PLAY IN TODDLERS WITH PERVASIVE DEVELOPMENTAL DISORDER AND AUTISM: ALTERNATIVE ASSESSMENT PROCEDURES AND IMPACT OF TREATMENT

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ABSTRACT

Most toddlers with Pervasive Developmental Disorder (PDD) and Autism are non-compliant, have language delays and immature play; however, some have intact information processing ability, while others do not. Play data from two treatment outcome studies of children with PDD and Autism, and one normative longitudinal study were analysed to (1) compare play of normally developing children to delayed children with intact versus impaired processing; (2) investigate differential impact of a parent-implemented cognitive-behavioural treatment on children with intact versus impaired processing; and (3) investigate the use of information processing, and non-verbal play measures, including sustained attention, for use with children with delays. Both children with intact and those with impaired processing, but particularly children with impaired processing, displayed immature play relative to normally developing children. With treatment, sophistication of play improved substantially for children with intact processing and less for children with impaired processing confirming the usefulness of both information processing and play as alternative assessment procedures for children who are non-verbal and non-compliant.

RÉSUMÉ

La plupart des bambins qui présentent un trouble de développement profond (TDP) ou qui souffrent d'autisme sont indociles et ont un retard de langage et un comportement ludique immature; la capacité de traiter l'information est intacte chez certainEs et déficiente chez d'autres. Les données ludiques de deux études portant sur l'issue du traitement administré à des enfants présentant un TDP ou souffrant d'autisme, et d'une étude longitudinale normative ont été analysées pour (1) comparer le comportement ludique d'enfants normaux et d'enfants présentant un retard de développement et ayant des facultés de traitement de l'information intactes ou déficientes; (2) étudier l'effet différentiel d'un traitement cognitiviste administré par les parents à des enfants possédant des facultés de traitement de l'information respectivement intactes et déficientes; (3) étudier l'effet du traitement de l'information et de mesures ludiques non verbales et notamment l'attention soutenue sur des enfants présentant des retards de développement. Chez les enfants dont les facultés de traitement de l'information sont intactes et chez ceux et celles qui présentent un déficit à cet égard, mais surtout chez ces derniers, on a observé des comportements ludiques immatures par rapport aux enfants normaux. Après traitement, le comportement ludique a gagné considérablement en complexité chez les enfants dont les facultés de traitement de l'information étaient intactes mais moins chez les enfants qui présentaient un déficit à cet égard, ce qui confirme l'utilité du traitement de l'information et du jeu comme méthode d'évaluation de rechange des enfants non verbaux et indociles.

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CONTRIBUTIONS OF AUTHORS

The first paper included in this thesis was co-authored by Dr. Philip R. Zelazo and Dr. Richard Kearsley. Dr. Zelazo and Dr. Kearsley conducted the treatment outcome study and published papers on other aspects of the data set (Zelazo, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984). I summarised and analysed the play data for this paper. Moreover, I wrote the paper. Dr. Zelazo supervised the writing of the manuscript. Earlier versions of the manuscript were presented as posters at the 1996 Annual Convention of the American Psychological Association in Toronto, and at the 1998 International Conference on Infant Studies in Atlanta, Georgia. This manuscript was submitted to Development and Psychopathology in May 1998.

The second paper was co-authored by Dr. Philip R. Zelazo and Dr. Constance Lalinec. The second treatment outcome study was conducted by Dr. Lalinec for her Ph.D. dissertation (Lalinec, 1995), and papers have been presented on other aspects of the data set (Lalinec, Zelazo, Rogers, & Reid, 1995). I viewed video-recordings of play sessions, then coded, summarised and analysed the play data. The longitudinal normative study was conducted by Dr. Zelazo and David Laplante, and I analysed the play data. I wrote this paper as well, and Dr. Zelazo supervised the writing. An earlier version of the manuscript was presented as a poster at the 1996 International Conference on Infant Studies in Providence, Rhodes Island. This manuscript was submitted to Developmental Psychology in May 1998.

