism, Wing & Gould found that all of the children with autism in their study had either an absence of or abnormalities in their symbolic play. They also proposed that in the autistic population there was an inverse relationship between symbolic play and repetitive behaviours. The proposed association between repetitive behaviours and imagination in autism is reflected in the two types of imaginative impairments which they examined; that is the absence of symbolic and imaginative acts including symbolic play and the presence of repetitive and stereotyped symbolic acts. Reflecting the findings and proposals of Wing & Gould (1979), symbolic play in the ASD population has traditionally been examined according to its 'autistic' qualities, i.e. its sociability and flexibility rather than by its level of sophistication as in the typical population.

To understand how symbolic play may be associated with repetitive behaviours it is important to examine these behaviours independently. Research must go beyond the assessment of symbolic play in terms of other triad features, i.e. it's repetitiveness or sociability, and focus upon the sophistication and nature of the symbolic abilities which a child has developed. By examining the sophistication of symbolic play abilities (which I will refer to as the developmental level of play) and not the extent to which other triad features may manifest themselves through play, it will be possible to determine the extent to which symbolic play itself is impaired and how these impairments may associate with the presence of other triad features.

Literature examining the symbolic play abilities of children with ASD has not traditionally taken this approach. The following sections will therefore examine the existing evidence for impairments in symbolic play in those with ASD, extracting the information provided about the developmental level of symbolic play which a child is capable and not the 'autistic' qualities of the play which they may engage in.

3.9 Do Children with ASD show Symbolic Play?

Evidence has been presented which suggests that an absence of symbolic play may be an early indicator of autism (Baron-Cohen, Allen & Gillberg, 1992; Baron-Cohen, Cox, Baird, Swettenham, Nightingale, Morgan et al., 1996; Scambler, Rogers, Wehner, 2001). Research exists to suggest that some children with autism are capable of symbolic play. Wing et al. (1977) describe the impairments of imagination associated with autism as either an absence of symbolic play or the presence of stereotyped symbolic play. In their study of 108 children with autism or mental retardation aged 5 to 14 years, 67% of those with autism showed no symbolic play in comparison to only 2% of the mental retardation group. In this study there were some children with autism who were able to engage in symbolic play (stereotyped or not). However, there were significantly fewer children with autism who were able to do so in comparison to children with only mental retardation. Evidence for symbolic play in autism was also found in the 1979 epidemiological study of autism conducted by Wing & Gould. In their assessments of 132 children, 76% of those with a history of autism showed no symbolic play, whilst 24% of these children showed repetitive symbolic activities. In comparison 49% of socially impaired children without a history of autism showed no symbolic play and 47% repetitive symbolic play. Of the sociable yet severely mentally

retarded children included in the study only 10% showed no symbolic play and 14% repetitive symbolic play; it can be inferred that 76% of these children showed no symbolic play impairments. The findings of Wing and colleagues suggest that whilst there may be a subgroup of children with autism who show no symbolic play, there also exists a group of children who show some, albeit impaired forms of symbolic play. This is reflected in the ICD-10 criteria for autism which does not seek a complete absence of symbolic play in those with autism but rather impairments in its presentation.

Despite finding evidence for symbolic play in autism, the early studies of Wing & Gould have limitations in light of how symbolic play has subsequently come to be conceptualised. First, there was no specific definition of symbolic play described at that time, for example, the use of object substitution or the use of a doll as an active agent, which are now currently accepted in the literature. In the 1977 study, a wide range of disparate activities were specified as evidence of symbolic play, for example, appropriate car noises, brushing a doll's hair (which under many definitions would be functional play) and inventing stories. In the 1979 study no description of what symbolic play entailed was provided. Second, groups were not formally matched for chronological or mental age as has currently become the methodological convention for group-based studies. In both studies there were fewer children in the mental retardation group who had a non-verbal mental age of less than 20 months than in the autism group. As children are still typically in the early stages of symbolic play development at this age (Fenson & Ramsay 1980; Fein, 1981) such findings suggest there would have been fewer children in the autism group who had reached a developmental age at which

symbolic play would be possible, which in turn would impact upon results and interpretations. Finally, play was examined in terms of its repetitiveness and not in terms of developmental levels identified in the typical population. For the 1977 study there is therefore only one clear finding in addition to the report of repetitiveness, that no child with a language comprehension age of less than 20 months showed symbolic play. For the epidemiological study, the two socially impaired groups (those with and those without a history of autism) were each reported to have a similar percentage of children with and without a language age greater than 20 months. It is therefore possible to conclude from this study that children with autism are more likely to have no symbolic play than children with social impairments and no history of autism.

Later studies of symbolic play have considered the effects of developmental abilities typically required to engage in symbolic play. The play of 10 children with autism, 10 children with Down syndrome and 10 children of normative development was examined; all children had a verbal mental age of approximately 29 months (Baron-Cohen, 1987). Play was assessed using three different groups of toys, stuffed animals and wooden blocks, a toy kitchen and a toy telephone and finally play people. Results revealed that children with autism showed near ceiling levels of functional play but were significantly impaired in their production of symbolic play in comparison to typical and mentally handicapped controls. It is worthy of note that in this study no child in any of the groups played with the "play people" included amongst the toy objects, as such the information attained from this study reports only upon decontextualisation abilities (the use of objects). It is possible that the play people were not played with as children in all groups had yet to develop sufficient decentration skills

to engage with such toys; however, this would need further investigation before it was substantiated.

As noted, Baron-Cohen (1987) found no differences in the functional play of typical, mentally retarded and autistic children; however, spontaneous symbolic play was found to be significantly less frequent in children with autism than in the other groups. Supporting these findings is Gould (1986). The free play and structured play scores were compared for 19 children who demonstrated impairments in triad features and 10 children with a language delay matched for language comprehension (Gould, 1986). Structured play was measured using the Symbolic Play Test (Lowe and Costello, 1976). Free play was scored using the spontaneous imaginative play and quality of play sections of the MRC Handicaps, Behaviours and Skills Schedule (Wing & Gould, 1978) and following extensive observations by the author. Results indicated that the symbolic play abilities of children with the triad of impairments were significantly poorer during free play than during structured play. This was not the case for the language delayed group. It should be noted that the Symbolic Play Test (Lowe and Costello, 1976) is not a true measure of symbolic play but one of functional play, and as such these results do not give a true indication of symbolic play abilities. Furthermore, different measures were used to assess spontaneous and prompted abilities and as such these assessments may not be comparable.

Rutherford & Rogers (2003) also report deficits in the spontaneous symbolic play of children with autism. Children with ASD, developmental delay and typical

development were matched for mental age and assessed using the Fewell Play Scale, a semi-structured interview assessing the prompted and spontaneous play abilities of children aged 5-30 months. The play scale was used to look at sensory motor and symbolic play, where symbolic play was defined as the use of a doll as an agent (decentration) and/or object substitution (decontextualisation). Results showed that overall the ASD group showed significantly less symbolic play (prompted and spontaneous) and spontaneous symbolic play than the other groups which did not differ from one another. Results were not reported for prompted symbolic play. As it has been highlighted previously and will continue to be, studies are not consistent in their definitions of symbolic play, this study is no exception. Rutherford & Rogers did not recognise functional play in this research and adopted a broad definition of symbolic play. It is stated in the paper that if an act may have been symbolic or is likely to have included symbolic play it would have been coded so. Furthermore, the authors recognise that some of the items "might be called only functional play in a more conservative tradition" (p294). Whilst the definition of symbolic play may not be particularly refined, the findings support previous postulations that of a possible deficit in the spontaneous play abilities of children with autism.

It is evident that symbolic play may be present in some children with ASD, provided they have reached the developmental level at which such behaviours would typically be seen. However, when present, symbolic play has been identified as less frequent in individuals with ASD than in their peers. Furthermore, symbolic play in autism has been reported to be significantly less spontaneous than in typical children and children with mental retardation of matched mental age (Baron-Cohen, 1987; Harris, 1993;

Jarrold, Boucher & Smith, 1993; Rutherford & Rogers, 2003, Sigman & Ungerer, 1984; Wing et al., 1977).

As with stereotyped or repetitive play, deficits in the spontaneous production of symbolic play can be inferred as a reflection of the excessive repetitive behaviours which characterise autism. As such, the spontaneity of symbolic play, whilst an important factor in the understanding of symbolic play impairments in the autism population, must not overshadow the importance of examining the developmental level of symbolic play, as would occur in studies of typical development. The following section will examine studies of symbolic play in ASD which have examined spontaneous and prompted play with regards to the information they provide about the developmental level of play.

3.10 How do Spontaneous and Prompted Symbolic Play Abilities Compare in ASD?

It has been proposed that children with ASD are impaired in their production of spontaneous symbolic play but not necessarily prompted symbolic play (Charman, 1997; Jarrold et al., 1993; Jarrold, 2003; Wolff, S., 1985). Specific difficulties with spontaneous symbolic play may be a reflection of difficulties in generativity associated with ASD (Jarrold et al., 1993) and more specifically with excessive repetitive behaviours; that is that repetitive behaviour may prevent a child being flexible and thus engaging in play spontaneously. The use of prompts in autism may to some extent reduce the impact of repetitive behaviours upon play.

The symbolic play abilities of sixteen children with autism (mean mental age = 24.8 months) were examined under free and structured play conditions (Ungerer and Sigman, 1981). The play which children showed was coded at each 10 second interval of a 16 minute unstructured play session and 30 minute structured play session. Play was coded as either manipulation, relational, functional or symbolic. From these codings the frequency of each play type was calculated for the group in both play sessions. The diversity of play was also examined by calculating the mean number of different play acts seen. Finally, for the unstructured setting only the child's integration or ability to create single or multi-schemes (3 or more acts) of play was assessed. Results revealed that children with autism showed fewer and less diverse symbolic play acts than would be expected of their typically developing peers' under both conditions. There were only four examples of symbolic play in the autism group during the unstructured setting and whilst it was found that symbolic play was more successfully elicited following prompts, the increase was not significant. Examination of integration revealed that multi-scheme combinations were more common in the unstructured play setting than single schemes; however, the number of symbolic play acts in these schemes is not reported. Furthermore, as a result of integration going unmeasured in the structured setting there is no way of comparing the effect of prompting upon this dimension of symbolic play. This study has not examined the developmental level of symbolic play but has focused on the frequency of play acts. As a result it is unclear what the most advanced level of symbolic play a child was showing. As mentioned previously examination of frequency of play acts in the ASD population may reflect the severity of repetitive behaviours rather than the sophistication of play. In addition, whilst comparisons were drawn with typical children in this study there was no control group

and therefore full conclusions of the symbolic play abilities of children with autism cannot be drawn.

Support for the findings of Ungerer & Sigman (1981), this time with the inclusion of control groups, were presented by Sigman & Ungerer (1984). A comparison of the play abilities of typically developing children, children with autism and children with mental retardation matched for a mental age of approximately 25 months was conducted under free and structured settings. Results revealed that children with autism engage in significantly fewer different symbolic play acts and sequences than mentally retarded children and typically developing children in both structured and unstructured settings. Following modelling, children with autism were able to imitate symbolic play including doll as an active agent (decentration) and object substitution (decontextualisation). However, such play continued to lack the complexity, generativity and creativity of play seen in non-autistic children of an equivalent mental age. This study focuses upon the number of different acts and the frequency of play and although it does identify three types of symbolic play (object substitution, agent play and imaginative play) these are not discussed in detail. However, information is provided on four types of functional play (object, self, doll and other directed play), revealing that functional play acts which required some level of decentration (all but object directed play) were the most problematic for all groups, suggesting that decentration may still be developing in this group of children. Therefore, the agent directed functional play (decentration) and symbolic play (advanced decentration) included in the definition of symbolic play may not yet have been attained by any group of children thus reducing the symbolic play abilities which could be measured in this study to object substitution alone.

Subsequent to these studies Mundy, Sigman, Ungerer & Sherman (1986) carried out an examination of play in 18 autistic children, 18 children of typical development and 18 children with mental retardation all matched for mental age. Significant between group differences were found for symbolic play, with children with autism showing fewer different symbolic play acts than control groups; however, this difference was only significant under the structured settings. The emphasis of this study is upon the number of different symbolic play acts being seen. Whilst this helps to eradicate the possibility that elicited play is purely imitation, by crediting individuals for the performance of novel play behaviours, it is in essence an examination of the flexibility of play. Whilst play is known to become more flexible with age in typical development, as discussed previously this should be examined carefully in the ASD population to ensure that it is not the impact of the excessive repetitive behaviours associated with autism upon play which is being examined (Jarrold et al., 1993).

3.10.1 Do Prompts Improve the Symbolic Use of Objects in ASD?

As discussed previously, the majority of studies examining symbolic play in autism have focused upon the symbolic use of objects. Studies examining the effects of prompts upon play are no exception. The free and prompted play of children with autism, Down Syndrome and typical children was examined by Riguet, Taylor, Benaroya & Klein (1981); children were matched for mental ability using the Peabody picture vocabulary test (Median age = 2.5 years). Overall five types of play were assessed: motor, transitional, symbolic, animation or non animated symbolic sequence and animated sequences. After modelling children with autism showed an improvement in their overall play levels yet they remained at a lower level than the other groups due

to the quality of imitation. At best the imitation shown by children with autism was a literal imitation of the demonstration with no generalisation or elaboration. In this study object substitution was the criterion for symbolic play. It is reported that children with autism produced significantly fewer object substitutions than children with Down Syndrome in only the structured play session. However, as noted by Baron-Cohen (1987), the attribution of properties and invisible objects were not accounted for. It is therefore possible that symbolic play abilities may have been underestimated in some children; this may account for the lack of difference in play abilities between the groups in the free play sessions during which typical children may have been showing more complex symbolic behaviours. Furthermore, symbolic play was measured in such a way that it was not only the ability to perform symbolic acts which was measured; for individuals to score maximum points the ability to combine sequences was required. Whilst integration is a key dimension of symbolic play, it is one which may be most closely linked to generativity issues which may explain excessive repetitive behaviours seen in autism. As such, the rating of behaviours in a hierarchical manner without separating the dimensions of symbolic play may put individuals with such problems at a disadvantage to attain maximum points. In addition to these points regarding the measurement and definition of symbolic play, there are concerns with regards to the developmental abilities of the sample. Whilst matched by mental age, examination of the descriptive statistics for the group reveals that the mental age ranged from 1.8 to 3.9 years in each group and as such some children are likely to still be developing the more advanced symbolic play skills which typically emerge around the age of two years.

Like Riguet et al. (1981), Charman and Baron-Cohen (1997) selected children with verbal abilities above and below the developmental level at which complex symbolic play would typically emerge (approx 2 years) for their research. In a comparison of 19 mentally handicapped children and 22 children with autism matched for chronological and verbal mental age support was found for claims that prompting improved the decontextualisation abilities of children with autism. The symbolic play abilities of the group were examined and play acts were coded as either situational appropriate object substitutions or novel object substitutions. Novel object substitutions required vocal confirmation of the use of the object from the child to be counted. Using a series of increasingly more structured prompts it was found that the majority of children required prompting or modelling for symbolic play to be shown. Overall most children showed some symbolic play; however these were fewer in the autism group. Furthermore, in comparison to the mentally handicapped group there were significantly fewer children in the autism group who showed one or more novel object substitutions. The primary concern with this study is the required confirmatory vocalisations for symbolic play. Although the authors indicate that there were no between group differences in the mean number of vocalisations, we must consider the findings that children with autism spend less time playing than their peers (Riguet et al., 1981). If this is the case would it not be possible that whilst vocalisation frequency may be equivalent there may have been fewer play related vocalisations in the autism group and thus less opportunity to affirm any novel substitutions which were made?

Supporting the research of Charman & Baron-Cohen (1997) is Charman, Swettenham, Baron-Cohen, Cox, Baird & Drew (1997). In a study of empathy, imitation, joint

attention and pretend play the play of thirty eight children of typical development, with developmental delay or with autism aged 20 months was examined during free and structured play sessions. The methodology previously used by Charman & Baron-Cohen (1997) was adopted. Under spontaneous play settings only one of ten children with autism was found to show object substitution in comparison to two of nine children in the developmentally delayed group and 12 of 19 children in the typical development group. Despite this, significant differences were found only between the typical and autism groups. Under the structured settings no child with autism was reported to show object substitution in comparison to all of the developmentally delayed children and two thirds of the typically developing children. However, these findings may not be a reflection of the true abilities of the autism group as there was a high refusal rate for this task. The lack of significant differences between the groups during the free play session may be explained by the floor effects which were reported; these may be a result of the low mental ages of the participants. Although object substitution may be reported to be evident in typical development as early as 13 months (Belsky & Most, 1981; Fenson et al., 1976), it continues to develop and become more complex well into the child's second year. In Charman & Baron-Cohen's study the autism and developmentally delayed groups had a non-verbal mental age of around 17 months whilst the typically developing children had a non-verbal mental age of 20 months; it is possible therefore that the developmental ages of the groups may have been too low for the tasks conducted. Furthermore, whilst verbal ages were not reported, significant differences in these abilities were identified between the typically developing group and both the autism and developmentally delayed groups. There were not any differences between the developmentally delayed and autism groups.

Like Riguet et al., Charman and colleagues (Charman & Baron-Cohen, 1997; Charman et al., 1997) focus upon object substitution as evidence of symbolic play. Evidence of an increase in the presence of object substitution with an increase in prompts adds to our understanding of this aspect of decontextualisation in children with ASD. However, these studies do not examine more complex decontextualisation such as the use of invisible objects. Such information would be useful in determining whether differences in these more advanced forms of object use were found between the groups, or indeed whether any group of children had these skills.

In keeping with research of Charman and colleagues, Blanc, Adrien, Roux & Barthelemy (2005) defined symbolic play in their research as decontextualisation. Unlike previous studies discussed, this study credited children for attributions of false properties and the use of imaginary objects. In an examination of symbolic activity the free and semi-structured play of 21 children with autism, 14 children with developmental delay (DD) and 15 children of typical development was examined (Blanc et al., 2005). Children were matched according to their developmental age (approximately 40 months). There was no evidence of symbolic play under free conditions in the autism group and significant differences were reported between the symbolic play scores of typically developing children and children with autism. However, there were no significant differences between the autism and the DD groups. For the whole sample (typical, DD and autism) symbolic play increased significantly following prompts. Overall the autism group showed more complex and varied play at a higher developmental level following guidance from an adult. Despite reporting an increase in the decontextualisation abilities of children with autism following prompting

the exact nature of this was not reported. In addition, the functional developmental age and developmental quotient were significantly higher in typically developing children than in the two clinical groups. However, the mean age for all groups for functional development, verbal development and overall development were above 29 months and therefore of an ability level at which symbolic play would typically emerge.

The findings from the studies discussed have been consistent in the findings that children with autism have difficulties in symbolic play in comparison to their peers; more specifically these difficulties are particularly pertinent under spontaneous conditions (Wetherby & Prutting, 1994; Riguet et al., 1981). Furthermore, studies which have not reported a reduced amount of spontaneous symbolic play in children with ASD in relation to their peers have been criticised for their choice of methodology (Lewis & Boucher, 1988; Mundy et al., 1986). These findings have led to postulations that children with autism, whilst able to engage in symbolic play, are less motivated to do so than their typically developing peers, (Lewis & Boucher, 1988; Jarrold et al., 1996; Stahmer, 1995). However, whilst the findings of intervention studies have indicated that the symbolic play of children with autism can be improved (Kasari, Freeman & Paparella, 2000; Stahmer, 1995), their findings are not universal and it remains unclear as to whether they will ever show the same symbolic play abilities as their peers.

3.11 How are Symbolic Play and Language Associated in Children with ASD?

Earlier in this chapter the relationship between symbolic play and language in typical children was discussed. The autism population is characterised by deficits in communication, it is important therefore that language be considered in studies of symbolic play in autism. A limited amount of research examining the relationship between play and language in the autism population has been conducted. The following section will examine the evidence for associations between symbolic play and language in children with ASD.

Within the normative population symbolic play has been linked with both expressive and receptive language, with better language abilities being associated with better symbolic play abilities (Bates & Thal, 1991; McCune, 1995; Tamis Le Monda & Bornstein, 1990; Ungerer & Sigman, 1984). Similar findings have been identified within the autism population. In an examination of differences in the play of 10 verbal children with autism and 10 non-verbal children with autism aged 2.5 to 3.6 years of age, significant differences were found between the verbal and non-verbal groups (Amato, Barrow & Dominigo 1999). However, the Symbolic Play Test (Lowe & Costello, 1988) was used and it is accepted that this is in fact a measure of functional not symbolic play. As such results which were reported as representing symbolic play were in fact measuring functional play. Results from this research therefore revealed that neither group of children showed age appropriate play. However, the verbal group did show significantly higher overall mean play scores and were therefore of a higher level of functional development than the non-verbal group. On the basis of these results it was suggested that language is an important factor in the development of play in the

autism population; however, in comparison to typically developing peers deficits are still present.

In his examination of the role of joint attention abilities in the development of autism, Charman (2003) examines associations between play and language. Longitudinal data for eighteen children with autism and PDD prospectively identified in the CHAT screening (Baron-Cohen et al., 1996; Baron-Cohen, Wheelwright, Cox, Baird, Charman, Swettenham et al., 2000) was reported at 20 and 42 months of age. During a five minute free play session children's play was scored as functional, pretend or neither. Language abilities were measured using the Reynell Developmental Language Scales (2nd Edition.) (Reynell, 1985) and were reported as raw scores for expressive and receptive language separately. Examination of correlations between overall play and language (expressive and receptive) revealed that the play abilities of children with autism at 20 months were not significantly associated with their language ability at 42 months of age. Whilst this study collected information on symbolic play in children with autism, the use of an overall play score means that the specific relationship between symbolic play and language was not addressed. Furthermore, examination of the play abilities of the group reveals that of 18 children only 2 showed any symbolic play, 4 children showed neither symbolic nor functional play and 12 showed only functional play. Results therefore may be better interpreted as correlations between functional play and language.

Symbolic play and language was measured specifically in the study of sixteen children with autism aged 3-6 years (mean age 51 months) with a mean mental age of 25 months (Ungerer & Sigman, 1981). Children were divided into two groups upon the basis of their receptive language abilities and their symbolic play examined in structured and unstructured settings. As discussed previously (see section 3.11), this study reported upon the number of different symbolic play acts a child performed, the amount of symbolic play engaged in and the child's ability to create sequences of play. Overall, symbolic play was found to be significantly more frequent for those with higher language abilities. When the content of symbolic acts demonstrated was considered this was found to be true for object directed and doll directed play but not for symbolic play. However, when structured and unstructured play settings were considered separately no differences were found in the amount of symbolic play shown by the high and low language group, this may be a result of the sparse number of play acts shown by the children. Whilst this study examines both decentration and decontextualisation it is not possible to separate out these dimensions of symbolic play to further examine the relation with receptive language. This study does allow examination of integration. It was reported that overall children with greater language comprehension showed longer sequences of meaningful integrated play acts than those children with poorer levels of language comprehension. For example, no child in the low language group showed any multi scheme combinations (3 or more different acts) whilst 5 out of 7 children in the higher language groups did. Whilst this research shows evidence that language abilities are related to symbolic play abilities in the autism group the language abilities of the group are not clearly defined. There is no indication as to the verbal age of the children in either group and therefore it is unknown as to whether one or indeed either of the

groups of children would yet have reached a development level at which symbolic play would have typically been present.

In an extension of the work by Ungerer & Sigman, (1981), Mundy, Sigman, Ungerer & Sherman (1987) examined sixteen children with autism of similar chronological and mental ages to those in the previous study. Using the Reynell Developmental Language Scales and the same play assessments as Ungerer & Sigman, it was found that symbolic play and expressive and receptive language abilities were significantly correlated. Whilst providing support for the findings of Ungerer & Sigman (1981) this study was limited by the fact that participants were of very low language abilities with half of the children receiving the lowest possible scores for both expressive and receptive language. Despite this the results reported that three quarters of the sample showed at least one symbolic play act; such a finding suggests that even those children with autism and very poor language are able to engage in symbolic play. A finding which may suggest that language is facilitated by and not the facilitator of symbolic play (McCune, 1995).

The findings of Ungerer and Sigman and colleagues were collated in a monograph by Sigman & Ruskin (1999) in which symbolic play was examined alongside other social competencies in children with autism, typically developing children, children with Down Syndrome and children with developmental delay (DD). Symbolic play was measured using the same criteria as used previously by Ungerer and colleagues, thus defining symbolic play through the presence of object substitution, using a doll as an

agent or imaginary play. Language was measured using the Reynell Developmental Language Scales (Reynell & Curwen, 1977) and a concurrent language age equivalent calculated to incorporate both expressive and receptive abilities. Results showed that symbolic play was significantly correlated with concurrent language in all groups. However, this relationship was weaker in those of typical development than in other clinical groups. Furthermore, the association between language and symbolic play only held for the autism and DD groups when mental age was partialled out. The use of a much larger sample of children (N = 69 for the autism group) adds strength to the findings of previous studies that play and language are associated in the autism population. Sigman & Ruskin (1999) continue the trend in which the dimensions of symbolic play are not examined separately thus providing limited information as to the exact relationship between symbolic play and language. Furthermore, whilst incorporating mental age into the examination of the relationship between these behaviours this study does not take into consideration the chronological age of children, which may also be pertinent in the relationship between play and language. This may be due to the child's exposure to play materials and scenarios and the appropriateness of test materials. For example, Lewis (2003) reanalysed Lewis & Boucher's (1998) comparison of play in children with autism, children with moderate learning difficulties and typically developing children matched for expressive language abilities. The expressive and receptive language and symbolic play abilities of 15 children with autism aged 6 to 16 years were examined and associations between them examined. Results showed that the percentage of time which children spend symbolically playing is significantly correlated with both expressive and receptive language. When chronological age was partialled out these relationships did not hold. Language scores were found to correlate with the complexity of play when age was partialled out. Such

a finding suggests that play and language may be correlated in children with autism; however, it is important to consider both the complexity of play and the developmental age of the child.

By definition, individuals with autism have deficits in communication and are likely to have problems with language. Language abilities may not therefore be reflective of general intelligence in the autism population and as such other measures of general intelligence and communication abilities should be examined. For example, in a study of play and joint attention, Charman (2003) examined associations between play and ability in young children with autism. Correlation analysis revealed that at 20 months of age, play and language were not associated in young children with autism, however, play was significantly correlated with non-verbal communication as measured by the 'Verbal and Non-verbal Communication' dimension of the ADI-R. This association was found to hold true when non-verbal IQ was partialled out. Charman whilst reporting a correlation between communication and play does not specifically examine symbolic play. Stanley & Konstantareas (2006) build upon and support these findings reporting that non-verbal cognitive ability and expressive language are unique predictors of symbolic play whilst receptive language is not. However, this study uses the Lowe & Costello Symbolic Play Test (1988) and as such the associations reported are likely to represent predictors of functional and not symbolic play.

In a study of symbolic play in children with autism, Down Syndrome and typical development (Riguet et al., 1981) matched for verbal mental age (Mean =2.5 years),

significant positive correlations were found between the verbal mental age and the number of different object substitutions (symbolic fluency) a child with autism made. This correlation was not replicated in the normative or Down Syndrome groups. Furthermore, no significant correlations were found between non-verbal mental age (as measured by the Leiter International Performance Scale) and symbolic fluency for the autism group; non-verbal IQ scores for the Down Syndrome and typical development groups were not reported and therefore associations in these groups were not examined. The findings of this study suggest that the flexibility of a child's use of objects as something else is associated with their language abilities. However, by measuring the diversity of object substitutions and not the developmental level of symbolic play or in this case decontextualisation e.g. were false attributes added or invisible objects used, it can be proposed that this study measures the impact of repetitive behaviours in autism upon the flexibility and generativity of symbolic play. Furthermore, it may be inferred that the severity of repetitive behaviours in autism are associated with verbal mental age.

As in typical development, evidence of an association between play and language has been presented for children with ASD. However, due to the developmental delays commonly seen in those with ASD, it is important that a child's developmental ability is considered in such studies, it may also be useful to consider a child's chronological age.

3.12 Summary

Symbolic play has been shown to be evident in children with autism, and to benefit from prompting and modelling. As in the typical population developmental ability has also been shown to impact upon the sophistication of symbolic play. Reflecting the Wing & Gould (1979) description of symbolic play in autism as repetitive and stereotyped, research has tended to focus upon the flexibility and diversity of symbolic play. This means that the areas of play which studies have reported to be impaired may be interpreted as a reflection of other triad features such as repetitive behaviour. Furthermore, autism research has not traditionally focused upon a child's abilities in the three dimensions of symbolic play identified in typical development; rather symbolic play has largely been defined by decontextualisation and more specifically by object substitution. As such we have a less detailed understanding of the sophistication or developmental level of symbolic play in ASD than in typical development.

3.13 Conclusion

This chapter has reviewed the literature surrounding symbolic play in typical development and in autism. It is clear that there is a subgroup of children with autism who are able to demonstrate some level of symbolic play. A case for the examination of the sophistication of these symbolic play abilities according to models of typical development and independent to the autistic quality of play has been presented.

To measure a range of increasingly complex behaviours in decentration, decontextualisation and integration would allow the sophistication of symbolic play in the ASD population to be compared to that of typical development. By examining play in this way, it may be possible to identify areas of particular strength or difficulty in those with ASD. Furthermore, by focusing upon the level of symbolic play which a child is capable and not upon its repetitive or stereotyped nature we will be better equipped to conduct examinations of associations between symbolic play and repetitive behaviours as independent phenomena. It is this dimensional approach of symbolic play development which will be adopted in this thesis.

Chapter 4

Measuring Repetitive Behaviours and Play

In the first chapters of this thesis, the importance of research into repetitive behaviours and play in children with ASD was discussed. Moreover, it was argued that it is necessary to first develop a detailed description of the behavioural phenomena associated with the disorder before seeking causal explanations (Davis & Rose, 2000; Kazdin, 2003). The empirical chapters of this thesis aim to provide a fuller description of the related phenomena of repetitive behaviour and imagination by developing and subsequently testing new measures of these behaviours.

In the current chapter I review the measurement tools that are currently available to assess repetitive behaviour. The aim was to discover whether measures that meet the key requirements identified in earlier chapters of this thesis already exist. The requirement was for a measure of repetitive behaviours that examines a wide range of behaviours and is suitable for use with typical and atypical populations and a measure of play that has the potential to examine the three dimensions of symbolic play (decentration, decontextualisation and integration) under both prompted and spontaneous conditions.

4.1 How Can We Measure Repetitive Behaviours?

The lack of literature surrounding repetitive behaviours in typical and atypical populations stems in part from the measurement challenge that such behaviours pose.

Repetitive behaviours are a wide ranging heterogeneous group of behaviours that vary within and between populations. Measurement tools used in the examination of such behaviours must be comprehensive enough to gather information on a wide range of behaviours and allow the comparison of individuals and populations. Furthermore, information on the entire repertoire of repetitive behaviours which an individual shows and not just those behaviours which are most prominent will assist in an understanding of repetitive behaviour profiles and how these may differ within and between groups.

The use of observational methods in the study of repetitive behaviours allows the researcher to experience the behaviours of an individual first hand and to apply the same coding criteria to the observations of each participant. However, whilst lower level repetitive behaviour such as motor mannerisms and sensory interests can be observed relatively easily, higher level behaviours such as rituals and routines reflect a relationship between behaviours and corresponding mental states (e.g. anxiety may increase repetitive behaviours) and are therefore more difficult for researchers to observe (Turner, 1999). Although observation of these more complex behaviours is possible, a large proportion of such behaviours are seen in the private context such as bedtime and mealtimes, and are therefore often inaccessible to researchers. Regardless of the type of repetitive behaviour seen during observational studies, the information obtained reflects only a snapshot of time. As such, observational studies may not reflect the true extent of repetitive behaviours.

Informant reports are an alternative research method which may be adopted. Informant reports can take the form of interviews or questionnaires and can be structured or unstructured with open ended or closed response options. The use of such measurement tools allows researchers to collect information about all types of repetitive behaviours that an individual may show from a source close to the participant such as a parent, carer or teacher. Informant reports are therefore more likely to elicit a complete picture of the repetitive behaviour profile of an individual than observation. Furthermore, using such measures it is possible to gain information about possible causes or triggers of behaviours, coping strategies and changes over time.

4.2 What Measures of Repetitive Behaviour Are Currently Available?

There are a variety of measures of repetitive behaviours available to researchers. These measures vary with regards to the behaviours that they examine, the level of detailed information which they elicit and the populations which they are applicable to. A number of measures have been designed to access information about repetitive behaviours seen in the ASD population. These measures fall into two categories, those which assess all features of ASD but do not focus primarily upon repetitive behaviours and those which have been designed to focus specifically upon repetitive behaviours although not necessarily designed to be used with the ASD population. A number of these measures are discussed below.

4.2.1 General Measures of Autistic Symptomatology

Virtually all diagnostic and assessment measures of ASD include a set of items that measure repetitive behaviours. Because of the very large number of general assessment measures for autism, I have reported only those that have specific repetitive behaviour subscales, thereby providing a specific, separate measure of repetitive behaviour.

Gilliam Autism Rating Scale (Gilliam, 1995)

The Gilliam Autism Rating Scale (GARS) is a 42 item measure which is made up of four subscales: stereotyped behaviours, communication, social interaction and developmental disturbances. The measure is suitable for use with individuals aged 3 to 22 years and is completed by a parent or teacher. Behaviours are rated according to their frequency on a four point scale which reflects the frequency of behaviours. The stereotyped behaviours subscale includes items which tap sensory and motor behaviours, such as spinning objects not designed for spinning and hand or finger flapping. This subscale does not include verbal rituals which are measured under the communication subscale or rituals and routines which are measured under social interactions. Furthermore, the stereotyped behaviours subscale also includes eye contact, a non-repetitive behaviour in which children with ASD show impairments. The GARS gathers useful information about repetitive behaviours from those who know a child well, however, the lack of a repetitive behaviour subscale examining rituals and routines (verbal and non-verbal) means that its usefulness in the specific examination of repetitive behaviours is limited.

Autism Diagnostic Observation Schedule-Generic (Lord et al., 1996; 2000)

The ADOS-G is a semi-structured play based measure of ASD, used in clinical practice to aid with the diagnosis of ASD and within research to confirm the diagnosis of individuals and to attain information about characteristic features of autism. Five domains of behaviour are assessed during the ADOS-G: reciprocal social interaction, communication, imagination, stereotyped behaviours and restricted interests and other abnormal behaviours. The ADOS-G is made up of four modules, only one module is administered to an individual and this is selected according to their expressive language ability. During the course of the assessment a range of language appropriate activities are conducted to assess a range of specific target behaviours and more general behaviours in each of the five domains. A series of items which reflect these behaviours are scored at the end of the assessment from which a series of algorithm scores are produced.

An algorithm is a rule for combining a selection of items in a particular way so that they fit most closely with the international classification systems, in this case ICD-10 (WHO, 1993). For the ADOS-G there are algorithm scores for social interaction, communication, imagination, and repetitive behaviours and also for social interaction and communication combined. It is the social interaction and communication algorithm which is typically used in the diagnosis of autism and ASD in clinical practice. All algorithm scores are produced on the basis of behaviours observed during the entire assessment (30-45 minutes). This short period of time is seen to be inadequate for the accurate examination of repetitive behaviours (Lord et al., 2000), therefore the diagnostic algorithm does not account for the presence of repetitive behaviours. It may

be this limitation which has led to few studies using the ADOS-G to examine repetitive behaviours in autism. In an examination of associations between repetitive behaviours and aspects of executive functioning in autistic and non autistic adults, Lopez, Lincoln, Ozonoff & Lai (2005) used the ADOS-G repetitive behaviour algorithms alongside the ADI, Abherent Behaviour Checklist and the Gilliam Autism Rating Scale to create a composite score of repetitive behaviours which would be reflective of the repetitive behaviour profiles of participants.

Autism Diagnostic Interview-Revised (Le Couteur et al., 2003; Lord et al., 1994)

The Autism Diagnostic Interview-Revised (ADI-R) is a standardised semi-structured in depth parental report interview which gathers detailed information about features of autism seen in a range of situations (Le Couteur et al., 2003; Lord, et al., 1994). Parents' responses for each behaviour are rated on their impact and degree of abnormality. Using a selection of the interview items, algorithm scores can be calculated for social, communication (verbal and non-verbal), repetitive behaviours and age of first recognition of abnormalities. The ADI-R algorithms are compatible with DSM-IV and ICD-10 diagnostic criteria for autism. Within the ADI-R there are fourteen items which target repetitive behaviours; two of these items (circumscribed interests and repetitive language) are not applicable to children under four years of age with low levels of verbal ability. Eight of the fourteen ADI-R repetitive behaviour items are included in the algorithm score and are categorised into four subsections which represent ICD-10 and DSM-IV repetitive behaviour criteria. Items not included in the algorithm are unusual fears, self-injury, difficulties with minor changes, resistance to change, abnormal idiosyncratic responses and unusual attachment to

objects. The ADI-R is the most widely used measure of repetitive behaviour in studies of ASD and subgroups of these behaviours (see Chapter 2). As reported in Chapter 2 (Section 2.2.1), factor analysis of the ADI-R has shown some support for ICD-10 categories of repetitive behaviours in autism.

Diagnostic Interview for Social and Communication Disorders – 10 (Wing, Leekam, Libby, Gould & Larcombe, 2002).

The Diagnostic Interview for Social and Communication Disorders (DISCO) is a parent interview measure that provides an in depth assessment of a wide range of developmental skills and behaviours. The main purpose of the DISCO is to provide an assessment of the individual's profile of behaviours and abilities rather than to provide a categorical diagnosis. Nevertheless, the DISCO has been designed to include algorithms for a number of different diagnostic systems including ICD-10. The structure of the DISCO enables clinicians to rate behaviours according to whether they are present, their current level and development and the occurrence of atypicality. Unlike the ADI-R and ADOS-G, repetitive behaviour items in the DISCO focus upon specific behaviours rather than categories of behaviours. Inter-rater reliability of DISCO items is high with kappa coefficients of 0.75 or higher in over 80 % of the items (Wing et al., 2002).

The DISCO includes more than 50 items covering repetitive behaviours and sensory interests. Twenty eight of these repetitive behaviour items are included in the DISCO ICD-10 algorithm. These items are categorised within the DISCO into the following

types of behaviours: limited interests, routines and rituals, motor stereotypies and interests in part objects. There are also a further 30 non-algorithm items in the DISCO that include additional detail within the categories above in addition to information on special skills and responses to sensory stimuli. In addition to the ICD-10 algorithms the DISCO also produces an 'autistic spectrum disorder' algorithm which reflects the Wing & Gould (1979) triad of impairments. This algorithm is based on four summary items: social interaction, reciprocal communication, repetitive behaviours and pretend play. The one repetitive behaviour item included in this algorithm refers to the restricted nature of behaviour. This is a summary item which reflects a 'limited pattern of self-chosen activity'.

The problem of using diagnostic tools and more specifically, the algorithm scores within diagnostic tools is that they pose a danger of circularity. If a group has already been selected or diagnosed on the basis of the presence or absence of specific behaviours measured by a diagnostic instrument, it is a problem to use the same instrument as a means of then describing their behaviours. As such, in the study of repetitive behaviour, tools designed specifically for diagnosing this population should not be the sole measurement tool adopted.

Table 4-1 *Measures of repetitive behaviour*

Measure	Description	Behaviours Measured	Rating Scale
Childhood Routines Inventory	Parent report questionnaire	19 items. Two types behaviour; just right and repetitive behaviour.	5 point Likert scale for frequency/intensity.
Behaviour Problems Inventory-01	Informant rating scale. Used with mentally retarded and developmentally delayed populations.	52 items examining stereotypic, self-injurious and aggressive/destructive behaviours	5 point Likert scale for frequency. 4 point scale for severity
Y-BOCS	Clinician administered interview. Assesses OCD in typical development	58 items symptom checklist comprised of 16 subgroups of specific OCD symptoms	5 point Likert scale
CY-BOCS	Derived from the Y-BOCS. Used with children aged 6 -14 years	10 items; 5 represent compulsions and 5 represent obsessions.	5 point Likert scale
Repetitive Behaviour Scale	Informant questionnaire	3 subscales; stereotypic, self-injurious and compulsions.	
Repetitive Behaviour Scale- Revised	Informant questionnaire	42 item scale. Six subscales; stereotyped, compulsive, ritualistic, sameness, restricted interests, restricted behaviours.	4 point Likert scale
Repetitive Behaviour Interview	Parent report semi-structured interview. Used with the ASD population.	59 items measuring a wide range of specific repetitive behaviours. Four subscales; motor behaviours, insistence of sameness, repetitive language & circumscribed interests	3 or 4 responses for severity or frequency dependent on behaviour in question.
Repetitive Behaviour Questionnaire	Parent report questionnaire.	33 items measuring a wide range of specific repetitive behaviours	3 or 4 responses for severity or frequency dependent on behaviour in question.
Repetitive Behaviour Questionnaire – 2	Parent report questionnaire. Used with young typical and atypical children.	20 items measuring repetitive sensory, behaviours, motor behaviours, interests and rituals.	3 or 4 responses for severity or frequency dependent on behaviour in question.

4.2.2 Specific Repetitive Behaviour Measures

In addition to diagnostic tools, measurement tools specifically designed for repetitive behaviours are also available. These tend to collect information in a broader range of behaviours that go beyond the algorithm items described above. Table 4.1 summaries measurement tools designed specifically to examine repetitive behaviours which are applicable to a number of populations. The strengths and weakness of these measures for use in the present research will be discussed in the following section.

The Childhood Routines Inventory (Evans et al., 1997)

The Childhood Routines Inventory (CRI) gathers information from parents/carers on two broad types of repetitive behaviour: just right behaviours and repetitive behaviours (Evans & Gray, 2000). Factor analysis has confirmed the presence of these two subscales and shown good internal consistency. The CRI assesses the frequency/intensity of specific behaviours and produces a total frequency score for each of the two subscales. The CRI has been used to extract valid and reliable data about age-related changes in 'compulsive like' behaviours in typically developing children (Evans et al., 1997; Evans et al., 2001; Evans & Gray, 2000), children with Bardet-Biedl Syndrome (Barnett et al., 2002), Prader-Willi Syndrome, Down Syndrome (Evans & Gray, 2000) and autism (Greaves et al., 2006). Whilst this measure gathers data on a wide range of behaviours, there is a clear lack of items which reflect sensory repetitive behaviours, such as special interests in smells and touch.

Behaviour Problems Inventory-01 (Rojahn, Matson, Lott, Esbensen & Smalls, 2001).

The Behaviour Problems Inventory-01 (BPI-01) is a refined version of the Behaviour Problems Inventory, a participant completed inventory (Rojahn, 1984). The primary limitation of this measure is that the only repetitive behaviour it examines are lower level stereotyped behaviours including rocking, spinning and hand movements, and does not take into consideration behaviours such as obsessions or rituals. The BPI-01 is also quite lengthy including over 50 items. The time it may take a participant to complete this measure may reduce its usefulness in some research studies for example, if participants have low motivation, have difficulties in completing forms and questionnaires and if there are a number of other measures which they are required to complete.

Yale-Brown Obsessive Compulsive Scale (Y-BOCS) (Goodman, Prince, Rasmussen, Mazure, Fleischmann, Hill et al., 1989; Goodman, Price, Rasmussen, Mazure, Delgado, Heniger, et al.,, 1989)

Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) (Scahill et al., 1997)

Although designed for use with the Obsessive Compulsive Disorder (OCD) population the CY-BOCS and Y-BOCS have been used in studies of repetitive behaviours in autism (Chavez, Chavez-Brown, & Rey, 2006; Hollander, Phillips, Chaplin, Zagursky, Novotny, Wasserman, et al., 2005; McDougle et al., 1995). These two measures are designed to identify the presence and severity of key obsessions and compulsions. The assessment of obsessions can be problematic in populations such as ASD where communication is a problem. In these situations the measures have been

used with caregivers to gather information about visible repetitive behaviours only. Whilst the CY-BOCS and Y-BOCS gather information about the absence or presence of specific behaviours, the severity ratings produced represent all repetitive behaviours shown by the individual and not individual behaviours. As such distinctly different repetitive behaviours such as finger flicking and routines will be grouped together reducing the amount of useful information available. Furthermore, severity is rated according to five criteria: time occupied, interference, distress associated with compulsion, resistance against compulsion and degree of control. It can be seen that some of these rating criteria will be difficult to assess in individuals with communication difficulties thus requiring inferences about behaviours to be made possibly reducing reliability and validity of the measure.

The Repetitive Behaviour Scale (Bodfish, Symons & Lewis, 1998)

The Repetitive Behaviour Scale (RBS) is reported to have acceptable levels of reliability and validity (Bodfish, Crawford, Powell, Parker, Golden & Lewis, 1995; Bodfish et al., 1998). The scale, however, does not collect information about the severity of behaviours shown by individuals. In a comparison study of repetitive behaviour seen in autism and mental retardation (Bodfish et al., 2000) the RBS was supplemented with additional information about the severity of behaviours attained through a number of behaviour specific measures such as the Behaviour Problem Inventory (Rojahn, 1986) and the MR-OCD (Vitiello, Spreat & Behar, 1989).

The Repetitive Behaviour Scale-Revised (Bodfish, Symons & Lewis, 1999)

The Repetitive Behaviour Scale-Revised (RBS-R) is the latest version of the RBS. Forty two items have been conceptually grouped to create six subscales: stereotyped behaviours, self-injurious behaviours, compulsive behaviours, ritualistic behaviours, sameness behaviours and restricted interests. In a factor analysis of the RBS-R (Lam, 2004) using data on 307 participants aged 3-48 years, a 5 factor solution was revealed. The most noticeable difference between the 6 conceptual subscales and the 5 factor solution is the collapse of ritualistic and sameness behaviours. In this same factor analysis study the psychometric properties of the RBS-R were found to be in the acceptable range for a clinical rating scale. As discussed previously the inclusion of a large number of items may be problematic in some research studies where time constraints and participants ability and or motivation levels are a concern.

The Repetitive Behaviour Interview (Turner, 1996)

The Repetitive Behaviour Interview (RBI) examines a wide variety of specific repetitive behaviours coding for severity or frequency dependent upon the type of behaviour in question. The RBI produces summary scores which provide an index of the display of repetitive behaviours in each of four categories. The inclusion of repetitive language as one of the subscales in the interview may place limitations on the population to which this measure is applicable; that is that due to the required presence of language the measure may not be suitable for use with young children or those with language impairments. Furthermore, as with the BPI-01 and the RBS-R, the RBI has a large number of items asking about over 50 types of behaviour, this may make it unsuitable

with some research populations. The RBI has been used in a number of studies of repetitive behaviour in autism (Turner, 1995; South et al., 2005) and has been used in the development of measures applicable to other populations (see discussion of RBQ and RBQ-2).

The Repetitive Behaviour Questionnaire (Turner, Unpublished).

The RBQ is a form of the RBI which gathers information about the severity, nature and frequency of a variety of repetitive behaviours. The questionnaire consists of 33 items and parents/carers are asked to rate each behaviour for either severity or frequency dependent upon the type of behaviour in question. Items have three or four response options; therefore response choices are not consistent across all items. The use of three response options for some items may encourage participants to opt for the middle response option. Furthermore, there is no distinction between 'Never' and 'Rarely' in any of the items; this may create floor effects when in some cases a behaviour is in fact present. The RBQ has been used in research into repetitive behaviours in autism and obsessive compulsive disorder (Ozonoff et al., 2000; Shearer, 2001; Zandt et al., 2007).

The Repetitive Behaviour Questionnaire – 2 (Leekam et al., in press)

The RBQ-2 was developed from the RBQ and the DISCO. Fifteen of the items in the RBQ-2 are common to both the DISCO and the RBQ and 5 items come only from the DISCO. The response format is based upon that of the RBQ, and therefore poses similar issues with data collection. The RBQ-2 has been used in a major longitudinal

research study in the North-East of England to investigate children's health and development in the first three years of life (Leekam et al., in press). As part of the research 679 parents of typically developing children aged 2 years 0 months to 2 years 9 months completed the questionnaire. Factor analysis of the questionnaire has revealed a four factor model which suggests four subscales of repetitive behaviour: sensory, motor, routines and interests. A two-factor model of sensory and motor behaviours (Factor 1) and routines and interests (Factor 2) is also suggested. This two factor model supports recent findings of Bishop et al. (2006) Cuccaro et al. (2003), Richler et al. (2007), Szatmari et al. (2005) and Shao et al. (2003) as discussed in Chapter 2 of this thesis (See Section 2.2.1).

4.3 Summary of Repetitive Behaviour Measures

It can be seen that there are a number of specific repetitive behaviour measures available for researching repetitive behaviours in the ASD population. Most measures have elected to use a closed ended response format, lending them to interview or questionnaire based administration. There are, however, a number of important differences between the measures. Tools such as the Y-BOCS and CY-BOCS, whilst suitable for use with the ASD population, limit the amount of useful data available to the researcher through the use of summary scores rather than individual item scores.

Furthermore, as discussed by Turner (1999) such measures also present difficulties in the measurement of more complex repetitive behaviours such as compulsions in the developmentally delayed populations as inferences about the behaviours have to be

made. Whilst the CRI (Evans et al., 1997) has been found to produce valid and reliable data for higher level behaviours, the measure lacks items examining sensory behaviours and therefore is unlikely to present a true picture of all types of repetitive behaviours which children may show. The RBS-R, RBQ and RBQ-2 are examples of well rounded repetitive behaviour measurement tools yet each of these measures has problems. The RBS-R includes a large number of items and therefore may not be suitable for some research projects. Reasons for its unsuitability include the time which respondents have to spend completing the questionnaire and the number of other measures used during the research. If a research project is seen to take up a considerable amount of the participants time there is likely to be an increased drop out rate thus reducing the research sample. Measures should therefore be designed to take up as little of the respondent's time as possible and as few measures as possible used in a study. The RBQ and RBQ-2, whilst shorter measures of repetitive behaviours, fail to distinguish between those individuals who never display a behaviour and those who rarely display a behaviour; in the examination of a population characterised by the presence of repetitive behaviour this is important information to attain.

The original aim of this chapter was to review existing measures of repetitive behaviours to investigate if any meet the requirements for obtaining information about a wide range of behaviours and go beyond behaviours which may be exclusive to the ASD population. By including behaviours which do not by definition of the disorder discriminate between groups we can avoid the circularity of simply re-describing diagnostic criteria. In addition, ideally, measures should take on an informant report format; this will ensure information about behaviours associated with specific activities

or circumstances which may not be seen during an observation will be reported on. In order to overcome possible time and resource restraints it would be preferable for measures to be of questionnaire format, to maximise the potential sample population through the reduction of time and costs associated with interviews and the accessing of a wide geographical area. Furthermore, when examining more than one key behaviour, as in the present research, the total administration time of all measurement tools should be as short as possible to encourage participation. Therefore, although preferable, a large battery of repetitive behaviour items such as those used in the RBS-R may not be possible.

4.4 How Can We Measure Symbolic Play Ability?

Symbolic play has historically been used as a measure of imaginative abilities. In the ASD population symbolic play has primarily been examined in terms of its autistic nature, such as is its sociability and repetitiveness. This has been useful in developing a picture of ASD and its associated behaviours. In this thesis, to gain a clear insight into the play abilities of children with ASD and the relationship between repetitive behaviours and imagination proposed by Wing & Gould (1979) it is deemed essential that measurement tools assess the developmental level of play abilities in children as opposed to their autistic qualities. As such, measurement tools should examine symbolic play according to models of play development.

Like repetitive behaviours, symbolic play is subject to measurement difficulties. Measures should make clear distinctions between symbolic play and its predecessors,

functional and exploratory play (Baron-Cohen, 1987). As discussed in Chapter 3 of this thesis, symbolic play is the most advanced type of play which a child develops. Symbolic play allows children to move away from reality and become less reliant upon the true properties of an object or situation to direct play. Symbolic play has its own developmental trajectory, becoming more complex over time. To begin this process a child must have first successfully attained functional and exploratory play. Ideally measures of symbolic play should provide researchers with the opportunity to attain information on these earlier play forms in order to track developmental changes in individuals and to prevent floor effects when examining populations in which symbolic play may be in its early stages of development.

As discussed earlier in this thesis, models of symbolic play development differ in their descriptions of the developmental trajectory of symbolic play and its key developmental stages. Measures of symbolic play, therefore, differ according to the theoretical model of play development upon which they are based. This can be problematic for research as it prevents the direct comparison of research findings. As discussed in Chapter 3, the research programme conducted as part of this thesis focuses upon the development of symbolic play in three dimensions: decentration, decontextualisation and integration. Table 4.2 describes these dimensions. A measurement tool which incorporates these dimensions is therefore essential. Furthermore, following the identification of differences in the spontaneous and prompted symbolic play of children with ASD (Blanc et al., 2005; Charman et al., 1997; Charman & Baron-Cohen, 1997; Riguet et al., 1981; Sigman & Ungerer, 1984), the ability to differentiate between these types of play

would also prove beneficial to a measure of symbolic play to be used in this programme of research.

Table 4-2 *The three dimensions of symbolic play*

Dimension	Description
Decentration	An increasing tendency for children to include players other than the self into his or her play such as using a doll as an active participant.
Decontextualisation	The decreasing use of props for their real purpose during play as seen through object substitution and the attribution of false properties to objects
Integration	The increasing ability of a child to combine play schemes to create meaningful sequences such as a pretend birthday parties or a pretend shopping trip

4.5 What Methods are Available for the Measurement of Symbolic Play?

In the discussion of repetitive behaviour measures it was identified that informant reports in the study of repetitive behaviours are likely to elicit more valid information about an individual's repetitive behaviour profile than observations. Play behaviours are much easier for researchers to accurately observe than repetitive behaviours as circumstance and situation are less likely to affect a child's performance; as such, a number of measures of play behaviours which use observational coding have been developed. Problems do, however, exist with play observations. For instance, the environment may have an important effect on play behaviours. Observations may take place in a laboratory or in a more naturalistic or home-based environment. Even the most unobtrusive assessment will inevitably have some impact upon the participant's behaviour and thus may not provide a valid representation of a child's typical behaviour patterns. Naturalistic observations also present an issue for the present research which aims to identify a child's most advanced symbolic play abilities. Whilst unstructured free play may show what a child typically does, it may not elicit the most advanced

level of symbolic play a child is capable of. Further, the desire to measure abilities across three dimensions of play in this thesis may not be possible through naturalistic observations as play is directed by the child. A further issue is the limited number of coding systems available for use in play research and a lack of consensus in operational definitions of play which creates research whose findings cannot be directly compared (Williams et al., 2001). The reliability of complex observational instruments such as the ADOS-G can be improved through standardisation procedures, although this is likely to require extensive training for users.

As mentioned previously, an alternative to observational measures are informant reports. Measures of play which adopt this methodology increase the likelihood that information collected about an individual's play abilities is reflective of their general play abilities across a number of situations, which may not be possible in an observational study. However, as with naturalistic observations, this method of play assessment does not allow the researcher to present and evaluate situations in which each child will be provided with an opportunity to demonstrate all play types. As such, informant reports may not be a true reflection of play ability but of the individual's typical play behaviours. Informant reports present an issue of coding similar to that associated with observations. To answer questions about the individual's play, the informant must interpret the question and associate this with play behaviours shown by the individual. There is the possibility that respondents may not interpret items in the same way as the researcher and therefore either incorrectly code play behaviours or not code particular play behaviours as they are unsure as to which item is most representative. It is imperative then, that items in informant report measures of play are clear in their definition of specific play behaviours and where possible clear examples

are provided. This is particularly true for questionnaires where the researcher may not be on hand to address any queries.

The purpose of a measure can influence the way in which behaviours are examined. As noted in the discussion of repetitive behaviour measures, the use of diagnostic tools and their algorithms in the assessment of behaviours characteristic or possibly exclusive to a population, poses an issue of circularity; that is that the group will have been identified on the basis of specific behaviours which are later to become the focus of research. Furthermore, with particular relevance to this thesis, items included in diagnostic instruments such as the ADI and ADOS-G which assess symbolic play focus upon the impairments of imagination characteristic of the autistic disorder and not the developmental level of symbolic play which has been reached (regardless of the disorder) in each of the three dimensions of symbolic play which are being examined. Specific tests of symbolic play are available such as the Symbolic Play Scale (Westby, 1980) and Fenson (1984) and these have focused upon the developmental level of this type of symbolic play. However, despite evidence in the existing literature for the presence of decentration, decontextualisation and integration (See Sections 3.5 and 3.6) few measures of symbolic play address each of these components.

4.6 How Do We Currently Measure Symbolic Play?

There are a number of observational measures of play currently available for use in research; however, the choice of measures is decidedly limited once the specific types of play abilities which the researcher wishes to examine are taken into consideration.

The following section examines the usefulness of general measures of play in the assessment of symbolic play development for the present programme of research, highlighting the importance of examining the definitions of play used in measures.

4.6.1 General Measures of Play

There are a number of general measures of play available to researchers, a number of these do not measure symbolic play. The Play Observation Scale (Rubin, 1984), for example, was designed to examine free play preferences in typically developing preschool children. This scale assesses the cognitive level and sociability of play shown in young children according to Piaget's play categories of functional, constructive, dramatic and games with rules. As such, this measure is unsuitable for use in research specifically related to symbolic play. Similarly, the Knox Preschool Play Scale (Knox, 1997) and Test of Playfulness (Bundy, 2001) are equally unsuitable focusing not upon symbolic play but space management, material management, imitation and participation during play (Knox Preschool Play Scale) and the child's approach or attitude during play, motivation, locus of control, freedom to suspend reality and framing (Test of Playfulness). Another such test is the Symbolic Play Test (Lowe and Costello, 1976/1988) which evaluates symbolic development among children between 12 and 36 months of age. Despite being called the symbolic play test the measure is actually one of functional play requiring no evidence of symbolic play for optimum scores to be attained. As discussed in the previous chapter, this test has been used in studies as a measure of symbolic play (Gould, 1986; Lewis et al., 2000; Amato et al., 1999; Salt, Shemitt, Sellars, Boyd, Coulson & McCool., 2002).

There are some general measures of play which include and measure elements of symbolic play. These measures are summarised in Table 4.3 and their relevance in the study of symbolic play for the purpose of this thesis will now be discussed.

Table 4-3 *General measures of play*

Measure	Description	Type of Play Measured
Play History Interview	Semi-structured parents/ carers interview. Used with children aged 0 to 16 years.	Four epochs of play; sensorimotor, symbolic, dramatic and games
Play Assessment Scale – Fifth Edition	Semi-structured observation? assessment of play in infancy and early childhood	Sensorimotor and symbolic play
Macarthur Communicative Development Inventory: Words and Gestures	Parent report measure. Used with typically developing children aged 8–18 months.	Symbolic Play

Play History Interview (Takata, 1974)

The Play History Interview is based upon the developmental stages of play identified by Piaget and identifies four epochs of play: sensorimotor, symbolic, dramatic and games. Information is gathered about the child's use of materials, role of people, use of action and setting during play. During the interview the informant is questioned about both past and present play shown by the child with the intention of allowing longitudinal information to be attained. Despite examining decentration (role of the child) and decontextualisation (use of objects) this measure does not examine the use of integration (sequencing) in play. The interview also produces qualitative information, potentially making it difficult to accurately compare between and within participant change over time.

Play Assessment Scale – Fifth Edition (Fewell, 1992)

The Play Assessment Scale (PAS) is based upon developmental literature of play and sequences play behaviours according to complexity. The PAS was used in a study examining predictors of spoken language in children with ASD (Stone & Yoder, 2001) and a modified version was used in the examination of imitation performance in toddlers with autism (Rogers, Hepburn, Stackhouse & Wehner, 2003). The PAS provides opportunities for the researcher to observe and code spontaneous play to produce a play age and also to elicit and code higher levels of play. However, this measure fails to examine prompted play which has been identified as important to this research.

Macarthur Communicative Development Inventory (Fenson, Dale, Reilly, Reznick, Thal & Bates, 1993)

The Macarthur Communicative Development Inventory (CDI) is made up of two protocols, the CDI: Words and Gestures and the CDI: Words and Sentences. Whilst the CDI is a measure of language the CDI: Words and Gestures examines symbolic play and has been used in studies of play, for example, Lyytinen, Laasko, Poikeus & Rita (1999) used the CDI in an examination of play and language. In this protocol there is one item entitled 'pretend objects', which aims to identify whether a child is able to substitute one object for another, the respondent is required to answer yes or no and then provide an example of such play. To increase validity the parent examples should be examined by the researcher prior to scoring, if the parental description is absent or does not reflect the play in question then that type of play will be scored as absent.

Despite including this requirement in a study of 659 typically developing children aged 8 to 16 months, object substitutions were reported to be present at around 12 to 14 months of age. In addition to this item there are also items relating to 'actions with objects' and 'pretending to be a parent'; within these sections there are 17 and 13 items respectively. Each of these sections of items includes some items examining play ('actions with objects' = 5 items, 'pretending to be a parent' = 13 items).

Some examples of the play items in the 'actions with objects' section are;

"Does your child do or try to do any of the following?"

- Lay head on hands and squeeze eyes shut as if sleeping
- Hold plane and make it fly
- Pour pretend liquid from one container to another

Some examples of the play items in the 'pretending to be a parent' section are;

"Here are some things that young children sometimes do with stuffed animals or dolls. Please mark the actions that you have seen your child do."

- Put to bed
- Feed with spoon
- Wipe its face or hands

These items track some aspects of the use of objects (decontextualisation) and the role of the child in play (decentration); however, these dimensions of play are not clearly

distinguishable from one another. For example, an item referring to the child's ability to feed a doll with a spoon does not account for the use of the object and the use of the doll as a participant independently. Furthermore, there is no consideration of the combination of play schemes (integration) or of the spontaneity of play acts.

The measures discussed above have not been designed with the specific aim of examining symbolic play in detail. There are measures available which have been designed with this in mind. The following sections will discuss these measures in more detail.

4.6.2 Specific Tests of Symbolic Play

In addition to general measure of play and those designed to diagnose ASD there are measures which examine symbolic play in detail. These measures will now be reviewed in the context of the requirements for this thesis; that is their usefulness in the examination of the developmental level of decentration, decontextualisation and integration under both prompted and spontaneous conditions.

Test of Pretend Play (Lewis & Boucher, 1997)

The Test of Pretend Play (ToPP) is a structured play assessment designed to assess a child's level of conceptual development and ability to use symbols (in measuring both these ToPP also measures important aspects of a child's readiness to develop language).

The ToPP claims to provide an indicator of the child's imaginative ability and creativity, indicate the child's emotional status and assess developmental difficulties. Primarily the ToPP assesses three types of decontextualisation: substituting one object for another object or person, attributing an imagined property to an object or person and reference to an absent object, person or substance. Two levels of decentration are also assessed in the ToPP: the child's ability to perform everyday activities with the play items and the child's ability to use a representational toy such as a teddy. There are two versions of the ToPP the non-verbal and the verbal. The non-verbal version is designed for use with typical children up to three years of age and older children with insufficient comprehension to follow the language used in the verbal version. The verbal version is designed to be used with typical children 3 years old and above. Having a verbal and non-verbal version of the test makes it suitable for use with a population of varying abilities; the ToPP has been used in studies of symbolic play in autism by Doswell et al. (1994), Lewis et al. (2000) and Salt et al. (2002). The ToPP is thorough in its assessment of the use of objects (decontextualisation) and although activities require the use of dolls alongside objects the development of decentration is not fully investigated and the sequencing of play acts (integration) is not addressed at all. Furthermore, no distinction is made between spontaneous and prompted play acts. In a review of the ToPP it was reported that children became bored with the materials used in the ToPP and as a result it was suggested that a checklist of skills with suggestions for suitable materials would have been more useful (Webb, 1999).

Symbolic Play Scale (Westby, 1980)

The Symbolic Play Scale was designed to assess the development of children's play. The play scale is a checklist which is used to assess the free play of children aged between 9 months and 5 years. A checklist is used to determine which of ten levels of play a child has reached on the basis of toy combinations, sequencing, decentration and planning. This scale, like many other measures, does not account for each of the three dimensions of play, in this case failing to address decontextualisation.

Brown, Rickards & Bortoli's coding scheme for symbolic play (2001)

Brown et al. (2001) developed a coding scheme for symbolic play as part of an examination of symbolic play and word production in hearing children and children with hearing loss. The coding scheme was used to assess symbolic play shown during free play sessions between child and mother, but has the potential be applied to a number of play situations. The coding scheme evaluates play abilities in four dimensions of pretend play: decentration, decontextualisation, sequencing and planning. Sequencing represents the child's increasing ability to combine single play acts to create meaningful sequences (similar to the dimension of integration). Planning represents the child's ability to move from spontaneous to organised intentional actions. Within the scheme four development levels were identified for the each of the dimensions, with the exception of planning where only three levels were identified. Table 4.4 reports the coding scheme.

Despite covering the development of decentration, decontextualisation and integration (albeit by a different title) there are a number of problems with the coding scheme developed by Brown et al. (2001). The developmental levels identified for decentration fail to differentiate between the use of animate and inanimate recipients of play, a factor which is identified in a number of developmental models of play (Bretherton, 1984; Fenson, 1984; McCune-Nicolich, 1981 Piaget, 1962). The dimension of decontextualisation in this coding scheme also lacks an important developmental marker, the attribution of false properties to an object. In Leslie's (1987) account of symbolic play, it is stated that object substitution, attribution of false properties and use of invisible objects are features which distinguish symbolic play from other types of play. Finally, the coding scheme fails to identify between play which is prompted and play which is spontaneous. By differentiating those play acts which the child performs spontaneously from those which are prompted the researcher will gain a more detailed insight into the play abilities of the participant.

Table 4-4 *Pretend play coding scheme used by Brown et al. (2001)*

	Decentration	Decontextualisation	Sequencing	Planning
Level 1	Actions on the self	Action without object or object used without action	Actions are isolated	Actions spontaneous events
Level 2	Actions on another	Real life objects with action	Same action repeated on more than one recipient	Actions intentional/planned
Level 3	Adopts characteristics of another	One object substituted for another	Different actions used on same recipient	Logical order cannot be violated
Level 4	Imaginary characters used	Imaginary objects used	Sequences follow higher order	

Adapted from Brown et al. (2001)

Fenson (1984) – Coding scheme for action based symbolic play.

Fenson (1984) developed a coding scheme which measures symbolic play abilities through action and language. The following discussion focuses only upon the coding scheme for action based symbolic play.

Fenson's scheme explicitly measures the three dimensions of symbolic play which are the focus of this thesis: decentration, decontextualisation and integration. The three dimensions of symbolic play (which can be seen in Table 4.2) were split by Fenson into levels; however, the number of levels was not equal for each dimension. In creating an unequal number of categories for each dimension the coding scheme does not allow for direct comparison of developmental level across decentration, decontextualisation and integration. Furthermore, for decontextualisation and integration pre-symbolic abilities are not recorded as they are in the decentration dimension under the level of self-directed play. That is, that a child must show evidence of object substitution and the combining of single schemes to be able to score anything in the decontextualisation and integration dimensions of this coding scheme. They are not, however, required to be able to direct play towards another to score in the decentration dimension of the scheme. Examination of the decentration dimension of the scheme reveals that level 3 is object directed play. It could be argued that this is not an element of decentration (role of self in play) but a level of decontextualisation and should therefore be moved from the decentration to decontextualisation as a level preceding object substitution. As with many of the other coding schemes discussed, Fenson fails to incorporate an option for coding whether an act is prompted or spontaneous. However, in her study, "Developmental trend for action and speech in pretend play", she successfully uses the

scheme to code play seen in free and structured settings providing evidence for the schemes usefulness in the examination of differences in these play abilities.

Despite the number of specific measures of symbolic play which have been used in typical development, surprisingly these have not been adopted and used with children who have autism, hence acknowledging developmental level. Instead studies of symbolic play in autism have focused on different factors namely repetitiveness and lack of spontaneity.

4.6.3 Measures of the Autistic Nature of Symbolic Play

A number of ASD diagnostic tools assess symbolic play. As they are designed to distinguish those with ASD from other populations they have a tendency to focus upon impairments in symbolic play which reflect other characteristics of the disorder rather than on the developmental level of play which the child has reached. As discussed in the repetitive behaviour section of this chapter, many diagnostic instruments create algorithm scores to summarise an individuals' performance in an assessment. Whilst these algorithms are useful for diagnostic purposes they do not necessarily include all the items relating to a specific behaviour (for instance play or repetitive behaviour). Furthermore, items included in the algorithm have been selected on the basis of their ability to differentiate between the target and other populations.

Diagnostic Interview for Social and Communication Disorders-10 (Wing, Leekam, Libby, Gould & Larcombe, 2002).

As outlined previously the DISCO is a parent interview schedule which rates behaviours for severity. DISCO-10 was the version researched for this thesis but has recently been superseded by DISCO-11 which includes more detailed items on imagination. For DISCO-10, there are three items which focus upon symbolic play: 'did not imitate domestic tasks in early childhood' 'lack of pretend play' and 'pretend play is repetitive'. In addition to these items, the DISCO-10 also includes two items within the 'Developmental Skills' section which relate to the development of symbolic play and role play. The symbolic play item focuses upon decontextualisation (the use of objects) and identifies seven developmental levels including no imaginative play, playing with real household objects in a realistic manner and the use of an object as something else. The role play item tracks the development of role play over three stages, from no role play to playing simple make-believe games, for example, pretending to be an animal or someone else, and finally to playing games of pretence with others where an awareness of dramatic roles is demonstrated. Whilst the DISCO includes a hierarchical model of play development based on typical development it does not separate out the three dimensions of imaginative play which have been identified for detailed analysis in this thesis.

Autism Diagnostic Interview-Revised (Le Couteur et al., 2003; Lord et al., 1994)

As discussed previously the ADI-R is an in depth informant report interview used in the diagnosis of ASD. Within the ADI-R there are four items examining symbolic play.

These items are summary items and do not examine specific aspects of symbolic play. These items focus upon symbolic play overall (item 63), symbolic play with peers (item 64), spontaneous imitation of actions (item 29) and imitative social play (item 65). Although the ADI-R is applicable to all individuals who are suspected of having an ASD, these items are only applicable to children under the age of 10 years. For anybody over this age the items refer to symbolic play seen at 4 to 5 years of age. There are a number of problems with the symbolic play items in the ADI-R. The imitative social play item focuses not upon symbolic play abilities but upon the sociability of play thus examining an autistic quality of play. Items measuring imaginative play and imaginative play with peers do not deal with differences between spontaneous and prompted play acts requiring spontaneous symbolic play abilities in order to score a behaviour as present. Finally, the spontaneous imitation of actions item, whilst examining early stages of decentration in which the child imitates acts such as cleaning or feeding a baby, does not address other dimensions of symbolic play (integration and decontextualisation). By definition this item focuses upon spontaneous imitation, it may be argued that to imitate is to be prompted thus creating difficulties in the coding of this item. Using information collected during the interview it is possible to create a diagnostic algorithm for the ADI-R. The algorithm reflects ICD-10 criteria for autism and therefore includes imagination as a component of communication. There are three items included in the imagination section of the algorithm, imaginative play, spontaneous imitation of actions and imitative social play.

Autism Diagnostic Observation Schedule – Generic (Lord et al., 1996; 2000)

As outlined in the discussion of repetitive behaviour measures, the ADOS-G is a tool used in clinical and research practice in the diagnostic of Autism and ASD. The ADOS-G is an observation tool which uses a series of semi-structured tasks which allow the examiner to observe and code play behaviours associated with ASD. The tasks included in the ADOS-G are predominantly play based and provide a number of opportunities for play abilities to be observed in participants of all ages and abilities. The activities are structured in such a way that increasingly strong presses or prompts are used to elicit play behaviours. In doing this it is possible to distinguish between spontaneous and prompted symbolic play. There is, however, only one summary item in the ADOS-G coding scheme which refers directly to spontaneous symbolic play behaviours shown during the observation. This item is used in the imagination algorithm of all modules, in fact in modules 2, 3 and 4 it is the only item in this algorithm. The imagination algorithm is not included in the diagnostic algorithm of any of the ADOS-G modules as play behaviours were found to be highly correlated with language ability thus reducing the diagnostic discrimination of Autism or ASD from other disorders when language was controlled for (Lord et al., 1996).

4.7 Summary of Symbolic Play Measures

There are a number of measurement tools available to examine the play abilities of children of both typical and atypical development. The number of measures which look specifically at symbolic play, however, is considerably smaller, and even more so when the measure is required to assess the development of decentration, decontextualisation

and integration. Clinical diagnostic instruments such as the ADI-R and ADOS-G focus upon the impairments of imagination which are associated with ASD and fail to apply models of play from typical development. Such an approach does not allow researchers to examine the true development of play in children with ASD when using these measures and reduces the ability to compare populations. Within these measures play is measured in terms of the impairments which are seen to be associated with the disorder, creating a circular argument of a similar nature to that discussed in the repetitive behaviours section. Therefore, by examining abilities in a way which does not by definition discriminate between groups, information attained is more likely to be valid as opposed to an artefact of the measures.

When examining symbolic play in ASD it is important to look beyond the autistic features of play, such as it repetitiveness and lack of sociability, and focus upon the developmental level of play a child is capable of. Symbolic play is a complex skill which requires development in three dimensions, decentration, decontextualisation and integration. Measures of symbolic play should therefore reflect developmental changes in each of these dimensions. The DISCO is a diagnostic tool which allows researchers and clinicians to look at play development in ASD alongside the impairments of imaginative play associated with the disorder. However, it does not explicitly address each of the three dimensions of symbolic play. Although measures such as the ToPP and Symbolic Play Scale measure some of the dimensions of play neither provide information on all three. The coding schemes proposed by Brown et al. (2001) and Fenson (1984) gather information about each of the dimensions of play; however, there are problems with the developmental levels of each of the dimensions of symbolic play

examined. Without a measure which gathers comprehensive information about all dimensions of symbolic play research into imaginative impairments in ASD it is not possible to identify the strengths and weaknesses of an individual's play. Moreover, associations between dimensions of symbolic play and other autism triad features cannot be examined. The development of a suitable coding scheme and the collection of such information will add to our understanding of the autism spectrum and in the development of possible interventions to improve play.

In addition to the assessment of the overall developmental levels of decentration, decontextualisation and integration, it is highly beneficial in a study of symbolic play in ASD to attain information about those play acts which are spontaneous and those which are prompted (Charman, 1997; Jarrold et al., 1993; Jarrold, 2003; Wolff, S., 1985). None of the measures of symbolic play discussed produce separate scores for the developmental level of prompted and spontaneous symbolic play demonstrated by a child. There are a number of measures which have the potential to do so. For example, the ADOS-G provides an opportunity to observe both prompted and spontaneous symbolic play, however, this is not accounted for in the current ADOS-G coding scheme. Similarly the coding scheme used by Brown et al. (2001) was applied to free play sessions and therefore distinctions between play performed with or without prompts could be made using this measure.

A further issue to consider in symbolic play measurement tools is the assessment of preceding play forms. Symbolic play is the most advanced form of play and in typical

development follows the successful development of exploratory and functional play (Leslie, 1987; Libby et al., 1998; Rusher et al., 1995; Schuler et al., 1997; Wing, 1996). Examination of a child's abilities in these precursors of symbolic play will not only prevent floor effects in a measurement tools but also provide important information on the impairments of play which a child may have and the specificity of these difficulties to symbolic play.

Whilst observational studies have been the tool of choice in much research into play, the CDI, ADI-R, DISCO and Symbolic Play Scale are examples of where parental reports of play have been used effectively to gather information about play skills in children. The use of a questionnaire to examine play abilities provides researchers with the opportunity to access a larger population than would be possible with observations. In this thesis associations between repetitive behaviour and play were initially examined using a parental-report questionnaire. The use of a questionnaire in the early stages of the research was driven by the aim of accessing a larger sample population than would be possible with alternative methods (e.g. interview or observations). This would enhance the power of any statistical tests conducted and improve confidence in any associations found.

In subsequent studies in the thesis, the use of observational measures aimed to validate the use of a questionnaire to collect information on play abilities and enhance our understanding of play abilities in ASD. Furthermore, within the observational technique, children have opportunities to engage in both spontaneous and prompted

symbolic play, allowing us to gain a greater understating on play abilities in ASD and how these may in turn be associated with repetitive behaviours.

A final issue to consider in the examination of play is the role of language. Play and language are proposed to develop in parallel (Bates et al., 1979; Lowe, 1975) in typical development. In reflection of the relationship between these behaviours many measures of play impose ability level cut offs. In doing this children with poor language abilities may not be given the opportunity to be assessed for symbolic play as they are seen to be too immature. Similarly, children with good language abilities may be seen to be too advanced to be assessed for symbolic play. The CDI (Fenson et al., 1993), for example, does not include items of pretend play in its Words and Sentences version, although it does in the earlier version. Similarly, the Symbolic Play Scale is designed for use with children up to 5 years of age. These measures are therefore limited in their applicability to a sample of varying ability such as ASD or in a longitudinal study of play development. In light of this, it is essential that measures of language abilities are included in studies, and where possible in observational studies language ability controlled for. The ADOS-G is an example of such a measure. In all modules of the ADOS-G symbolic play can be examined allowing changes over time to be assessed using the same measure. Furthermore, the ADOS-G module used with a child is selected on the basis of their expressive language and tasks administered are therefore language appropriate. As such, play can be examined whilst the language constraints which may impact upon testing are controlled for.

4.8 Summary and Conclusions

To successfully examine the relationship between repetitive behaviours and imagination proposed by Wing & Gould (1979) the selection of repetitive behaviour and symbolic play measures is critical. As discussed in this chapter, it is essential that any measure selected for use with the ASD population should go beyond the examination of behaviours exclusive to them; this applies to both repetitive behaviours and symbolic play. A review of measures of symbolic play revealed that of those measures applicable to a range of populations, few assessed all three dimensions of decentration, decontextualisation and integration. It is important to include measures of each of these dimensions not only to attain a complete picture of symbolic play abilities in children with ASD but also to ensure the continuity of measures across typical and atypical populations. Language is known to be associated with play and it is therefore also necessary to consider this when measuring play abilities. At present there are few play measures which take account of the varying language abilities which will inevitably be found in a population such as ASD. Furthermore, research tells us that there may be differences in the play children with ASD show under free and prompted conditions. It would be advantageous therefore for a measure of play to also allow for comparisons between prompted and spontaneous play to be made.

There are a number of repetitive behaviour measures available to researchers which cover a wide range of behaviours seen in typical and atypical populations. To attain the most detailed information on repetitive behaviours we need to examine both high and low level behaviours, e.g. circumscribed interests and motor repetitions, to gain a complete picture of an individual's repetitive behaviour profile. It is important when

studying symbolic play and higher level behaviours, such as routines and rituals, that assessments are as objective as possible; that is that the cause of certain repetitive behaviours or the intent of play acts which are not clearly symbolic are not inferred. If such inferences were to be made then the validity of the information would be brought into question.

None of the measures of repetitive behaviour and imaginative play reviewed in this chapter met all the requirements identified above. Furthermore, there is no published measure that collects data on both types of behaviour in the same instrument. The first stage of the research programme of this thesis was the development of a parental report questionnaire. The questionnaire gathers information on repetitive behaviours and symbolic play seen in individuals of varying ability using a single measure. The developed questionnaire was then used to collect data about the play and repetitive behaviours of typical children and children with ASD, reported in Chapter 6.

The second stage of the research was to use observational methods to examine play and repetitive behaviour to continue to examine associations between these behaviours. The observational stage of this thesis, reported in Chapters 7 to 9, included the use of an existing measure and the development of a new measure that could record three dimensions of symbolic play and distinguish between spontaneous and prompted play. The development of such a coding scheme allowed further validation of the questionnaire developed earlier in the thesis. Furthermore, it provided detailed information about symbolic play abilities in children with ASD which are not merely a

reflection of other triad features but a measure of the developmental level of symbolic play as measured by models from typical development. This information not only provides detailed information about symbolic play in ASD but also how aspects of symbolic play may be associated with repetitive behaviours.

Chapter 5

Developing a New Measure:

The Activities and Play Questionnaire- Revised

The literature reviewed in Chapters 2 to 4 revealed that although an association between repetitive behaviours and imaginative impairment in children with ASD is strongly assumed by researchers, ICD-10 (WHO, 1993) clinical criteria for autism do not actually require that these impairments must co-occur for a diagnosis of autism to be made. Surprisingly, no research has previously investigated the extent to which an association actually does occur in children. This was one of the aims of this thesis.

The next step of this thesis was to carry out a systematic study to investigate this association. In order to do this, it was necessary to first develop a reliable method of collecting data for both repetitive behaviour and play, drawing on the features that were identified in Chapters 2 to 4 as important but so far lacking in separate measures of repetitive behaviour and play. For repetitive behaviours this is a tool which measures a range of behaviours in typical and atypical populations and goes beyond the ICD-10 criteria for autism, and for symbolic play, a tool which measures the developmental level of three dimensions of symbolic play: decentration, decontextualisation and integration.

At the point of starting this research there had not been any measure previously developed that was designed to assess both repetitive behaviour and play together

within one instrument. The first stage in developing such a measure was a pilot study that was carried out as my masters dissertation project (Honey, 2002). Given the lack of previous measures, it was decided to start with a questionnaire measure rather than an observation tool in order to provide a survey of a wide range of behaviours in a relatively short period of time. The results of this pilot study are reported briefly, followed by a more detailed discussion of the work involved in developing the final questionnaire measure, the Activities and Play Questionnaire- Revised (APQ-R) for the PhD thesis[2].

5.1 Designing the Activities and Play Questionnaire

An initial questionnaire was designed for my master's thesis. This had 31 items, selected on the basis of a comprehensive literature review and review of existing measures of repetitive behaviour. Items were largely adaptations of items from the DISCO-10 (Wing et al., 2002) and the RBQ (Turner, Unpublished) (see Chapter 4 for details of these measures) and covered a wide range of behaviours which may be seen in typical and atypical development. Within this questionnaire 21 items measured repetitive behaviours including motor, sensory and perceptual behaviours and rituals and routines. Seven items measured play behaviours and three items measured language and communication. The questionnaire, designed to be sent by post, asked parents to rate specific types of repetitive behaviour and play according to their frequency or intensity over the past four weeks.

[2] **The Activities and Play Questionnaire- Revised (APQ-R) is now published** (Honey, Leekam, Turner & McConachie (2006).

Items from the RBQ were selected for inclusion in the questionnaires as this measure and its interview form (RBI, Turner, 1996) have been successfully used in previous research into repetitive behaviours in ASD, OCD and typical development (Leekam et al., in press; Ozonoff et al., 2000; Shearer, 2001; South, et al., 2005; Turner, 1996; Zandt et al., 2007). Repetitive behaviours from the DISCO were adapted for inclusion in the questionnaire to measure sensory behaviours which are not included in the original RBQ. Other DISCO-10 items adapted for the questionnaire related to play. Items were selected on the basis that although used in a diagnostic tool for ASD they measured the developmental level of play according to models of typical development rather than the autistic like nature of play. The DISCO has been shown to have good inter-rater reliability.

The questionnaire was used to collect data from an initial sample of parents of 91 typically developing children and 40 children with ASD aged between 2 and 8 years.

Factor analysis indicated that the items formed two separate factors, repetitive behaviour and play. Preliminary correlational analyses showed associations between repetitive behaviour and play scores in the ASD group. This finding suggests that repetitive behaviour and play are essentially independent behaviours and any associations found between them when using the APQ are not an artefact of the measurement tool.

Despite its promising results, there were a number of weaknesses in the design of the initial questionnaire, in particular in relation to the selection of the play items. The first study of this PhD thesis therefore produced a revised version of the pilot questionnaire, in order to improve its reliability before using it in the main study.

Within the present chapter I discuss the limitations of the pilot questionnaire and methods used to rectify them. Analysis of the reliability of the new measure follows, using data from parents of typically developing children and children with ASD. In Chapter 6, information gathered using the revised questionnaire is examined, with consideration of associations between repetitive behaviours and imagination in typical development and ASD.