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GENERAL INTRODUCTION

Play in Toddlers with Pervasive Developmental Disorder and Autism: Alternative Assessment Procedures and Impact of Treatment

Piaget considered play to be crucial to a child's cognitive development, especially in the toddler years (1962). Garwood (1982) explained that through play, young children develop particular skills and gain knowledge of how responses can be co-ordinated for better problem-solving ability. Garvey (1990) expanded on this by suggesting that play facilitates cognitive growth by allowing children to manipulate and control their environments in ways that they cannot do in other contexts. Similarly, Bruner (1973) argued that play is a forum through which children develop and practice behavioural subroutines that are eventually integrated into more complex behavioural sequences. Weisler and McCall (1976) argued that play provides children with opportunities to acquire skills and strategies that will later be developed into more goal-directed behaviours. Others see play as a primary medium through which language develops (Cooper, Moodley & Reynell, 1978; Vygotsky, 1967). Eisert and Lamorey (1996) asserted that play is a "prerequisite" skill for the pre-school setting and Fewell and Rich (1987) claimed that it is within and through play that social behaviours develop. Clearly many researchers consider play to be primordial to development, but there is no agreement about how play functions. However, there is near consensus on the progression of play throughout development.

Play and Development

Piaget (1962) was one of the first to draw a map of the developmental progression of play and most contemporary accounts of play are based in one way or another on his analysis. Although an in-depth overview of his ideas is beyond the scope of this paper, a brief summary is warranted nevertheless. Piaget theorised that play proceeded through three umbrella developmental levels from birth to six or seven years: sensorimotor, symbolic and games with rules. Of particular interest to this thesis are the sensorimotor and symbolic stages. Piaget claimed that during the sensorimotor stage, in the first two years of life, cognitive development is based primarily in physical action. He wrote that throughout this period children move from repetitious instinctual motor activity, to the reproduction of reflexive schemes such as finger sucking or vocalising purely for practice or pleasure, to the repetition of actions with objects (banging or waving), to use of objects as tools to attain goals, to the combination of schemes, to the use of familiar schemes but without the objects to which they are typically applied.

According to Piaget, symbolic play is initially a solitary activity (Stage One) and later social (Stage Two). He asserted that during Stage One of symbolic play, children's pretense changes with respect to: (a) the decontextualising of behaviour, (b) the sequential combination of behavioural elements, (c) a shift from self- to other-referencing, (d) the substitution of one object for another (see Fein, 1981 for a comprehensive review of the research on these stages). Stage Two is "Sociodramatic Play" and is characterised by reciprocal roles, "collective symbols" and more realistic enactment of events.

Much research has been conducted in the past three decades in an effort to empirically validate the developmental progression of play in early childhood and most has, either directly or indirectly, supported Piaget's theory. Although the approaches used to assess play, and labels given to identify stages by different researchers have varied, the findings nevertheless converge on one general progression (Belsky & Most, 1981; Fein & Apfel, 1979; Fenson, Kagan, Kearsley & Zelazo, 1976; Largo & Howard, 1979; Lowe, 1975; Lowe and Costello, 1976; McCune-Nicolich, 1981; Nicolich, 1977; Rosenblatt, 1977; Sinclair, 1970; Westby, 1980; Zelazo & Kearsley, 1980). Immature sensorimotor activities such as mouthing, banging, waving and fingering indiscriminately (e.g., stereotypical play, sensorimotor single toy, simple manipulation) decrease systematically from 7 to 30 months; inappropriate relation of two or more objects (e.g., inappropriate relational play) increases between 9 and 13 months to decrease thereafter; appropriate use of objects (e.g., functional play, appropriate relational play, representational play, "self-referenced pretense", "other-referenced pretense") appears around 11 to 15 months to increase subsequently; and finally, around 18 to 20 months of age, pretense is generally agreed to be well-imbedded (e.g., substitution, sequence pretend).

Play in Children with Developmental Disabilities

Numerous studies have shown that the level of play in children with delays, including Down's Syndrome, mental retardation and autism, is associated with mental age, not chronological age (Casby & Ruder, 1983; Cunningham, Glenn, Wilkinson, & Sloper, 1985; Fewell, Ogura, Notari-Syverson, & Wheeden, 1997; Fewell & Rich, 1987; Hill & McCune-Nicolich, 1981; Lombardino & Sproul, 1984; Odom, 1981; Sigman & Sena, 1993; Wing, Gould, Yeates & Brierly, 1977). This means that children who are delayed in other areas of cognitive development, such as language, are also delayed in play. However, some studies have shown that the play of children with developmental disabilities is qualitatively less mature than that of normally developing children. For instance, children with language, as well as more pervasive delays, have been found to display less diverse and more repetitive play than normal children (Li, 1981; Skarakis-Doyle & Prutting, 1982, cited in Lombardino & Sproul, 1984; Rescorla & Goosens, 1992; Sigman & Ungerer, 1984). Moreover, toddlers with delays have been shown to spend less time engaged with toys, and to instead engage in long episodes of aimless wandering or staring into space (Krakow and Kopp, 1983). Others claim that children with autism display particularly poor play when compared to children with other developmental disabilities. Sigman and Sena (1993) reported that in a free-play situation, after a few functional acts had been modelled, toddlers with autism engaged less in functional play and displayed fewer sequences of three or more related functional acts than did other children. Similarly, Lewis and Boucher (1988) found that children with autism who had language abilities in the four to five year-old range engaged in less functional play than language-matched controls. Moreover, some researchers claim that children diagnosed with autism have deficiencies specific to symbolic play. For example, Sigman and colleagues (Mundy, Sigman, Ungerer & Sherman, 1986; Sigman & Sena, 1993; Sigman & Ungerer, 1984) have reported fewer symbolic acts by children with autism than control children; children with autism showed less diverse symbolic play acts and fewer acts overall. Baron-Cohen (1987) has reported similar findings, in that children with autism display fewer symbolic play acts spontaneously.

These kinds of results have led researchers to conclude that children with autism have, as a core deficit, paucity of symbolic play, and to hypothesise that this deficit is in fact the result of an inherent inability to understand symbolic representations. Without going into an exhaustive discussion of pretense, representation and theory of mind in children with autism (see Baron-Cohen, 1987; Leslie 1987, 1988; Sigman, 1994 for a detailed analysis of these issues), there are, on the very surface, serious problems with the idea that children with autism do not have the capacity for representation. Toddlers who present with autism are almost always diagnosed with concurrent behaviour problems -- the most common of which is non-compliant and resistant behaviour (Lalinec, 1995; Lovaas & Smith, 1988; Zelazo, 1997a, 1997b). Children with autism often display active non-compliance, such as temper tantrums, crying or head-banging, and/or more passive forms of non-compliance, such as staring into space, reaching for a different object or smiling in a distracted manner. Zelazo, Kearsley, Smith and Rogers (1990) argued that a developmental perspective on early autism must emphasise the role of non-compliance as a defining behaviour. Moreover, Lalinec (1995) argued that passive non-compliance can easily be mistaken for inability to understand requests or as difficulty engaging with the interpersonal world. We disagree therefore with the argument that children who present with autistic symptoms are incapable of interacting with the outside world, or that they are incapable of understanding symbolic representations. We hypothesise instead, that these children's non-compliant behaviour interferes with their development; they may be delayed in symbolic play, but that does not mean that they do not have the underlying capacity to understand symbolic representations. In fact, the same argument can be applied to other response systems such as expressive language. Zelazo (1989) claimed that because response systems, such as language and play themselves are undergoing development, they may be influenced adversely by behaviour difficulties and become "delayed" with the potential to mask intact mental ability.

Theoretically, the development of expressive abilities can be adversely affected by behavioural difficulties. Imitation, a key skill for learning (Piaget, 1976), requires compliance. Observations of children with autism in structured teaching sessions, where demands are placed on children by their parents, reveal that non-compliant behaviour results in breakdown of learning (Zelazo et al., 1990). Non-compliance serves an escape function that terminates the request or demand (Carr & Durand, 1985; Carr & Newsom, 1985). Successful escape from a task demand reduces the stress of the demand thereby reinforcing the non-compliant behaviour that produced the escape. Since the non-compliant behaviour is reinforced in this way, it is maintained. It is not difficult to imagine how this pattern of behaviour could truncate normal parent-child interactions and radically reduce essential learning opportunities that foster the development of expressive language and play -- including symbolic play (Rogers, Zelazo, Mendelson, & Rotsztein, 1998; Zelazo, 1989; 1997b).