5.2. Main Study: Developing the Activities and Play Questionnaire-R (APQ-R)

The original APQ included twenty one repetitive behaviour items going beyond the four ICD-10 categories of repetitive behaviour for autistic disorder (see Section 2.1.1). It also included seven play items that assessed play type, variation and sociability. Three types of play behaviours were examined in the questionnaire: exploratory, functional and symbolic with one item in the questionnaire for each of these types of play. Each item was developed specifically for the APQ and included a specific example of a relevant play activity with the aim of clearly defining the type of play behaviours which questions aimed to tap. By doing this it was hoped that the likelihood of respondents producing differing subjective interpretations of items would be reduced, improving the construct validity and test-retest and inter-rater reliability of the questionnaire. Item 23

of the APQ for example, taps symbolic play and describes, "walk a doll along, feed or care for a toy animal". There are also three play items which tap the overall sociability and variety of play behaviours; these items were taken from the DISCO. The seventh play item in the APQ was a summary item of the overall variability of self-chosen activities. This item originates from the 'Wing & Gould' diagnostic algorithm for ASD produced by the DISCO.

Although the two factors that emerged from the factor analysis were found to have good levels of internal consistency for both a mixed group of typically developing children and children with ASD and for a group of typically developing children independently. The internal consistency of the play factor of the questionnaire was found to be poor for the ASD group independently. It was therefore important that this issue should be addressed in subsequent versions of the APQ.

Further examination of the data from this study and a review of the parental feedback of the questionnaire also highlighted a number of additional problems with the questionnaire including unreliable repetitive behaviour items, limited response options and the absence of items which examine the three dimensions of play to be examined in this thesis: decentration, decontextualisation and integration. The first study of this thesis revised the APQ to create a reliable measure of play and repetitive behaviours in young children. Appendix 2 shows the original APQ used in the pilot study before its development into the APQ-R. Some example items from the APQ can also be found in Figures 5.1 and 5.2

Figure 5-1 *Examples of repetitive behaviour items from the APQ*

	Never or Rarely	One or more episodes daily	15 or more episodes daily (or at least once an hour)
Does your child:			
1. Arrange toys or other items in rows or patterns?	☐	☐	☐
2. Repetitively fiddle with toys or other items? E.g. spin, twiddle, bang, tap, twist or flick anything repeatedly?	☐	☐	☐
3. Spin him/her self around and around?	☐	☐	☐

Figure 5-2 *Examples of play items from the APQ*

	Never or rarely	Once a week or more	Once per day or more
21. Does your child roll toy cars or trains along, build with blocks, play with jigsaws etc.	☐	☐	☐
22. Does your child play with toys as if they were real? E.g. walk a doll along, feed or care for a toy animal.	☐	☐	☐
23. Does you child play make believe games (such as pretend tea party) or invent games stories or scenarios where they pretend to be someone else using objects and or dressing up?	☐	☐	☐

Study 1

To improve the reliability of the pilot questionnaire it was necessary to make a number of changes. This included both the removal of existing items and the addition of new items. See Appendix 3 for a summary of the changes made to the original questionnaire. The Activities and Play Questionnaire – Revised (APQ-R) is the product of the changes made. Table 5.1 reports the sources for all items in the APQ-R (See Appendix 4 for APQ-R).

Table 5-1 *APQ-R items: The behaviours measured and their original sources*

APQ-R Item	Behaviour Measured	Source*
1. Does your child arrange toys or other items in rows or patterns?	Sensory Motor	RBQ
2. Does your child repetitively fiddle with toys or other items?	Sensory Motor	RBQ
3. Does your child spin him/herself around and around?	Sensory Motor	RBQ
4. Does your child rock backwards and forwards or side to side either when sitting or standing?	Sensory Motor	RBQ
5. Does your child pace or move around repetitively?	Sensory Motor	RBQ
6. Does your child make repetitive hand and/or finger movements?	Sensory Motor	RBQ
7. Does your child touch parts of his/her body or clothing repeatedly?	Sensory Motor	RBQ
8. Does your child have an unusual interest in the smell of people, toys or objects?	Sensory Motor	DISCO
9. Does your child have an unusual interest in the feel of different surfaces or toys?	Sensory Motor	DISCO
10. Does your child have an unusual interest in some sounds other than music?.	Sensory Motor	DISCO
11. Does your child show a special interest in bright or shiny things?	Sensory Motor	DISCO
12. Do any sounds upset your child that would not affect others?	Sensory Motor	DISCO
13. Does your child flick his/her hands or objects near his/her eyes?	Sensory Motor	DISCO
14. Does your child like to look at objects from particular or unusual angles?	Sensory Motor	DISCO
15. Does your child insist on things about the house staying the same?	Rituals/Routines	RBQ
16. Does your child insist that aspects of daily routine remain the same?	Rituals/Routines	RBQ
17. Does your child insist that other people do things in the same way?	Rituals/Routines	New
18. Does your child insist on wearing the same clothes or refuse to wear new clothes?	Rituals/Routines	RBQ
19. Does your child play the same music, game or video or read the same book repeatedly (if child doesn't read then have same book read to them)?	Rituals/Routines	RBQ

Table 5-1 *Contd.*

APQ-R Item	Behaviour Measured	Source*
20. Does your child roll toy cars or trains along, build with blocks or play with jigsaws?	Play	APQ
21. Does your child play with real or toy household items using them for their real purpose?	Play	DISCO
22. Does your child hold dolls or toy animals as if they are real?	Play	DISCO
23. Does your child play simple sequences with toys as if they are real?	Play	DISCO
24. How often does your child start these games?	Play	New
25. Does your child play act longer sequences with toys as if they are real?	Play	DISCO
26. How often does your child start these games?	Play	New
27. Does your child use an object as something else when they are playing?	Play	DISCO
28. Does your child play make-believe games where they use 'invisible objects' as if they are really there?	Play	DISCO
29. How often does your child start these games?	Play	New
30. Does your child invent, talk about, write about games, stories or scenarios where they pretend to be someone else or create fictional characters?	Play	DISCO
31. How often does your child start these games?	Play	New

* Source refers to the measure from which the items originated.
RBQ - Repetitive behaviour Questionnaire (Turner, Unpublished)
DISCO - Diagnostic Interview for Social and Communication Disorders -10 (Wing et al, 2000)
New – Item was developed specifically for the APQ-R

5.3 Changes Made to the Repetitive Behaviour Items of the APQ

The original questionnaire (the APQ) had 21 items tapping a range of repetitive behaviours. Four changes were made to these items; the exclusion of three items and the inclusion of a new item. The APQ-R therefore includes nineteen repetitive behaviour items and as in the original questionnaire these include items which fit with the ICD-10 autistic disorder criteria.

5.3.1 Removing Repetitive Behaviour Items

The three items excluded from the original questionnaire are listed below and reasons for their exclusion will now be discussed

1. Is your child attached to anything in particular? (APQ Item 25)
2. Is your child concerned by changes in heat or cold or by pain? (APQ Item 11)
3. Does your child insist on eating the same foods or a very small range of foods at every meal? (APQ Item 19)

The APQ-R no longer includes an item which examines a child's attachment to objects as analysis of the original questionnaire revealed that this item failed to load onto either the repetitive behaviour or play factor.

The item "is your child concerned by changes in heat or cold or by pain?" loaded onto the repetitive behaviour factor of the original questionnaire. However, close

examination of the item, led to a decision that responses may require subjective inferences about an individuals cause for specific reactions to be made to express to their parent/carer why they have reacted in a particular way. Furthermore, respondents may compare the idiosyncratic reactions of their own child to those seen in other children introducing another level of subjectivity. This item was therefore excluded from the questionnaire.

The APQ-R also omits Item 19 of the original questionnaire, relating to food related repetitive behaviours. Whilst principal component analysis of the original questionnaire revealed that this item loaded onto the repetitive behaviour factor, parental comments on the questionnaire indicated that in some cases these behaviours were in part related to limited diets caused by food intolerances such as gluten and casein, as a result these behaviours were no longer included in the questionnaire.

5.3.2 Adding Repetitive Behaviour Items

In addition to removing repetitive behaviour items from the original questionnaire, changes also included the addition of a new item relating to routines and rituals. This item was included in the APQ-R following parental comments added to the original questionnaire. This new item examines the child's need for routines relating to other people to be upheld, such as everybody sitting in the same place at dinner time or the need to know what each family member plans to do for the day and then later what they had actually done and whether these accounts match up.

5.4 Changes Made to the Play Items of the APQ.

The APQ contained seven play items, of which three tapped specific types of play. These items were designed to ascertain which types of play a child was able to perform and tapped exploratory, functional and symbolic play behaviours. The remaining four items examined the quality of self-directed activities including the variety of imaginative activity a child engages in, whether children play alone and whether it was easy to distract a child whilst playing their favourite game.

Principal component analysis of the APQ pilot questionnaire produced a factor representing play; however, the internal consistency scores for this factor were low. It is suggested that a lack of play in children with ASD may produce floor effects for these items resulting in low reliability levels for the play factor; these items should therefore be reviewed. Changes made to play items included in the questionnaire were the removal of five items and the inclusion of ten new items. There are therefore a total of 12 play items in the APQ-R: ten symbolic play items, one functional play item and one exploratory play item. The items within the original questionnaire which tapped exploratory and functional play were seen to be sufficient to provide information about these early play skills and therefore remained unchanged in the APQ-R.

5.4.1 Removing Play Items

The five play items removed from the APQ are listed below and reasons for their exclusion will now be discussed.

1. When other children are around does your child usually play alone? (APQ Item 24)
2. Is your child's imaginative activity varied? (APQ Item 26)
3. How easy is it to distract your child when they are playing with their favourite toy or game or doing their favourite activity? (APQ Item 27)
4. If your child is free to choose any activity what will he or she usually choose to do? (APQ Item 28)
5. Does your child play with toys as if they are real? (Item 23)

The first four items (APQ Items, 24, 26, 27 and 28) removed from the questionnaire originally came from the DISCO and tap the quality of self-directed activities. These were summary items and it was viewed that they were unlikely to be scored as objectively as more specific items. Close examination of the wording of these four items clearly indicates that these items measure the repetitiveness and flexibility of self-directed activities as opposed to the developmental level of play or a specific behaviour. These items were therefore excluded from the new revised questionnaire.

Within the APQ there was only one item examining symbolic play abilities (APQ Item 23). As discussed in Chapter 3 of this thesis, symbolic play is a complex behaviour for which a number of developmental models have been put forward. For the purpose of this thesis symbolic play is being examined in terms of its development in three dimensions: decentration, decontextualisation and integration (Bretherton, 1984; Fenson, 1984; McCune-Nicolich, 1981; Piaget, 1962). To analyse symbolic play

abilities in accordance with this model the symbolic play item from the APQ questionnaire (Item 23) was removed to be replaced with a series of symbolic play items which will be outlined in the following sections.

5.4.2 Adding Play Items

The aims of this study were to produce a measure that would record symbolic play according to its development in three areas: decentration, decontextualisation and integration. To summarise briefly, decontextualisation, is when the child's dependence upon realistic objects decreases, indicating a separation between objects and their meaning. Decentration is when the child's pretence moves from the self as an agent to others as an agent. Integration occurs when symbolic play becomes sequentially and hierarchically organised. It can be seen then that as the child develops skills in each of these dimensions they become able to direct play away from the self and eventually toward other animate or inanimate participants, props used in play become more abstract, and play becomes sequential and flexible allowing the child to create stories and scenarios as opposed to single scenes. To examine the development of symbolic play in each of these three dimensions, six new items were created for the APQ-R. The new items will be discussed in Section 5.4.3 of this chapter.

In addition, as discussed in Chapter 3, it is important for measures of symbolic play to have the potential to differentiate between spontaneous and prompted symbolic play, particularly in children with ASD (Baron-Cohen, 1987; Charman, 1997; Jarrold et al., 1993, 2006; Wing et al., 1977). The original questionnaire did not include items which

allowed this. Four items were therefore added to the new questionnaire to examine the spontaneity of symbolic play; these items will be discussed in Section 5.6.4 of this chapter.

5.4.3 Measuring the Dimensions of Symbolic Play.

Six of the new symbolic play items incorporated into the APQ-R focus upon the development of decentration, integration and decontextualisation abilities (See Table 5.2). The number of play items added to the APQ-R was kept to a minimum to ensure the measure did not become too long for participants and thus reduce the likelihood of participation. It was proposed that as in the original questionnaire, items should tap specific developmental levels of play rather than providing a large battery of items which ask about very specific play behaviours. Furthermore, items should provide an example of a play activity which many children are likely to demonstrate so that similar activities can easily be inferred. Based upon the developmental play items from the DISCO (See Section 4.6.2), two items were created for each of the three dimensions of symbolic play. Items tapping decentration asked about the role which the child has in play and whether they are able to move away from self-directed play, for example, (q30), fictional role play. Items which asked about the way which the child uses objects in play tapped decontextualisation, for example, object substitution (q27). Integration was tapped using items which refer to the length of sequences a child uses in play, for example, long sequences of imaginative play (q25). Each item included an example of relevant play behaviour. Activities portrayed in the play items in the APQ-R were developed on the basis of play behaviours which were described or observed in developmental frameworks and existing measures of symbolic play, for example,

question 22 asks "Does your child hold dolls or toy animals as if they are real? E.g. hug teddy or kiss doll".

5.4.4 Differentiating Between Prompted and Symbolic Play

It was not possible to examine the spontaneity of all the symbolic play behaviours assessed in the APQ-R as the reliability of parent reports for some items would be questionable. For instance, the spontaneity of simple acts of decontextualisation such as using an object as something else (q27) were not measured as the child's understanding of the act could not be ascertained through a questionnaire. Complex acts of decontextualisation such as the use of invisible objects, however, were measured for spontaneity (q29) as these require the child to have a certain level of understanding in order to perform the act and were therefore seen to be free from parental assumptions. With regards to decentration, only the spontaneity of complex acts such as pretending to be someone else was measured (q31). Play acts directed to the self or an inanimate object were not measured for spontaneity as the child's level of understanding could not be ascertained; the behaviour could simply be imitation, for instance holding a doll may not be nursing, rather just picking it up. The spontaneity of integration was measured at both levels; single sequences (q24) and complex combinations (q26) as the child's initiation of such play was seen to be clear to parents. Table 5.2 summarises all play items included in the APQ-R.

Table 5-2 *Play items in the APQ-R*

Item	Play Type	Symbolic Play Dimension
20. Does your child roll toy cars or trains along, build with blocks or play with jigsaws?	Exploratory	
21. Does your child play with real or toy household items using them for their real purpose? E.g. using a sweeping brush to sweep floor.	Functional	
22. Does your child hold dolls or toy animals as if they are real? E.g. hug teddy or kiss doll.	Symbolic	Decentration
23. Does your child play simple sequences with toys as if they are real? E.g. push a toy train or car along the floor making appropriate noises, tuck a doll in bed, give a toy animal a bath.	Symbolic	Integration
24. How often does your child start these games?	Symbolic	Spontaneity of Integration
25. Does your child play act longer sequences with toys as if they are real? E.g. A doll's tea party or loading and transporting different goods when playing with toy cars and trucks.	Symbolic	Integration
26. How often does your child start these games?	Symbolic	Spontaneity of Integration
27. Does your child use an object as something else when they are playing? E.g. block as a phone or car, a piece of paper as a blanket, plasticine as a cake.	Symbolic	Decontextualisation
28. Does your child play make-believe games where they use 'invisible objects' as if they are really there? E.g. pretend tea party with imaginary cake, shop with imaginary groceries or money.	Symbolic	Decontextualisation
29. How often does your child start these games?	Symbolic	Spontaneity of Decontextualisation
30. Does your child invent, talk about, and write about games, stories or scenarios where they pretend to be someone else or create fictional characters?	Symbolic	Decentration
31. How often does your child start these games?	Symbolic	Spontaneity of Decentration

5.5 Response Options.

The APQ-R measures the frequency of play and repetitive behaviours seen in young children. This means scores for these behaviours generated by the APQ-R are directly comparable to one another. The use of a frequency score ensures that all the behaviours which the child engages in are taken into consideration in analysis. A highest level of play score would not provide information about time spent on all types of play behaviour and may misrepresent the presence of symbolic play. For instance, a child may occasionally pretend to be someone else in their play but for the majority of their play engage in simple sequences of play with a doll or figure. By only looking at the highest level of play we would be led to believe that the child did not spend a lot of time playing. Similarly a score for the total number of types of repetitive behaviour which a child engages in will not account for the time spent performing repetitive behaviours.

Response options used in the original pilot version of the questionnaire were revised to create four options rather than three. This provides greater differentiation of those behaviours which in the APQ had appeared to be absent in a large number of typically developing children through the use of the response option never/rarely. This required the never/rarely option provided in the APQ to be split to form two separate responses. All repetitive behaviour and play items in the new questionnaire are scored from 0 – 3 with a score of 3 if the behaviour was present to a considerable degree and 0 if a behaviour was never shown. The APQ -R items and response options can be seen in Appendix 4.

5.6 Testing the Reliability of the APQ-R

Following the development of the Activities and Play Questionnaire – Revised the factor structure of the questionnaire and its internal consistency was examined. The questionnaire has been designed to examine repetitive behaviours and play to gain an understanding of these behaviours independently and of any associations between them. To ensure that any associations found are true it is important to determine whether repetitive behaviour and play items in the questionnaire form independent factors. This was found in the original APQ and was a deciding factor in the selection of this measure for adaptation in the present research.

5.6.1 - Ethics

This research project was approved by the ethical committees of the University of Durham and the National Autistic Society. The researcher did not have access to the names and addresses of any participant recruited through schools, nurseries or support groups. For those participants recruited through a national advertisement, addresses and names were supplied by the participant directly to the researcher. No participant who did not return the questionnaire to the researcher was contacted again about the research.

Items originally included in the questionnaire pack to gather information about social economic status, ethnicity, family make up and detailed information about diagnosis were not permitted by the ethical committees as the questionnaire was to be anonymous.

5.7 Participants

In total 325 questionnaire packs (see Appendix 4) were sent out to parents of typically developing children and 110 to parents of children with ASD. All participants were recruited from different sources than had been used for the master's research project to avoid repeat testing. Of the questionnaire packs that were sent, 36% (n=117) of those sent to parents/carers of typically developing children aged 2 to 4 and 6 to 8 years and 72% (n=80) of those sent to parents/carers of children with ASD aged 2 to 4 and 6 to 8 years were returned.

Parents of typically developing children were recruited through four schools and nurseries within the North of England. Data were gathered for an equal number of typically developing children in each of the age groups. All participants were asked to provide information about any psychological diagnoses which their child may have. If any respondent recruited for inclusion in the typically developing groups indicated that their child had any psychological diagnosis for instance dyslexia, epilepsy, ASD or learning difficulties they were not included in the analysis. Children suspected to have ASD were not added to the ASD group unless a diagnosis was reported by the respondent.

Parents of children with ASD were recruited from schools and nurseries with specialist autism provision in the North of England, where the child was required to have a Special Educational Needs statement for Autism or ASD, specialist support groups across England and via an advertisement placed in Communication, the national

newsletter of the National Autistic Society for parents of children with ASD. For inclusion in the ASD group, parents were required to specify on the completed questionnaire that their child had a diagnosis of Autism or ASD. Recruitment via national advertisement and support groups across England attempted to reach the wider ASD population and maximise numbers for the 2-4 year age group. However, due to the difficulties in diagnosing ASD at such a young age (Baird, Charman, Cox, Baron-Cohen, Swettenham, Wheelwright & Drew, 2001; Howlin & Moore, 1997; Howlin & Asgharian, 1999) it was not possible to gather an equal amount of data for each of the ASD age groups.

For the present study two groups of children were created, those with typical development and those with a diagnosis of ASD. Table 5.3 reports the descriptive statistics for the group.

Table 5-3 *Descriptive statistics for typically developing and ASD children.*

Group	N	Males	Females	Age range (months)	Mean Age (SD)
Typically developing	117	51	56	29 -104	64.47 (20.32)
ASD	80	58	22	35-106	76.09 (18.21)

5.8 Procedure

5.8.1 Typical children

Head teachers of primary schools and nurseries in the North East of England were approached about a study into repetitive behaviours and play in young children. Head teachers were sent a letter which outlined the background of the study and the

procedures for collecting data using a parental report questionnaire. One week after postal contact head teachers were contacted by telephone to discuss the research further. Following contact by telephone four head teachers agreed for their school to take part in the research. Questionnaire packs including a letter for parents explaining the research, contact details of the researcher, a consent form, a copy of the APQ-R, a form for parents to indicate if they were interested in further research and a sealable envelope addressed to the researcher were delivered to the schools. Class teachers were asked by head teachers to hand out the forms to parents of children aged 2 to 4 and 6 to 8 years. Parents who wished to be involved in the research were requested to complete the questionnaire and consent form and return it to school in the envelope provided. Parents who did not wish to take part in the research simply did not complete the questionnaire. Two weeks after the questionnaires were handed out to parents the researcher returned to the school to collect the questionnaires which had been returned.

5.8.2 Children with ASD

Head teachers of primary schools and nurseries in the North of England with specialist provision for ASD and co-ordinators of ASD support groups in England were approached about a study into repetitive behaviours and play in young children. Head teachers and co-ordinators were sent a letter which outlined the background of the study and the procedures for collecting data using a parental report questionnaire. One week after postal contact head teachers and co-ordinators were contacted by telephone to discuss the research further. Those head teachers and co-ordinators who agreed for their school or group to take part in the research were then supplied with questionnaire packs to hand out to parents. Questionnaire packs including a letter for parents

explaining the research, contact details of the researcher, a consent form, a copy of the APQ-R, a form for parents to indicate if they were interested in further research and a stamped envelope addressed to the researcher. Class teachers and parents followed the same procedures handing out and returning questionnaire as described for typically developing children in the previous section.

5.9 Results: Examination of the factor structure of the APQ-R

Principal component analysis (PCA) of the APQ-R was used to examine the construct of the questionnaire. Bartlett's test for sphericity ($p < .001$) and Kaiser-Meyer-Olkin test of sampling adequacy (KMO = 0.88) confirmed that PCA was appropriate for the data. Varimax rotation was used as items were designed to represent two distinct phenomena; repetitive behaviour and play. PCA of the repetitive behaviour and play items in the APQ-R resulted in a two factor solution, in which repetitive behaviour and play items loaded onto separate factors (see Table 5.6). The two factor solution was true for the entire sample, and ASD and typically developing children independently.

Internal consistency scores for all items in the repetitive behaviour factor and all items in the play factor of the questionnaire were calculated for the entire sample, typically developing and ASD groups independently. All Cronbach's alpha scores were between .84 and .94 suggesting the factors extracted were reliable. Table 5.4 reports the Cronbach's alpha scores for the two factors for the three samples examined.

Table 5-4 *Cronbach's alpha scores for entire APQ-R*

Factor	Group		
	All (N = 197)	TD (N = 117)	ASD (N = 80)
Repetitive Behaviour (Factor 1; 19 items)	.933	.880	.929
Play (Factor 2; 12 items)	.937	.837	.926

First, the factor structure of the repetitive behaviour items was examined to determine whether these items could be split according to type. Principle component analysis of the 19 items in the repetitive behaviour factor was conducted. Direct oblimin rotation was used as these items form a single factor in the APQ-R overall and are therefore correlated. A two factor solution was extracted in which sensory motor behaviours loaded onto one factor and rituals and routines loaded onto another separate factor (see Table 5.7). The solution was true for the entire sample and the ASD and typically developing groups independently. The internal consistency of all of the sensory motor items and then all of the rituals and routines items were calculated for the entire group, and the typically developing and ASD groups independently. Cronbach's alpha scores were between .73 and .92 suggesting the factors were reliable (See Table 5.5)

Table 5-5 *Cronbach's alpha scores for APQ-R repetitive behaviour items*

Factor	Group		
	All (N = 197)	TD (N = 117)	ASD (N = 80)
Sensory Motor	.916	.876	.888
Rituals & Routines	.886	.731	.860

Second, the factor structure of the play items in the APQ-R was examined using principal component analysis in order to investigate whether subtypes of play would emerge. As these items form a single factor in the APQ-R overall and are therefore

correlated direct oblimin rotation was used. A two factor solution was extracted in which two items tapping exploratory and functional play loaded onto one factor and the remaining 10 items tapping symbolic play loaded onto another separate factor (see Table 5.8). This was true for the entire sample and the ASD and typically developing groups independently. Using Cronbach's alpha the internal consistency of the functional and exploratory play items and then all of the symbolic play items were calculated for the entire group, and the typically developing and ASD groups independently. The symbolic play items were found to have a Cronbach's alpha score of .94 for the entire sample, .86 for typically developing children and .91 for children with ASD suggesting that the symbolic play factor is reliable. The exploratory and functional play items, however, had Cronbach's alpha values of .57 for the group as a whole, .32 for typically developing children and .41 for children with ASD. These low values may be a result of the number of items in this factor or that the two items although both representing precursors to symbolic play are different types of play behaviours in themselves.

Table 5-6 *APQ-R items and factor loadings for the entire sample.*

Item No.	Item	Factor	
		1	**2**
19	Does your child play the same music, game or video or read the same book repeatedly?	**.794**	-.099
14	Does your child like to look at objects from particular or unusual angles?	**.781**	-.249
5	Does your child pace or move around repetitively?	**.769**	-.130
6	Does your child make repetitive hand and/or finger movements?	**.752**	-.200
16	Does your child insist that aspects of daily routine remain the same?	**.734**	-.153
2	Does your child repetitively fiddle with toys or other items?	**.728**	-.077
7	Does your child touch parts of his/her body or clothing repeatedly?	**.711**	-.127
1	Does your child arrange toys or other items in rows or patterns?	**.439**	.319
9	Does your child have an unusual interest in the feel of different surfaces or toys?	**.699**	-.228
17	Does your child insist that other people do things in the same way?	**.694**	-.149
10	Does your child have an unusual interest in some sounds other than music?.	**.683**	-.171
11	Does your child show a special interest in bright or shiny things?	**.657**	-.118
8	Does your child have an unusual interest in the smell of people, toys or objects?	**.656**	-.164
13	Does your child flick his/her hands or objects near his/her eyes?	**.656**	-.226
12	Do any sounds upset your child that would not affect others?	**.654**	-.239
3	Does your child spin him/herself around and around?	**.594**	.056
18	Does your child insist on wearing the same clothes or refuse to wear new clothes?	**.590**	-.036
4	Does your child rock backwards and forwards or side to side either when sitting or standing?	**.645**	-.103
15	Does your child insist on things about the house staying the same?	**.386**	-.071

Table 5.6 ***Contd.***

Item No.	Item	Factor	
		1	**2**
25	Does your child play act longer sequences with toys as if they are real?	-.113	**.885**
26	How often does your child start these games?	-.157	**.854**
23	Does your child play simple sequences with toys as if they are real?	-.164	**.827**
24	How often does your child start these games?	-.250	**.811**
29	How often does your child start these games?	-.250	**.811**
28	Does your child play make-believe games where they use 'invisible objects' as if they are really there?	-.185	**.796**
27	Does your child use an object as something else when they are playing?	-.179	**.792**
21	Does your child play with real or toy household items using them for their real purpose?	-.036	**.708**
22	Does your child hold dolls or toy animals as if they are real?	-.092	**.677**
30	Does your child invent, talk about, write about games, stories or scenarios where they pretend to be someone else or create fictional characters?	-.197	**.659**
31	How often does your child start these games?	-.181	**.623**
20	Does your child roll toy cars or trains along, build with blocks or play with jigsaws?	.044	**.552**
	TOTAL VARIANCE EXPLAINED (%)	**26.74**	**26.08**

Table 5-7 *Factor solution for repetitive behaviour items for the whole sample*

Item No.	Item	Factor	
		1	2
6	Does your child make repetitive hand and/or finger movements?	**.774**	.175
2	Does your child repetitively fiddle with toys or other items?	**.765**	.150
7	Does your child touch parts of his/her body or clothing repeatedly?	**.762**	.208
5	Does your child pace or move around repetitively?	**.745**	.240
9	Does your child have an unusual interest in the feel of different surfaces or toys?	**.725**	.218
14	Does your child like to look at objects from particular or unusual angles?	**.721**	.362
4	Does your child rock backwards and forwards or side to side either when sitting or standing?	**.718**	.201
10	Does your child have an unusual interest in some sounds other than music?.	**.708**	.104
13	Does your child flick his/her hands or objects near his/her eyes?	**.683**	.226
11	Does your child show a special interest in bright or shiny things?	**.578**	.223
1	Does your child arrange toys or other items in rows or patterns?	**.576**	.008
3	Does your child spin him/herself around and around?	**.564**	.185
12	Do any sounds upset your child that would not affect others?	**.517**	.406
8	Does your child have an unusual interest in the smell of people, toys or objects?	**.515**	.373
16	Does your child insist that aspects of daily routine remain the same?	.300	**.840**
17	Does your child insist that other people do things in the same way?	.290	**.801**
15	Does your child insist on things about the house staying the same?	.336	**.759**
19	Does your child play the same music, game or video or read the same book repeatedly?	.420	**.709**
18	Does your child insist on wearing the same clothes or refuse to wear new clothes?	.157	**.694**
	TOTAL VARIANCE EXPLAINED (%)	**45.71**	**9.98**

Table 5-8 *Factor solution for play items for the whole sample*

Item No.	Item	Factor	
		1	**2**
25	Does your child play act longer sequences with toys as if they are real?	**.900**	.034
26	How often does your child start these games?	**.882**	.045
29	How often does your child start these games?	**.878**	-.135
24	How often does your child start these games?	**.852**	.241
23	Does your child play simple sequences with toys as if they are real?	**.845**	.285
28	Does your child play make-believe games where they use 'invisible objects' as if they are really there?	**.844**	-.127
27	Does your child use an object as something else when they are playing?	**.837**	.008
22	Does your child hold dolls or toy animals as if they are real?	**.696**	.198
31	How often does your child start these games?	**.699**	-.619
30	Does your child invent, talk about, write about games, stories or scenarios where they pretend to be someone else or create fictional characters?	**.703**	-.618
21	Does your child play with real or toy household items using them for their real purpose?	.202	**.662**
20	Does your child roll toy cars or trains along, build with blocks or play with jigsaws?	.516	**.580**
	TOTAL VARIANCE EXPLAINED (%)	**61.55**	**11.33**

5.10 Discussion

In this chapter I have discussed how the Activities and Play Questionnaire-Revised (APQ-R) was developed and reported a study to examine the factor-structure and the internal consistency of this new measure. Principal component analysis revealed that repetitive behaviour and play items in the APQ-R formed independent factors, both of which were found to have good internal consistency. This confirms that the questionnaire reliably taps two different types of behaviour and ensures that any relationship identified between these behaviours using the APQ-R exists beyond the properties of the questionnaire.

Difficulties in the measurement of repetitive behaviours have been cited as a possible reason for the limited research into this area of ASD (Turner, 1999). The APQ-R has addressed issues surrounding the measurement of repetitive behaviours which do not lend themselves to observational methods such as circumscribed interests and rituals through the use of parental reports. Examination of the structure of the repetitive behaviour items in the APQ-R revealed that items form two subgroups of behaviour: sensory and motor behaviours and rituals and routines (see Table 5.6). These categories of repetitive behaviour fit with the criteria proposed by Turner (1999) of higher and lower level behaviours and also the research of those who have conducted factor analysis of repetitive behaviours in ASD using the ADI-R (Cuccaro et al., 2003; Shao et al., 2003, Szatmari et al., 2005, Leekam et al., in press – see Section 2.2.1 for more details). The APQ-R therefore lends itself to studies which may wish to examine the presence of different subgroups of repetitive behaviour in typical and atypical populations. Such studies would provide useful information in between group

differences which may occur in the different types of repetitive behaviour children engage in. Furthermore, if used in longitudinal studies information may be elicited about the way which types of repetitive behaviours change with age. In relation to the research programme conducted in this thesis, the opportunity to examine subtypes of repetitive behaviour will allow more detailed examination of associations between symbolic play and repetitive behaviour than if only a total repetitive behaviour score were available.

The APQ-R has also addressed the issue of salience. As one of the identifying features of ASD, parents of children diagnosed with the disorder are likely to be aware of the behaviours and activities which their child engages in repetitively. Parents of typically developing children, on the other hand, may not necessarily notice repetitive behaviours which their child may show. The advantage of the APQ-R is that it allows information about these behaviours to be gathered easily from parents using a self-report questionnaire, without the need for extensive clinical interview. Whilst such methods may present a risk in terms of reliability, other recent research using parent questionnaires to collect behaviours on language (McArthur Communication Development Inventory, Fenson et al., 1993), communication (Children's Communication Checklist, Bishop, 1989) and autism behaviour (Social Communication Questionnaire, Berument, Rutter, Lord, Pickles, & Bailey, 1999) have proved to be both effective and reliable in collecting information from large numbers of parents.

The APQ-R has been designed to be used with a wide range of populations. The examination of behaviours seen in typical and atypical populations such as playing the same music, game or video repeatedly ensures populations are not distinguished from others on the basis of behaviours which are definitive of the disorder. Similarly imaginative impairments are not measured in the APQ-R by their autistic nature but by the presence or absence of levels of symbolic play identified in models of play development proposed in typical development. The APQ-R is currently the only measure which allows the attainment of information about the frequency and severity of a wide range of repetitive behaviours alongside information about symbolic play in which skills in three dimensions of symbolic play are considered.

Chapter 6

Using the APQ-R to Investigate Associations Between Repetitive Behaviours & Play

Having examined the internal consistency of the Activities and Play Questionnaire – Revised (APQ-R) and established its structure in terms of repetitive behaviour and play, the aim of the present chapter was to use the APQ-R to investigate associations between repetitive behaviour and play. The chapter begins with a brief introduction and outlines the questions for the study, which is then reported and discussed.

6.1 Repetitive Behaviours and Play in Typical Children and Children with ASD

Repetitive behaviours are a normative feature of child development seen from infancy to school age. At around the age of two there is a change in the type of repetitive behaviours shown by typically developing children; that is a move from 'lower level' behaviour such as sensory and motor behaviours to 'higher level' repetitive behaviours such as routines and rituals (Evans et al., 1997). These latter behaviours will later decline in frequency so that by the time children typically start school they demonstrate very few repetitive behaviours (Berkson & Tupa, 2000; Evans et al., 1997). In children with ASD, repetitive behaviour are more frequent and severe than in typical development (Abelson, 1993; Baraneck, 1999; Bodfish et al., 2000; Richler et al., 2007). Research has indicated that as in typical development there may be some changes in repetitive behaviour over time (Bishop, 1989; Bishop, et al., 2006; Charman et al., 2005; Fecteau et al., 2003; Kanner, 1943; Lord et al., 1996; Piven et al., 1996).

However, repetitive behaviours are pervasive in ASD existing beyond the developmental level at which they would typically cease in the normative population.

Symbolic play begins to emerge in typically developing children around the time when language is developing (Bates et al., 1979; Charman et al., 2000; Doswell et al., 1994; Lewis et al., 2000; Lowe, 1975; McCune, 1995). At this time children begin to learn to use objects as something else, take on roles and create meaningful stories. Impairments in symbolic play are a characteristic feature of ASD, however, there is debate about the nature of these impairments with some claiming that symbolic play in individuals with ASD is stereotyped (Riguet et al., 1981), others that it is lacking in spontaneity (Baron-Cohen, 1987; Jarrold et al., 1993) and some that the absence of symbolic play may be an early indicator of early ASD (Baron-Cohen et al., 1992; Baron-Cohen et al., 1996; Scambler et al., 2001).

The Wing & Gould (1979) triad of impairments proposes that excessive repetitive behaviours seen in children with ASD occur in place of symbolic play and that when symbolic play occurs it is restricted or repetitive. In typical development the emergence of symbolic play appears to coincide with the ceasing of repetitive behaviour and thus associations between these phenomena may be inferred. Despite this, associations between repetitive behaviours and play have not been systematically examined in typical or atypical populations. The study which follows uses the Activities and Play Questionnaire-Revised to examine associations between repetitive behaviours and play in young typical children and children with ASD.

Study 2

6.2 Hypotheses

The following hypotheses are examined in the present study using the APQ-R.

1. There will be more repetitive behaviours in children with ASD than in children with typical development
2. There will be less play (overall and symbolic) in children with ASD than in typical development
3. Symbolic play will be associated with language abilities in both typical development and ASD.
4. The frequency of the repetitive behaviours and play that a child shows will be associated in typical development and ASD

6.3 Participants

This study utilises the same data described in the examination of the reliability and validity of the Activities and Play Questionnaire-Revised in the previous chapter. The Activities and Play Questionnaire-Revised was used to collect information about 117 typically developing children (61 = 2 to 4 years old; 56 = 6 to 8 years old) and 80 children with ASD (20 = 2 to 4 years old; 50 = 6-8 years old). Detailed information on the recruitment of participants and inclusion criteria can therefore be found in Section 5.7 of this thesis

6.4 Measures

6.4.1 Activities and Play Questionnaire-Revised

The APQ-R was used to measure repetitive behaviour and play in the present study. The development of the APQ-R, including testing of its internal consistency, is discussed in the previous chapter of this thesis. The questionnaire has been shown to consist of two independent factors: play and repetitive behaviours (see Section 5.9). The repetitive behaviour factor of the questionnaire has been shown to consist of two factors: sensory motor behaviours and routines and rituals. The play factor has been shown to consist of two factors, symbolic and exploratory/functional.

From the information collected using the APQ-R, summary scores can be created for total repetitive behaviours and total play, these are created by totalling the scores for the items which make up these factors in the questionnaire; that is for total repetitive behaviour items 1 – 19 and for total play items 20 - 31. In addition there are also sub-scores for the following categories of repetitive behaviours and play: total sensory and motor behaviours (items 1 – 14), total rituals and routines (items 15-19) and symbolic play (items 22 – 31). These sub-scores represent the two repetitive behaviour factors and the symbolic play factor elicited in the factor analysis of the questionnaire in section 5.9

6.4.2 Language Measures

Play is known to be mediated by verbal abilities (Baron-Cohen et al., 1996, 2000; Bates et al., 1979; Doswell et al., 1994; Lewis et al., 2000; Lowe, 1975; McCune, 1995; Sigman & Ruskin, 1999; Tamis-LeMonda & Bornstein, 1990, 1993, 1994), it is therefore important to include a measure of language in any study of play. The APQ-R does not include a measure of language so to gather this information in the present study additional measures were required. Given the length of the APQ-R and the time taken to complete it, any additional measures to be included in the questionnaire pack needed to be as short as possible to encourage participation.

Two language items were added to the questionnaire pack. These were adaptations of the expressive language level and receptive language level items of the DISCO. These items both have good intra-class correlations for school age and pre-school age children (Wing et al., 2002). Both items were adapted for postal use by providing the rater codes from the interview as response options for participants. Expressive language scores were created by scoring responses from 0 – 8, receptive language scores ranged from 0 – 5. The adapted items included with the APQ-R and the scoring system can be seen in Figures 6.1 and 6.2.

Figure 6-1 *Expressive language item*

How much can your child talk?	Please Tick	Score
• No speech or sounds	☐	0
• Babbles, gurgles, coos laughs without meaning	☐	1
• Babbles or makes noises with meaning	☐	2
• Gives names of people or things when asked	☐	3
• Spontaneously says names of several familiar objects for some purpose	☐	4
• Says phrases of two words	☐	5
• Says some longer phrases, missing out the small linking words (when time go holiday?)	☐	6
• Talks in spontaneous sentences using small linking words	☐	7
• Uses past, present and future tenses and complex sentences	☐	8

Figure 6-2 *Receptive language item*

How much does your child understand?	Please Tick	Score
• Responds to name only	☐	0
• Understands simple phrases in context (e.g. go to bed, give mummy a kiss)	☐	1
• Understands and responds appropriately to a phrase not said regularly	☐	2
• Can be sent out of the room to fetch 2 or more objects (e.g. go upstairs and get your hat and shoes)	☐	3
• Understands a sequence of instructions (e.g. first put your paints away and then wash your hands)	☐	4
• Understands instructions which involve decisions (e.g. see if your hat is in the cupboard if it isn't then have a look upstairs)	☐	5

6.5 Analysis

The normality of the data used in this study was examined using box-plots. Where data were parametric group differences were examined using t-tests, where data were non-parametric Mann-Whitney U tests were used. The relation between variables was examined using correlations and hierarchical regression.

6.6 Results

Initially, a total repetitive behaviour (TRB) and total play (TP) score was created for each participant, these represented Factors 1 (items 1 - 19) and 2 (items 20 – 31) of the APQ-R respectively. In addition, sub-scores for total symbolic play, rituals and routines and sensory and motor behaviours were created. A total symbolic play score (TSymb) was calculated for each individual by summing items 22 to 31 of the APQ-R together; these items were shown in principal component analysis to form a single factor. Principal component analysis had also previously confirmed that the repetitive behaviour items in the APQ-R form two categories, rituals and routines and sensory and motor behaviours (See Section 5.9). Total scores for sensory and motor (TSM) (APQ-R items 1-14) and rituals and routines (TRR) (APQ-R items 15 -19) were created for each child. These were converted into standardised scores to allow comparison as there are unequal numbers of items in each factor. Table 6.1 reports the scores for these variables for typically developing children aged 2-4 years and children with ASD aged 2-8 years.

Initial analysis of the data for the four groups of children (TD 2-4 years and 6-8 years; ASD 2-4 years and 6-8 years) revealed that expressive and receptive language ratings for the older typically developing group had reached ceiling level and therefore the effects of language upon the relationship between repetitive behaviours and play in these children could not be examined further. In the ASD groups there was little variation between the language abilities of the two age groups; it was therefore proposed that these groups be collapsed for further analysis of associations between repetitive behaviour and play in order that comparisons were between groups for whom language was not yet fully developed. The following calculations therefore compare

typically developing children aged 2 to 4 years (n=61) and children with ASD aged 2 to 8 years (n=79).

Table 6.1 reports the scores for the play and repetitive behaviour variables created by the APQ-R and expressive and receptive language scores for typically developing children aged 2 to 4 years and children with ASD aged 2 to 8 years. It should be noted that whilst neither group of children have yet reached the ceiling level for receptive or expressive language, the verbal abilities of the typically developing group are higher than those of the ASD group. The typically developing group are also more homogenous with regards to their language abilities as seen in the standard deviations for the two groups.