This theory has been recently tested empirically by Rogers et al. (1998). They argued that non-compliant behaviours such as those commonly displayed by children with autism, represent mediated strategies for regulating negative emotions, such as frustration and anxiety. In a study of self-regulation in pre-schoolers with developmental disabilities, they found that children who were compliant tended to be more attentive, that compliant behaviour was strongly associated with children's successful task performance, and that children with developmental delays became increasingly more non-compliant with increasing task difficulty. These results imply that the escape strategies used by children with PDD and autism, used on a consistent basis, impede development by diminishing learning opportunities. Clearly, the hypothesis that children diagnosed with PDD and autism may have intact mental abilities, despite delays in language and play, is plausible. What is needed then, are means of assessing these children so that the confounds between expressive abilities and mental ability can be sorted out.

Assessment

Conventional standardised assessment procedures, such as the Bayley Mental Scale of Infant Development (Bayley, 1969, 1993) or the Griffiths Test of Intelligence (Griffiths, 1958), pose many problems for use with children with developmental disabilities. They are biased against children with language deficits in that they are heavily weighted with receptive and expressive language items (Bailey, 1989; Cicchetti & Wagner, 1990; LeVan, 1990; Linder, 1990; Zelazo, 1979, 1982b, 1989, 1997a). Furthermore, they are biased against children who are non-compliant because they require children to comply with the examiners requests and to imitate (LeVan, 1990; Zelazo, 1979, 1982b, 1989, 1997a). In fact, some have argued that procedures such as these, that emphasise control, uniformity, and direction are incompatible with the very characteristics of young children (LeVan, 1990; Linder, 1990). They are biased against toddlers with any disability in that they do not allow examiners to modify items or item presentation (Bailey, 1989; Brooks-Gunn & Lewis, 1981; Garwood, 1982; Linder, 1990). Moreover, standardised tests administered to toddlers do not provide relevant information about children's problem-solving strategies, their learning styles, their abilities to organise and structure their world, or children's functional skills in the context of home and school settings (Bailey, 1989; Cicchetti & Wagner, 1990; Linder, 1990; Zelazo, 1982b). Neisworth and Bagnato (1992), based on a critique of intelligence testing for toddlers with developmental disabilities, went so far as to suggest that "the use of such tests in young children with developmental delays and disabilities must be abandoned" (p. 1)! They more recently substantiated their claim by showing that, in a U.S. national survey of pre-school psychologists, early tests of intelligence failed to be workable tools and to accomplish their alleged purpose nearly 50% of the time (Bagnato & Neisworth, 1994). Zelazo (1989) sums up the problem well: "These tests are most needed for -- and confounded with -- three pervasive classes of disability: children with neuromotor delays, expressive language delays, and behaviour problems" (p. 95). It is clear that alternative assessment techniques are necessary to supplement conventional tests for toddlers with developmental delays. In this thesis, we investigate two such alternatives: play assessment and an information processing assessment procedure.

Play assessment. Play as an assessment tool for young pre-school children with developmental disabilities has been increasing in popularity over the past decade. Piaget, recognising the usefulness of play observations for assessment purposes, argued that children's exploration of their world could be used as a "window" on cognitive development (Fein & Apfel, 1979). In fact, the close correspondence that has been reported, between play and cognitive development justifies the use of play as a method for assessing cognitive and symbolic capacity (Cicchetti & Wagner, 1990). Bates (1979) observed that a category of play combining relational and functional play predicted language production and comprehension in 9 to 13 month olds. Hill and Nicolich (cited in Belsky and Most, 1981) found that performance on a play scale correlated (r=.66, p<.001) with performance on the Bayley Test of Mental Development (Bayley, 1969) after controlling for chronological age in children who presented with Down's Syndrome. Casby and Della Corte (1987) demonstrated a strong relation (r=.84) between symbolic play and language level in a sample of 19 to 24 month old children. Of the 20 children studied by Rosenblatt (1977), those whose play matured more rapidly also learned language earlier, achieved object permanence earlier, and scored higher on the developmental quotient on the Bayley Test at two years.