Table 6-1 *Descriptive statistics for ASD and TD children*

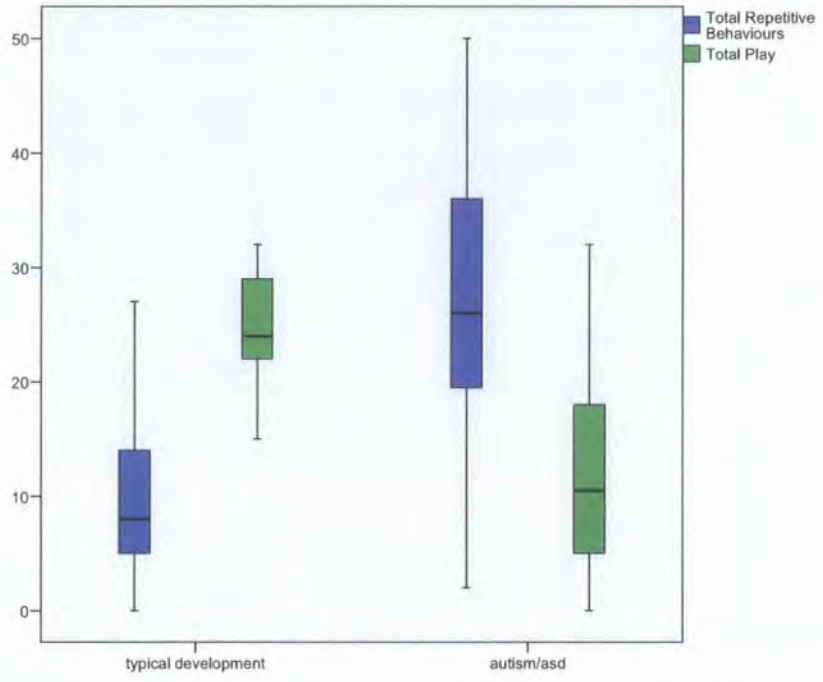
Group (N)	TD 2-4 yrs (61)	ASD 2-8 yrs (80)
Males	35	58
Female	26	22
Mean age in months (SD)	46.36 (6.60)	76.09 (18.21)
Mean Exp. Language Rating (SD)	7.56 (.72)	5.37 (2.32)
Mean Rec. Language Rating (SD)	4.66 (.77)	2.54 (1.58)
Mean TRB (SD)	10.21 (7.06)	26.49 (12.16)
Mean TP (SD)	24.43 (4.97)	11.88 (8.10)
Mean Symbolic Play (SD)	13.16 (3.20)	6.05 (4.71)
Mean Standardised Sensory and Motor (SD)	0.57 (.42)	1.40 (.67)

Hypotheses 1: There will be more repetitive behaviours in children with ASD than in typically developing children.

It can be seen in Table 6.1 that typically developing children aged 2 to 4 years have lower total repetitive behaviour scores than children with ASD aged 2 to 8 years. It can

also be seen that typically developing children were reported to engage in more play than children with ASD. These findings support the first hypotheses that there will be less repetitive behaviour in typical development than in ASD. Significant differences were found between total repetitive behaviour scores of typically developing 2-4 year olds and ASD children aged 2-8 years ($t = -8.98$, $p < 0.001$). These differences are pictured in Figure 6.3

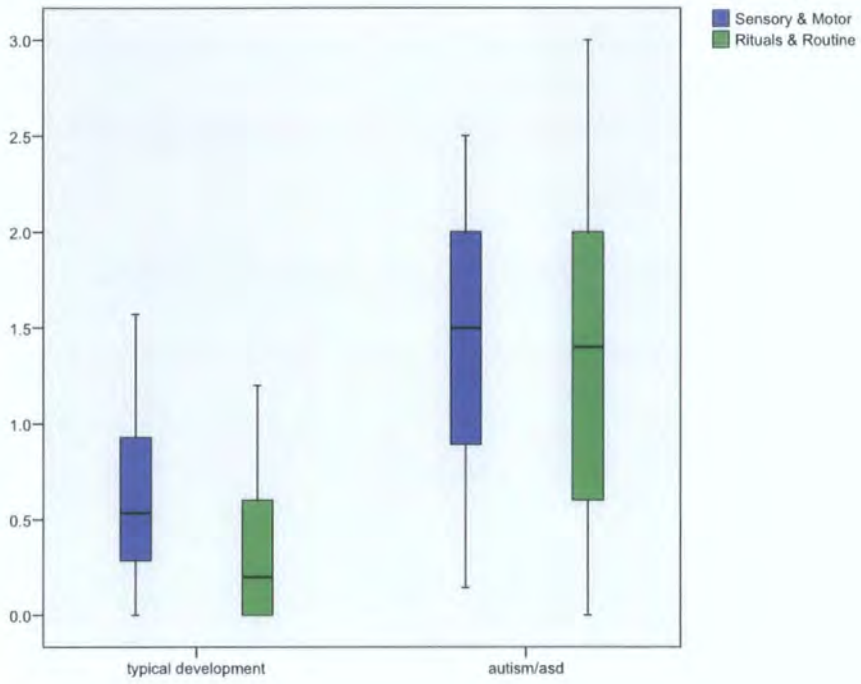
Figure 6-3 *Box-plots of mean total repetitive behaviour and total play scores*



As shown in Table 6.1 children with ASD show more of each type of repetitive behaviour than children of typical development. There are similar levels of sensory and motor behaviours and rituals and routines in the ASD group. In the typically developing group there are more sensory and motor behaviours than rituals and routines. However, there are no children in the ASD group who report no sensory and motor repetitive behaviours, unlike in the typically developing group. Whilst both

groups of children show evidence of rituals and routines, these behaviours may be more frequent in those with ASD as indicated by the presence of scores of 3 in this group.

Figure 6-4 *Box plots of scores for standardised rituals & routines and sensory & motor behaviours*



Data for the two subtypes of repetitive behaviour were not normally distributed (See Figure 6.4). Children with ASD (Mdn = 1.5) were found to show significantly more frequent sensory motor behaviours than children of typical development (Mdn = .5) (U = 734, p <.001). This was also true for rituals and routines (U = 787.5, p <.001) where children with ASD (Mdn = 1.4) showed these behaviours significantly more frequently than typically developing children (Mdn = .2). Figure 6.4 illustrates the differences in repetitive behaviour scores for sensory motor behaviours and rituals and routines for the two groups.

Hypotheses 2: There will be less play in children with ASD than in typically developing children.

Total Play

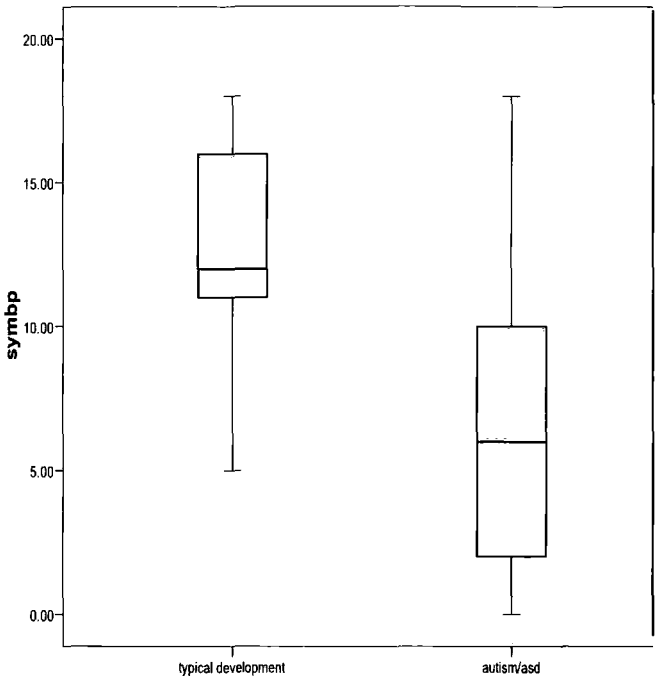
As can be seen in Table 6.1 typically developing children were reported to engage in more play than children with ASD. Significant differences between the total play scores were found between these groups of children ($t = 10.44$, $p < 0.001$) (see Figure 6.3). These findings support primary hypotheses two that there will be more play in typical development than in ASD.

Symbolic Play

It can be seen from Table 6.1 that children with ASD show less total symbolic play (TSymb) than children of typical development. As noted by the relevant ranges of scores it can be seen that some individuals with autism are reported to have scored the maximum for total symbolic play whilst others are reported to show no symbolic play. In comparison, there are no children in the typically developing group who show no symbolic play.

Data for the variable TSymb were not normally distributed (See Figure 6.4). Children in the ASD group were found to have significantly lower total symbolic play scores (Mdn = .6) than children in the typically developing group (Mdn = 1.2) ($U = 543.5$, $p < .001$). This means that children with ASD engage in symbolic play significantly less frequently than those of typical development.

Figure 6-5 *Box plots of scores for total symbolic play*



Hypothesis 3: Symbolic play will be associated with language abilities in both typical development and ASD.

Following the finding that receptive language was not a predictor of total play in typically developing children and children with ASD, examinations of Spearman rank correlations between expressive language and play were conducted. Expressive language was found to be significantly associated with total play and total symbolic play for the ASD group. For the typically developing group, expressive language was also found to be associated with symbolic and total play. Table 6.2 reports the Spearman rank correlations between play and expressive language for the two groups.

Table 6-2 *Spearman Rank correlation matrices between play and expressive language*

		Expressive Language		Total Play		Total Symbolic Play	
		R_s	p-value	R_s	p-value	R_s	p-value
TD	Expressive Lang		.000	.400	.001	.418	.001
	Total Play	.400	.001		.000	.902	.000
	Total Symbolic Play	.418	.001	.902	.000		.000
ASD	Expressive Lang		.000	.365	.004	.372	.003
	Total Play	.365	.004		.000	.835	.000
	Total Symbolic Play	.372	.003	.835	.000		.000

Hypothesis 4: The frequency of repetitive behaviours a child shows will be associated with the frequency of play shown in typical development and ASD.

Total Play

The data for the total play and total repetitive behaviour variables were normally distributed (See Figure 6.3). Total repetitive behaviour and total play were found to be significantly correlated in children with ASD ($r = -0.35$, $p = 0.003$). However, the correlation between these variables was non significant for typically developing children ($r = 0.063$, $p = 0.64$).

Hierarchical regression analysis was used to examine expressive language, receptive language and TRB as predictors of total play. Residual plots were examined to check assumptions of linearity and homoscedasticity and P-P plots to check for normality. For

the entire group (TD 2-4 years, ASD 2-8 years combined) expressive language and receptive language were revealed as significant predictors of total play (R^2 = .33). For ASD children only total repetitive behaviours and expressive language were revealed as significant predictors of total play (R^2 = .33). For typically developing children expressive language was the only significant predictor of play (R^2 = .27). Table 6.3 reports the hierarchical regression output.

Partial correlations were carried out to examine the association between repetitive behaviour, expressive language and play in ASD further. When expressive language was accounted for repetitive behaviour and play remained associated (-.283 p = 0.018). When repetitive behaviour was accounted for the association between play and expressive language also remained (.484, p < .001).

Symbolic Play

The data for total symbolic play had previously been identified as non-parametric. Significant correlations between total symbolic play (TSymbP) and total repetitive behaviours (TRB) were found for the ASD group only (r_s = -.342, p = .003). Further examination of this relationship was conducted by looking at associations between the two categories of repetitive behaviour measured and total symbolic play. Correlations (r_s= -.407, p <.001) revealed significant associations only for total symbolic play and total sensory motor repetitive behaviours.

Examination of residual plots for homoscedasticity and linearity and P-P plots for normality was conducted and hierarchical linear regression used to examine predictors of symbolic play. Whilst the earlier regression in this study examined associations between total repetitive behaviour and total play, this regression focuses only upon symbolic play behaviours. The regression analysis revealed total repetitive behaviours and expressive language to be significant predictors of symbolic play for the group as a whole. These two variables accounted for around 54% of the total variance in symbolic play. Of this expressive language alone accounted for approximately 45% of the variance and repetitive behaviour alone 31%. For typical children only expressive language was a significant predictor of symbolic play accounting for 26% of the variance in symbolic play. For the ASD group repetitive behaviour and expressive language were significant accounting for 34 % of the variance. Alone, expressive language accounted for 28% of the variance and repetitive behaviour 12%. Table 6.4 reports the regression output.

Table 6-3 *Hierarchical regression for variables predicting total play*

Group	Model	R^2	B	SEB	B	T	p-value
All	**Step 1**	.33					
	Receptive Language		.30	.06	.46	5.13	<.001
	Expressive Language		.18	.05	.34	3.80	<.001
	Step 2	.34					
	Receptive Language		.13	.06	.23	2.13	.035
	Expressive Language		.17	.05	.37	3.44	.001
	TRB		-.10	.07	-.10	-1.40	.163
TD	**Step 1**	.27					
	Expressive Language		.44	.13	.46	3.30	.002
	Receptive Language		.09	.12	.10	.75	.457
	Step 2	.29					
	Expressive Language		.46	.13	.48	3.44	.001
	Receptive Language		.07	.13	.08	.55	.582
	TRB		.16	.14	.13	1.10	.275
	Step 3	29					
	Expressive Language		.50	.11	.53	4.56	<.001
	TRB		.17	.14	.14	1.22	.227
	Step 4	.27					
	Expressive Language		.41	.09	.52	4.47	<.001
ASD	**Step 1**	.319					
	Expressive Language		.16	.05	.35	2.68	<.001
	Receptive Language		.19	.09	.28	2.182	.033
	Step 2	.36					
	Expressive Language		.15	.06	.34	2.66	.010
	Receptive Language		.15	.09	.22	1.66	.101
	TRB		-.22	.11	-.22	-2.05	.044
	Step 3	.33					
	Expressive Language		.19	.19	.46	4.44	<.001
	TRB		-.27	-.27	-.27	-2.50	.015

Table 6-4 *Hierarchical regression for variables predicting symbolic play*

Group	Model	R^2	B	SEB	B	t	p-value
All		.54					
	Expressive Language		1.36	.17	.53	8.09	<.001
	TRB		-.14	.03	-.34	-.516	<.001
TD		.26					
	Expressive Language		2.23	.50	.52	4.43	<.001
	TRB		.029	.05	.06	.55	.58
ASD		.34					
	Expressive Language		1.00	.20	.48	4.96	<.001
	TRB		-.10	.04	-.26	-2.61	.01

6.7 Discussion

The aim of this chapter was to examine repetitive behaviour and play in young children of typical and atypical development using the APQ-R. In the present study the APQ-R was used to examine differences between repetitive behaviours and play and how they may be related in typical children and children with ASD. Information about the play and repetitive behaviours of 117 typically developing children and 80 children with ASD was collected using the questionnaire. Detailed analysis was conducted on 80 children with ASD aged 2-8 years and 61 children of typical development aged 2-4 years.

The use of a questionnaire in the present research allowed access to a large sample of participants in a relatively short period of time to conduct preliminary analysis of the association between repetitive behaviours and symbolic play proposed by Wing & Gould (1979). Analysis of the questionnaire in Chapter 5 of this thesis revealed that repetitive behaviours and play are independent and that the APQ-R gathers reliable and valid information about these behaviours.

6.7.1 Do children with ASD Engage in More Repetitive Behaviours than Children of Typical Development?

Initial examination of the data in the present study revealed that typically developing children showed significantly less repetitive behaviours than children with ASD. This information confirms that the questionnaire was consistent with international diagnostic

criteria for autism (ICD-10 & DSM-IV) and the triad of impairments (Wing & Gould, 1979) which states that excessive repetitive behaviours are a defining feature of the disorder.

Close examination of the types of repetitive behaviour in which children engaged revealed that the ASD group are reported to show more of both types of repetitive behaviours (sensory motor behaviours and routines and rituals) than the typically developing group. Frequent sensory motor behaviours and routines and rituals formed on average equal percentages of the total repetitive behaviour scores of children with ASD. Sensory motor behaviours were on average more frequent than routines and rituals in the typically developing group. The typically developing group included in this section of analysis were aged 2 to 4 years. According to Evans et al. (1997) routines and rituals only begin to emerge at 24 to 36 months of age. These children may therefore be in the early stages of developing these types of behaviours. So, although repetitive motor behaviours in typical development are known to reduce around the child's first birthday (Thelan, 1979), these may still be the most prominent behaviour in the child's repertoire at 2 to 4 years of age. Differences between the results of the present study and Thelan's may also be explained by differences in the choice of methodologies; Thelan used observations whilst I have chosen to use parental reports. As such, Thelan is likely to be reporting on behaviours seen during a snapshot of time whilst I am reporting upon behaviours reported by parents as seen over a child's average day.

Post-hoc examination of associations between repetitive behaviour and language revealed only sensory motor behaviours in ASD to be associated with expressive language (r_s = -.278, p = 0.02). This suggests that a child with ASD may have to reach a particular language level in order to see a reduction in these types of behaviours. It is possible then that a two way relationship between language and self-chosen activities exists. As a child's communication abilities improve they become better able to make their needs and desires known, as a result of this improved communication the number of activities which they are able to engage in may increase. A greater range of activity options may therefore lead to a reduction in the time spent engaging in motor and sensory repetitive behaviours. This may be reflected in an increase in higher level repetitive behaviour (rituals and routines) or in non repetitive behaviours such as play.

6.7.2 Do children with ASD show less play than children of typical development?

Initial examination of the data in the present study indicated that typically developing children engaged in significantly more total play than children with ASD. Examination of symbolic play only, revealed that children with ASD were reported to engage in less symbolic play than children of typical development. Such findings indicate that children with ASD may have impairments in symbolic play in comparison to their typically developing peers. The range of total symbolic play scores for typical children and children with ASD was examined revealing that some children with ASD scored the maximum for this variable whilst others scored the minimum. This means that although according to parental reports of play using the APQ-R, symbolic play is less frequent in children with ASD than in typically developing children, evidence indicates that some children with ASD are capable of advanced symbolic play behaviours. This suggests

that as with the other features of the disorder, impairments in imagination occur to differing degrees across the population, that is, that features of ASD occur as a spectrum of severity. It should be noted, however, that the expressive language scores for children with ASD were lower than those for children of typical development, this may explain between group differences in the play scores. That is that given the existing literature surrounding play and language (Baron-Cohen et al., 1996, 2000; Bates et al., 1979; Doswell et al., 1994; Lewis et al., 2000; Lowe, 1975; McCune, 1995; Sigman & Ruskin, 1999; Tamis-LeMonda & Bornstein, 1990, 1993, 1994) children of greater verbal ability would be expected to engage in more advanced play behaviours.

Play and language are known to develop alongside one another in the typical population with the first signs of play emerging around the time when a child speaks their first words (Bates et al., 1979; Morans, 1997; Piaget, 1962). Following the finding that receptive language, as measured by the adapted DISCO measures, was not a predictor of total play in typically developing children or children with autism, examinations of expressive language scores, total play scores and total symbolic play scores were conducted. Results revealed associations between expressive language and both overall play and symbolic play in the ASD and typically developing groups. These findings support findings that play and language are associated and suggest that an inability to attain specific levels of play in ASD may be a result of poor language ability.

6.7.3 Are Repetitive Behaviours and Play associated in Typical Development and ASD?

One of the aims of this thesis was to examine how repetitive behaviour and play, in particular symbolic play, may be associated in typical and ASD populations. In the present study, significant correlations between total repetitive behaviour and total play were found to exist for the ASD group only. Such a finding suggests that children with ASD who engage in few play activities are more likely to engage in frequent repetitive behaviours than children with ASD who engage in frequent play activities. Given the association found between play and language, a hierarchical regression was carried out to examine this relationship further. Using these methods, total play in typical development was found to be predicted only by expressive language, whilst in the ASD population total play was predicted by both expressive language and total repetitive behaviour. What these findings may suggest is that repetitive behaviour and play are associated in both typical development and ASD, yet play is also strongly mediated in the typical population by the development of language.

Significant associations were only found between total symbolic play and sensory and motor repetitive behaviours in the ASD population. The hierarchical regression showed that for the typically developing group total symbolic play was predicted by expressive language only, whereas for the ASD group, total symbolic play was predicted by repetitive behaviour and expressive language, although alone language accounted for a large proportion of the variance in symbolic play. It is suggested that whilst language is necessary for the development of symbolic play in both typical children and children with ASD, that in children with ASD there are additional factors which may impact upon symbolic play abilities. Such factors may include the child's choice to engage in

repetitive behaviours which are not play based. In limiting the amount of time spent engaged in play the child will therefore be reducing the amount of time they spend developing play skills and are therefore likely to be at a developmentally lower level than their typically developing peers.

On the basis of the findings in this study, support has been identified for the Wing & Gould (1979) triad of impairments in which excessive repetitive behaviours replace symbolic play. Evidence of an association between repetitive behaviour and symbolic play in the ASD population and not in the typically developing population may suggest that these behaviours are uniquely related in the ASD population. This finding has theoretical implications for our understanding of ASD; theories of autism which have been proposed have to date failed to examine the associations between repetitive behaviour and imagination proposed by Wing & Gould (1979).

The results from the study have been interpreted as indicative of associations between symbolic play and repetitive behaviour in children with ASD but not in typical development and therefore as supporting Wing & Gould (1979). However, a possible limitation of this study is that the association may simply be a reflection of the language abilities of the children in the ASD group. Examination of the distribution of language scores for the typically developing and ASD groups included in the present study revealed that the ASD scores were less homogenous. Further examination of the expressive language scores for each child in the study revealed that in the typically developing group all children were able at minimum to join two words together. In

comparison, in the ASD group there were 15 children not yet at this developmental level, of these children 13 were not able to gives names of people or things when asked. Considering these findings it is possible that associations between symbolic play and repetitive behaviour found in this study are a result of the lower verbal abilities of the ASD group.

To examine this proposal further, a post-hoc analysis was conducted in which children with ASD unable to join together two words were excluded from analysis. Thus the minimum language levels of the typically developing and ASD groups were equivalent. Furthermore, they were of the minimum level required to engage in symbolic play. Examination of associations between repetitive behaviour and symbolic play for these children revealed that total symbolic play was significantly correlated with total repetitive behaviours (r_s = -.321, p =.019) and sensory-motor behaviours (r_s = -.341, p =.013). Although differences remain in the language abilities of the typically developing and ASD groups, the post-hoc analysis suggests that when a child has reached the language level at which symbolic play would typically be possible, repetitive behaviours and symbolic play are associated only in ASD. It should be noted, however, that examination of the symbolic play scores for each participant included in the study revealed that even at a language level when symbolic play should be possible there are some children with ASD who according to parental reports show no evidence of symbolic play. Furthermore, data collected using the APQ-R suggests that there are some children with very limited expressive language who do engage in some forms of symbolic play. These results provide evidence to support the theory of an autism spectrum in which imaginative impairments vary in severity within the ASD population.

However, they also suggest that the measure of language used in the present study should be considered carefully.

6.7.4 How Should We Move Forward in our Study of Repetitive Behaviour and Imagination?

Despite the development of a reliable measure of repetitive behaviour and play and the successful examination of these behaviours in typical and ASD populations, the present study has limitations particularly in the measurement of symbolic play. First, the ability to make distinctions between developmental levels of symbolic play requires a familiarity with play literature and a trained eye which many respondents are unlikely to have. Furthermore, whilst the APQ-R allows for some analysis of spontaneous symbolic play acts there are insufficient items to allow the comparison of spontaneity across the three dimensions of play. In addition those items which examine the spontaneity of symbolic play ask "how often does your child start these games?"; the way in which these items have been phrased may result in over estimations of spontaneous play abilities in the ASD population. For instance, a child who initiates interaction by presenting parents with a toy has not actually spontaneously started the play act. The parent may be the one who uses the toy as an agent of action. If the child's behaviour was coded as starting play then it would result in an over estimation of spontaneous play. Unlike repetitive behaviours, play lends itself to observational methods. The play items created for the APQ-R have been based on theory and existing detailed interview and observation schedules. It is proposed that to further validate the APQ-R play items, observational methods should be employed.

As discussed previously the measure of language used in the present study should be carefully considered. Whilst parent reports on children's levels of ability can be shown to have good validity (Bailey, Simeonsson, Byusse & Smith, 1993; Fenson et al., 1993), a more accurate measure of language would be preferable. The reported presence of some symbolic play in children with ASD and very limited expressive language abilities should not be immediately dismissed. It should be considered that the social deficits of ASD may impact upon the child's use of language masking true language abilities. That is, a child's use of language may be mediated by their social deficits making them appear to be less verbally able than they are as a result of limited social interactions.

A further limitation to this research is the lack of information about the severity of ASD or indeed the procedures which were used in establishing the clinical diagnosis for each participant; unknown differences in these factors would therefore need to be taken into consideration in future research. Finally, during the present study difficulties were found in recruiting and indeed identifying parents of children with ASD under the age of 5 years. To investigate associations between repetitive behaviour and imagination further a larger sample of these young children would be highly advantageous.

6.8 Conclusion

In this chapter I have used the APQ-R to examine repetitive behaviour and play in a broad range of children through parent report. The present study found that repetitive behaviour and play were associated in children with ASD aged 2-8 years but not in typically developing children aged 2-4 years, providing some support for the Wing &

Gould (1979) categorisation of imaginative impairments. Findings that repetitive behaviours in ASD were predicted by total play and language has theoretical implications for the understanding of the developmental relationship between imagination and repetitiveness in ASD and practical implications for current diagnostic classifications and interventions in which attempts to reduce certain behaviours may lead to an improvement in play abilities. The possibility that we may need to consider an association not only between repetitive behaviour and imagination but a three-way association that incorporates both imagination and language may also help us to rethink the way that ASD is currently categorised, as well as helping to gain further insights into symbolic development and autism.

Chapter 7

Using the ADOS-G to Examine Associations Between Repetitive Behaviours & Play in ASD

In the previous chapter I used data from a new parental report questionnaire to show that repetitive behaviours and symbolic play are associated in children with ASD. Findings from this study also showed that the degree of symbolic play in ASD is significantly predicted by expressive language and total repetitive behaviours supporting existing findings of relations between the development of play and language and the proposal of Wing & Gould (1979) that repetitive behaviours occur in individuals with ASD in the place of symbolic play.

Questionnaires have various inherent limitations and in order to explore the relationship between repetitive behaviour and imagination more systematically it is important to use alternative methods. In the present chapter a study is reported that uses an observational method to study both repetitive behaviour and imagination. This study also provides the opportunity to further consider the impact of language on this relationship.

7.1 Overcoming Some of the Limitations of the APQ-R

One of the limitations of the APQ-R used in the previous study is the ability of respondents to correctly interpret the play items. The play items included in the APQ-R give examples of specific types of play behaviour, for instance item 25 asks "Does your

child play make-believe games where they use 'invisible objects' as if they are really there? E.g. pretend tea party with imaginary cake, shop with imaginary groceries or money". A child may not engage in the activities mentioned, however, they may, for instance, pretend to drive around in an invisible car. For accurate information to be reported it is essential that the respondent is able to recognise the similarity between the given example and the actual activities that their child engages in. Standardised observational studies of play that require a trained observer to recognise and code types of play behaviours may increase the reliability of the information gathered about the types of play of which a child is capable. This is achieved through the use of standardised procedures which encourage high levels of inter-rater reliability.

Observational studies can be structured or unstructured. Unstructured observations are more naturalistic than structured observations and would allow the child to direct their own play and behaviour. However, in order to both observe an individual's play abilities and ensure observations are comparable across children, it may be necessary to impose a structure. Furthermore, structured activities present opportunities to facilitate behaviours which the individual may be capable of but not typically choose to engage in. As such it is possible to gain information about the capabilities of an individual rather than a picture of their usual behaviours. The nature of structured observations and the ways in which they attempt to direct activities requires the language abilities of the participant to be taken into consideration. For instance, a child of low verbal ability may require non-verbal direction such as modelling to direct them whilst a child with good verbal ability will be able to respond to verbal instructions and directions (for

example the Test of Pretend Play; Lewis & Boucher 1997 and the Symbolic Play Test; Lowe & Costello, 1976, 1988).

It is well known that the development of play and language are synchronous in the typical population (McCune, 1995; Lowe, 1975; Bates et al., 1979). Furthermore, information collected using the APQ-R indicated that repetitive behaviour and expressive language may be predictors of play abilities in children with ASD. As such, it is important that, where possible, language is accounted for when examining associations between repetitive behaviour and imagination. This can be done using standardised language assessments. However, the role of language in the assessment of play should also be considered. A structured observational study of play which does not rely upon the presence of language for play to be elicited, yet can be tailored to the developmental level of the child would offer enormous benefits to the study of both symbolic play ability and associations between symbolic play and repetitive behaviour. One such measure is the ADOS-G (See Sections 4.2 and 4.6.3 for summary) which also provides information on repetitive behaviours shown during an observed session. It was the ADOS-G which was selected for use in the present study as an observational measurement tool of symbolic play and repetitive behaviour. The following sections will discuss the ADOS-G in more detail, in particular its usefulness in examining repetitive behaviours and symbolic play in children with a limited range of language ability.

7.2 The Autism Diagnostic Observation Schedule- Generic

The ADOS-G is a diagnostic tool for autism which has been widely used in clinical and research practice. The ADOS-G is a semi-structured tool which uses play based activities to examine features of autism. Five domains of behaviour are assessed over the course of the assessment, these are reciprocal social interaction, communication, imagination, stereotyped behaviours and restricted interests and other abnormal behaviours. A study of 223 children and adults with ASD, Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) and non spectrum disorders found the ADOS-G to have substantial inter-rater reliability and test-retest reliability for all items, excellent inter-rater reliability within each behavioural domain and excellent internal consistency (Lord, Leventhal & Cook, 2005).

The ADOS-G consists of four modules all of which provide opportunities to assess each of the five domains of behaviour mentioned above. Only one module is administered to each participant at any given time and the module to be used is selected according to their expressive language level. Each of the four ADOS-G modules is administered over a period of 30 to 45 minutes. Within this time the administrator presents a series of standard activities which allow the administrator to observe the presence or absence of behaviours important to the diagnosis of autism and other pervasive developmental disorders (Appendix 5 reports the activities included in each module). Within these activities the administrator uses standard 'presses' for communication and social interaction. 'Presses' consist of planned social occasions in which it has been determined in advance that a particular type of behaviour is likely to appear (Murray,

1938). All those who administer the ADOS-G must have been trained to do so and also maintain high levels of rating reliability.

The availability of four modules each applicable to a specific expressive language level means the ADOS-G is suitable for individuals of all verbal abilities, from those with no speech to individuals who are verbally fluent. The use of modules which represent different expressive language abilities was incorporated into the design of the ADOS-G as a result of difficulties in diagnosis associated with early versions of the ADOS-G (Lord et al., 2000). The ADOS and Pl-ADOS were predecessors to the ADOS-G and were prone to over diagnosing children with autism when language levels were insufficient to complete tasks and under diagnosing children when their language abilities exceeded those required for the task. The use of different modules and therefore different coding schemes and tasks in the ADOS-G aimed to overcome this problem through the minimisation of any biases which variations in language ability may cause. The modular design of the ADOS-G is therefore particularly useful in the study of populations such as ASD where ability levels within a group may vary highly and also in longitudinal studies allowing the same measurement tool to be used at each time point regardless of changes in the participant's ability. Furthermore, and with particular relevance to the topic of symbolic play, the ADOS-G allows symbolic play abilities to be measured in non-verbal and verbal individuals.

The module to be used with a participant is selected at the time of the observation on the basis of the administrator's first hand experiences of the child's verbal abilities. The

ADOS-G, however, has a significant amount of cross-over between neighbouring modules and therefore is flexible enough for administrators to switch between modules if they feel their initial choice was inappropriate. For instance, in cases where a child appears to have good language but after working with the child it becomes evident that language being used is stereotyped or learned then a lower level ADOS-G module can be introduced. Similarly, if a child does not verbally engage with the administrator at the beginning of the session but later shows evidence of more advanced expressive language then a more advanced module can be introduced. At the end of the assessment session the module from which all tasks have been administered will be coded. This flexibility ensures that language appropriate tasks are always administered.

7.3 The ADOS-G and ICD-10 Diagnostic Criteria for Autism

As discussed in Chapter 4 of this thesis, the ADOS-G uses a series of language appropriate activities which are administered to assess a range of specific target behaviours and the quality of more general behaviours within each of the five domains of behaviour mentioned above. These behaviours are then scored at the end of the ADOS-G in a series of codes. These scores are a representation of the individual's performance over the course of the ADOS-G and therefore aim to present a reliable and valid picture of their abilities and behaviours. Codes are generally rated on a 3 point scale from 0 to 2, where 2 represents a definite abnormality, 1 represents some evidence of abnormalities and 0 represents no evidence of abnormality. From these ratings, algorithm scores are derived that are a reflection of DSM-IV and ICD-10 criteria for autism. Algorithm scores are produced for social interaction, communication, and repetitive behaviours separately and there is a combined algorithm for social interaction

and communication. The combined social and communication algorithm is the score which is primarily used in the diagnosis of ASD. Cut off scores are then applied to the algorithm scores to identify whether a child meets criteria for core autism or ASD.

The ADOS scores for stereotyped behaviour and restricted interests are not currently included in the total algorithm score. The reason is that although reliability studies of the ADOS-G (Lord et al., 2000) identified group differences in each of the 4 modules for these categories, these codes were not useful in categorising individuals. While these items identified differences between non-spectrum children and children with PDD-NOS or autism, they did not identify differences between the latter sub-groups. In addition to the algorithm scores discussed a separate score for creativity/imagination is also created. However, like repetitive behaviour, this is not classed as an algorithm score in the ADOS-G manual (Lord et al., 2000) and is not used in the diagnosis of autism or ASD.

Of particular relevance to the present research is the fact that ADOS-G is based upon ICD-10 criteria of ASD. Within the ICD-10 criteria for autism, play is categorised with communication, (See Appendix 1) by definition then there should be no overlap between imaginative behaviours and sociability and repetitive behaviours. This is important to ensure that any associations found between play and repetitive behaviour are not an artefact of the measure in which play can be coded as repetitive.

7.4 Measuring Repetitive Behaviours using the ADOS-G

The ADOS-G assesses a variety of repetitive behaviours which individuals may demonstrate throughout the session. As mentioned above, the presence of repetitive behaviours in the ADOS-G is not currently required for a diagnosis of autism to be made. The assessment using the ADOS-G is a snapshot of time and therefore it is unable to capture behaviours which may be circumstance specific, for example, a child having to walk to the shop via a specific route or always sit at the same place at the table and eat with the same cutlery. Nevertheless, despite the small time frame which the ADOS-G evaluates, it is still possible to code four or five different categories of behaviour depending upon the module administered. ICD-10 criteria for autism highlights four categories of repetitive behaviour common to the disorder and all modules of the ADOS-G evaluate three of these:

- persistent preoccupations with parts of objects
- stereotyped and repetitive motor mannerisms
- encompassing preoccupations and restricted patterns of interest

Only Modules 3 and 4 assess the fourth ICD-10 category of repetitive behaviour, "an apparent inflexible adherence to specific non-functional routines or rituals". For each category of repetitive behaviour measured there is one ADOS-G code. In addition to these three or four repetitive behaviour codes, each module also evaluates self-injurious behaviour which may be shown during the assessment.

As discussed previously, each repetitive behaviour code is rated at the end of the assessment according to severity and reflects repetitive behaviours seen throughout the ADOS-G. Scores for repetitive behaviours range from 0 to 2 or 0 to 3.

7.5 Measuring Symbolic Play using the ADOS-G

Each module of the ADOS-G includes tasks that specifically elicit play behaviours, the Birthday Party in Modules 1 and 2, Joint Interactive play in Modules 2 and 3 and Creating a Story in Modules 3 and 4 (See Appendix 6 for details). Each module also produces ratings for play. Modules 1 and 2 each have two codes within this domain which represent functional and symbolic play respectively. Modules 3 and 4 on the other hand have only one code: symbolic play. Like the majority of codes in the ADOS-G, play is scored at the end of the session and rated from 0 to 3 with 0 representing no impairments. Although each module has codes examining symbolic play, it should be noted that the ratings used are not consistent across modules. The detailed ratings increase according to the level of sophistication expected of children assessed in that module; that is that children's play abilities are rated with reference to their expressive language abilities. This will be discussed in more detail in Chapter 9 of this thesis.

In each ADOS-G module a score is produced for imagination. For Module 1 this is a combination of the functional and symbolic play codes whilst for all other modules it is a representation of symbolic play only.

Study 3

7.6 Can We Better Utilise the Repetitive Behaviour and Symbolic Play Information which the ADOS-G Elicits?

As expressive language and symbolic play are known to be associated in typical development (Charman et al., 2000; Doswell et al., 1994; Lewis et al., 2000) by selecting language appropriate tasks, the influence of language upon any associations between repetitive behaviour and symbolic play is to some extent held constant.

As discussed in the review of measures of play (See Section 4.4), some assessments of symbolic play focus upon children within a specific expressive language bracket. For example, the Macarthur Communicative Development Inventory (Fenson et al., 1993) does not measure symbolic play in its second protocol (Words and Sentences) and the Symbolic Play Scale is designed for use with children aged 9 months to 5 years. The ADOS-G Module 1 is different as it is suitable for use with individuals of all abilities. Furthermore, Module 1 of the ADOS-G can be used with individuals who have no or limited expressive language. This module requires that a child's expressive language abilities range between no words at all and the use of simple phrases yet still presents opportunities for a child to perform symbolic play acts. For example, The Birthday Party task presents an opportunity for children to engage in play behaviours such as feeding a doll with a pretend cake or wiping up an invisible drink.

The purpose of the study reported in the current chapter was to follow up the questionnaire study discussed in Chapter 6 of this thesis using observational methods. While the questionnaire study included children with a range of different language levels, the current study confined the investigation of play and repetitive behaviour to children who had more consistent language abilities. By examining children in the early stage of language and symbolic play development (Bates & Thal, 1991; McCune, 1995; Tamis Le Monda & Bornstein, 1990; 1993; 1994; Ungerer & Sigman, 1984) it may be possible to determine if associations between repetitive behaviour and play found in the previous study stand true during the early parallel development of language and play. That is to determine if, when symbolic play and language are only just beginning to emerge in children, an association between play and repetitive behaviour exists. Furthermore, the study reported in Chapter 6 presented evidence that according to parental reports some children with autism with very limited expressive language were able to engage in symbolic play.

Observational studies that have adopted a free play approach (Belsky & Most, 1981; Brown et al., 2001; Charman, 2003; Fenson et al., 1976; Ungerer & Sigman, 1984) and questionnaires such as the APQ-R do not offer the same potential to identify the true symbolic play abilities of a child as structured play assessments. Parental reports of their child's play behaviours and the play behaviours observed during free play assessments (regardless of the standardisation of toys) are likely to reveal only the play skills which the child wishes to engage in. Whilst for some children this may be a reflection of their most advanced behaviours it is unlikely that this will be the case for all children. The ADOS-G adopts a semi-structured approach to play assessment and

uses presses within its activities to promote specific behaviours. The semi-structured approach provides children with the opportunity to guide activities to a certain extent; however, the use of structured tasks which included a series of presses provides each child with the same opportunities to engage, thus increasing the likelihood of a true representation of the child's abilities. For example, during The Birthday Party in Module 1, there is an opportunity for the child to wipe up an invisible drink which the assessor spills. The presses to be used are written into the instructions and provide a number of opportunities for the child to engage. The instructions are as follows;

> "After placing the napkin on the table, knock over the cup as if by accident, and say 'Oh, no! I spilled the juice! What a mess! What should we do?' If the child does not respond, ask him/her, 'Can you help clean up?' If there is still no response, hand him/her the napkin/serviette." (Lord et al., 1996, p.13)

It can be seen in the instructions for this part of the task that there is an opportunity for the child to perform the behaviour of wiping up the drink spontaneously and then a further two opportunities for the child to perform after presses. Such an approach maximises the opportunity for the child to perform a behaviour which under normal free play circumstances they may not engage in.

In this study, the ADOS-G was used to examine repetitive behaviours and imagination in a large sample of young children with a diagnosis of ASD. Children who had been assessed with Module 1 of the ADOS-G were selected for inclusion in the present study as this will allow the examination of any associations between these repetitive behaviour and play during the earliest stage of language development. Their language

abilities were also examined using the Mullen Scales for Early Learning (Mullen, 1995) to allow for further examination of the role of language.

7.7 Hypotheses

Data collected using the ADOS-G were used in the present study to test the following hypotheses. These have been derived on the basis of the findings of the previous questionnaire study (Chapter 6) and a systematic review of play and repetitive behaviour literature (Chapters 2 and 3):

1. Expressive language ability as measured by the Mullen Scales will be associated with the degree of play impairment seen in children as measured by the ADOS-G.
2. The severity of repetitive behaviours will be associated with the degree of play impairments seen in children.
3. Expressive language abilities and the severity of repetitive behaviours will be significant predictors of play impairments seen in children.

7.8 Participants

Data from 75 children with a diagnosis of autism or ASD aged between 2 and 4 years were used in the present study. All children had been assessed with Module 1 of the ADOS-G. These were archival data from children included in a cohort of 104 children aged between 24 and 48 months with autism, ASD and speech and language difficulties. Only those children with a diagnosis of autism or ASD were included in the present

research. Of the 104 children in the cohort, 79 had a diagnosis of autism or ASD, four of whom were excluded from the present study as complete ADOS-G data was not available for two children and two children had been administered with an ADOS-G Module 2. Table 7.1 reports descriptive statistics for the sample of 75 children with a diagnosis of ASD/autism included in the present study.

Table 7-1 *Descriptive statistics for ASD children*

Group	N	Male	Female	Age Range in Months	Mean Age (SD)
ASD/Autism	75	61	14	24 – 48	36.87 (6.22)

7.9 Ethical Issues

The present study uses archival data for the purpose of investigating associations between repetitive behaviour and symbolic play in young children with ASD. Although some of the data used in the research was pre-existing the research projects from which these data originate were directed by Prof. Le Couteur and Prof. McConachie both members of a collaborative group of clinical and academic researchers "The North East Autism Research Group" of which I was co-ordinator. The data were used with their full permission. Furthermore, I have also previously worked with the data to be used in the present research as a research associate for Prof. McConachie.

The American Psychological Association (APA; 2002) identifies the use of existing data in research within its ethical guidelines, stating that:

> "8.05 Dispensing With Informed Consent for Research
>
> Psychologists may dispense with informed consent only (1) where research would not reasonably be assumed to create distress or harm and involves ... only anonymous questionnaires, naturalistic observations, or archival research for which disclosure of responses would not place participants at risk of criminal or civil liability or damage...and confidentiality is protected."

Taken from section 8.05 of the APA ethical guidelines (2002).

The present study utilised existing observational data which was seen only by the researcher and the relevant supervisors. This in no way placed the participants at risk. Furthermore all existing data were made anonymous with all identifying information including names, postcodes and dates of birth removed. The hypotheses tested for the current study were also conceptually close to the research already conducted using the cohort data (Honey et al., 2006a).

There are a number of advantages to data sharing, which are recognised by research bodies such as the Medical Research Council (MRC; 2006) and the National Institute of Health (NIH; 2003). In fact, both the MRC and the NIH suggest that research data should be considered for sharing whilst ensuring the privacy of participants and the protection of confidentiality. Researchers often spend extensive periods of time collecting data directed towards their specific research goals and hypotheses. Prolonged exclusive use of data, however, is not typically in the interests of scientific advancement (MRC, 2006). Data sharing presents a number of opportunities for researchers to legitimately benefit from their efforts. Sharing data reduces the unnecessary duplication of data collection; it is possible for findings from an existing dataset to be replicated by new research groups and techniques adding further to the reliability of the initial results

(NIH, 2003). By sharing data it is possible for larger datasets to be created, increasing the power and generalisability of psychological findings whilst also encouraging collaborative research amongst researchers (MRC, 2006; NIH, 2003).

7.10 Recruitment of participants

A cohort of 104 children aged between 24 and 48 months were recruited from community health sources in North East England. All the children took part in one of two studies. Inclusion criteria in both studies were the presence of complex social and/or communication difficulties which may be indicative of an autism spectrum disorder; therefore some children did not have a clinical diagnosis at recruitment. For one study, children with specific language delay/disorder were also recruited. Exclusion criteria for both studies were the presence of severe birth complications or other diagnosable severe organic medical disorder.

In one study, forty six children with ASD or language disorder were recruited for a study of precursors of executive dysfunction (Shearer, 2001). In another, fifty eight children with suspected or diagnosed ASD were recruited for a systematic evaluation of a group parent training intervention (McConachie, Randle, Hammal & Le Couteur, 2005). The studies took place in North East England. The data for these two studies had previously been pooled for analysis (Honey et al., 2006a)

All children received standardised and systematic diagnostic assessments (ADI-R, ADOS-G, Mullen Early Learning Scales and Vineland Adaptive Behaviour Scales). All children had significant social, communication or behaviour abnormalities identified in their development before 36 months of age. A best estimate clinical diagnosis was developed by two senior clinicians drawing on all available clinical information and including the ADI-R and all Time 1 research assessment information. This included direct assessment with the ADOS-G. ADOS-G tapes were viewed to clarify ambiguity and reach consensus. 51 children had a diagnosis of autism, 28 Autism Spectrum Disorder (ASD), and 25 had other diagnoses, primarily specific language impairment (SLI).

7.11 Measures

The present study utilised data collected using the ADOS-G and the Mullen Scales of Early Learning. These measures will now be described.

7.11.1 Autism Diagnostic Observation Schedule-Generic

All seventy five children included in the present study had been assessed with Module 1 of the ADOS-G. This Module is used for children with a minimum of no spoken language and a maximum of simple phrases. For a detailed description of the ADOS-G see section 4.2.1.

7.11.2 Mullen Scales of Early Learning

The Mullen Scales of Early Learning (Mullen, 1995) are a direct standardised assessment of children's abilities and are used in many studies of preschool children with ASD or other developmental disorder (e.g. Lord, Shulman & DiLavore, 2004). Three measures of language are available through this measure: expressive, receptive and verbal ability (expressive + receptive / 2). For the purpose of this study, expressive language was used given the results of the previous study showing that expressive language uniquely predicts both play and repetitive behaviour for children with ASD. The Mullen raw scores for expressive language were used, age equivalents are not necessary as the raw score increase with age scores almost identically (Mullen, 1995). Raw scores are therefore a good enough reflection of language age.

The Mullen expressive language scores have been found to be correlated with the Preschool Language Assessment measure of verbal ability (Zimmerman, Steiner and Pond, 1979), the Birth to Three Scale measure of language expression (Bangs, 1986) , the Metropolitan Readiness Test measure of language (Nurss & McGauvran, 1976) and the MCDI expressive language scores (Mullen, 1992, 1995; Tager-Flusberg; 2005).

7.12 Procedure

Both studies from which the data were drawn were approved by the Northern and Yorkshire Multi-centre Regional Ethical Committee and all relevant Local Ethics Committees. Community paediatricians and speech and language therapists in the

North East of England were asked to obtain informed consent from parents of young children who met the inclusion criteria to participate in one of the studies. In each of the studies, the research assessments were carried out in the children's homes by one of two developmental psychologists. The present study is independent of those in which the assessments were carried out and uses the pre-existing data to examine new hypothesis which are conceptually close to those for which original ethics approval was attained.

7.12.1 Rating Repetitive Behaviour

Each module of the ADOS-G examines a range of repetitive behaviours and produces a repetitive behaviour algorithm score. However, as discussed previously these algorithm scores do not reflect the true range of possible repetitive behaviour scores. To attain a more accurate measure of total repetitive behaviours for the present study a new variable was created (NewRB). This total repetitive behaviour variable was created by summing all repetitive behaviour items in the Module 1 ADOS-G, with the exception of self-injurious behaviour which is not included as it is not an ICD-10 category of repetitive behaviour. The variable, NewRB, has a score range of 0 to 7 (see Table 7.2); the higher the score the more strikingly autistic-like repetitive behaviours are shown by the child during the course of the ADOS-G.

Table 7-2 *Total repetitive behaviour: ADOS Module 1 items included*

Item	Description	Range of Scores
D1. Unusual Sensory Interest in Play Material/Person	The child's interest in or unusual response to sensory aspects of toys or surroundings.	0 – 2
D2. Hand and Finger and Other Complex Mannerisms	Unusual and/or repetitive mannerisms or posturing of the hands and fingers, arms or whole body.	0 – 2
D4. Unusually Repetitive Interests or Stereotyped Behaviours	Unusually repetitive or stereotyped behaviours, including preoccupation with unusual activities or object.	0 – 3
Total Repetitive Behaviours (NewRB)		0 – 7

7.12.2 Rating Play

Module 1 of the ADOS-G includes two items which rate play (Item C1 – functional play and Item C2 - symbolic play). For the present study two new play variables were created: Total Play and Symbolic Play.

Total Play

For the present study the two play items in a Module 1 ADOS-G were summed to create a total play variable (TPlay) which represented the severity of overall play impairments seen during the ADOS-G and had a range of scores from 0 to 6 and with 6 reflecting the most severe impairment (See Table 7.3).

Table 7-3 *Total play: ADOS-G Module 1 items included*

Item	Item Description	Range of scores
C1. Functional play with objects	The appropriate use of toys or miniatures as they are intended. Exclude play that occurs in response to directions. Imagination/creativity item should be used to rate all play with a doll.	0-3
C2. Imagination/Creativity	Flexible, creative use of objects in a representational manner that goes beyond the physical properties of the materials. Any use of the doll should be coded here.	0-3
Total Play (TPlay)		0-6

Symbolic Play

Item C2 of ADOS-G Module 1 scores symbolic play abilities. This item has four response options rating symbolic play impairments from 0 to 3 with 0 representing no imaginative impairments. Table 7.4 reports the possible response options and their definition.

Table 7-4 *Symbolic play: Response options & definition for Item C2 Module 1*

Item C2 code	Definition
0	Spontaneous use of a doll or other object as an independent agent, OR uses objects to represent other objects (e.g. using a block to give the doll a drink)
1	Spontaneous pretend play with a doll (e.g. feeding, hugging, or giving a drink) or other objects, but no use of a doll or other toy as an independent agent or placeholder
2	Imitates pretend play as described above for a rating of 1, OR imitation with a placeholder; no spontaneous pretend play
3	No pretend play

The range of possible scores for this item is small and therefore unsuitable for use within correlations. Examination of cross-tabulation of the ADOS-G symbolic play

scores (Item C2) for the children with ASD/Autism included in the present study revealed that there were similar numbers of children in each of the four possible scoring categories. Table 7.5 reports the cross-tabulation.

Table 7-5 *Number of children in sample attaining each score on ADOS-G item C2*

	ADOS-G Item C2 Score			
	0	1	2	3
Number of children	15	20	16	24

On the basis of equal groupings across the item, data was split to create two groups of children, those with a score on the ADOS-G symbolic play item of 0 or 1 and those with a score of 2 or 3. On the basis of these groupings a binary variable (Splay) was created in which children were categorised as having "unimpaired" or "impaired" symbolic play. As shown in Table 7.4 those children with scores of 0 and 1 are able to use a doll as an animate or inanimate participant during play or are using object substitution, children showing these abilities (scoring 0 or 1) were therefore coded as having "unimpaired" symbolic play. Those children with scores of 2 and 3 comparatively were at best imitating modelled play with a doll as an inanimate participant or object substitutions, children with this level of symbolic play ability were therefore coded as having "impaired" symbolic play.

7.13 Analysis

Data were screened for normality using box-plots, as the data were not normally distributed differences between the two groups discussed above (those with and without symbolic play) were examined using non-parametric Mann-Whitney U tests. Associations between variables were examined for all children and for each of the two symbolic play groups separately using Spearman's correlations and predictors of play abilities examined using binary logistic and hierarchical regression.

7.14 Results

To recap, the hypothesis being examined in the present study are;

1. Language ability will be associated with the degree of overall play impairment (for both symbolic and non-symbolic play) seen in children.
2. The severity of repetitive behaviours will be associated with the degree of overall play impairments seen in children.
3. Expressive language abilities and the severity of repetitive behaviours will be significant predictors of overall play impairments seen in children.

To investigate these hypotheses the sample population being used in the present study (N=75) was split into two groups according to the new binary symbolic play variable. Table 7.6 reports summary scores for total play (TPlay), total repetitive behaviours (NewRB) and expressive language ability for the entire sample and for the two groups: unimpaired symbolic play and impaired symbolic play.

Table 7-6 *Summary scores for children with ASD*

	All (N =75)	Symbolic Play Group (N =35)	Impaired Symbolic Play Group (N =40)	Symbolic play 'V' Impaired Symbolic Play Group Mann Whitney U	p-value
Mean Expressive Language Age in months (SD)	16.53 (6.29)	19.41 (6.84)	13.95 (4.42)	310.50	<.001
Mean NewRB Score (SD)	3.78 (1.44)	3.34 (1.27)	4.1 (1.52)	-526.00	.026
Mean TPlay Score (SD)	2.97 (1.97)	1.31 (1.13)	4.43 (1.28)		

Hypothesis 1: Language ability will be associated with the degree of play impairment seen in children.

Total Play

The data for expressive language ability were not normally distributed. Spearman's correlations between total play (Tplay) and expressive language revealed a significant correlation (r_s =-.513, $p < 0.001$).

Symbolic Play

Examination of Table 7.6 reveals that in comparison to children showing unimpaired symbolic play during the ADOS-G, children demonstrating impaired symbolic play were reported to have lower expressive language abilities according to the Mullen. Mann-Whitey U test revealed significant differences between the verbal abilities of the groups.

Hypothesis 2: The severity of repetitive behaviours will be associated with the degree of play impairments seen in children.

Total Play

Examinations of box-plots revealed that data for repetitive behaviour and expressive language ability were not normally distributed. Total repetitive behaviours (NewRB) and total play (Tplay) were found to be significantly associated with one another ($r_s = -.354$, $p = .002$).

Symbolic Play

It can be seen in Table 7.6 that in comparison to children showing unimpaired symbolic play during the ADOS-G, children reported to show impairments in symbolic play showed more repetitive behaviours. Mann-Whitey U test revealed significant differences between groups in the amount of total repetitive behaviours demonstrated in the ADOS-G.

Hypothesis 3: Expressive language abilities and the severity of repetitive behaviours will be significant predictors of play impairments seen in children.

Total Play

As in an earlier parental report study of repetitive behaviour and total play (see Section 6.6), regression analysis was used to examine predictors of total play. Assumptions were checked with P-P and residual plots. Analysis revealed that verbal ability and total repetitive behaviours were predictors of total play. Examination of the R squared

values revealed that repetitive behaviour and verbal ability account for 32% of the variance in total play scores, verbal ability alone accounts for 24 % of this. Table 7.7 reports the regression.

Table 7-7 *Hierarchical regression for variables predicting total play*

Variable	B	SE B	B
Step 1			
Expressive Lang.	-.150	.032	.484 **
Step 2			
Expressive Lang.	-.139	.031	-.450 **
NewRB	.405	.134	.301 *

Note. $R^2 = .235$ for Step 1; $\Delta R^2 = .324$ for Step 2.
** $p < .001$, * $p = .003$

Symbolic Play

Binary logistic regression was used to examine this relationship further. Total repetitive behaviour and expressive language ability were entered as predictors of whether a child had unimpaired or impaired symbolic play. All assumptions were met and examination of the residual statistics did not reveal any cause for concern. Analysis revealed that of repetitive behaviour and expressive language the only significant predictor of a child's symbolic play abilities after the contribution of the other factor has been taken into account is expressive language. Table 7.8 reports the regression. Examination of the R statistic reveals that repetitive behaviour and expressive language ability account for 31% of the variance in whether a child has impaired or unimpaired symbolic play; expressive language alone accounts for 25% of this and repetitive behaviours 7%.

Table 7-8 *Binary regression model for variables predicting symbolic play*

		95 % CI for exp b		
	B (SE)	Lower	exp b	Upper
Step 1 (a)				
Constant	-1.16 (.687)**		.314	
NewRB	.343 (.172)*	1.006	1.409	1.973
Step 1 (b)				
Constant	2.95 (.88)*		19.12	
Expressive Lang.	-1.74 (.05)**	.758	.840	.931
Step 2 (c)	1.53 (1.11)*		13.90	
Constant	1.53 (1.11)*		13.90	
NewRB	.364 (.19)**	.99	1.44	2.10
Expressive Lang.	-.170 (.05)***	.76	.84	.94

Note
(a) R^2 = .073 (Nagelkerke). Model $X^2(1) = 4.21$, p = .040. * p = 0.092, ** p = 0.046
(b) R^2 = .254 (Nagelkerke). Model $X^2(1) = 15.19$, p <. 001. * p = .001, ** p = .001
(c) R^2 = .309 (Nagelkerke). Model $X^2(2) = 18.95$, p = .040. * p = .169, ** p = .060, ***p = <.001

7.15 Discussion

The observational study reported in this chapter used the ADOS-G to study repetitive behaviour and symbolic play in a large group of 2 to 4 year old children with a diagnosis of ASD. The aim was to assess proposed relationships between repetitive behaviour and imagination (Wing & Gould, 1979) which had been found in a parent-report study of these behaviours in a heterogeneous study of children with ASD aged 2 to 8 years.

7.15.1 Are Expressive Language and Play Abilities Associated in Children with ASD?

Symbolic play and expressive language are reported to be associated with one another in typical development (Charman et al., 2000; Doswell et al., 1994; Lewis et al., 2000; McCune, 1995; Ungerer & Sigman, 1984) and the emergence of a child's first words

has been reported to occur around the time which symbolic play begins to develop (McCune, 1995; Lowe, 1975; Bates et al., 1979). However, the direction of this relationship has not been clearly defined (See Section 3.7). The present study has examined a group of young children with ASD and autism who have little (simple phrases) to no expressive language - as noted through the use of Module 1 ADOS-G. The presence of thirty five children in the symbolic play group indicates that in children with ASD of relatively poor verbal ability it is possible for symbolic play to develop. The presence of significant differences between the expressive language abilities of the impaired and unimpaired symbolic play groups, however, should not be dismissed. According to the mean Mullen Scales expressive language scores for the groups the unimpaired symbolic play group were able to use two word phrases whilst the impaired symbolic play group were only beginning to name objects when asked. It is evident therefore that the impaired symbolic play group are overall a less able sample.

7.15.2 Are Repetitive Behaviours Associated with Play Abilities in Children with ASD?

The results showed that in comparison to children with unimpaired symbolic play those with symbolic play impairments (use of a doll as a participant in play and/or object substitution) had significantly more severe repetitive behaviours. These findings (Table 7.6) may indicate that children with severe and/or frequent repetitive behaviours are likely to show better overall and symbolic play abilities than children with fewer or less severe repetitive behaviours.

7.15.3 Are Expressive Language and Repetitive Behaviours Predictors of Play Abilities in ASD?

Linear regression was carried out to test the finding from the previous APQ-R study that repetitive behaviours and expressive language are significant predictors of total play (functional and symbolic) in children with ASD aged 2-8 years. The present study confirmed these findings. Expressive language was the most significant predictor of the total variance in total play scores on the ADOS-G, suggesting that in young children with ASD and limited expressive language, language abilities are more likely to influence play abilities than the severity/frequency of repetitive behaviours. For children with language ability at a very low level it is likely to be their pre-symbolic level of development, rather than their repetitiveness that limits their ability for symbolic play

The ADOS-G controls to some extent for verbal ability as modules are selected on the basis of expressive language abilities. By comparing individuals tested with the same module the verbal demands of the assessment are controlled. Examination of the standard deviations for the Mullen Scales expressive language scores (SD = 6.28), however, reveals variation within the group. The finding of associations between repetitive behaviour and symbolic play in the sample examined in the present study, suggests associations between these behaviours are present in young children with ASD and low expressive language ability. However, binary logistic regression identified only expressive language abilities as a significant predictor of symbolic play skills. This suggests that repetitive behaviours whilst associated with symbolic play abilities do not have a significant impact on whether young children with limited expressive

language develop symbolic play. The finding that repetitive behaviour is only a significant predictor of Total Play may be explained by the limited verbal abilities of the group; that is that there were many children in the present study that did not have the expressive language skills typically required to engage in symbolic play. As symbolic play is measured in this study by a binary variable, it is not possible at this time to examine this further as exclusion of children with limited verbal abilities would likely exclude a large number of children in the impaired symbolic play group. A more detailed coding scheme for symbolic play in which the level of impairment of symbolic play can be better assessed would be required to examine this. Furthermore, where possible, children should be of a verbal ability level at which symbolic play would typically be possible.

Evidence of symbolic play in children of relatively low verbal ability would suggest that any relationship between repetitive behaviour and symbolic play should be evident in this group. The present study, however, does not present a strong case for such a relationship. It is suggested then that an ability threshold may exist and that a child must have the expressive language ability required to typically engage in symbolic play before symbolic play and repetitive behaviours become associated. Evidence of a relationship between symbolic play and repetitive behaviour has been shown in the present study using correlations. Verbal ability, however, is reported to have the most significant role in the prediction of symbolic play abilities in the present population.

Symbolic play is known to begin to emerge in typical development in the child's second year around the age when repetitive behaviours are beginning to decrease and language is emerging. The earlier APQ-R parental report study examined symbolic play and repetitive behaviour in typically developing children aged 2 to 4 years and found no relationship between these behaviours. The proposal that a requisite level of verbal ability is required before play and repetitive behaviour become associated would suggest then that whilst repetitive behaviour and symbolic play are related in children with ASD, the influence which repetitive behaviour has remains non-significant until specific criteria have been met. It is suggested that whilst language is continuing to develop and may not yet be conducive to fully fledged symbolic play that repetitive behaviours may not be significantly related to symbolic play. Rather it is once a child has reached the developmental level when repetitive behaviours should have ceased and complex symbolic play commenced that it is possible to discern an association between these behaviours. In typical development this is likely to be around the age of 4 years. Therefore, once a child is capable of engaging in symbolic play, the time which they choose to spend on such activities may be strongly influenced by their repetitive behaviours.

Alternatively, it may be inferred that verbal ability impacts upon the type of repetitive behaviour which an individual performs and that a specific level of verbal ability is required in order to engage in some repetitive behaviour; more specifically higher level behaviours such as rituals, circumscribed interest and repetitive speech. It is only once an individual has the verbal skills necessary to engage in a range of repetitive behaviours that repetitive behaviours will have a greater impact upon symbolic play in

ASD. This could be examined in a longitudinal study in which children on the cusp of developing the verbal abilities necessary to engage in symbolic play are followed to monitor both how symbolic play and repetitive behaviours change over time.

It is proposed then that whilst the total play (functional and symbolic) of young non-verbal children with ASD may be influenced by the severity of their repetitive behaviours, their ability to develop and engage in symbolic play is primarily influenced by their development of language. It is suggested then that the relationship between these behaviours in different ability groups should be considered further. This may be possible through the selection of participants matched for expressive language and, if possible, chronological age. Furthermore, as discussed, a more detailed measure of symbolic play would be necessary to examine how specific types of impairments in play may be associated with repetitive behaviours.

7.15.4 Overcoming Limitations from the Questionnaire Study

The present study was designed to build upon the results of the parental report questionnaire reported in Chapter 6, in which repetitive behaviours and symbolic play were found to be associated in young children with ASD. Repetitive behaviours were also found to be a significant predictor of play abilities alongside expressive language. Although play and language were found to be associated, the questionnaire study did not account particularly well for variations in the language abilities of the sample. The APQ-R itself does not include a measure of language and to ensure that the whole questionnaire pack was not too time consuming only two language items were included

for respondents to complete. These measures were taken from the DISCO and whilst they are known to be reliable as interview items their usefulness as postal questionnaire items is unknown. It was necessary therefore that language was considered in more detail in subsequent studies.

The present study used the ADOS-G as a mechanism for holding expressive language level constant. Before the ADOS-G is administered the relevant module must be selected, this is done on the basis of the expressive language level of the participant. The present study utilises existing data from children aged 2 to 4 years with a diagnosis of autism and ASD who have all been assessed using module 1 of the ADOS-G. This group of children is therefore more homogenous than the group used in the questionnaire study. The reduction in variation of language ability and age allows to some extent for the effects of language upon any associations between repetitive behaviour and imagination to be controlled for. Furthermore, the use of children with very limited expressive language allows the early stages of any possible relationship between these behaviours to be examined and also removes the requirements of language often associated with play assessments from the present study. It should not be forgotten, however, that there remained differences in the mean expressive language abilities of the impaired and unimpaired symbolic play groups as measured by the Mullen.

The questionnaire study was also limited by its inability to verify the validity and reliability of diagnostic status of children. Ethical constraints applied to the study

meant that whilst researchers could enquire about the nature of any diagnosis which their child had that they were unable to request verification of this or details of diagnostic procedures. The use of the ADOS-G in the present study allows for greater control over diagnostic status as algorithm cut off scores can be used to ascertain whether a child falls into the ASD or autism diagnostic groups.

The ADOS-G is a structured and well validated tool which provides the researcher or clinician with the opportunity to observe the participants range of social, communicative and imaginative abilities alongside any repetitive behaviours which a participant may engage in. It is well documented that language and play have similar developmental timings and the use of the ADOS-G takes this relationship into consideration as ADOS-G modules are selected according to the participants' expressive language abilities. The present study therefore controlled to a degree for language ability. As such the ADOS-G presents an excellent opportunity to examine associations between repetitive behaviour and imagination in the ASD population.

7.15.5 Conclusion: How Can We Build On Our Findings So Far?

Whilst the ADOS-G provides a structured and reliable method for the examination of play abilities in those with ASD, it still has limitations. The measure only produces a summary score for symbolic play and does not categorise play behaviours into the three dimensions of decontextualisation, decentration and integration which this thesis is examining. Furthermore, the ADOS-G current coding scheme does not take into

consideration the effects which prompting and modelling may have upon the performance of play behaviours.

Observations are obviously essential for play as we need to see what the child is capable of when prompted or not, and structured settings allow this to be tested and compare across children in a relatively reliable way. However, whilst the ADOS-G provides us with ideal tasks to do this, the richness of information which is required is not available. For example, unlike the questionnaire study in Chapter 6 of this thesis, the ADOS-G measure has focused upon the autistic nature of play impairments and has not fully explored symbolic play abilities in ASD on the basis of the three dimensions of play which lie at the heart of this thesis. We therefore need a new measure in order to look in more detail at play and imagination in children with autism

Therefore in the next study, an observational measure of play was developed, building on the ADOS-G tool but in which the developmental dimensions of decentration, decontextualisation and integration are also assessed. This study is described in Chapter 9.

Chapter 8

Describing the Participants to be Included in the Following Chapters

The studies presented in the remainder of this thesis draw upon pre-existing data. As discussed in Chapter 7 (section 7.9) of this thesis, there are many advantages in the sharing of data (MRC, 2006; NIH, 2006). The use of archival data in this thesis meets with the ethical guidelines outlined by the APA and discussed in detail in the previous chapter. In the present chapter I will provide details of the sources from which the archival data used originated and the make up of the final dataset used in Studies 4 and 5 of this thesis.

8.1 – Creating a Large Dataset

The data from four studies were collated to produce a cohort of 131 children aged between 24 and 117 months, of which 20 are of typical development (mean age = 25.94 months), 24 children have a Specific Language Impairment (SLI) (Mean age = 41.45 months) and 87 have a diagnosis of autism or ASD (mean age = 47.92 months).

All children included in this cohort had been assessed with the ADOS-G module appropriate for their expressive language ability or the ADOS-G Birthday Party task, again this was appropriate for the child's verbal ability. All assessments were conducted by a trained ADOS-G administrator. All ADOS-G administrators are

required to maintain high levels of inter-rater reliability, usually achieved through regular rating sessions with other ADOS-G administrators.

The data from this large cohort was used in the studies reported in Chapters 9 and 10 of this thesis. However, the data was used for different purposes and therefore the sample size varies across studies. Reasons for this include the examination of assessment data for those with autism or ASD only and not those with a SLI or of typical development and the exclusion of Time 2 data from longitudinal follow-ups.

8.2 Where Did the Children in this New Large Cohort Come From?

The large cohort of 131 children created for this thesis consists of data from four datasets (N=165), three of which were pre-existing (Datasets 1, 2 and 4) and one which was recruited during this programme of research (Dataset 3). The four research studies from which these datasets originate are outlined below. Figure 8.1 illustrates the make-up of the cohort.

8.2.1 Dataset 1

104 children were part of a larger cohort recruited between 24 and 48 months (Mean = 36.92 months, s.d = 6.02 months) of age as part of two earlier studies conducted in the North East of England. 58 children were recruited for an evaluation of parent training in suspected ASD in 2000-1 (McConachie et al., 2005). 46 children were recruited in

1999-2000 for a study of precursors of executive dysfunction in children with autism/ASD or language disorder (Shearer, 2001). 51 children had a diagnosis of autism, 28 ASD, and 25 had other diagnoses, primarily SLI. Assessment data for 75 of the 79 children with autism/ASD were utilised in Study 3 of this thesis. Four children with autism/ASD were excluded from Study 3 as complete ADOS-G data was not available for two children and two children had been administered with an ADOS-G Module 2 (See Section 7.8 for more details).

For the purpose of the cohort created for this thesis, 33 children were excluded due to missing data. This included ADOS assessment tapes which were missing, tapes which were damaged and missing information about age and the ADOS-G module used. Of those children excluded 8 had a diagnosis of SLI and 25 a diagnosis of ASD. There were therefore 71 children included in the larger cohort of this thesis, 17 with a diagnosis of SLI and 54 with a diagnosis of autism/ASD.

8.2.2 Dataset 2

20 children with ASD or SLI aged 42 to 57 months (Mean age = 48.9 months, s.d. = 4.17 months) were selected at random from a larger cohort of children recruited as part of a study of precursors of executive dysfunction in children with autism/ASD or language disorder (Shearer, 2001). Within this sample twelve children had a diagnosis of autism/ASD and 8 of SLI. Inclusion criteria for this study were the presence of social and/or complex communication difficulties which may indicate an autism spectrum disorder. Exclusion criteria were the presence of severe birth complications or

other diagnosable severe organic medical disorder. Of the 20 children in this dataset, one child with a diagnosis of SLI was excluded due to missing ADOS-G data. Data included in the larger cohort created for use in this thesis was for 12 children with a diagnosis of autism or ASD and 7 children with a diagnosis of SLI.

This sample of children is taken from Time 2 data of a longitudinal study of executive dysfunction and repetitive behaviour in children with ASD and SLI. The Time 1 data of this study is that of Shearer (2001) which makes up some of the Dataset 1 outlined above. The cohort created for this thesis included data from two time points for some children. As a result of this, in any analysis of group differences where a child has two pieces of data available, the Time 2 data for these children was excluded.

8.2.3 Dataset 3

21 children aged 46 to 117 months (Mean = 76.0 months, S.D. = 20.23 months) were recruited during the research for this thesis for inclusion in an observational study of repetitive behaviour and play in young children with ASD (Studies 4 and 5 of this thesis). The parents of all children involved in this observational study had previously taken part in a questionnaire study of repetitive behaviour and play in children with ASD (Studies 1 and 2 of this thesis). 65 parents involved in the questionnaire study indicated that they were interested in receiving information about future studies. Parents were approached for themselves and their child to take part in an observational study of play and repetitive behaviours via a letter which indicated the aims of the study

and the procedure. 21 parents agreed for themselves and their child to take part in the research.

Children were seen in their home or at school for approximately 2 hours. The author saw each child. During the session the child was assessed using the ADOS-G, the Ravens coloured progressive matrices (Raven, Raven & Court, 1998) a measure of non-verbal ability, and the British Picture Vocabulary Scale-II (Dunn, Dunn, Whetton & Burley, 1997) a measure of receptive language ability. Parents were asked to complete the APQ-R again and were interviewed using the Vineland Adaptive Behaviour Scales (Sparrow et al., 1984) a measure of the child's personal and social skills. As all children were assessed with the ADOS-G algorithm scores were available. According to ADOS-G cut offs all children met the criteria for autism or ASD. Exclusion criteria for this study were the presence of other diagnosable severe organic medical disorder as indicated by the parent at the time of recruitment

8.2.4 Dataset 4

20 typically developing children aged 24 to 28 months (Mean = 25.94 months, s.d. = 0.84 months) were selected from a sample of 206 children originally recruited to take part in a study examining factors behind associations between social and economic adversity and the relation between poverty and delays in the development of children's language and play skills. Children were selected for inclusion in the present study at random from the larger sample population. Children from this study are included in the analysis conducted by Leekam at al. (in press).

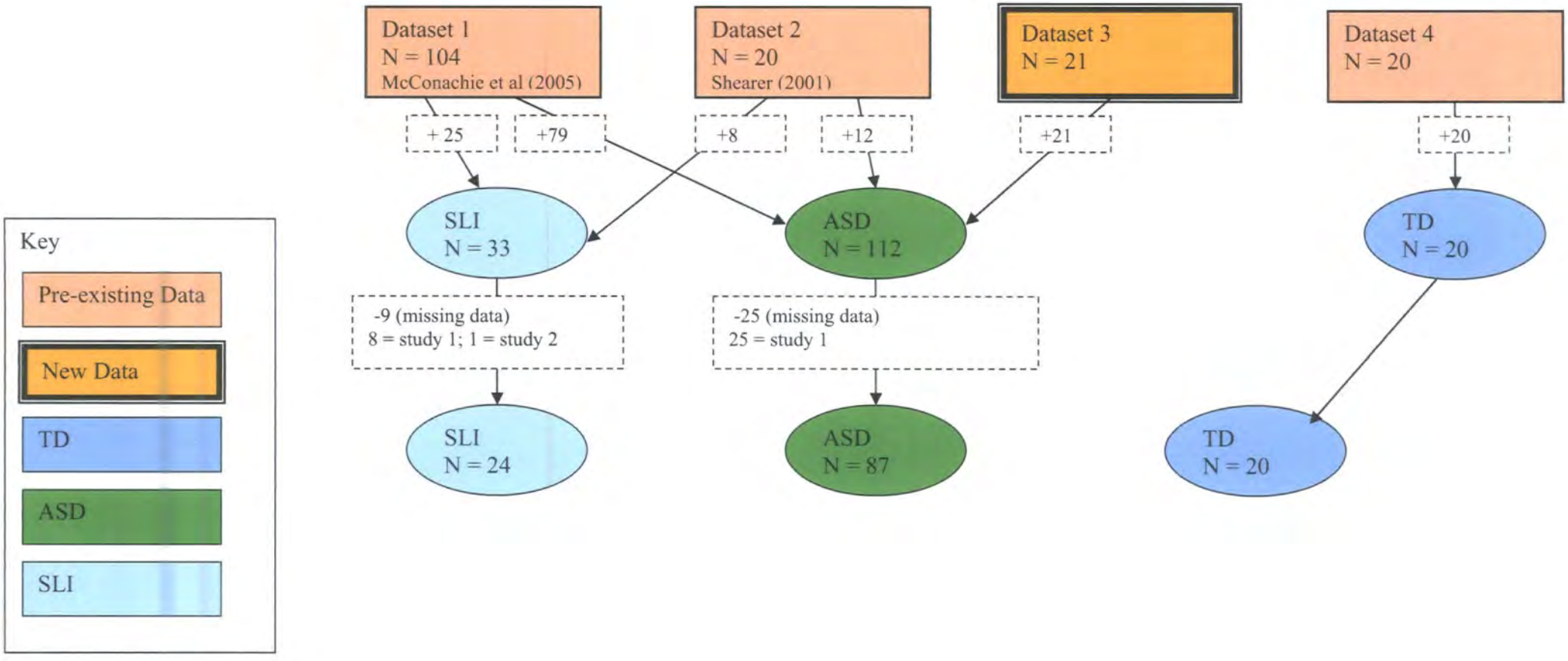
8.3 The Final Cohort

The data from the four datasets outlined above were pooled for the present study. Of the 165 children which make up the four datasets, 34 children were excluded; reasons for exclusion included missing tapes and poor or incomplete assessment recordings. In total 131 children (mean age = 43.59 months, S.D. = 18.32 months) were included in the cohort created for this thesis. Participants formed three diagnostic groups: Autism/ASD (N = 87), SLI (N = 24) and typical development (N = 20). The descriptive statistics of the large cohort of 131 children is described in Table 8.1.

Table 8-1 *Descriptive statistic for the new cohort of children*

		Number of Children (Time 2 Data)
Diagnostic Group	ASD	87 (12)
	SLI	20 (7)
	TD	20
ADOS-G Module	1	89 (12)
	2	16 (7)
	3	6
	Birthday Party Task	20

Figure 8-1 *The make-up of the large cohort for this thesis*



Chapter 9

Developing a New Coding Scheme for Symbolic Play to use with the ADOS-G

Earlier chapters in this thesis have presented evidence for an association between repetitive behaviour and play in children with ASD. Using both questionnaire and observation methods, repetitive behaviour and language were identified as predictors of both overall (functional and symbolic play) and symbolic play in ASD.

In Chapter 6, symbolic play was found to correlate with total repetitive behaviours in children with ASD aged 2 to 8 years. More specifically we saw that the category of sensory and motor repetitive behaviours was significantly associated with symbolic play. In Chapter 7, an observational study was conducted using data collected with the ADOS-G Module 1. By examining data from children who had been assessed with the same ADOS-G module a more homogeneous sample population was created with regards to expressive language abilities than in the earlier questionnaire study. In doing this, efforts were made to control for the effects of language upon both the developmental level of symbolic play attained and the demands of the play assessment. In this observational study associations were found between symbolic play and repetitive behaviour in young children with ASD. Examination of the predictors of whether a child showed impairments in symbolic play or not revealed that despite evidence of a relationship between repetitive behaviour and symbolic play in this group of children, verbal ability was the only significant predictor of whether a child had impaired or unimpaired symbolic play.

The questionnaire and observational studies conducted have highlighted the necessity to continue to examine associations between repetitive behaviour and symbolic play in ASD. The APQ-R has gone some way in attaining information about the skills which children with ASD have in each of the three dimensions of symbolic play: decentration, decontextualisation and integration. However, abilities in each of the dimensions independently have not yet been examined. Furthermore, observational measures are better suited to the examination of play abilities and at present there are no observational measures which examine symbolic play in this way.

The next stage of this research programme was therefore the creation of a more detailed observational measure which allows the developmental levels of the three dimensions of symbolic play to be examined in detail. Within this chapter I will discuss further the advantages and disadvantages of the use of the ADOS-G as an observational measure of symbolic play. This will be followed by the development of a new observational coding scheme for play designed to be used alongside the ADOS-G. Finally, an analysis of the reliability and validity of the new measure using data from young typical and atypical children will be presented. Chapter 10 of this thesis will then examine in detail the symbolic play abilities of the children with ASD and examine further associations between these and repetitive behaviours.

9.1 Measuring Play through Observation

Play behaviours are best examined using observational methods which encourage and provide the opportunity for the child to engage in all levels of play. Such measures

overcome the reliance upon respondents of questionnaires or interviews to correctly interpret items through the use of trained administrators/coders. Observational measures also have the advantage of being able to attempt to elicit the behaviours being examined. For example, a questionnaire may ask, "does your child have pretend tea parties?" The respondent may have never seen their child engage in this sort of play and therefore record a response of 'No'. Observational measures provide an opportunity to set up a scenario where a specific behaviour would be expected, allowing true abilities rather than behaviours which a child typically engages in to be assessed.

Unlike play, repetitive behaviours are better suited to informant report due to the effects which specific circumstance or situation may have upon their presence (see Chapter 4 for discussion) i.e. some repetitive behaviours may not be easily observed as they may only occur in specific contexts such as bedtime or mealtimes. It is for this reason that only a new observational measure of play was sought in this section of the research programme and that the APQ-R was deemed to be a successful and useful measure of repetitive behaviours.

9.2 The Use of the ADOS-G as an Observational Measure of Symbolic Play

Structured observations such as the ADOS-G have the ability to facilitate and direct play in such a way that each child is presented with the same opportunities to engage in specific types of play. Furthermore, the use of presses or prompts in the ADOS-G potentially provides researchers with the opportunity to observe differences between spontaneous and prompted play in ASD. The ADOS-G has been identified as a tool by

which symbolic play abilities can be examined in individuals of all abilities whilst also allowing some consistency in the range of verbal ability.

As discussed earlier in the thesis, it is important to consider the role of language when examining play ability. Language and play have been shown to emerge at a similar age in typical development (Bates et al., 1979; Morans, 1997; Piaget, 1962) and therefore assessments of play should be reflective of a child's language abilities. The use of assessments which are not language appropriate may result in the over or under estimation of play abilities. Furthermore, when comparing populations where language and ability delays may be an issue, a measure which is applicable to a range of abilities is essential. Despite this, few measures of play are applicable across development. As discussed previously (See Section 7.2), the ADOS-G is made up of four modules, of which the module appropriate for an individual's expressive language ability is administered. As a result of this design it can be argued that the use of the appropriate ADOS-G module within a sample of children with ASD will control for variations in expressive language.

9.3 What Can the ADOS-G Currently Tell Us About Symbolic Play?

As discussed earlier in this thesis each of the four ADOS-G modules presents opportunities for symbolic play to be elicited (See Section 7.5 and Appendix 6 for details). Rich and useful information about symbolic play abilities can potentially be elicited from the observations of these ADOS-G tasks. The ADOS-G, however, fails to make full use of this information rating symbolic play in a single item on a four point

coding scheme. Appendix 7 reports the codes for the symbolic play item in each of the four ADOS-G modules. In the following section problems with the ADOS-G imagination scoring system are discussed in more detail.

9.4 Is the Current ADOS-G Rating for Symbolic Play Suitable for the Present Research?

The ratings currently used in the ADOS-G focus upon the autistic like nature of play; primarily that play is repetitive and lacks sociability. This is entirely appropriate for its use as a diagnostic measure. However, for the present programme of research, where the ADOS-G was used as a descriptive measure of skills there are some limitations with these ratings.

First, there is a lack of consistency across the modules with regards to the scoring codes. Whilst each Module uses four codes with 0 representing no impairments of symbolic play and 3 representing no symbolic play there are differences in the impairments identified in each Module. For instance, to be awarded a score of 2 in a Module 1 a child will show no spontaneous pretend play or will imitate some play with a doll or with a placeholder, in a Module 3, however, the child will show little spontaneous creative or make-believe play or only symbolic play which is stereotyped or repetitive. The differences in these codings reflects the developmental progression of play and as each module of the ADOS-G represents a different level of developmental maturity it is appropriate that the types of play impairments a child may show will differ across the modules. However, in a study of symbolic play abilities in ASD the current ADOS-G

coding does not allow the direct comparison of types of impairments across different ability groups. As a result of the differing coding schemes, findings for different groups of children (e.g. Module 1 and Module 3) cannot reliably be compared. Furthermore, as the level of impairments measured across Modules differs the use of the symbolic play ratings in any longitudinal study would not give a clear indication of how play may have changed over time.

A second problem with the ADOS-G coding scheme for imagination is the inconsistency of terms which refer to symbolic play. The inconsistency presents an issue of interpretation, that is that examiners who may not be familiar with play literature may attribute differing meanings to what are essentially the same terms; this is particularly relevant to the present research. This issue reflects another specific problem with the ADOS-G for the present research in that it is not deeply reflective of play theories from typical development.

The primary problem with the ADOS-G when considering its use for the present research is the lack of information provided about abilities in each of the three dimensions of symbolic play which this thesis focuses upon: decentration, decontextualisation and integration. (See chapter 3 for review).

The activities within the ADOS-G allow the examiner to promote and examine behaviours in each of the three dimensions of symbolic play. However, the current

ratings do not to clearly reflect this and there is no way of re-wording this at present. The aim of the present research is therefore to make this possible. In Module 1, for instance the code for a score of 1 requires the child to either perform acts away from the self (decentration) or to use an object as it is intended (decontextualisation), this code therefore fails to separate these skills from one another. Further, with the exception of Module 1 (code 0) there is a failure within the ADOS-G imagination coding to identify the development of integration and the subsequent production of meaningful sequences of play.

As discussed, the ADOS-G was designed to be a diagnostic tool for ASD based upon ICD-10 criteria in which play is categorised with communication (Lord et al., 1996; 2000). By definition then there should be no overlap between imaginative behaviours and sociability and repetitive behaviours. Despite this, codes 0 and 1 for the symbolic play item of Module 2 reflect social impairments of play and codes 2 and 3 for Module 2 and codes 1, 2 and 3 for the symbolic play item in Module 3 reflect repetitive and stereotyped play. To attain a true reflection of a child's symbolic play abilities it is essential that the developmental level of play of which they are capable is examined rather than the type of impairments which may accompany it.

A final limitation of the ADOS-G coding scheme for symbolic play for the present study is its focus upon spontaneous play and its non-inclusion of a systematic way of coding play which occurs following prompts. The ADOS-G activities which facilitate symbolic play abilities (see Appendix 6) all include detailed protocol and scripts which

incorporate presses and prompts designed to promote specific types of behaviour. Such a methodology provides information not only about the spontaneous play abilities of a child but also their abilities to follow a prompt. Literature tells us that children with ASD have difficulties in spontaneous symbolic play (Baron-Cohen, 1987; Charman, 1997; Jarrold et al., 1993; Jarrold, 2003). Furthermore, it has been suggested that prompting improves the symbolic play abilities which a child with ASD shows (Baron-Cohen, 1987; Blanc et al., 2005; Charman, 1997). The ability to differentiate between play abilities under prompted and spontaneous conditions would therefore prove highly beneficial in the present research.

9.5 Developing a New Measure of Symbolic Play for use Alongside the ADOS-G.

To attain greater value from the symbolic play information which the ADOS-G elicits, an additional coding scheme for symbolic play which can be applied to data collected during the ADOS-G was devised.

The new coding scheme incorporates the three dimensions of symbolic play examined in this thesis and allows comparisons between spontaneous and prompted abilities. In the following sections of this chapter I will discuss how this coding scheme was developed and report details of the final coding scheme. I will then report findings for the reliability and validity of the measure using data from typical and atypical children.

Study 4

9.6 Developing a New Coding Scheme for Symbolic Play Shown During the ADOS

A new observational coding scheme was developed to be used alongside the ADOS-G (Lord et al., 1996, 2000) to make better use of the symbolic play information which the ADSO-G elicits. The new coding scheme was designed to be used alongside all ADOS-G Modules and as a result of its generic design has the potential to be used in other situations where play may be elicited, such as free play.

The final coding scheme produces detailed information about a participant's abilities across the three dimensions of symbolic play: decentration, decontextualisation and integration. Such information is important for the understanding of the development of symbolic play in atypical development, for the development of play interventions and for the understanding of associations between play and other behavioural features of ASD.

9.7 Developing a Pilot Version of the Coding Scheme

Pilot versions of the coding scheme were based upon the ordinal model of play proposed by McCune-Nicolich (1981), which recognises decentration, decontextualisation and integration as essential components of symbolic play thus tying closely with ideas of Bretherton (1984), Fenson (1984) and Piaget (1962). Unlike Fenson and Bretherton, however, McCune-Nicolich does not examine the development of each of these dimensions independently but proposes a hierarchical model to describe

development of symbolic play from play directed to the self to the combination of schemes and finally to the inclusion of object substitution. For a more detailed review of this model of play see Chapter 3.

The hierarchical coding scheme provided a measure of the child's most advanced pretend play ability by ranking play behaviours and scoring accordingly. However, this scheme consistently raised problems as to the ordering of play behaviours, i.e. which were the most complex and thus highest ranking. For example, does spontaneously eating a pretend Play-Doh cake (the use of objects substitution and action towards self) require less symbolic play ability than playing with a doll as if it is real following a prompt (doll as participant)?

It was proposed that an alternative to the McCune-Nicolich (1981) model of symbolic play development and the ranking of whole play schemes according to their complexity be adopted. Further examination of the play literature and the successful development of the APQ-R raised a new possibility for coding pretend play. The three dimensions of symbolic play identified in typical development (Bretherton, 1984; Fenson, 1984; McCune-Nicolich, 1981; Piaget, 1962) parsimoniously encompass models and definitions of symbolic play and therefore provided an ideal framework for developing the new coding scheme. This would elicit a detailed picture of the components of symbolic play which a child demonstrates and where their strengths and weaknesses may lie. The following section will discuss the development of the final coding scheme, named the Pretend Play Scale.

9.8 The Development of the Pretend Play Scale.

The final coding scheme, the Pretend Play Scale (PPS), includes twenty-one items which gather detailed information on symbolic play through the coding of specific tasks in the ADOS-G. The PPS codes three dimensions of symbolic play: decentration, decontextualisation and integration. Whether play behaviours seen are spontaneous or prompted is also coded.

9.8.1 Development of the PPS Items

Items were developed for each of the three play dimensions. Each dimension allowed the complexity of associated play acts to be tracked. Items were based on play items included in the APQ-R and close examination of the description of the developmental trajectories of each of the dimensions in the literature (See Chapters 3, 4 and 5 for further details). Examples of behaviours which may be elicited during the observation were provided for each item (See Table 9.1)

For each play act that the child demonstrates the examiner is required to code the child's role, their use of objects and the way in which they combine sequences. The examiner must also indicate for each dimension of the play act whether the behaviour was prompted or spontaneous. This will provide detailed information about the symbolic abilities of the child in each of the three dimensions of symbolic play.

Table 9-1 *Examples of items included in the PPS for each dimension of play*

Dimension of Play	Example Items
Decentration	Non-everyday activities are directed to the self. E.g. cleaning, tidying etc. OR Activities are directed to a passive inanimate participant such as a doll or teddy. E.g. child hold or hugs doll, feeds doll. Note if the inanimate participant talks, or is referred to as talking or feeling score 3. OR Activities are directed to another child or adult. Note the other participant should not be taking on the role of a character.
Decontextualisation	Child uses miniature objects conventionally. E.g. Pushes toy car, builds with blocks, puts toy cup to mouth without sound effects, uses doll as active or inactive participant Child uses an object to represent something else. E.g. Play-doh as a cake, dowel as candles, spinning disk as moon
Integration	Child uses a single play scheme only. E.g. cup to own mouth or fork to dolls mouth. Child combines variations of a single scheme. E.g. cup to self and then to doll, pour self a drink and then adult.

A binary coding scheme for spontaneity of play was selected following the piloting of two types of coding schemes, one which coded spontaneity according to a 5 point scale dependent upon the degree of prompting used and one which simply rated play schemes according to whether they were present when prompted or not. Piloting revealed that the 5 point scale was difficult to code as the types of prompts used were inconsistent. Furthermore, some prompts were verbal and due to the varying language abilities of children with ASD it was important that language was not a discriminatory factor in the scoring of spontaneity. As such a spontaneous/prompted coding scheme was seen to be more suitable.

Due to the variability in definitions of prompts in the ADOS-G, it was necessary to specify what determines a prompt when using the PPS. The following definitional criteria of a prompt were created for the PPS and can be applied to children of all language abilities.

- A prompt must be:
    - An explicit request to perform the pretend play act in question e.g. can you give dolly a drink? Or, can you make your man fly?
    Or
    - An explicit instruction to perform the pretend play act in question e.g. give dolly a drink, or, make him fly.
    Or
    - The physical modelling of the pretend play act in question e.g. giving the doll a drink, wiping up the pretend drink, making a figure fly around the room or making a figure jump into a pretend pond

- A prompt does not include
    - Non-directive verbal or physical cues aimed at stimulating the pretend play act e.g. saying dolly is thirsty or hungry, miming spilling a drink or telling the child that the tinfoil is a pond.

Piloting of the PPS revealed that some children did not demonstrate pretend play in any of the three dimensions. There was, however, evidence of these children engaging with the play materials during the ADOS-G tasks. Categories of **No play and Exploratory Play** were created to provide information about the play behaviours of those children not yet engaging in pretend play. **No play** was described as: the child does not engage with the play materials or the play themes in any way or does so in an *atypical* way e.g. for sensory stimulation such as sniffing, holding close to eyes; or uses toys in repetitive behaviour such as banging, twiddling, spinning, shaking, repeatedly cutting 'cake'. **Exploratory play** was described as: the child manipulates the play materials in a non-functional way but shows evidence of exploratory play e.g. shakes object, looks at object. Do not include: a) repetitive behaviour such as banging, twiddling, spinning, repetitive shaking, repeatedly cutting 'cake', b) sensory stimulation such as sniffing,

holding close to eyes. Each of these play types was described as present / not present. See Appendix 8 for final PPS.

9.8.2 Coding the PPS

Each of the three dimensions of symbolic play in the PPS has three levels of complexity and is coded from 1 to 3 accordingly. The procedure for coding requires the examiner to record examples of play as they occur next to the dimension and level of play which they represent, whether the act is spontaneous or prompted is also noted. So, each example of play was coded on each of the three dimensions. For instance, a child cutting a pretend cake spontaneously but following the examiners introduction of the Play-Doh as a cake, was scored as: spontaneously displaying decentration level 2 (spontaneously engaging in non-everyday activity); displaying decontextualisation level 2 following a prompt (the object substitution in this case was introduced by the examiner); and spontaneously displaying level 1 for integration (cutting cake is a single scheme).

Following completion of the recording a number of summary scores are derived. First, the highest level observed for each of the three dimensions is recorded for spontaneous and prompted examples separately. Based on these values the highest overall level of each play dimension (spontaneous or prompted) can be derived. By summing these individual dimension scores, the highest level of spontaneous, prompted and overall play can be calculated for the scale as a whole (Total Play). Exploratory play and No

play were coded as present (score = 1) or not present (score = 0). These items were not included in the calculation of summary scores or reliability analysis.

9.9 Examination of the Validity and Reliability of the PPS

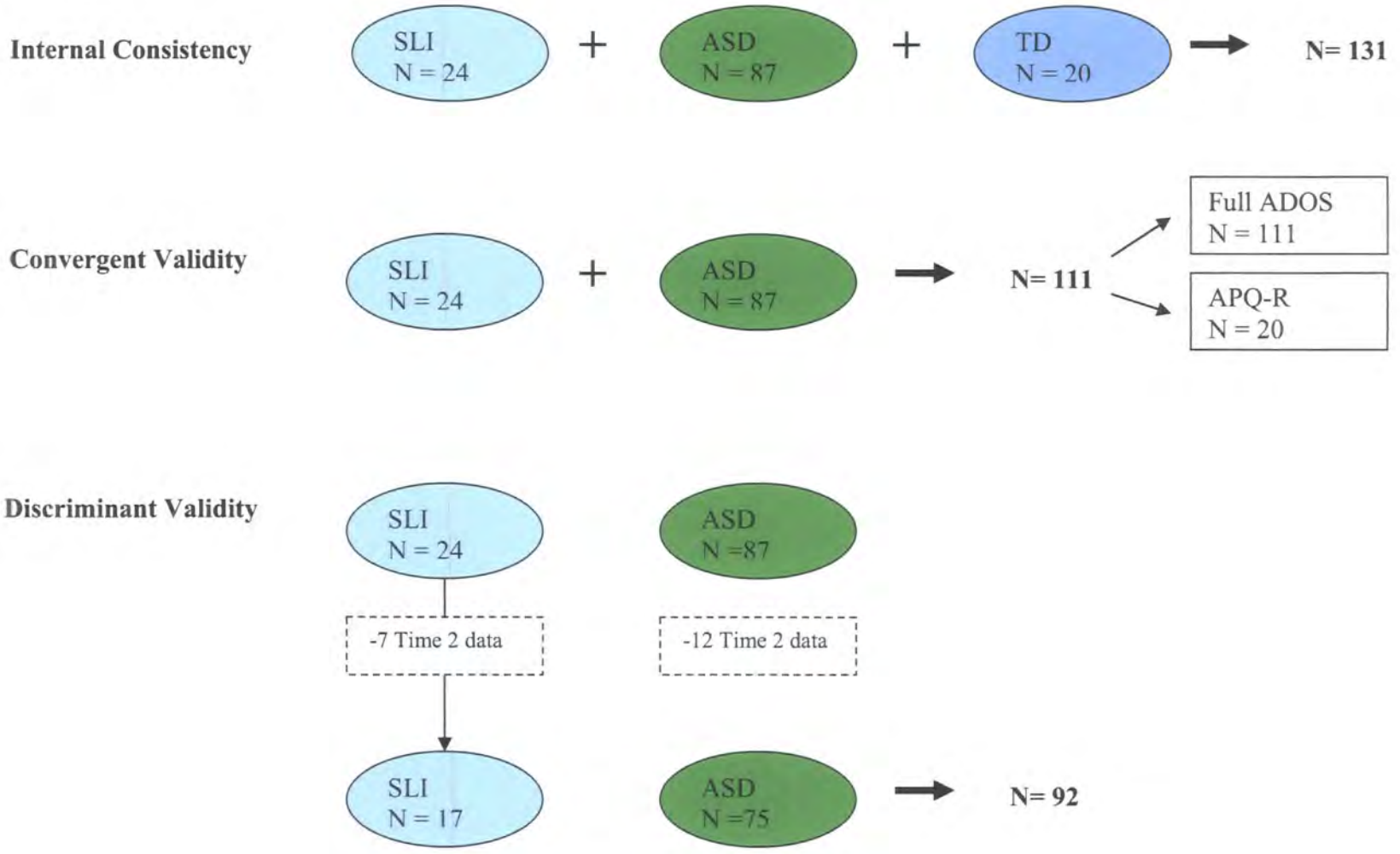
Following development of the PPS the reliability and the validity of the coding scheme was examined using a large sample of young children of typical development, with ASD and with SLI.

9.10 Participants

The dataset used in this study is the product of the amalgamation of four datasets, the processes by which this dataset was formed and the sources from which the data came are discussed in detail in Chapter 8. The advantages of using existing data and details of the relevant ethical issues are discussed in Section 7.9

The entire cohort of 131 children with ASD aged 24 to 117 months were included in the reliability analysis of the PPS. All children had been assessed using either the entire ADOS-G or the Birthday Party task from the ADOS-G. All assessments were appropriate for the child's expressive language ability. All assessments had been videotaped, for the present study these videoed assessments were coded using the PPS. This was the first time that the assessments had been used in this way.

Figure 9-1 *Data used in analyses*



9.11 Procedure.

All data had been collected following ethical permission by the relevant university and NHS ethical committees. All assessments were carried out in either the child's home or in the University of Durham psychology laboratory and were videotaped. All assessments were carried out by developmental psychologists.

The present study used the newly developed measurement tool (The PPS) to examine symbolic play abilities in typical and atypical children. This required the videotaped assessments of children to be coded for the first time with the PPS. For each of the observations only one ADOS-G activity was coded. For ADOS-G Modules 1 and 2 this was the Birthday Party and for Module 3 this was Joint Interactive Play.

9.12 Results

The internal consistency, inter-rater reliability, convergent validity and discriminant validity of the PPS were examined in order to assess the validity and reliability of the measure.

As a result of variations in the type of data available for each child in the dataset, the present study utilises information from varying numbers of participants when examining different aspects of the validity and reliability of the PPS. Figure 9.1 outlines the participants in each part of the data-analysis.

9.12.1 Internal Consistency

Data from 131 participants was used in the examination of the internal consistency of the PPS. As items in the PPS were binary, Kuder-Richardson 20 tests were used to examine the internal consistency of the scheme. Internal consistency for the entire PPS was found to be good (.787). This was also true for the spontaneous items (.715) and for the prompted items independently (.617).

9.12.2 Inter-rater reliability

Cohen's Kappa could not be used to calculate inter-rater reliability as differences in the ratings of items meant that the number of categories used by each rater varied and therefore the statistic could not be calculated. Intra-class correlations were therefore used for summary codes produced by four trained examiners. Sixty-four of the 131 tapes were each coded by two trained examiners (31 = autism, 15 = ASD, 10 = TD, 8 = other). The four examiners included me and three other psychology postgraduate students. The three postgraduate students each received one hour of training on the PPS from me. The three students and I then held a collaborative rating session in which 3 ADOS assessments independent to this research were rated using the PPS. Tapes were initially rated independently and then discussed as a group to ensure consistency. Following training examiners rated their videos independently and blind to the ratings of other examiners. Table 9.2 reports the intra-class correlations for each of the summary codes created by the PPS (alpha = .004). All intra-class correlations were significant indicating that inter-rater reliability was good.

Percentage agreements were also calculated for each summary score and were all found to be high (>80%) for the summary scores for each of the three symbolic play dimensions: decentration, decontextualisation and integration. The summary scores for Total Play are the least reliable (61.2 – 81.3%). It is suggested that this is a result of the summing of the three dimension scores and therefore carries over disagreements which may have occurred in each of these. Contingency tables reporting the pattern of agreement and disagreement for each of the PPS summary scores can be found in Appendix 9.

Table 9-2 *Inter-rater reliability for PPS summary codes*

Highest Score for:	Intra-Class Correlations	% Agreement between two raters
Total Play (any)	.83 *	81.3
Total Play (spontaneous)	.81 *	70.3
Total Play (prompted)	.87 *	61.2
Decentration (any)	.68 *	92.2
Decentration (spontaneous)	.87 *	87.5
Decentration (prompted)	.80 *	87.5
Decontextualisation (any)	.79 *	90.6
Decontextualisation (spontaneous)	.76 *	84.4
Decontextualisation (prompted)	.82 *	82.8
Integration (any)	.63 *	87.5
Integration (spontaneous)	.67 *	85.9
Integration (prompted)	.68 *	82.8

P <.001

9.12.3 Convergent Validity

Of the 131 children included in the dataset the parents/carers of twenty of the children with Autism/ASD had completed the APQ-R at the time of observation. Total Play scores for the PPS and Total Play scores for the APQ-R were correlated. Results showed significant correlations between the two measures, $r = .51$, $p = 0.03$.

All children in the dataset with a diagnosis of Autism/ASD (N=87) or SLI (N=24) had been assessed using the entire ADOS-G. As such 111 children were included in the analysis of convergent validity between the PPS and the ADOS-G. The ADOS-G symbolic play variable (Item C2 Modules 1 and 2, Items C1 Modules 3 & 4) was converted from a four point scale to a binary variable using the criteria discussed in the previous chapter. Two groups, those with unimpaired symbolic play (ADOS C2 score = 0-1) and those with impaired symbolic play (ADOS-G C2 score = 2-3), were created.

Data were not normally distributed and sample sizes unequal. Bonferroni corrections were applied as multiple comparisons were conducted (alpha = .004). Mann-Whitney U tests to examine between group differences in the PPS total play scores (any, prompted and spontaneous) revealed significant differences in the scores for Total Play, Total Spontaneous Play and Total Prompted Play. Significant differences were also found between the groups for each of the three dimension scores of the PPS. Table 9.3 reports these results.

It can be seen that the unimpaired symbolic play and impaired symbolic play groups created using the ADOS-G C2 item, relate to each of the summary scores attained from a more detailed observational analysis of play abilities (PPS). Furthermore, parental reports of play abilities obtained through a questionnaire (APQ-R) and observations of play abilities (PPS) are also related. It should be noted, however, that there were twice as many children in the unimpaired symbolic play group.

Table 9-3 *PPS scores for unimpaired and impaired symbolic play groups*

	ADOS-G (Item C2) Impaired Symbolic Play (N = 34) Mean (SD)	Unimpaired Symbolic Play (N = 77) Mean (SD)	Mann-Whitney U	Effect size
No of children with ASD	32	55		
PPS Scores				
Total Play (any)	3.97 (2.99)	7.36 (1.37)	403 **	-.56
Total Play (spont)	2.38 (2.67)	6.36 (2.13)	363.5 **	-.59
Total Play (prompt)	3.21 (2.58)	5.51 (1.54)	656.5 **	-.41
Decentration (any)	1.29 (1.03)	2.36 (.48)	567 **	-.52
Decentration (spont)	.82 (.94)	2.25 (.69)	373 **	-.59
Decentration (prompt)	1.24 (1.07)	2.03 (.56)	813 **	-.38
Decontextualisation (any)	1.47 (1.16)	2.69 (.57)	501.5 **	-.55
Decontextualisation (spont)	.58 (.86)	1.84 (1.05)	481 **	-.53
Decontextualisation (prompt)	1.29 (1.17)	2.34 (.84)	651 **	-.43
Integration (any)	1.21 (1.12)	2.29 (.95)	639 **	-.44
Integration (spont)	.97 (1.17)	2.27 (.99)	556.5 **	-.49
Integration (prompt)	.68 (.68)	1.14 (.76)	871 **	-.33

** $p < .001$

9.12.4 Discriminant Validity

To test the discriminant validity of the PPS, differences between children with SLI and children with ASD were examined. Of the 131 children in the dataset, 19 children with a diagnosis of ASD or SLI had been tested with the ADOS at two time points (7 = SLI; 12 = ASD). The Time 2 data for these children were excluded from the analysis which will follow. Data from 20 typically developing children were also excluded as they had not been tested with the full ADOS-G. A sample of 92 children with ASD (n = 75) and SLI (n =17), all tested with the full ADOS-G were therefore included in the following analysis. All 92 children had scores for the symbolic play variable common to all ADOS-G modules and PPS summary scores.

Non-parametric tests were used in this analysis as the data were not normally distributed and the sample sizes unequal. To account for multiple comparisons Bonferroni corrections were applied (alpha = .004). Mann-Whitney U test revealed significant differences between the SLI and ASD groups for the symbolic play item of the ADOS-G. Significant differences between SLI and ASD groups were also found for Spontaneous Total Play, Spontaneous Decontextualisation, Integration and Spontaneous Integration. Table 9.4 reports the significant differences between the groups

Table 9-4 *Differences between symbolic play scores in SLI and ASD groups*

Score	ASD (N = 75) Mean (SD)	SLI (N=17) Mean (SD)	Mann-Whitney U
ADOS -G Symbolic play (C2)	1.40 (1.04)	.65 (.49)	380.5
Total Play (any)	5.69 (2.76)	7.78 (1.26)	488.0
Total Play (spont)	4.36 (3.08)	7.06 (2.21)	332.0 **
Total Play (prompt)	4.48 (2.41)	5.61 (.61)	530.0
Decentration (any)	1.95 (.97)	2.28 (.46)	607.5
Decentration (spont)	1.64 (1.13)	2.11 (.76)	525.0
Decentration (prompt)	1.67 (.98)	2.00 (.00)	621.0
Decontextualisation (any)	2.13 (1.07)	2.83 (.38)	432.0
Decontextualisation (spont)	1.19 (1.12)	2.33 (.97)	326.5 **
Decontextualisation (prompt)	1.92 (1.13)	2.44 (.51)	555.0
Integration (any)	1.61 (1.11)	2.67 (.77)	348.0 **
Integration (spont)	1.53 (1.22)	2.61 (.92)	367.5 **
Integration (prompt)	.88 (.71)	1.17 (.51)	511.5

** $p < .001$

9.13 Discussion

In this chapter I have discussed how the PPS was developed to better utilise the symbolic play information which the ADOS-G elicits and reported a study which aimed to test the validity and reliability of the new measure. The PPS has been found to be a reliable and valid tool in the assessment of abilities across the three dimensions of symbolic play on which this thesis focuses.

The ADOS-G is a reliable and valid research and clinical diagnostic tool which provides information on a range of behaviours associated with ASD. Made up of four modules selected according to the participants' expressive language ability, the ADOS-G is a tool which can be applied to a broad population. The use of language appropriate modules controls for the verbal demands of the assessment and reduces variation in expressive language within a research study. Furthermore, it enables the same measurement tool to be used within a population of varying ability and for the same assessments to be carried out in a longitudinal study regardless of any developmental changes which may occur over time.

The ADOS-G produces a large amount of detailed information about symbolic play abilities, both spontaneous and prompted. However, it does not currently make full use of this information, using only one summary item to code these behaviours. Based upon detailed evidence for different stages of symbolic play throughout development the PPS examines three dimensions of symbolic play: decentration, decontextualisation and integration. It also separates spontaneous from prompted symbolic play. Such a measure is more comprehensive than the current ADOS-G symbolic play item which does not clearly identify differences between these types of play behaviour. The PPS is therefore likely to be more sensitive in the identification of subtle differences in play abilities between and within diagnostic groups.

To determine the usefulness of the PPS, its validity and reliability were examined. The measure was found to have good levels of inter-rater reliability and internal consistency.

These results confirm that, when used alongside the PPS, the ADOS-G provides a reliable measure of symbolic play abilities. Associations with existing measures of symbolic play were conducted to examine the convergent validity of the PPS. The PPS was found to associate with the APQ-R, a parental report questionnaire developed in the earlier stages of this thesis which examines the same dimensions of symbolic play. Associations were found between the two measures confirming that the PPS reported similar levels of total play for children using an observational method as parents reported using a questionnaire measure. This result not only strengthens the validity of the PPS but also that of the questionnaire.

The PPS was also found to associate with the ADOS-G symbolic play ratings. In the comparison of those with and without impaired symbolic play, according to the current ADOS-G symbolic play item, it was found that the two groups differed significantly on all PPS summary scores. Those identified by the ADOS-G to have unimpaired symbolic play were found to score significantly higher in all PPS summary scores (total and dimensions) than those with impaired symbolic play and therefore to have more advanced symbolic play. Medium to high effect sizes were reported for all of the differences. The strongest effect sizes for differences between the two groups were those associated with spontaneous symbolic play. This finding suggests that the area of symbolic play most likely to be impaired in young children with ASD or communication impairments is spontaneous play. Such a finding supports findings such as Charman & Baron-Cohen (1997) who found that the majority of children with autism (aged 2 years) required prompting or modelling for any symbolic play to be shown. Similarly, those of Blanc et al (2005) who found children with autism (mean age 40

months) showed no symbolic play under free play conditions but that following guidance from an adult these abilities improved. Unlike these findings, however, which focus only on decontextualisation abilities (the use of objects in play), the present study has shown that children benefit from prompting in decentration and decontextualisation; that is the role which the child takes and the way which they use objects. Integration was not found to improve with prompting but this is likely to be a reflection of the rarity of prompts to join together two or more play schemes.

Finally, data from 92 children with ASD and SLI were examined to determine whether differences could be found between the clinical groups. Significant differences were found between the group's ratings of the ADOS-G symbolic play item (C2). Differences in the PPS summary scores were also found between the groups supporting the ADOS-G and its ability to distinguish between clinical groups. The PPS, however, goes beyond this, identifying significant differences between groups in terms of their spontaneous play abilities in particular in decontextualisation. This supports findings from earlier studies in this thesis that found decontextualisation skills are the latest to develop in typical and atypical population. A lack of symbolic play overall then is likely to be most evident through the examination of decontextualisation abilities.

9.14 Conclusion

The PPS was developed to enhance the usefulness of the ADOS-G with regards to the quality of information it currently produces about play abilities. The PPS rates an individual's play according to three dimensions which examine the role of the child

(decentration), the use of objects (decontextualisation) and the creation of meaningful sequences (integration). In addition the PPS also allows differences in the spontaneous and prompted play abilities of an individual to be assessed.

The present study has shown the PPS to be a reliable and valid measure of symbolic play abilities in typical development, ASD and SLI. In the following chapter I will use the PPS to examine the symbolic play abilities of children with ASD in more detail.

Chapter 10

Using the PPS to Examine Symbolic Play Abilities in ASD in Detail

The preceding chapter of this thesis described the development of the Pretend Play Scale (PPS), a new coding scheme for symbolic play. Using data from typically developing children and children with SLI and ASD, the scheme was found to have good reliability and validity. In the current chapter the PPS will be used to examine in detail the symbolic play abilities of young children with ASD.

On the basis of findings from Studies 2 and 3 of this thesis (see Chapters 6 and 7) and a systematic review of the literature (Chapter 2 and 3) the following hypotheses were proposed to examine the relationship between symbolic play abilities and language and between repetitive behaviour and symbolic play in young children with ASD.

1. That children with ASD who have greater language ability will have more advanced symbolic play than children with ASD and poor verbal ability
2. That prompting will improve the symbolic play abilities of children with ASD
3. That repetitive behaviours and symbolic play will be negatively associated in children with ASD

Study 5

10.1 Using the PPS to Examine Symbolic Play Abilities in Children with ASD

The present study utilises existing data from children with ASD to examine the effects of language upon symbolic play and associations between symbolic play and repetitive behaviour in young children with ASD and limited verbal ability.

10.2 Participants

The present study utilises data from a subset of 60 children (mean age = 39.84 months, SD = 11.56) from the larger dataset described in Chapter 8. This subset of data includes only children diagnosed with ASD and assessed with Module 1 of the ADOS-G. As discussed in Chapter 8 (Section 8.2.2), where assessment data for a child had been collected on two occasions' only 'Time 1' data were included.

10.3 Procedure.

The ethical and data collection procedures are described in Chapter 8. In the present study for each child the Birthday Party task from the ADOS-G was coded using the Pretend Play Scale.

10.4 Measures

The present study used data collected using the Autism Diagnostic Observation Schedule-Generic, the Mullen Scales of Early Learning and the Pretend Play Scale.

The ADOS-G is described in sections 4.2 and 4.6.3 of this thesis. All children in the present study had been assessed with Module 1 which is used for children with a minimum of no spoken language and a maximum of simple phrases.

The Mullen Scales of Early Learning (Mullen 1995) have been described in detail in section 7.11.2 of this thesis.

The Pretend Play Scale (PPS) is a coding scheme for use alongside the ADOS-G. The PPS (See Chapter 9) was developed as part of the present research programme to increase the quality and volume of information attained from the ADOS-G in relation to symbolic play abilities. The coding scheme, examines symbolic play abilities across three dimensions: decentration (role of self), decontextualisation (role of object) and integration (creation of meaningful stories). The scheme also produces information about the symbolic play abilities of a child under prompted and spontaneous conditions. The PPS has been shown to have good reliability and validity and to be applicable to atypical and typical populations.

10.5 Analysis

Examination of box-plots revealed that the data were not normally distributed. Mann-Whitney U tests were used to calculate between group differences. Within group differences were examined using Wilcoxon Signed Rank tests. Associations between variables were examined using Spearman rank and point biserial correlations. Where multiple tests were carried out Bonferroni corrections were applied and the accepted level of significance reported.

10.6 Results

10.6.1 Hypothesis 1: Children with ASD who have greater expressive language ability will have fewer impairments in symbolic play than children with ASD and poor verbal ability.

The sample of 60 children was split into two groups according to the expressive language abilities of the child according to the Mullen. The sample was split into those with an expressive language age of less than 18 months and those with an expressive language age of 18 months or above. This split is in keeping with findings that at around 18 months of age typically developing children are able to show symbolic abilities in all dimensions of play (Belsky & Most, 1981; Fenson et al., 1976; Fenson & Ramsay, 1980).

Examination of the mean scores for each of the total play variables of the PPS revealed that scores were higher for those children of greater verbal ability. As reported in Table

10.1 between group differences in symbolic play abilities were only significant for Any Total Play and Spontaneous Total Play.

Table 10-1 *PPS & language scores for sample split by expressive language ability*

	Expressive Lang. Age < 18 months		Expressive Lang. Age > 18 months		Group Comparisons
N	28		32		
	Mean	(SD)	Mean	(SD)	Mann Whitney U
Age in months	34.79	(5.56)	39.65	(5.45)	166.0 n.s
Expressive. Lang. Age in months	13.13	(3.01)	24.45	(4.45)	36.0 **
Receptive. Lang. Age in months	16.54	(4.81)	22.95	(5.11)	28.5 **
Total Play (any)	3.56	(2.50)	6.38	(1.86)	132.5 **
Total Play (spont)	2.6	(2.40)	4.88	(2.36)	139 **
Total Play (prompt)	3.56	(2.50)	5.21	(1.59)	172.5

** P <.001

To examine the effects of language upon symbolic play further, the individual symbolic play dimension scores obtained from the PPS were examined. Table 10.2 reveals that for each of the three dimensions (decentration, decontextualisation and integration) scores were higher for children with greater expressive language abilities. These findings indicate that overall those children assessed to have greater expressive language abilities have higher PPS summary scores and therefore more advanced symbolic play skills. Overall, the most advanced symbolic play behaviours were found in the decontextualisation dimension for both groups of children. In both groups the least developed overall symbolic play behaviours were seen in the integration dimension. Examination of prompted play scores showed the least developed area of symbolic play to be integration for both groups of children, however, as discussed previously this is likely to be due to a lack of prompts for a child to join together play acts during the ADOS-G. The second lowest scores for prompted symbolic play were therefore examined. In both groups these were for decentration. The most developed

area of prompted symbolic play in both groups was decontextualisation. Spontaneous play was most developed in the dimension of decentration for both groups. For the group with lower language the least developed dimension of spontaneous symbolic play was integration whilst for those children with an expressive language age greater than 18 months the least developed form of spontaneous play was decontextualisation. Significant between group differences were found for the PPS variables measuring Any Decontextualisation and Spontaneous Decontextualisation (Alpha = .005).

Table 10-2 *PPS scores for sample split by expressive language ability*

	Expressive Lang. Age < 18 months		Expressive Lang. Age > 18 months		Group Comparisons
N	28		32		
	Mean	(SD)	Mean	(SD)	Mann Whitney U
Decentration (any)	1.56	(.96)	2.17	(.71)	197.5
Decentration (spont)	1.20	(1.04)	1.88	(.99)	193.0
Decentration (prompt)	1.32	(.95)	1.96	(.69)	194.0
Decontextualisation (any)	1.64	(1.19)	2.54	(.72)	170.0 **
Decontextualisation (spont)	.56	(.71)	1.42	(1.02)	152.0 **
Decontextualisation (prompt)	1.52	(1.23)	2.38	(.88)	182. 0
Integration (any)	1.0	(.76)	1.67	(.05)	196.0
Integration (spont)	0	(0)	1.58	(1.14)	190.0
Integration (prompt)	.84	(.85)	.09	(.30)	253.5

** $p < .001$

10.6.2 Hypothesis 2: Prompting will assist children with ASD in performing symbolic play

The statistics reported in Table 10.2 show that for children with ASD with an expressive language age greater than 18 months all prompted play scores on the PPS were higher than the corresponding spontaneous play scores, with the exception of integration, for which spontaneous scores were higher than prompted scores. For those children with

an expressive language age below 18 months prompted play scores were higher than spontaneous play scores for all dimensions of symbolic play measured by the PPS.

Significant differences between prompted and symbolic play were found for both language groups (Alpha = .008). For those children with ASD and an expressive language age below 18 months prompting was found to significantly improve the child's ability to use object substitution and invisible objects in play (decontextualisation) ($z = -3.107$, $p = 0.002$). This was also true for those children with ASD and an expressive language age greater than or equal to18 months ($z = -2.914$, $p = .004$), for these children there was also a significant difference in prompted and spontaneous sequenced behaviours (integration) ($z = -2.70$, $p = 0.007$), however, in this case spontaneous behaviours were more advanced than prompted behaviours.

10.6.3 Hypothesis 3: Repetitive behaviour and symbolic play will be associated in children with ASD

In the present analysis repetitive behaviours for 60 children had been assessed with the ADOS-G. Three repetitive behaviour items are common to all ADOS-G modules; these tap sensory interests, hand and finger mannerisms and unusual repetitive interests. Of these items sensory and motor items have a score range from 0 to 2 and unusual repetitive interests a range from 0 to 3. In Chapter 7 (Section 7.12.1) of this thesis a total repetitive behaviour score was created by summing these items for each of the participants; this created the variable NewRB which had a range from 0 to 7. A high score on this variable represented severe/excessive repetitive behaviours. As discussed

the ADOS-G repetitive behaviour items have a very small range (3 or 4 point scale) of scores. To overcome this, for each of the three types of repetitive behaviour rated in the ADOS-G the sample was split into two groups, those who showed none of this behaviour and those who showed some of this behaviour. Table 10.3 reports information about the presence of repetitive behaviours seen in the sample.

Table 10-3 *Types of repetitive behaviours shown by the sample*

		All (N = 60)	Exp. Lang age	
			<18 months (N=28)	> 18 months (N=32)
NewRB (SD)		3.56 (1.35)	3.80 (1.50)	3.42 (1.18)
Sensory Motor	Present	45	23	22
	Not Present	15	5	10
Hand & Finger	Present	52	25	27
	Not Present	8	3	5
Repetitive Interests	Present	49	21	28
	Not Present	11	7	4

It can be seen in Table 10.3 that for the two expressive language groups there are similar levels of total repetitive behaviour (NewRB). Statistical examination of this difference between revealed it to be non-significant ($U = 255.5$, $p = .363$). Examination of the different types of repetitive behaviour which children had been seen to engage showed that in both language groups there were more children showing each type of repetitive behaviour than those not showing it. Furthermore, there were a similar number of children in each of the expressive language groups showing each type of behaviour.

Associations between total repetitive behaviour and symbolic play abilities were initially examined using Spearman rank correlations. Table 10.4 reports the correlations

between total repetitive behaviours seen during the ADOS-G (NewRB) and PPS summary scores for the group as a whole and the two language groups. No significant association were found between total repetitive behaviour and symbolic play (Alpha =.004) for any of the groups.

Table 10-4 *Spearman rank correlations (r_s) between total repetitive behaviour (NewRB) and PPS scores*

	All (N=60)		Expressive Language Age <18 months (N=28)		> 18 months (N=32)	
NewRB (SD)	3.56 (1.35)		3.80 (1.50)		3.42 (1.18)	
	r_s	p-value	r_s	p-value	r_s	p-value
PPS Score						
Total Play (any)	-.033	.800	.145	.490	-.070	.746
Total Play (spont)	-.024	.854	.064	.762	.116	.591
Total Play (prompt)	.096	.466	-.046	.827	.013	.951
Decentration (any)	-.180	.168	-.070	.741	-.382	.066
Decentration (spont)	.024	.853	.207	.321	-.210	.324
Decentration (prompt)	-.112	.392	-.068	.747	-.125	.561
Decontextualisation (any)	.025	.852	.057	.787	.198	.353
Decontextualisation (spont)	-.046	.729	.037	.859	-.112	.603
Decontextualisation (prompt)	.021	.871	.061	.772	.176	.412
Integration (any)	-.105	.425	-.113	.590	.065	.763
Integration (spont)	-.031	.813	.109	.603	.089	.680
Integration (prompt)	-.045	.734	-.195	.351	.188	.378

Point biserial correlations (Alpha = 0.004) between the presence of specific types of repetitive behaviours and PPS summary scores were used to further examine associations between symbolic play abilities and repetitive behaviours (See Table 10.5). No significant associations were found between the presence of any specific type of repetitive behaviour and any of the symbolic play scores created by the PPS. This was true for the group as a whole and the two expressive language groups independently.

Table 10-5 *Point-biserial correlations between the presence of repetitive behaviours and PPS summary scores*

	Language Age																	
	All (N=60)						<18 months (N=28)						> 18 months (N=32)					
	Sensory Motor		Hand and Finger		Repetitive Interests		Sensory Motor		Hand and Finger		Repetitive Interests		Sensory Motor		Hand and Finger		Repetitive Interests	
	r_s	**p-value**	r_s	**p-value**	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value
PPS Score																		
Total Play (any)	.016	**.901**	-.075	**.571**	-.146	**.266**	.155	**.458**	.040	**.851**	-.093	**.658**	-.019	**.930**	-.031	**.887**	-.199	**.352**
Total Play (spont)	.065	**.624**	-.022	**.865**	-.153	**.228**	.233	**.283**	.020	**.930**	-.238	**.251**	-.035	**.872**	.217	**.308**	-.347	**.097**
Total Play (prompt)	-.086	**.512**	-.083	**.528**	.031	**.816**	.014	**.948**	-.008	**.969**	.128	**.543**	-.209	**.327**	.060	**.781**	.097	**.051**
Decentration (any)	-.098	**.457**	-.108	**.411**	-.069	**.602**	.135	**.519**	-.021	**.920**	.019	**.929**	-.378	**.069**	-.217	**.309**	-.092	**.670**
Decentration (spont)	.032	**.806**	-.009	**.944**	-.157	**.230**	.202	**.333**	.098	**.641**	-.087	**.680**	-.177	**.408**	.058	**.789**		**.404**
Decentration (prompt)	-.161	**.218**	-.083	**.530**	.055	**.678**	-.008	**.969**	-.151	**.471**	.261	**.207**	-.311	**.139**	.138	**.521**	.914	**-.092**
Decontextualisation (any)	.009	**.944**	.007	**.956**	-.051	**.700**	.068	**.748**	.189	**.365**	.036	**.866**	-.027	**.900**	.026	**.903**	-.067	**.756**
Decontextualisation (spont)	.046	**.729**	.020	**.882**	-.032	**.806**	.183	**.382**	-.029	**.892**	-.204	**.333**	-.100	**.643**	.299	**.156**	-.348	**.096**
Decontextualisation (prompt)	-.072	**.585**	-.018	**.892**	.018	**.892**	.009	**.965**	.133	**.527**	.127	**.544**	-.147	**.493**	-.065	**.762**	.018	**.932**
Integration (any)	.126	**.336**	-.101	**.442**	-.215	**.095**	.250	**.228**	-.134	**.524**	-.367	**.065**	.238	**-.035**	.073	**.217**	-.245	**-.347**
Integration (spont)	.086	**.514**	-.064	**.625**	-.218	**.094**	.229	**.270**	-.096	**.648**	-.234	**.261**	.171	**.424**	.134	**.533**	-.254	**.231**
Integration (prompt)	.059	**.654**	-.186	**.155**	.008	**.965**	.067	**.751**	-.089	**.672**	-.184	**.379**	.035	**.872**	.169	**.430**	.238	**.263**

10.7 Discussion

The Pretend Play Scale (PPS) is an observational coding scheme which has been designed to elicit more detailed information about symbolic abilities than is possible using the current ADOS-G coding for play. The PPS examines abilities in three dimensions of symbolic play, decentration, decontextualisation and integration. It also provides information of a child's abilities in each of these dimensions under prompted and spontaneous conditions. Using the PPS, the present study aimed to examine the symbolic play abilities of young children with ASD focusing upon the effects of language development and prompting upon play abilities. It also aimed to examine associations between symbolic play and repetitive behaviour in these children.

Symbolic play has been shown to be associated with language in typical development, in particular with expressive language (Bates et al., 1988; Charman et al., 2000; McCune, 1995; Tamis LeMonda & Bornstein, 1994). There has also been some evidence of a link between symbolic play and language in children with ASD (Lewis, 2003; Mundy et al., 1987; Ungerer & Sigman, 1981). However, the difficulties which children with ASD demonstrate in symbolic play have been shown to continue to exist regardless of language ability (Lewis, 2003; Sigman & Ruskin; 1999, Ungerer & Sigman, 1981). All children in the present study had been assessed with the same ADOS-G module; this means that the variation in expressive language abilities within the group is reduced in comparison to previous studies in this thesis where the samples have had a wide range of verbal abilities. Furthermore, the verbal demands of the tasks upon all of the children were similar and appropriate for their ability level.

In selecting children assessed with Module 1 of the ADOS-G the symbolic play abilities of children with limited language abilities were examined. In typical children symbolic play and language are reported to emerge at similar ages, the examination of young children with ASD who have low levels of expressive language therefore allows the early development of symbolic play to be examined.

10.7.1 Do children with ASD with greater language ability have less impairment in symbolic play than children with ASD and poor verbal ability?

To investigate the effect of language upon symbolic play in ASD, assessment data from a sample of 60 children with ASD assessed with a Module 1 ADOS-S were examined. The group was split according to expressive language ability to create two groups, those with an expressive language age of 18 months or above and those with an expressive language age lower than 18 months. Examination of the summary scores of the PPS revealed that in both groups there was some evidence of symbolic play. This is particularly interesting as our knowledge of the developmental milestones of typical children would suggest that this would not be the case. These findings confirm earlier parental reports (see Chapter 6) that symbolic play may be evident in children with ASD and very limited verbal skills. Furthermore, there were also some children who had scored the maximum scores for symbolic play in both groups. In the more verbally able group there was 1 child who scored the maximum in all dimensions of spontaneous play. There were no children who scored the maximum in all dimensions of prompted play. In the less verbally able group there were no children who scored the maximum in all dimensions of prompted play and no children who scored the maximum in all dimensions of spontaneous play. However, there were some children in both groups

who showed no symbolic play; 5 in the least able group and 1 in the more able group. Overall, abilities in decentration, decontextualisation and integration were shown to improve in ASD with an increase in verbal ability. This was reflected in higher scores for each PPS summary score for the more verbally able group in comparison to those of poor verbal ability. On the basis of these findings it is suggested that in future studies of symbolic play in ASD a measure of cognitive ability is used alongside measures of language.

In the present study, significant between groups differences were found for overall play, spontaneous overall play, overall decontextualisation and spontaneous decontextualisation, with the more verbally able children scoring higher than the less able children. In comparison to other dimensions of symbolic play, scores for overall decontextualisation were the lowest in the more verbally able group, this supports suggestions made in Study 2 of this thesis, that decontextualisation is the last dimension of symbolic play to emerge in typical development. If this is the case, it is possible that the difficulties found in these skills in children with ASD and the difference in abilities between the verbal ability groups in the present study may be a representation of a developmental delay. Decontextualisation, however, was not the lowest scoring dimension of symbolic play in the less able group, rather integration was. In keeping with previous research (see Chapter 3) this research shows that each dimension of symbolic play has its own developmental pathway and timings. For the group of lower verbal ability in the present study, developmentally they may be at the stage at which typically the more basic levels of decentration and decontextualisation have emerged and the creation of stories or play sequences is only just beginning. As such the less

verbally able children are at the developmental level where integration is starting to emerge, whilst the more verbally able group have developed these skills and now are at the stage at which typically the more complex levels of decontextualisation will be emerging. Such an explanation suggests that the deficits reported in the symbolic play of children with ASD in the present study are primarily due to a developmental delay and not a characteristic feature of the disorder. It should therefore be considered that, whilst children with ASD are likely to show impairments in their symbolic play in comparison to their peers, when assessing these impairments developmental ability should continue to be taken into consideration. This highlights the importance of clearly separating the developmental nature of symbolic play from its autistic like nature i.e. it repetitiousness or sociability when seeking to identify or separate out the deficits in play which are unique to ASD and those which are a reflection of developmental ability.

10.7.2 Does prompting assist children with ASD in performing symbolic play?

Examination of PPS summary scores revealed that in both language groups there were some children with no spontaneous symbolic play in each dimension of symbolic play. Within the least able group there were nine children who showed no spontaneous symbolic play and 8 who showed no prompted symbolic play. In the more able group there were two children who showed no spontaneous and one child who showed no prompted symbolic play. Prompting was shown to significantly improve the decontextualisation skills of children with a verbal age below 18 months. Those children with a verbal age greater than 18 months showed significant improvements in decontextualisation and integration following prompting. The effect of prompting upon

symbolic play abilities suggests that in both groups, children with ASD may have deficits in the self direction of play and lack the motivation to engage in play spontaneously. The increase in the developmental level of decontextualisation abilities of symbolic play following prompts supports the findings of Lewis & Boucher (1988), Riguet et al. (1981) and Charman & Baron-Cohen (1997), who found a child's ability to use object substitution improved following prompts.

10.7.3 How are repetitive behaviour and symbolic play related in ASD?

The present study examined associations between total repetitive behaviour and symbolic play. Findings from earlier studies in this thesis have identified that overall play in ASD can be predicted by the repetitive behaviours and expressive language abilities of a child (Studies 2 and 3). However, it was found in Study 3 that although related to repetitive behaviour symbolic play was primarily predicted by expressive language abilities. Linking with findings that in the ASD population there is a negative association between repetitive behaviours and developmental age (Bishop et al., 2006; Piven et al., 1996; Schultz & Berkson, 1995; Starr et al., 2003), the present study reports that although non-significant there was some evidence of a decrease in total repetitive behaviours as verbal abilities increased in young children with ASD. Examination of specific types of repetitive behaviour measured by the ADOS-G revealed no correlations between symbolic play and the presence or absence of sensory motor behaviours, hand and finger mannerisms or repetitive interests. This was true for the group overall and the two language groups.

Post-hoc analysis of associations between symbolic play and the ADOS-G repetitive behaviour items were conducted. Due to the very limited coding scheme these results should be interpreted extremely cautiously. For the ASD group as a whole, associations were found between decontextualisation and hand and finger mannerisms. However, this did not remain significant when Bonferroni corrections were applied. This result can be linked with those of the questionnaire study earlier in this thesis (Study 2), in which sensory motor behaviours and total symbolic play were significantly associated in those with ASD. The items which make up the sensory motor category of the Activities and Play Questionnaire-Revised used in Study 2 include hand and finger mannerisms and therefore indicate continuity between the present findings and those in Study 2 of this thesis. When split by expressive language ability and only prior to Bonferroni corrections significant associations were found between hand and finger mannerisms and decontextualisation for the more able group of children. There were no associations between repetitive behaviour and symbolic play for the less able group of children. As discussed these correlations were investigatory only and should be interpreted with extreme caution.

As suggested by Study 3 of this thesis, the findings of associations between repetitive behaviour and symbolic play in the more able group may be explained by the need for a specific level of verbal ability before these phenomena become related. The proposal of an ability threshold in the relationship between symbolic play and repetitive behaviours suggests that repetitive behaviour and symbolic play are associated in ASD when a specific level of language is attained. That is that only when a child has the verbal skills to engage in complex symbolic play and when repetitive behaviours would typically

cease to exist will these behaviours become associated. Only once a child can select symbolic play or repetitive behaviour as an activity to engage in will these behaviours begin to strongly impact upon the presence of one another. The importance of examining true symbolic play abilities of a child is highlighted here; that is that a child should be encouraged to elicit specific types of behaviour during an assessment. For instance, a child who typically chooses to repetitively spin around and around rather than play house or shop may appear to have less developed symbolic play than say a child who always chooses to engage in play with dolls and typical play objects. The use of prompted or structured play assessments provides opportunities for play to be directed by others and not self directed by the child, as such it may be apparent that the child who generally chooses to spin around and around is able to perform similar play tasks to their peers.

10.7.4 Limitations of this Study

The present study has provided useful and detailed information about the symbolic play abilities of young children with ASD; however, this level of detail has not been reflected in the information collected about repetitive behaviours. The ADOS-G, whilst known to be a reliable and valid diagnostic tool, examines only a snapshot of time. Repetitive behaviours which may be associated with a particular scenario, such as bedtime or mealtimes, may not therefore have been performed during the assessment period. This phenomenon is reflected in the absence of repetitive behaviours from the current diagnostic algorithm produced by the ADOS-G. The lack of significant correlations between repetitive behaviour and symbolic play in the present study are likely to be a result of the limited information which could be included in analysis; that

is that severity could not reliably be taken into consideration. Furthermore, there are likely to have been a number of children who showed no or few repetitive behaviours during the assessment session due to its artificial nature but who regularly show repetitive behaviours on a day to day basis. Had detailed parental reports been available then information about a wider range of behaviours seen in all aspects of a child's life would have been available. This may have meant that correlations between symbolic play and the presence of repetitive behaviours would have been found. Furthermore, it would mean that associations between the severity of repetitive behaviours and symbolic play could be more reliably examined.

10.8 Conclusion

The present study reports that the dimension of symbolic play which children with ASD may find most difficult varies with ability. It is likely that these variations represent the typical developmental pathway which symbolic play takes and different developmental timescales which occur in integration, decentration and decontextualisation. Support has been presented in this study for the proposal that play is related to language in children with ASD, supporting the findings of Studies 2 and 3 of this thesis and previous research (Lewis, 2003; Mundy et al.; 1987; Sigman & Ruskin; 1999, Ungerer & Sigman, 1981). In the present study, for children with ASD and an expressive language level which in typical development is required for symbolic play to occur, the most problematic area of play is the use of objects as something else or the use of invisible objects (decontextualisation). It has also been reported in the present study that prompting improves the symbolic play abilities of children with ASD, in particular the use of object substitutions and invisible objects (decontextualisation). This suggests

that whilst children with ASD may show deficits in their symbolic play that structure and guidance will allow them to perform at a higher developmental level.

The present study has not provided further evidence of significant associations between symbolic play and repetitive behaviour in children with ASD. However, in keeping with the findings from the questionnaire study (Study 2, Chapter 6), post-hoc analysis may have indicated that associations exist between sensory motor repetitive behaviours and decontextualisation in the ASD population. However, in the present study this was only found to be true for children with a verbal age greater than 18 months, further suggesting that any association between repetitive behaviour and symbolic play is mediated by developmental ability. To examine this further, it is proposed that future studies use a triangulation of observation and parental report measures to access equally detailed information about repetitive behaviours and symbolic play. Furthermore, it is suggested that the presence of specific types of repetitive behaviours should be measured in more detail.

Chapter 11

Discussion

The programme of research discussed in this thesis aimed to examine repetitive behaviours and symbolic play in ASD in more detail and to address the question "Are repetitive behaviours and symbolic play associated in ASD?" The development of two new measures to measure repetitive behaviours and symbolic play has been reported in this thesis. Findings from a series of questionnaire and observation studies of play and repetitive behaviour were also presented. The final chapter of this thesis will draw together the findings of this research before considering their implications and possible directions for future studies.

11.1 Why are Associations Between Repetitive Behaviours and Symbolic Play an Important Area of Research?

Imaginative impairments and repetitive behaviour are considered to be highly associated in autism (Wing & Gould, 1979). This view has influenced research in which theoretical accounts of autism have been proposed (See Frith, 1999; Happé, 1994). Despite this, in the international diagnostic criteria for autism (DSM-IV & ICD-10) no specific associations between these phenomena are proposed. Figure 1.1 illustrates the differences between these models, showing that the Wing & Gould triad of impairments places imagination with repetitive behaviours whilst international classification systems place imagination with communication impairments.

The proposed association between repetitive behaviour and imagination in autism is reflected in the way in which the symbolic play of individuals with autism have been described and assessed. Symbolic play in autism has been described as repetitive, stereotyped and lacking in spontaneity. This type of description does not take account of the content of play acts or its level of sophistication in relation to normative models of symbolic play development. To fully understand any associations which may exist between symbolic play and repetitive behaviour it is proposed that these behaviours must be separated. Symbolic play should be examined in terms of its developmental level with its repetitiveness set aside. Furthermore, a wide range of repetitive behaviours beyond repetitive play should be examined. By doing this associations between repetitive behaviours and symbolic play may be reliably examined. If as proposed by Wing & Gould (1979) these behaviours are associated then it would follow that the amount of repetitive behaviours an individual showed would be related to their level of imaginative impairment; that is that children with large amounts of repetitive behaviour would have poorer imagination than those with fewer repetitive behaviours.

11.2 What Did this Programme of Research Seek to Achieve?

To date research into repetitive behaviours and imagination in ASD has not been as thorough as that into the other characteristic features of the disorder: impairments of social interaction and communication. Furthermore, the proposed associations between these behaviours had not, to my knowledge, been systematically examined. This thesis therefore aimed to examine these behaviours independently and any associations which may exist between them.

This research programme did not take a traditional approach of attempting to test a pre-existing causal explanation, either in terms of how imaginative impairments and repetitive behaviours might manifest in those with ASD or why these behaviours may or may not be associated. Having identified a substantial gap in the ASD literature through the lack of research into imagination and repetitive behaviour, my aim was to gain a more detailed picture of these behaviours independently and then begin to examine whether the presence of these behaviours in children with ASD was associated with one another i.e. could a child with ASD have high levels of repetitive behaviour yet also show good imagination? This approach to research focusing on description of phenomena has been proposed as lacking in psychology (Kazdin, 2003) and as one which should be considered equally as valid and informative as that which focuses upon theory (Davis & Rose, 2000; Kazdin, 2003).

11.3 What Has this Programme of Research Achieved?

During the present research two new measures have been developed which have proved reliable and valid in the assessment of symbolic play and repetitive behaviours in typical and atypical populations. Detailed descriptive information about repetitive behaviours and symbolic play abilities seen in young children with ASD has been attained. Evidence has shown that both language abilities and repetitive behaviours impact upon the symbolic play abilities of children with ASD. While it has not been possible to analyse this association systematically in a group of children with a range of different ability levels, these results point toward the development of a new hypothesis that could be tested by future research. This hypothesis is that whilst the degree of repetitive behaviours an individual with ASD shows impacts upon their symbolic play

abilities this relationship only becomes significant once a child has reached a developmental level at which these behaviours would typically cease to co-exist. In the following sections I will discuss this 'threshold' hypothesis further along with the other findings of this programme outlined above.

11.4 Measuring Repetitive Behaviour and Symbolic Play

The first aim of this programme of research was to develop a measure which met the needs of this thesis. Examination of existing measures of repetitive behaviour and symbolic play highlighted the need for a measurement tool which could measure each of these behaviours in a range of individuals. Diagnostic tools such as the ADI-R, ADOS-G and DISCO measure both symbolic play and repetitive behaviours. As diagnostic tools focus upon behaviours which are either exclusive to the group in question or likely to distinguish populations from one another, if such tools are later used in research it creates a situation in which the behaviours in question will be that by which the research population was identified, thus creating circularity. Measurement tools must therefore go beyond this and examine a range of behaviours which may be found in both typical and atypical populations.

Specific measures of repetitive behaviour such as the CY-BOCS, CRI, RBQ and RBS-R (see section 4.2.2 for summaries), were deemed unsuitable for the present research. Reasons included the use of summary scores rather than individual item scores, which was seen to limit the amount of useful information available to the researcher. A second limitation was the focus upon specific types of repetitive behaviours. For

example, both the CRI and CY-BOCS focus upon higher level repetitive behaviours such as rituals and routines and fail to address lower level behaviours such as repetitive touch or feel. Finally, measures which addressed a wide range of behaviours which were likely to be seen in a range of populations were flawed in the length of the questionnaire and seen to require too lengthy a time commitment for participants who would be involved in the present research.

When examining symbolic play in the present research the aim was to begin to develop a picture of the developmental level of symbolic play abilities of children with ASD. As early as Piaget's first accounts of play, models of symbolic play development in typical children have identified three dimensions of skill, decentration, decontextualisation and integration (Bretherton, 1984; McCune-Nicolich, 1981; Fenson, 1984). Decentration is an increasing tendency for children to include players other than the self into his or her play such as using a doll as an active participant. Decontextualisation is the decreasing use of props for their real purpose during play as seen through object substitution and the attribution of false properties to objects. Finally, integration is the increasing ability of a child to combine play schemes to create meaningful sequences such as a pretend birthday parties or a pretend shopping trip. It was this developmental model of symbolic play which formed the basis of the play research in this thesis.

Examination of the three dimensions of symbolic play was seen as a mechanism by which possible specific impairments of symbolic play in autism may be identified and

through which closer examination of possible associations between repetitive behaviours and different aspects of symbolic play could be conducted. Existing symbolic play tools were seen to be unsuitable for the present research, primarily as they did not examine these dimensions. Of the symbolic play measures evaluated in Chapter 4 of this thesis, only two measures produced information about each of these dimensions, Fenson's (1984) coding scheme and Brown et al.'s (2001) scheme. However, these measures were not suited to parental report as used in the early part of this thesis. Furthermore, they did not provide information about the differences in prompted and spontaneous symbolic play abilities. This factor is identified in the literature review to be important in the assessment of symbolic play in ASD (Blanc et al., 2005; Charman, et al., 1997; Charman & Baron-Cohen, 1997; Jarrold, et al., 1996; Riguet et al., 1981; Stahmer, 1995; Sigman & Ungerer, 1984) as impairments in spontaneous play may be associated with repetitive behaviour due to the impact which these may have upon the generativity and flexibility of activities. As such, it was important to consider the impact of prompting to gain a true picture of the symbolic play abilities of children with ASD.

As a result of the lack of suitable measurement tools for the present research, two new measurement tools were developed: the APQ-R and the PPS. Chapters 5 and 9 of this thesis document the development of these measures and the studies which were conducted to examine their validity and reliability. The following sections will review these measures and their role in the present research.

11.4.1 The Activities and Play Questionnaire – Revised.

The Activities and Play Questionnaire – Revised (APQ-R) is a 34 item parental report questionnaire which examines a range of repetitive behaviours and play behaviour. The questionnaire is applicable to children of typical and atypical development and can be administered as a postal survey. As such, a large population can be accessed at very little cost and in a short space of time. In Chapter 5 of this thesis a study was presented which showed the APQ-R to be a reliable measure. Examination of the construct of the questionnaire confirmed that repetitive behaviour and play are independent behaviours and therefore any associations found between them would not be an artefact of the measure.

Principal components analysis of the repetitive behaviour items in the questionnaire in this study revealed that the repetitive behaviour items in the APQ-R formed two factors: sensory and motor behaviours and rituals and routines. This finding is in keeping with Turner's (1999) proposal that repetitive behaviours can be categorised according to the cognitive capacity into higher and lower level behaviour. These categories also support a number of factor analysis studies which have been conducted with ADI-R repetitive behaviour items and in which these two categories of repetitive behaviours have been proposed (Bishop et al., 2006; Cuccaro et al., 2003; Leekam et al., in press; Richler et al., 2007; Shao et al., 2003; Szatmari et al., 2005). Although these findings do not completely concur with Honey et al.'s (2006a) ADI-R factor analysis study in which a third category of repetitive behaviour is proposed – circumscribed interests – it should be noted that the APQ-R does not include items which feature in this category (that is unusual preoccupations and unusual attachments). These items were excluded from the

APQ-R due to the general acceptance that language is required for a child to show an unusual preoccupation and that in the APQ (the predecessor of the APQ-R) attachment to objects loaded onto both the play and repetitive behaviour factors.

The APQ-R was also designed to examine play abilities and to my knowledge is the only questionnaire to measure the three dimensions of symbolic play: decentration, decontextualisation and integration. The symbolic play items in the APQ-R were designed specifically for the questionnaire with the intention of measuring the developmental nature of play in children with autism something which has previously been overlooked. The spontaneity of play behaviours was also examined. The play items in the APQ-R were shown to be valid when significant correlations were found between total play scores in this questionnaire and those from an observational measure of play (the PPS). This confirmed that the abilities which a parent reported their child to have were also observed by trained examiners during the ADOS-G, a semi-structured play assessment. In addition, the symbolic play items in the APQ-R were found to form a separate factor to other pre-symbolic play items. This allowed both total and symbolic play to be examined.

11.4.2 The Pretend Play Scale

The Pretend Play Scale (PPS) is an observational coding scheme developed to be used with the ADOS-G. As described in detail earlier in this thesis (See Section 4.2 and 4.6.3), the ADOS-G is a standardised observation measure which is used around the world in both clinical and research work. It elicits detailed information about symbolic

play abilities, however, its current coding system records very little information about this play. The ADOS-G was seen to be an ideal measure for which a new coding scheme for symbolic play could be developed and used in the present programme of research. The PPS measures play across the three dimensions of symbolic play and tracks the development of each of these across three levels of complexity. It also distinguishes between spontaneous and prompted play behaviours in each dimension. In a study presented in Chapter 9 of this thesis, the PPS was shown to have good validity and reliability and to be useful in the assessment of symbolic play in typical and atypical populations.

11.4.3 What Have These New Measures Provided?

The development of the APQ-R and PPS has provided measures which have met the needs of this thesis; that is that a range of typical and atypical repetitive behaviours are examined and symbolic play is assessed according to its developmental level on the basis of models of typical development and not according to its autistic like nature. The APQ-R is a measure which incorporates both repetitive behaviour and symbolic play and can be used as a postal questionnaire. This makes it highly advantageous in the accessing of large amounts of data in a short period of time and with minimum financial implications. The APQ-R also provides the opportunity to gather information about repetitive behaviours which may not be seen in observational studies due to their limitation to specific times or places. However, the measure is limited in the level of detail it produces about symbolic play and relies upon the correct interpretation of play behaviours by respondents. The PPS overcomes these issues by using trained examiners to code play behaviours seen during a standardised assessment. The PPS,

when used with the ADOS-G, unlike the APQ-R aims to elicit the most advanced play behaviours a child is capable of rather than the behaviours which they typically chose to engage in. As a new coding scheme the PPS provides opportunities for existing ADOS-G data to be recoded and detailed information about symbolic play abilities attained without the need to recruit new participants. It is suggested then, that future studies of play and repetitive behaviour would benefit from the use of both the APQ-R and the PPS.

11.5 What Have We Learnt about Repetitive Behaviours?

One of the characteristic features of ASD is the presence of excessive repetitive behaviours. Using data collected with the APQ-R from a large sample of typically developing 2 to 4 year olds and 2 to 8 year olds with ASD it was confirmed that children with ASD engage in more repetitive behaviours than children of typical development, confirming previous research findings (Bodfish et al., 2000).

As discussed earlier (See Section 11.4.1), the development of the APQ-R provided evidence to suggest that repetitive behaviours may be split into sensory and motor behaviours and rituals and routines. Previous research has reported that within the typical population lower level repetitive behaviours such as sensory and motor behaviours are seen during a child's first year (Thelan, 1979), at around the age of 2 years these behaviours begin to be replaced by higher level behaviours, such as a need for rituals and routines (Evans et al., 1997). In Study 2 (Chapter 6) of this thesis, data collected with the APQ-R revealed that children of typical development were shown to

engage in more sensory and motor behaviours than rituals and routines at 2 to 4 years of age. These results can be linked with the findings of Evans et al. (1997) and Thelan, as whilst sensory motor behaviours remained the most prominent form of repetition for a child to engage in, repetitive routines and rituals were evident. It is suggested then that the typically developing children assessed in the questionnaire study of this thesis are likely to have been on the cusp of changes between the two levels of repetitive behaviour. This finding was not replicated in the ASD group who were shown on average to have equivalent sensory motor and rituals and routine scores on the APQ-R. However, the ASD group differed in age to the typical group including children aged 2 to 8 years rather than 2 to 4 years. As a result of this larger age range and the lack of information surrounding the general developmental level of the ASD group it was not possible to make comparisons between the most prominent types of behaviour shown in the two groups.

11.5.1 How do Repetitive Behaviours Change in Children with ASD?

Within the typical population, repetitive behaviours are reported to change in type over time as a result of cognitive maturation (Piaget, 1952), the development of emotions and social communication (Berkson, 1983; Evans et al., 1997). This developmental trajectory is also reported to occur in developmentally delayed populations when mental age is taken into consideration (Evans & Gray, 2000). Whilst repetitive behaviours remain pervasive in those with ASD, as in the typical population, repetitive behaviours are reported to change with age (Kanner, 1943). For example, Fecteau et al. (2003) reported that according to the ADI-R over three quarters of those with autism showing repetitive use of objects at 4 to 5 years of age showed a decrease in these behaviours

over time. In comparison verbal rituals increased in frequency over time. In keeping with postulations from research in the typical population, such findings suggest that ability may play a role in the change in repetitive behaviours over time. The increase in verbal rituals with age reported by Fecteau et al. may be better explained by an improvement in the verbal abilities of the sample. As the language abilities of the group improved over time it is likely that more children attained the verbal abilities necessary to engage in such behaviours thus resulting in an increase in the presence of these behaviours over time. Furthermore, an improvement in the language abilities of those children who showed such behaviours at 4 to 5 years of age is likely to present more opportunities for these children to engage in verbal opportunities further contributing to the increase in their presence over time.

Similarly an examination of the ability levels and repetitive behaviour of young children with autism, ASD and speech and language delays in a study independent of this thesis (Honey et al., 2006a), revealed that those children of greater verbal ability and adaptive behaviour showed lower levels of repetitive behaviours as measured by the ADI-R than those of poorer verbal and adaptive ability. In the research conducted in this thesis, evidence has been presented to support theories that repetitive behaviour and ability level are related in those with ASD. In the second study of this thesis (Chapter 6), repetitive behaviours as reported by parents using the APQ-R were found to be associated with verbal ability. Significant correlations were also found between expressive language and sensory and motor behaviours; the greater a child's verbal abilities the less frequent their sensory and motor behaviours. However, there was no evidence of an association between repetitive rituals and routines and verbal ability in

this study. It is suggested that this may be a result of what would be expected to be the generally low development level of the group. On the basis of literature surrounding the developmental trajectory of repetitive behaviours and the fact that children with ASD generally show some developmental delay it would be unlikely that many children in the group would be of a verbal ability where rituals and routines would be common. As such whilst the verbal abilities of children may mediate the degree to which lower level repetitive behaviours are seen, the group may still not have reached a developmental stage at which higher level behaviours would be emerging.

The observational study reported in Chapter 10 of this thesis used ADOS-G data from 60 children with autism aged 2-4 years. Whilst all children were of limited verbal ability and had been assessed with a Module 1 ADOS-G it was possible to split the group according to expressive language ability: those with an expressive language age above and below 18 months. No significant differences were found between these groups according to their overall repetitive behaviour scores from the ADOS-G. To examine group differences further, each of the three ADOS-G repetitive behaviour items were split into binary variables: those who showed a repetitive behaviour and those who did not. Examination of the data revealed no between group differences in the presence of any specific type of repetitive behaviours during the assessment. Whilst these results contradict those found using the APQ-R and existing literature it should be considered that repetitive behaviours items in the ADOS-G are unlikely to provide an accurate measure of a child's general repetitive behaviour profile as they reflect only a snapshot of time (Lord et al., 2000). It is therefore possible that behaviours associated with specific times or events may not be seen during an ADOS-G assessment. As such,

an individual, who according to parental reports frequently engages in repetitive behaviours, may be reported on the ADOS-G to show very little repetitive behaviour, particularly in relation to circumscribed interests or rituals and routines. Furthermore, to examine specific types of repetitive behaviour seen during the assessments it was necessary to examine differences in the presence of a repetitive behaviour and not in its severity or frequency. As such, associations between language and the extent to which a repetitive behaviour is present could not be examined.

It can be seen from the findings presented in this thesis that children with ASD engage in more repetitive behaviours than children of typical development. The verbal ability of a child is also likely to have an impact upon the severity of the repetitive behaviours in which they engage, with more able children engaging in less severe behaviours than their less able peers. Furthermore, the ability level of a child may also impact upon the type of behaviour in which they engage.

The methodology by which repetitive behaviours are studied has been shown to impact upon the reported levels or severity of behaviours. In order to attain a true picture of the repetitive behaviour profile of an individual it would be suggested that behaviours should not be rated as simply present or not but rated according to either their frequency or their severity. Such methodology is likely to improve the likelihood of identifying differences within the autism population in which repetitive behaviours by definition will always be present. The most useful measurement tool would be that of parent/carer report, this will allow the entire repertoire of behaviours which an individual shows to

be reported upon in relation to one another. This is particularly important in the assessment of higher level behaviours and therefore in studies where age or ability related changes in the types of behaviour engaged are being studied. When using parental reports validations should be considered, for example through correlations with reports from teachers who also see a child over a large part of the day and are therefore likely to know extensive information about their repetitive behaviours.

11.6 What Have We Learnt about Symbolic Play in Children With ASD?

Impairments of imagination in ASD, specifically those seen in symbolic play, have been proposed as one of the possible criteria for distinguishing ASD from other populations (Lord, Leventhal & Cook, 2005). One of the primary aims of this research was to begin to bridge a gap between the symbolic play research into typical development and that into ASD.

Whilst it has been accepted that symbolic play is made up of more than an ability to use object substitution, there have been a number of studies into symbolic play in typical and atypical studies which have used decontextualisation as evidence of symbolic play (Baron-Cohen, 1987; Charman et al., 2000; Doswell et al., 1994; Lewis et al., 2000). Furthermore, within autism research there has been a tendency for researchers to focus upon the autistic nature of symbolic play which children with ASD show (Mundy et al., 1986; Riguet et al., 1981; Sigman & Ungerer, 1984; Ungerer & Sigman, 1981; Wing et al., 1977), that is its flexibility and spontaneity not its developmental level. By developing the APQ-R and PPS in which the three dimensions of symbolic play were

examined, it has been possible to examine in detail the level of symbolic play abilities of children with ASD.

Previous research has suggested that there are some children with ASD who can show symbolic play (Wing et al., 1977; Baron-Cohen, 1987). However, research has shown that the play of children with ASD is less complex than that of their peers (Charman et al., 2000; Rutherford & Rogers, 2003) and appears to lack the spontaneity which would be expected in children of their age and ability (Baron-Cohen, 1987; Harris, 1993; Jarrold et al., 1993, 1996; Sigman & Ungerer, 1984; Wing et al., 1977). Results from the questionnaire study of this thesis revealed that in comparison to typically developing children, on average the play of children with ASD was less developed (See Section 6.6). However, there was evidence that some children with ASD were able to frequently show relatively complex symbolic play such as joining together acts of play to create sequences, using invisible objects during play such as pretend drinks and taking on the role of someone else during play. There were also some children with ASD who were not able to show any symbolic play.

As discussed, one of the aims of this thesis was to examine the symbolic play abilities of children with ASD according to models of typical development which identify three dimensions of symbolic play. Whilst these dimensions of symbolic play are evident in the typically developing literature, all three dimensions have rarely been considered in a single study. To my knowledge this is the only questionnaire which explicitly addresses each of these three dimensions including varying levels of sophistication in its

assessment of symbolic play. Information about the play of typical children and children with ASD collected with the APQ-R was used to examine total and symbolic play. Results showed that children with ASD had lower play scores than children of typical development, indicating that both total and symbolic play were less frequent and developed in the ASD group than the typical group.

The study presented in Chapter 10 of this thesis used the PPS to examine the three dimensions of symbolic play in detail in children with ASD assessed with the ADOS-G Module 1. Unlike the questionnaire study, the participants in the observational study were matched for chronological age (2 to 4 years) and were all of limited verbal ability. This created a more homogenous group in which play abilities could be examined. Scores from the PPS indicated that children with ASD showed particular deficits in the decontextualisation or the use of objects during play.

It has been reported that children with ASD lack the motivation to engage in symbolic play (Jarrold, et al., 1996; Lewis & Boucher, 1988; Stamher, 1995). Furthermore, it is suggested that these difficulties may be a reflection of the impact of repetitive behaviours upon play; that is that repetitiveness prevents children generating new ideas for activities. Therefore, to gain a true understanding of the underlying symbolic play abilities of children with autism, prompted play should be examined.

Examination of the make up of symbolic play using the PPS revealed that the spontaneous symbolic play of children with ASD was less developed than their prompted symbolic play. The effect of prompting upon symbolic play was examined in two groups of children with ASD: those with an expressive language age above 18 months and those with an expressive language age below 18 months. It was found that in both groups there were more children who showed no spontaneous symbolic play than no prompted symbolic play. In both groups prompting was found to improve symbolic play, specifically in the dimension of decontextualisation. These findings of improvements in the use of object substitutions and invisible objects following prompts support findings from previous research where the use of object substitution has improved following prompts or modelling (Charman & Baron-Cohen, 1997; Lewis & Boucher, 1988; Riguet et al., 1981).

11.6.1 Are Symbolic Play and Language Associated in Children with ASD?

Language is associated with play in both typical development (Bates et al., 1979; Charman et al., 2000; Lowe, 1975; McCune, 1995; Ungerer & Sigman, 1981) and ASD (Lewis, 2003; Mundy et al., 1987; Sigman & Ruskin, 1999; Ungerer & Sigman, 1981). By comparing children of similar expressive language ability, for example those assessed with the same ADOS module, the impact of language upon symbolic play can to some extent be controlled. Nevertheless, it still remains important to consider the role of language in the development of symbolic play.

Literature has suggested that expressive language may be more closely associated with symbolic play development (Bates et al., 1988; Charman et al., 2000; McCune, 1995; Morans, 1997; Piaget, 1962; Tamis LeMonda & Bornstein, 1994). For example, decontextualisation emerges around the same time as language in typical development (Lowe, 1975). It has been reported that vocabulary size and single pretend acts to the self such as eating and drinking occur around 12-15 months of age (McCune, 1995) and that around 13 to 20 months, first words, enactive naming during play and single play schemes are correlated (Bates et al., 1988). These findings from typical development were supported in the questionnaire study of this thesis where correlations were found between symbolic play and expressive language in young children of typical development. This was also confirmed in a hierarchical regression in this study in which expressive language was found to be the only significant predictor of symbolic play in typical development.

Significant correlations between symbolic play and expressive language were also identified in ASD using the APQ-R, suggesting that as expressive language improves in children with ASD so too will symbolic play abilities. The findings were further confirmed when in this study expressive language was identified as one of the predictors of symbolic play scores on the APQ-R, alongside repetitive behaviours. As discussed previously, the typical development and ASD groups examined in the questionnaire study are difficult to compare meaningfully due to the lack of information about the developmental level of the groups and the larger age range in the ASD sample. As such, reasons for the differences in the predictors of symbolic play could

not be examined further; however, proposed explanations will be discussed further, later in this chapter.

Further examination of the relationship between play and language was conducted in Study 3 of this thesis (Chapter 7, see section 7.14) in a more homogenous group of children with ASD and limited verbal ability. It was found that those children who according to the ADOS-G symbolic play item were able to engage in symbolic play had higher expressive language abilities than those children who showed impaired symbolic play. The group who showed unimpaired symbolic play were on average according to the Mullen able to use two word phrases, whilst those in the impaired symbolic play group could only combine words and gestures and were beginning to name objects. Further examination of the effects of language was conducted in the final study of this thesis in which the ADOS-G was used again to examine symbolic play and the Mullen verbal ability. In this study, children with ASD of limited verbal ability assessed with the ADOS-G were split by expressive language ability into those with an expressive language age above and below 18 months. Play was scored using the PPS providing detailed information about decentration, decontextualisation and integration, at both a prompted and spontaneous level. It was found that the groups differed significantly for overall symbolic play, but further analysis revealed that this was specifically related to spontaneous symbolic play with the children of higher verbal abilities having more advanced self-directed symbolic play. When each of the three dimensions of symbolic play were examined it was found that this association remained significant only for decontextualisation. What this means is that for young children with a diagnosis of ASD and limited verbal abilities, improvements in verbal ability correspond with

improvements in the level at which objects are spontaneously used in play. It was also found that for those children of higher verbal ability, decontextualisation was once again the least advanced dimension of symbolic play. This was in keeping with the findings from typical children and children with ASD in the earlier questionnaire study of this thesis. However, this was not true for the less able group who showed most difficulties in integration. It is proposed that these findings indicate that different dimensions of symbolic play develop at different rates and that at the developmental level at which the less able group are performing it is integration – the creation of meaningful stories - which is beginning to develop. Furthermore, the comparatively lower scores for decontextualisation in this less able group also indicates that this dimension of symbolic play is still developing and it is proposed therefore that this dimension will only begin to develop further once a child is able to combine play acts. As such the hierarchical model of symbolic play development proposed by McCune-Nicholich (1981) may be supported.

The examination of symbolic play abilities in children with ASD conducted throughout this research programme has indicated that it is possible for a child to have a diagnosis of ASD and still perform symbolic play. Furthermore, this is possible in children of the age at which play would be expected to be emerging in the typical population. It has been consistently shown in this research programme that the most difficult area of symbolic play for children with ASD is decontextualisation and more specifically spontaneous decontextualisation. Decontextualisation has been the focus of most previous play research and this was a criticism which I made during the introductory chapters of this thesis. Whilst this may be the dimension through which play deficits

are most evident it remains imperative that information about the play skills in decentration and integration also continue to be sought. This is important for both typical and atypical children in order to attain a clear picture of the developmental trajectory of these dimensions and how skills in one dimension may impact upon the development of those in another. Furthermore, as decontextualisation and language are closely linked through their mutual use of symbols it is important to consider the role which language may have in the deficits in symbolic play which children with ASD may present.

11.7 What Have We Learnt about Associations Between Symbolic Play and Repetitive Behaviour?

Throughout this thesis the relationship between repetitive behaviours and symbolic play has been examined. In line with the triad of impairments proposed by Wing & Gould (1979) in which "we see repetitive activities in place of imaginative interests" (p.26), evidence from observational and questionnaire studies has shown that children with ASD who score highly for repetitive behaviours show less developed symbolic play than those children with lower repetitive behaviour scores. However, language abilities have also been shown to be associated with the development of symbolic play abilities, in which an increase in symbolic play is associated with an increase in language ability.

Associations were found between total repetitive behaviour and symbolic play in children of typical development in a questionnaire study. However, examination of the predictors of symbolic play revealed only expressive language to be significant. It is

suggested that in typical development whilst the time spent engaging in repetitive behaviours may impact upon the time a child spends engaging in symbolic play, that it is the level of language which a child is capable of which is most influential of their symbolic play behaviours. This would be expected as the developmental literature of typical development implies that as repetitive behaviours decrease within the repertoires of young children they are beginning to engage in symbolic play, which itself is associated with the emergence of expressive language.

In the ASD population repetitive behaviours are pervasive and therefore do not cease to exist in the repertoires of these individuals. A relationship between repetitive behaviour and symbolic play would therefore be expected as children choose which behaviours to engage in. Examination of the parental reports of play and repetitive behaviour attained through the APQ-R indicated that significant associations existed between repetitive behaviours and symbolic play. Furthermore, regression analysis revealed that symbolic play scores were predicted by total repetitive behaviours and expressive language ability. These findings were further supported in an observational study using ADOS-G data for children with ASD aged 2-4 years. In this study (Study 3; Chapter 7) children were split into two groups on the basis of their ADOS-G symbolic play score and children with unimpaired symbolic play were found to engage in less severe or unusual repetitive behaviours than children with impaired symbolic play. These groups were also found to differ in their verbal abilities with the impaired group having poorer expressive language abilities according to the Mullen. These findings suggest that the more verbally able a child is, the more developed their symbolic play and the less severe repetitive behaviours they will show. Binary logistic regression examining

predictors for whether a child had impaired or unimpaired symbolic play according to the ADOS-G identified both expressive language ability and repetitive behaviour independently as significant predictors of symbolic play abilities. However, when both factors were included in analysis only expressive language ability remained significant. Such findings indicate that whilst the severity of repetitive behaviours differ between children with ASD, the child's expressive language abilities will play a significant role in their development of symbolic play.

Closer examination of the association between symbolic play and repetitive behaviour was conducted using the APQ-R. Analysis revealed significant associations between sensory motor behaviours and total symbolic play in children with ASD aged 2 to 8 years. There were no significant correlations between either sensory and motor or rituals and routines and symbolic play in typical children aged 2-4 years. These findings suggest that it is the presence of lower level behaviours which may impact upon the observed symbolic play abilities of a child. Using information about play collected using the PPS and information on repetitive behaviours obtained through the ADOS-G associations between the developmental level of three dimensions of symbolic play and repetitive behaviour were examined (Chapter 10). In this study it was found that total repetitive behaviours were not significantly associated with total symbolic play or any dimension of symbolic play, this was true for the whole group, for those children with an expressive language age above 18 months and those with an expressive language age below 18 months. Furthermore, there were no associations found between symbolic play and the presence or absence of each of the three types of repetitive behaviours which the ADOS measures. As discussed previously the repetitive

behaviour items in the ADOS-G provide information on only a snapshot of time and therefore may not be an accurate reflection of the overall repetitive behaviour profile of a child. Furthermore, by comparing those with or without each of the individual repetitive behaviours measured, associations between the extent to which a repetitive behaviour is present and the developmental level of symbolic play cannot be examined. As repetitive behaviours are a defining feature of autism and therefore always present to some extent, such analysis is likely to be necessary to determine whether repetitive behaviours and symbolic play are associated and the finer details of any relation.

The findings of this thesis lead to the hypothesis that repetitive behaviour and symbolic play in children with ASD may only become associated when these behaviours occur together beyond the developmental level at which this would typically occur, furthermore, that language may play a role in mediating this relationship. By the age of four years, typical children will have developed a relatively high level of language and be engaging in relatively complex symbolic play where they take on different roles, create meaningful stories and use invisible objects (Lord & Paul, 1997; Nielson & Dissanayake, 2000). It is around this age which repetitive behaviours have generally ceased to be part of a child's behavioural repertoire (Berkson & Tupa, 2000). Whilst language is continuing to develop, both symbolic play and repetitive behaviours are likely to be evident in children, with repetitive behaviours gradually being taken over by symbolic play behaviours as an activity of choice. It is proposed that if a child has reached the cognitive level at which symbolic play would typically be a child's main source of activity, yet repetitive behaviours continue to be evident, that the presence of these behaviours will become associated. On the basis of this it is inferred that there

becomes a point in development, likely to be related to the achievement of the language skills necessary to engage in early forms of symbolic play, when the time a child spends engaging in repetitive behaviour should become time engaged in symbolic play. To test this hypothesis it would be necessary to include children with higher ability levels than those tested in the studies in the thesis and to extend the study of imaginative skills to include not only symbolic play but higher level role play also.

Repetitive behaviours are pervasive in children with ASD regardless of verbal ability. No matter what the ability of the individual they will by definition of the disorder engage in excessive repetitive behaviours throughout their life. On the basis of the threshold hypothesis outlined above it would be inferred that children with a diagnosis of ASD and the necessary language skills to engage in symbolic play will have associations between their symbolic play activities and their repetitive behaviour. Findings from a questionnaire study in this thesis provide some support for this threshold hypothesis through evidence of a three way relationship between a child's expressive language abilities, the frequency in which they engaged in repetitive behaviour and the frequency with which they engaged in symbolic play. The final study of this thesis also goes some way to supporting this hypothesis, although the following results should be interpreted with extreme caution due to the use of a very limited rating scale for repetitive behaviours in correlational analysis. Using scores from the ADOS-G repetitive behaviour items, children with an expressive language age greater than 18 months had stronger, although non-significant, associations between hand and finger mannerisms and decontextualisation abilities. Should these findings be supported in future research this may mean that the developmental level of a child's abilities to use

objects during play and the severity of their repetitive behaviours may become more closely related in children with ASD as their verbal abilities improve. However, the lack of significant correlations means that the requisite verbal level at which these behaviours become associated is as yet unknown.

11.8 What are the Implications of this Research?

The evidence presented in this thesis has a number of implications. First, the development of two new measures: a questionnaire which examines play and repetitive behaviours through parental report and a coding scheme for symbolic play to be used with the ADOS-G which provides details on decentration, decontextualisation and integration abilities under prompted and spontaneous conditions. Each of these measures has been shown to be reliable for use with typical and atypical populations and have the potential to be used in both clinical and research practice. Considering the practical restraints of research and practice neither the questionnaire nor the coding scheme require large amounts of time or funding in order to be used and gather information. Furthermore, the coding scheme can be used to recode existing ADOS-G data held on video recordings. Using these measures useful information has been gathered about repetitive behaviours and symbolic play in young children, the implications of which will now be discussed.

Using the APQ-R, repetitive behaviours seen in typical development and ASD have been shown to form two distinct categories, sensory and motor behaviours and rituals and routines. Such findings confirm previous research and empirical studies which

have proposed two categories (Bishop et al., 2006; Cuccaro et al., 2003; Richler et al., 2007; Shao et al., 2003; Szatmari et al., 2005; Turner, 1999). Evidence of two distinct types of repetitive behaviour paves the way for research into repetitive behaviours which may aim to examine longitudinal changes in the repetitive behaviours which children of typical or atypical development show and how these may change over time and also for the examination of links between specific types of repetitive behaviours and other skills which require a certain level of cognitive ability, such as working memory or executive functioning.

This thesis has also examined symbolic play in its pure form; that is that the developmental level of play has been the focus and not its quality in terms of its flexibility and spontaneity as in much of the existing ASD literature. Furthermore, this thesis has provided a systematic look at the way in which the three dimensions of symbolic play abilities identified in typical development present in young children with ASD. Evidence has been presented which shows that symbolic play is not absent in children with ASD and that some children are able to engage in such play spontaneously. However, it should be noted that the symbolic play of children was assessed using the highly structured ADOS-G Birthday Party Task, and whilst play could be scored as spontaneous it was elicited following strong social presses such as, "baby is hungry" or "baby is tired". Prompting was also very strong and could involve physical modelling, a factor which has previously been identified as a possible mechanism for imitation and not symbolic play (Baron-Cohen, 1990b). The use of such strong presses and prompts fit with the aims of the present research to elicit the most

advanced symbolic play a child was capable of in terms of decentration, decontextualisation and integration.

The three dimensions of symbolic were scored on the PPS independently to one another and therefore high scores did not reflect the use of each of these behaviours simultaneously. For example, a child who blew out the pretend candles themselves got the same score for decontextualisation as a child who used a doll to blow out the candles despite the fact that the entire play act was more complex in the second child given the use of the doll as an active agent. The symbolic play in children with ASD therefore, whilst possible to be of a high level in terms of scores on the PPS dimensions was not scored for complexity overall. Anecdotally, it can be reported that the play seen in children with ASD was not of the level of complexity which would typically be expected by a 5 year old where we would expect the child to take on roles in play themselves and create complex and meaningful stories. The presence of impaired symbolic play in children with ASD in comparison to their typically developing peers is therefore not being debated in this thesis, rather that there are some children with ASD who are able to develop relatively complex symbolic play skills in each of the dimensions of symbolic play.

Despite these limitations, examination of associations between repetitive behaviours and symbolic play has provided evidence for Wing & Gould's triad of impairments. As they proposed, the repetitive behaviours a child shows has been shown to impact upon the presence of symbolic play in terms of its frequency and its developmental level. On

the basis of these findings and as discussed in the previous section, a threshold hypothesis, in which associations between repetitive behaviour and symbolic play are proposed to be mediated by verbal ability, has been suggested. That is that these behaviours will only become associated when a child has the verbal abilities to be able to perform symbolic play and when typically repetitive behaviours would cease to be part of the behavioural repertoire of a child.

11.9 Implications for Future Research

If repetitive behaviours are associated with overall symbolic play or its individual dimensions, there are possible implications for intervention. If in future the direction of the association can be identified it may be possible to create interventions which target either the reduction of repetitive behaviour through symbolic play interventions or an improvement in symbolic play abilities through interventions aimed at the reduction of repetitive behaviours. Whilst it has not been possible to ascertain in this programme of research, it is hypothesised that once a child has the verbal abilities required to engage in symbolic play the association between play and repetitive behaviours is driven by an individual's repetitive behaviours. Repetitive behaviours are evident in typical development in infancy long before symbolic play begins to emerge; furthermore, they are a pervasive feature of autism. It is this pervasive nature of the desire or drive for repetition which is suggested as a mechanism for reducing the amount of time a child spends engaging in symbolic play and possibly as a result preventing the development of these abilities to the extent which would appear in the typical population. Whilst a child with autism may have some relatively complex symbolic play abilities their drive

for repetitive activities is likely to result in stereotyped and inflexible symbolic play through the use of play as a form of repetitive behaviour.

In addition, it is also proposed that future research should examine associations between the different dimensions of symbolic play and the impairments in social interaction and communication and repetitive behaviours which currently define ASD. Decontextualisation can be closely linked to verbal abilities, that is that play and language require the manipulation of symbols (Piaget, 1962). It is possible that the ability to use symbols in play and in language requires flexibility and therefore may also be linked with the level of repetitiveness which a child shows. Integration can also be seen to reflect flexibility and closer examination of how children join together sequences of play may identify clearer links between these behaviours. It is possible that the structure of the ADOS-G play tasks used in the present research do not produce a true reflection of integration skills as they do not provide many opportunities for elaboration and therefore allow children to join together sequences as they would in free play. Theoretical links can be drawn between decentration (the role of the child) and the social interaction skills of a child as this dimension of symbolic play requires a child to become less egocentric and interact with others (animate or inanimate), however, this has not been examined in this thesis. If specific dimensions of symbolic play are associated with different characteristic features of ASD, interventions which target symbolic play may be able to impact upon social interaction and communication as well as repetitive behaviours, or vice versa.

11.10 Limitations

Throughout this thesis I have discussed the limitations of the research conducted (See Sections 6.7.4, 7.15.5, 10.7.4.). As a whole the research conducted has focused specifically on young children with limited verbal abilities. Whilst this provides opportunities to examine the early developmental stages of symbolic play and repetitive behaviour and any associations between these phenomena, the research is limited through the inclusion of children who are yet to reach a developmental level at which symbolic play is typically possible. To fully address the threshold hypothesis, it is necessary for future studies to select participants of higher verbal abilities either as an additional or an alternative research population. Furthermore, to truly examine the threshold hypothesis proposed in this thesis, it will be necessary to conduct longitudinal research in children following them as language develops.

A major limitation of this research has been the omission of data on non-verbal intelligence. The Mullen Scales of Early Learning (MSEL) were used in the studies contributing to the large dataset reported in Chapters 9 and 10 of this thesis. An estimated non-verbal IQ score can be created by averaging the two non-verbal subtests (fine motor and visual recognition) of the MSEL (Lord, et al., 2006; Scrambler, Hepburn, Rutherford, Wehner & Rogers, 2007; Thurm, Lord, Lee & Newschaffer, 2007). However, of 124 children for whom complete verbal information (receptive and expressive language) was available, complete non-verbal information (fine motor and visual recognition) was available for only 47% as the fine motor skills subscale had not been completed. Relying on only one subtest for a non-verbal estimate would be open to considerable error. Given that verbal and non-verbal IQ are known to be closely

associated in typical development and that existing literature points to a close relationship between play and language in typically developing children, it seemed logical to focus on the play-language relationship in the research for this thesis. Nevertheless, it is recognised that this is a limitation. Without considering non-verbal ability it is not possible to identify the extent to which the association between play and repetitive behaviour is specific to level of verbal ability as opposed to general cognitive ability. Future research should therefore consider examining the effects of non-verbal ability upon associations between play and repetitive behaviour and also partialling out non-verbal ability from verbal ability to consider the role of language further.

This thesis has used two different methods (observation and questionnaire) to examine the relationship between play and repetitive behaviours in young children. The triangulation of methods has allowed findings from single studies to be compared with one another and where comparative results have been found increased the credibility of findings. However, the ways in which repetitive behaviours and symbolic play are measured in this thesis differs. One study examines the developmental level of symbolic play and the severity of repetitive behaviours, another the frequency of different play abilities and the frequency of a range of repetitive behaviours and another the severity of a category of repetitive behaviours. To gain a clearer understanding of how symbolic play may be related to repetitive behaviours and possibly other features of ASD, it would be necessary that the focus of measures used in future studies were consistent. It is suggested that this should be the observed level of symbolic play and the reported frequency of repetitive behaviours. To determine the strength of the threshold hypothesis and whether associations between repetitive behaviours and earlier forms of play exist, the developmental level of a child must also be taken into consideration. If repetitive behaviours and symbolic play are truly related in ASD, this

must be identified in children with the requisite ability skills to perform both repetitive behaviour and symbolic play. For those children who do not have the skills typically required to perform symbolic play, this may mean that associations between earlier forms of play are examined to determine if and how pre-requisite forms such as exploration and functional play are related to repetitive behaviours.

11.11 Conclusion

The research programme discussed in this thesis aimed to examine the proposal that repetitive behaviours and symbolic play are associated in children with ASD (Wing & Gould, 1979). To do this symbolic play and repetitive behaviour were examined as two independent factors, requiring a move away from the traditional approach to play research in autism. Rather than examine play according to its autistic nature, the focus of research was upon the developmental level of symbolic play abilities according to a model of play identified in typical development (Bretherton,1984; McCune-Nicolich, 1981; Fenson, 1984). In conducting this research two new measures useful in clinical practice and research have been developed and the repetitive behaviours and symbolic play abilities of young children with ASD examined. Examination of repetitive behaviours and symbolic play in young children has identified an association between these phenomena in children with ASD. A threshold hypothesis has been proposed to explain associations between repetitive behaviour and symbolic play in ASD. Furthermore, it is suggested that it is the degree of repetitive behaviours a child shows which impacts upon their symbolic play abilities. This thesis has laid the groundwork for future studies beginning to bridge gaps in existing ASD literature which until recently has been heavily weighted towards social and communication impairments. It

has also highlighted the need to examine further how the defining characteristics of ASD may be related and how this may change with age and ability.

It should be recognised that the studies included in this thesis have all presented statistical analysis and discussed the significance of results and are therefore in some ways abstract from 'reality'. ASD affects real people, individuals. Furthermore, by its definition those with a diagnosis of ASD vary in the severity at which symptoms are presented. It is therefore important that we do not lose sight of the individual in this research.

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Appendix 1 Diagnostic Criteria for Autism

Diagnostic Criteria for Autism Disorder (ICD-10; WHO, 1993)

At least 8 of the 16 specified items must be fulfilled.

a. Qualitative impairments in reciprocal social interaction, as manifested by at least three of the following five:

1. Failure adequately to use eye-to-eye gaze, facial expression, body posture and gesture to regulate social interaction.
2. Failure to develop peer relationships.
3. Rarely seeking and using other people for comfort and affection at times of stress or distress and/or offering comfort and affection to others when they are showing distress or unhappiness.
4. Lack of shared enjoyment in terms of vicarious pleasure in other peoples' happiness and/or spontaneous seeking to share their own enjoyment through joint involvement with others.
5. Lack of socio-emotional reciprocity.

b. Qualitative impairments in communication:

1. Lack of social usage of whatever language skills are present.
2. Impairment in make-believe and social imitative play.
3. Poor synchrony and lack of reciprocity in conversational interchange.
4. Poor flexibility in language expression and a relative lack of creativity and fantasy in thought processes.
5. Lack of emotional response to other peoples' verbal and non-verbal overtures.
6. Impaired use of variations in cadence or emphasis to reflect communicative modulation.
7. Lack of accompanying gesture to provide emphasis or aid meaning in spoken communication.

c. Restricted, repetitive and stereotyped patterns of behaviour, interests and activities, as manifested by ate least two of the following six:

1. Encompassing preoccupation with stereotyped and restricted patterns of interest.
2. Specific attachments to unusual objects.
3. Apparently compulsive adherence to specific, non-functional routines or rituals.
4. Stereotyped and repetitive motor mannerisms.
5. Preoccupations with part-objects or non-functional elements of play material.
6. Distress over changes in small, non-functional details of the environment.

d. Developmental abnormalities must have been present in the first three years for the diagnosis to be made.

Appendix 2 Activities and Play Questionnaire

Activities and Play Questionnaire

Does your child:	Never or Rarely	One or more episodes daily	15 or more episodes daily (or at least once an hour)
1. Arrange toys or other items in rows or patterns?	☐	☐	☐
2. Repetitively fiddle with toys or other items? E.g. spin, twiddle, bang, tap, twist or flick anything repeatedly?	☐	☐	☐
3. Spin him/herself around and around?	☐	☐	☐
4. Rock backwards and forwards or side to side either when sitting or standing?	☐	☐	☐
5. Pace or move around repetitively? E.g. walk to and fro across a room or around the same path in the garden?	☐	☐	☐
6. Make repetitive hand and/or finger movements? E.g. flap, wave, or flick his/her hands or fingers repetitively?	☐	☐	☐
7. Touch parts of his/her body or clothing repeatedly? E.g. repeatedly rub his/her legs, pull at the buttons on his/her clothing or touch his/her ear or elbow?	☐	☐	☐
	No	**Regular feature of behaviour**	**Marked feature of Behaviour**
8. Have an unusual interest in the smell of people, toys or objects?	☐	☐	☐
9. Have an unusual interest in the feel of different surfaces or toys?	☐	☐	☐
10. Show an unusual interest in bright or shiny things?	☐	☐	☐
11. Is your child concerned by changes in heat or cold or by pain?	☐	☐	☐
12. Do any sounds upset your child that would not affect others (e.g. a vacuum cleaner, road drills or fire engines)?	☐	☐	☐

Appendix 2 Contd.

Does your child:	No	Regular feature of behaviour	Marked feature of Behaviour
13. Have an unusual interest in some sounds other than music (e.g. bells, hissing in pipes etc)?	☐	☐	☐
14. Flick his/her hands or objects near his/her eyes?	☐	☐	☐
15. Like to look at objects from many different angles for no obvious reason?	☐	☐	☐

	No	Mild problem which does not effect others	Serious problem which effects others on a regular basis
16. Insist on things about the house staying the same? E.g. insist on furniture staying in the same place, or curtains being open or closed?	☐	☐	☐
17. Insist that aspects of daily routine remain the same? E.g. always bathing before breakfast, on going to the same shops every afternoon or on watching a video after every meal?	☐	☐	☐

	Never or rarely	Regular feature of behaviour but will tolerate alternatives when necessary	Highly regular and highly rigid feature of behaviour. Will not tolerate alternatives
18. Play the same music, game or video or read the same book repeatedly	☐	☐	☐
19. Insist on eating the same foods or a very small range of foods at every meal?	☐	☐	☐
20. Insist that certain items of clothing must always be worn?	☐	☐	☐

Appendix 2 Contd.

	Never or rarely	Once a week or more	Once per day or more
21. Does your child roll toy cars or trains along, build with blocks, play with jigsaws etc.	☐	☐	☐
22. Does your child play with toys as if they were real? E.g. walk a doll along, feed or care for a toy animal.	☐	☐	☐
23. Does you child play make believe games (such as pretend tea party) or invent games stories or scenarios where they pretend to be someone else using objects and or dressing up?	☐	☐	☐
24. When other children are around does your child usually play alone?	☐	☐	☐

25. Is your child attached to anything in particular? For example, does he/she carry a teddy, a blanket or a stick etc around with him/her?

Please tick one

a) No particular attachment to any object ☐

b) Attachment to an object of the sort commonly used as a comforter (E.g. teddy, blanket etc) ☐

c) Attachment to an unusual object (e.g. a stick or a glove etc) ☐

26. Is your child's imaginative activity (e.g. pretend play, acting out rules, other creative activity) varied?

Please tick one

a) Imaginative activity is always repetitive ☐

b) Imaginative activity shows some flexibility ☐

c) Imaginative activity is varied and flexible ☐

27. How easy is it to distract your child when they are playing with their favourite toy or game or doing their favourite activity?

a) No problem distracting them ☐

b) Mild problem distracting them ☐

c) Marked/severe problem distracting them ☐

Appendix 2 Contd.

28. If your child is free to choose any activity what will he or she usually choose to do?	**Please tick one**
a) A range of different and flexible self-chosen activities	☐
b) Some varied and flexible interests but commonly chooses the same activities	☐
c) Almost always chooses from a restricted range of repetitive activities	☐

Communication and Language

1. If your child uses speech what is their language level?	**Please tick one**
a) Gives the name of some people or things when asked.	☐
b) Spontaneously says names of several familiar objects for some purpose.	☐
c) Says phrases of two words	☐
d) Says some longer phrases, missing out the small linking words (e.g. "when time go on holiday?").	☐
e) Talk in spontaneous sentences using small linking words.	☐
f) Uses past, present and future tenses in complex sentences (e.g. "perhaps I will go out tomorrow if it has stopped raining."	☐

2. What kind of communication does your child normally use? (Whether or not they use speech.)	
a) No communication or communicates needs only	☐
b) Communicates own interests (never shares other's interests)	☐
c) Listens, asks after and shares other peoples interests	☐

Appendix 3 Summary of Changes Made to the Activities and Play Questionnaire

APQ	APQ-R
1. Does your child arrange toys or other items in rows or patterns?	1. Does your child arrange toys or other items in rows or patterns?
2. Does your child repetitively fiddle with toys or other items?	2. Does your child repetitively fiddle with toys or other items?
3. Does your child spin him/herself around and around?	3. Does your child spin him/herself around and around?
4. Does your child rock backwards and forwards or side to side either when sitting or standing	4. Does your child rock backwards and forwards or side to side either when sitting or standing?
5. Does your child pace or move around repetitively?	5. Does your child pace or move around repetitively?
6. Does your child make repetitive hand and/or finger movements?	6. Does your child make repetitive hand and/or finger movements?
7. Does your child touch parts of his/her body or clothing repeatedly?	7. Does your child touch parts of his/her body or clothing repeatedly?
8. Does your child have an unusual interest in the smell of people toys or objects?	8. Does your child have an unusual interest in the smell of people, toys or objects?
9. Does your child have an unusual interest in the feel of different surfaces or toys?	9. Does your child have an unusual interest in the feel of different surfaces or toys?
10. Does your child show an unusual interest in bright or shiny things?	10. Does your child have an unusual interest in some sounds other than music?
11. Is your child concerned by changes in heat or cold or by pain?	11. Does your child show a special interest in bright or shiny things?
12. Do any sounds upset your child that would not affect others?	12. Do any sounds upset your child that would not affect others?
13. Does your child have an unusual interest in some sounds other than music	13. Does your child flick his/her hands or objects near his/her eyes?
14. Does your child flick his/her hands or objects near his/her eyes?	14. Does your child like to look at objects from particular or unusual angles?
15. Does your child like to look at objects from many different angles for no obvious reason?	15. Does your child insist on things about the house staying the same?
16. Does your child insist on things about the house staying the same?	16. Does your child insist that aspects of daily routine remain the same?
17. Does your child insist that aspects of daily routine remain the same?	17. Does your child insist that other people do things in the same way?
18. Does your child play the same music, game or video or read the same book repeatedly?	18. Does your child insist on wearing the same clothes or refuse to wear new clothes?
19. Does your child insist on eating the same foods or a very small range of foods at every meal?	19. Does your child play the same music, game or video or read the same book repeatedly (if child doesn't read then have same book read to them)?
20. Does your child insist that certain items of clothing must always be worn?	20. Does your child roll toy cars or trains along, build with blocks or play with jigsaws?
21. Does your child roll toy cars or trains along, build with blocks, play with jigsaws?	21. Does your child play with real or toy household items using them for their real purpose? E.g. using a sweeping brush to sweep floor.

Appendix 3 Contd.

APQ	APQ-R
22. Does your child play with toys as if they were real?	22. Does your child hold dolls or toy animals as if they are real?
23. Does your child play make believe games or invent games, stories or scenarios where they pretend to be someone else using objects and or, dressing up?	23. Does your child play simple sequences with toys as if they are real?
24. When other children are around does your child usually play alone?	24. How often does your child start these games?
25. Is your child attached to anything in particular?	25. Does your child play act longer sequences with toys as if they are real?
26. Is your child's imaginative activity varied?	26. How often does your child start these games?
27. How easy is it to distract your child when they are playing with their favourite toy or game or doing their favourite activity?	27. Does your child use an object as something else when they are playing?
28. If your child is free to choose any activity what will he or she usually choose to do	28. Does your child play make-believe games where they use 'invisible objects' as if they are really there?
	29. How often does your child start these games?
	30. Does your child invent, talk about, and write about games, stories or scenarios where they pretend to be someone else or create fictional characters?
	31. How often does your child start these games?

Key to changes

	Removed – No replacement
	Removed - Replacement item/s
	New item

Appendix 4 Activities & Play Questionnaire - Revised

Activities & Play

Dear Parent,

Thank you for taking part in my study, your time and efforts are greatly appreciated. Enclosed is a questionnaire, which I would like you to complete. Please try and complete all sections.

All information will remain anonymous and confidential and neither yourself nor your child will be identified in any written reports.

Please ensure that you return the questionnaire along with the completed consent form.

Child's gender: (please delete) Girl / Boy

Child's date of birth .....

Today's date: .....

Any psychological or clinical diagnoses which your child has received and when: (E.g. Specific Language Impairment, Dyslexia, Autism, Attention Deficit Hyperactivity Disorder, Hearing Impairment, Autism Spectrum Disorder, Semantic Pragmatic Disorder, Severe Visual Impairment, Pervasive Developmental Disorder.)

.....
.....
.....
.....
.....

Please return in the enclosed envelope.

Thank you in advance for you assistance,

Yours sincerely,

Emma Honey

Activities & Play

(a) Consent Form

(Please delete as appropriate)

I have read and understood the information about this study. YES/NO

I have been provided with enough information about this study. YES/NO

I have been given the opportunity to ask any questions I have. YES/NO

I understand that I am free to withdraw all the information I provide from the study at any time and without giving any reason. YES/NO

Signed.....

Date.....

Activities & Play

This questionnaire asks only about the activities and play which your child has shown over the last 4 weeks.

Does your child:	Never	Rarely	One or more episodes daily	15 or more episodes daily (or at least once an hour)
1. Arrange toys or other items in rows or patterns?	☐	☐	☐	☐
2. Repetitively fiddle with toys or other items? E.g. spin, twiddle, bang, tap, twist or flick anything repeatedly.	☐	☐	☐	☐
3. Spin him/herself around and around?	☐	☐	☐	☐
4. Rock backwards and forwards or side to side either when sitting or standing?	☐	☐	☐	☐
5. Pace or move around repetitively? E.g. walk to and fro across a room or around the same path in the garden.	☐	☐	☐	☐
6. Make repetitive hand and/or finger movements? E.g. flap, wave, or flick his/her hands or fingers repetitively.	☐	☐	☐	☐
7. Touch parts of his/her body or clothing repeatedly? E.g. repeatedly rub his/her legs, pull at the buttons on his/her clothing or touch his/her ear or elbow.	☐	☐	☐	☐
	No	**Occasional feature of behaviour**	**Regular feature of Behaviour**	**Marked feature of behaviour**
8. Have an unusual interest in the smell of people, toys or objects?	☐	☐	☐	☐
9. Have an unusual interest in the feel of different surfaces or toys?	☐	☐	☐	☐
10. Have an unusual interest in some sounds other than music? E.g. Bells, hissing in pipes etc.	☐	☐	☐	☐

	No	Occasional feature of behaviour	Regular feature of Behaviour	Marked feature of behaviour
11. Show a special interest in bright or shiny things?	☐	☐	☐	☐
12. Do any sounds upset your child that would not affect others? E.g. a vacuum cleaner, road drills or fire engines.	☐	☐	☐	☐
13. Flick his/her hands or objects near his/her eyes?	☐	☐	☐	☐
14. Like to look at objects from particular or unusual angles?	☐	☐	☐	☐

	No	Mild problem which does not effect others	Regular feature of behaviour but tolerates alternatives when necessary	Serious problem, affects others on a regular basis. Will not tolerate alternatives
15. Insist on things about the house staying the same? E.g. insist on furniture staying in the same place, or curtains being open or closed.	☐	☐	☐	☐
16. Insist that aspects of daily routine remain the same? E.g. always bathing before breakfast, on going to the same shops every afternoon or on watching a video after every meal.	☐	☐	☐	☐
17. Insist that other people do things in the same way? E.g. always sit in the same place at dinner.	☐	☐	☐	☐
18. Insist on wearing the same clothes or refuse to wear new clothes?	☐	☐	☐	☐
19. Play the same music, game or video or read the same book repeatedly (if child doesn't read then have same book read to them)?	☐	☐	☐	☐

Does your child?

	Never	Rarely	Once a week or more	Once per day or more
20. Roll toy cars or trains along, build with blocks or play with jigsaws?	☐	☐	☐	☐
21. Play with real or toy household items using them for their real purpose? E.g. using a sweeping brush to sweep floor.	☐	☐	☐	☐
22. Hold dolls or toy animals as if they are real? E.g. hug teddy or kiss doll.	☐	☐	☐	☐
23. Play simple sequences with toys as if they are real? E.g. push a toy train or car along the floor making appropriate noises, tuck a doll in bed, give a toy animal a bath.	☐	☐	☐	☐

How often does your child start these games?

- Often ☐
- Sometimes ☐
- Never ☐

	Never	Rarely	Once a week or more	Once per day or more
24. Play act longer sequences with toys as if they are real? E.g. A doll's tea party or loading and transporting different goods when playing with toy cars and trucks.	☐	☐	☐	☐

How often does your child start these games?

- Often ☐
- Sometimes ☐
- Never ☐

	Never	Rarely	Once a week or more	Once per day or more
25. Use an object as something else when they are playing? E.g. block as a phone or car, a piece of paper as a blanket, plasticine as a cake.	☐	☐	☐	☐
26. Play make-believe games where they use 'invisible objects' as if they are really there? E.g. pretend tea party with imaginary cake, shop with imaginary groceries or money.	☐	☐	☐	☐

How often does your child start these games?

- Often ☐
- Sometimes ☐
- Never ☐

	Never	Rarely	Once a week or more	Once per day or more
27. Invent, talk about, write about games, stories or scenarios where they pretend to be someone else or create fictional characters?	☐	☐	☐	☐

How often does your child start these games?

- Often ☐
- Sometimes ☐
- Never ☐

If there is any other information which you would like to add about your child's behaviours and activities then please feel free.

29. What kind of communication does your child normally use? (Whether or not they use speech.)

- No communication or communicates needs only ☐
- Communicates own interests (never shares other's interests) ☐
- Listens, asks after and shares other peoples interests ☐

30. How much can your child talk?

- no speech or sounds ☐
- babbles, gurgles, coos laughs without meaning ☐
- babbles or makes noises with meaning ☐
- gives names of people or things when asked ☐
- spontaneously says names of several familiar objects for some purpose ☐
- says phrases of two words ☐
- says some longer phrases, missing out the small linking words (when time go holiday?) ☐
- talks in spontaneous sentences using small linking words ☐
- uses past, present and future tenses and complex sentences ☐

Thank you for you your help!

Please return in the envelope provided.
Don't forget to also include the signed consent form in the envelope.

Questions 8-14, 21-23a, 24a, 27a, 29, 30 32-34 adapted from the DISCO (2002) with permission of Lorna Wing
Questions 1-7, 15-19 adapted from Turner (Unpublished) with permission of Dr M Turner

Activities & Play

Future Research

Dear Parent,
Thank you for taking the time to complete the questionnaire. It is important to look at how these behaviours change as children grow older. To do this I would like to ask whether you would be willing to complete a similar questionnaire again in 12 months and 2 years time. Your help in allowing further study of how these behaviours develop would be greatly appreciated. If you would be happy to do this please complete this form.

You are in no way obliged to take part in further research, however should you choose to do so all information provided will remain anonymous and confidential, any data provided about your child can be removed at any time simply by contacting the researcher.

If you only wish to complete this questionnaire, simply return your questionnaire without this form completed.

If you would like to be sent information about future research please sign below

Signed .....

Your Name: .....
Address: .....
.....
.....
..... Postcode.....
Telephone: .....
Email: .....

If possible can you provide an alternative contact address (e.g. the address of a relative or friend), this will ensure that results of the study and any future information reach you should your details change.

Address: .....
.....
.....
..... Postcode.....

Yours sincerely,

Emma Honey
Psychology Department
University of Durham
Durham, DH1 3LE

Appendix 5 Activities Included in ADOS-G Modules 1 – 4

Module	Level of Expressive Language	Activities
1	Minimum – No speech Maximum - Simple phrases	Free Play, Response to Name, Response to Joint Attention, Bubble Play, Anticipation of a Routine with Objects, Anticipation of a Social Routine, Functional and Symbolic Imitation. Birthday Party, Snack
2	Minimum - Flexible three-word phrases Maximum - Verbally fluent	Construction Task, Response to Name, Make-Believe Play, Joint Interactive Play, Conversation, Response to Joint Attention, Demonstration Task, Description of a Picture, Telling a Story from a Book, Free Play, Birthday Party, Snack, Anticipation of a Routine with Objects, Bubble Play
3	Minimum - Verbally fluent (Child/Younger adolescent)	Construction Task, Make-Believe Play, Joint Interactive Play, Demonstration Task, Description of a Picture, Telling a Story from a Book, Cartoons, Conversation and Reporting, Questions about Emotions, Questions about Social Difficulties and Annoyance, Break, Questions about Friends and Marriage, Questions about Loneliness, Creating a Story
4	Minimum - Verbally fluent (Adolescent/adult)	Construction Task, Telling a Story from a Book, Description of a Picture, Conversation and Reporting, Questions about Current Work/School, Questions about Emotions, Questions about Social Difficulties and Annoyance, Demonstration Task, Cartoons, Break, Questions about Friends and Marriage, Questions about Loneliness, Questions about Plans and Dreams, Creating a Story

grounds for the recognition of this association by other diagnostic systems. However, the findings also open up new questions about the developmental nature of this association that need to be tested in future research. If the association can be confirmed in children at different developmental levels, there may also be potential for designing interventions through which symbolic play abilities are improved by reducing repetitive behaviours and/or repetitive behaviours are reduced by improving symbolic play.

Contents

Appendix 6 Description of Symbolic Play Activities in the ADOS-G

Task	Description
The Birthday Party (Modules 1 & 2)	A set of toys including a doll, plate, cutlery, napkin, Play-Doh, dowel and blanket are used to hold a birthday party for 'baby'. Throughout the party the examiner presents a number standard situations including; making the cake using Play-Doh, blowing candles out, feeding baby, spilling a drink and putting baby to bed. During each of these situations the examiner sets up the scenario and provides an opportunity for spontaneous actions from the child, if these are not seen then presses are used to promote prompted actions. Actions which The Birthday Party encourages includes object substitution, e.g. using the Play-Doh as a cake, using a doll as an active agent, e.g. making appropriate noises when the doll is given a drink and using invisible objects, e.g. wiping up a spilt drink.
Joint Interactive Play (Modules 2 & 3)	A set of toys which are appropriate for the participant including figures, junk objects and miniature objects such as food and cars are used in this activity. Joint Interactive Play follows on from a Make-Believe Play activity in which the participant plays alone with the objects mentioned above. During Joint Interactive Play the examiner attempts to collaborate with the participant through the introduction of new play themes and ideas. In this activity the child has the opportunity to engage in a wide range of symbolic play activities including object substitution the use of figures as active participants and the integration of play schemes. The examiner's role is to provide opportunities for the child to engage in these types of play following prompts and presses. For example a piece of cloth (junk object) may be used as a blanket for a baby or a figure may fall into an invisible river.
Creating a Story (Modules 3 & 4)	6 items with a definite purpose and 6 junk items are used in this activity. The examiner selects five items at random and uses these to make a simple narrative story. The participant then selects five new items and is asked to create a story. This activity allows the participant to use symbolic play skills such as object substitution, creation of animate participants, use of invisible objects and integration of schemes. The participant can perform these spontaneously or prompted, prompted behaviours would be defined as replications of themes and ideas used in the examiners story.

Appendix 7 Imagination Codes for the Four ADOS-G Modules.

Module (Item)	Score and description
Module 1 (C2)	0 = Spontaneous use of a doll or other object as an independent agent, OR uses object to represent other objects (e.g. using a block to give the doll a drink)
	1 = Spontaneous pretend play with a doll (e.g. feeding, hugging or giving a doll a drink) or other objects, but no use of a doll or other toys as an independent agent or placeholder
	2 = Imitates pretend play as described above for a rating of 1, OR imitation with a placeholder; no spontaneous pretend play
	3 = No pretend play
Module 2 (C2)	0 = Variety of spontaneous, inventive, creative play or activities, including use of doll or figures as agents of action
	1 = Some spontaneous creative or make believe play, but rather limited in range. May include some use of doll or figures as agents, but less flexible than what would qualify for a rating of 0.
	2 = Little spontaneous creative or make-believe play, OR only play that is repetitive or stereotyped in quality
	3 = No creative or inventive play (not even stereotyped or repetitive)
Module 3 (C1)	0 = Several different spontaneous, inventive creative activities or comments in conversation
	1 = some creative or make-believe actions, but limited in range or occurring only in response to one contrived situation (e.g. creating a story).
	2 = Little spontaneous creative or make-believe play, OR only actions that are repetitive OR stereotyped in quality
	3 = No creative or inventive play (not even stereotyped or repetitive)
Module 4 (C1)	0 = Several different spontaneous, inventive creative activities or comments in conversation
	1 = some creative or make-believe actions, but limited in range or occurring only in response to one contrived situation (e.g. creating a story).
	2 = Little spontaneous creative or make-believe play, OR only actions that are repetitive OR stereotyped in quality
	3 = No creative or inventive play (not even stereotyped or repetitive)

Appendix 8 Pretend Play Scale

Pretend Play Scale

Notes on administration

- If a play act or scheme becomes repetitive e.g. the child becomes preoccupied and perseverant in cutting the 'cake' then tick item '0' and do not the score the sequence as a play behaviour on any of the remaining items

- **If a child is observed to combine schemes of play this should not be scored as displaying a single scheme unless a separate single scheme is observed**

- In determining the spontaneity of the child's play the following definitional criteria of a prompt should be used
    - A prompt must be:
        - An explicit request to perform the pretend play act in question e.g. can you give dolly a drink?

      Or
        - An explicit instruction to perform the pretend play act in question e.g. give dolly a drink

      Or
        - The physical modelling of the pretend play act in question e.g. giving the doll a drink / wiping up the pretend drink
    - A prompt does not include
        - Non-directive verbal or physical cues aimed at stimulating the pretend play act e.g. saying dolly is thirsty or hungry / miming spilling a drink and telling the child that the drink has been spilled.

Pretend Play Scale

Decentration	S	P	Examples
1. Everyday activities are directed to the self. E.g. feeding, sleeping, drinking			
2. Non-everyday activities are directed to the self. E.g. cleaning, tidying etc OR Activities are directed to a passive inanimate participant such as a doll or teddy. E.g. child hold or hugs doll, feeds doll. Note if the inanimate participant talks, or is referred to as talking or feeling score 3. OR Activities are directed to another child or adult. Note the other participant should not be taking on the role of a character.			
3. Activities are directed to an active inanimate participant. E.g. doll is given drink and makes appropriate sounds, doll holds cup or fork self. OR Activities are directed to another adult or child who is in role. OR Activities are directed to the self but when playing the role of another. E.g. cowboy, nurse, fictional character.			
Highest score			

Decontextualisation	**S**	**P**	**Examples**
1. Child uses miniature objects conventionally. E.g. Pushes toy car, builds with blocks, puts toy cup to mouth without sound effects, uses doll as active or inactive participant			
2. Child uses an object to represent something else. E.g. Play-doh as a cake, dowel as candles, spinning disk as moon			
3a. Child attributes a false property to an object or person. E.g. The car has wings; dowel used as a *lit, hot* candle; action figure flies; action figure vomits			
3b. The child includes invisible objects in play. Wipes up a spilt invisible drink, pays with invisible money, fills car with invisible petrol, puts toy cup to mouth and makes 'drinking' noises			
Highest score			

Integration	S	P	Examples
1. Child uses a single play scheme only. E.g. cup to own mouth or fork to dolls mouth.			
2. Child combines variations of a single scheme. E.g. cup to self and then to doll, pour self a drink and then adult.			
3. Child combines a variety of single schemes including one or more participants. E.g. wash doll and then put to bed, feed doll and then give doll a drink, feed self and then pour doll a drink.			
Highest score			

Non-pretend play behaviour

Behaviour	S	Examples
1. No play: The child does not engage with the play materials or the play themes in any way or does so in an *atypical* way e.g. for sensory stimulation such as sniffing, holding close to eyes; or uses toys in repetitive behaviour such as banging, twiddling, spinning, shaking, repeatedly cutting 'cake'.		
2. Exploratory play: The child manipulates the play materials in a non-functional way but shows evidence of exploratory play e.g. shakes object, looks at object. Do not include: a) repetitive behaviour such as banging, twiddling, spinning, repetitive shaking, repeatedly cutting 'cake', b) sensory stimulation such as sniffing, holding close to eyes		

Appendix 9 Contingency tables of agreement & disagreement between raters for each of the 12 PPS summary scores

Decentration - Any

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	3 (75)	0 (0)	1 (25)	0 (0)
		1	0 (0)	1 (100)	0 (0)	0 (0)
		2	0 (0)	0 (0)	33 (91.7)	3 (8.3)
		3	0 (0)	0 (0)	2 (8.7)	21 (91.3)

Decentration – Spontaneous

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	5 (62.5)	0 (0)	3 (37.5)	0 (0)
		1	0 (0)	2 (66.7)	1 (33.3)	0 (0)
		2	0 (0)	0 (0)	29 (90.6)	3 (9.4)
		3	0 (0)	0 (0)	4 (19)	17 (81.0)

Decentration – Prompted

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	5 (83.3)	0 (0)	1 (16.7)	0 (0)
		1	0 (0)	0 (0)	0 (0)	1 (100)
		2	1 (2.2)	1 (2.2)	43 (93.5)	1 (2.2)
		3	1 (9.1)	0 (0)	1 (9.1)	9 (81.8)

Decontextualisation - Any

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	3 (75)	0 (0)	0 (0)	1 (25)
		1	0 (0)	3 (100)	0 (0)	0 (0)
		2	0 (0)	1 (7.7)	11 (84.6)	1 (7.7)
		3	0 (0)	2 (4.5(	1 (2.3)	41 (93.2)

Decontextualisation - Spontaneous

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	10 (83.3)	1 (8.3)	0 (0)	1 (8.3)
		1	0 (0)	19 (86,4(	0 (0)	3 (13.6)
		2	0 (0)	1 (20)	3 (60)	1 (20)
		3	10 (15.6)	4 (16)	1 (4)	20 (80)

Decontextualisation Prompted

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	7 (87.5)	0 (0)	1 (12.5)	0 (0)
		1	1 (100)	0 (0)	0 (0)	0 (0)
		2	0 (0)	0 (0)	20 (80)	5 (20)
		3	1 (3.4)	0 (0)	3 (10.3)	25 (86.2)

Integration Any

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	3 (60)	0 (0)	1 (20)	1 (20)
		1	0 (0)	9 (64.3)	0 (0)	5 (37.5)
		2	0 (0)	0 (0)	5 (100)	0 (0)
		3	0 (0)	3 (7.5)	3 (7.5)	34 (85)

Integration – Spontaneous

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	4 (66.7)	1 (16.7)	1 (16.7)	0 (0)
		1	0 (0)	7 (53.8)	0 (0)	6 (46.2)
		2	1 (16.7)	0 (0)	5 (83.8)	0 (0)
		3	0 (0)	3 (7.7)	2 (5.1)	34 (87.2)

Integration – Prompted

			Highest score Rater 2 Number for rating (% within variable)			
			0	1	2	3
Highest score Rater 1	Number for rating (% within variable)	0	8 (80)	2 (20)	0 (0)	0 (0)
		1	1 (2.5)	34 (85)	4 (10)	1 (2.5)
		2	0 (0)	0 (0)	3 (100)	0 (0)
		3	1 (9.1)	3 (27.3)	0 (0)	7 (63.6)

Total Play - Any

Highest score Rater 1	Highest score Rater 2 Number for rating (% within variable)									
Number for rating (% within variable)	0	1	2	3	4	5	6	7	8	9
0	3 (75)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (25)	0 (0)	0 (0)
1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (75)	0 (0)	1 (25)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (50)	1 (12.5)	1 (12.5)	2 (25)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (10)	7 (70)	1 (10)	1 (10)
8	0 (0)	0 (0)	0 (0)	0 (0)	1 (4.5)	0 (0)	1 (4.5)	2 (9.1)	17 (77.3)	1 (4.5)
9	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (14.3)	1 (7.1)	0 (0)	11 (78.6)

Total Play – Spontaneous

Highest Score Rater 1	Highest score Rater 2 Number for rating (% within variable)									
Number for rating (% within variable)	0	1	2	3	4	5	6	7	8	9
0	4 (66.7)	0 (0)	0 (0)	0 (0)	1 (16.7)	0 (0)	0 (0)	1 (16.7)	0 (0)	0 (0)
1	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	3 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	1 (25)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	1 (10)	0 (0)	6 (60)	1 (10)	1 (10)	1 (10)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	1 (12.5)	1 (12.5)	4 (50)	0 (0)	2 (25)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (50)	2 (33.3)	1 (16.7)
8	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (7.1)	2 (14.3)	2 (14.3)	8 (57.1)	1 (7.1)
9	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (27.3)	0 (0)	0 (0)	8 (72.7)

Total Play - Prompted

Highest score Rater 1 Number for rating (% within variable)	Highest score Rater 2 Number for rating (percentage)									
	0	1	2	3	4	5	6	7	8	9
0	5 (83.5)	0 (0)	0 (0)	0 (0)	0 (0)	1 (16.7)	0 (0)	0 (0)	0 (0)	0 (0)
1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	1 (25)	0 (0)	0 (0)	1 (25)	0 (0)	1 (25)	0 (0)	1 (25)	0 (0)	0 (0)
5	0 (0)	1 (6.3)	0 (0)	0 (0)	0 (0)	8 (50)	5 (31.3)	2 (12.5)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (12.5)	20 (83.3)	1 (4.2)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (14.3)	2 (28.6)	4 (57.1)	0 (0)	0 (0)
8	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)
9	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (25)	1 (25)	2 (50)