Play assessment can be a useful screening tool for identifying infants and pre-schoolers who may be handicapped or at-risk of developmental delay (Bailey, 1989, Lowe, 1975). Zelazo and Kearsley (1980) claimed that children's displays of functionally appropriate uses of toys in a free-play setting serve as positive evidence that they have accomplished the transition in cognitive development that occurs at the end of the first year of life (see also Zelazo, 1982a; Zelazo & Leonard, 1983; Zelazo & Zelazo, in press). Similarly, Kalverboer (1977) asserted that through play, one can infer children's developmental level, as well as their ability to organise their behaviour in a complex environment. Thus, we can identify children who fail to move beyond a certain stage in the developmental progression of play, or who fail to show the spontaneous, flexible, diverse play characteristic of normal development, as being at risk for delays in other domains of development. Play assessment can also be used for clinical analysis of skills (Rosenblatt, 1977) to aid in determining the type of treatment procedure that would be most appropriate and to serve as a measure of the effectiveness of intervention themselves (Zelazo &

Kearsley, 1980). For example, children who are delayed and who show no functional play at all may need different treatment than children who are delayed but whose functional play is age-appropriate. With proper norms, play assessment could even be used to aid in diagnosis. Recognising this, Garvey (1977) stated that "the study of spontaneous play can provide a rich source of information about the nature of a child's competence" (p. 124). For instance, Sigman and Sena (1993) found that children with mental retardation displayed play that was in line with their mental age; children with Down's Syndrome tended to explore objects less avidly and less flexibly than normally developing children; children with language delays who did not have autism displayed symbolic play skills comparable or a bit better than their language skills; and finally, children with autism showed the most profound disturbance of any group in both representational play and language.

"Play as an assessment paradigm addresses the shortcomings of traditional assessment protocols" (Eisert & Lamorey, 1996, p. 222), and has other distinct advantages as well. Play assessment is less dependent on language (Kalverboer, 1977), thereby potentially removing the confound of expressive language and mental ability found in conventional tests (Sigman & Sena, 1993; Zelazo & Kearsley, 1980). Zelazo, Rotsztein, Reid and Carlin (1998) argued that free-play can yield information that is both more objective and richer than parent-report. The natural and relaxed atmosphere inherent in play assessment places fewer demands on the child than traditional testing methods (Fewell, et al., 1997) thereby giving children who are non-compliant the opportunity to demonstrate their competencies (Zelazo & Kearsley, 1980). Moreover, the natural and relaxed atmosphere is more likely to elicit behaviours that are more representative of a children's typical behaviour. Similarly, Ogura (1991) argued that play behaviour is spontaneous and therefore reflects truer cognitive capacity in comparison to testing situations. Play is a dominant developmental activity during early childhood and provides an authentic and naturalistic context for observing skills that are functional to toddlers (Linder, 1990). It is universal (Sigman & Sena, 1993), follows a regular developmental sequence from infancy through early childhood, is non-threatening, and can be assessed unobtrusively (Fewell & Kaminski, 1988). Play is fun, voluntary, intrinsically motivated and flexible (Belsky & Most, 1981; Rogers & Sawyers, 1988), and children will therefore play relatively unselfconsciously in many settings (Sigman & Sena, 1993) and thus, children can take a more active role in the assessment (Fewell et al., 1997). Finally, when compared to standardised assessments, play assessment takes less time and results in more favourable parent and staff perceptions (Myers, McBride, and Peterson, 1996).

Information Processing. Speed of information processing is another measure that can shed light on the central processing ability of children with delays without being subject to the confounds of traditional measures of testing. Zelazo and colleagues (Zelazo, 1979, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984; Zelazo, Kearsley & Stack, 1995) created a procedure that tests the integrity of children's capacity to create mental representations for sequential auditory and visual events and to measure the rate at which these representations are formed and announced in toddlers under the age of 42months. Children with intact information processing display age-appropriate speed of processing, create mental representations for visual and auditory events, and compare the representations with the events on subsequent presentations. Children who perform at a depressed level on these tasks are diagnosed with impaired processing.

The advantages of this information processing procedure for assessment of toddlers with developmental delays are numerous. First, this procedure eliminates the confounds of conventional tests. Children need not display expressive language; instead, the procedure uses less developmentally vulnerable behaviours such as elicited cardiac changes, visual fixation, smiling and vocalising as dependent variables. Children who are non-compliant generally find this procedure fun and interesting given the puppet-show like atmosphere and are, therefore, less likely to resist. Also, there are no direct demands placed on the child, thereby reducing the chances of wilful defiance. Zelazo et al. (1995) enumerated other distinct advantages of this procedure: (a) use of sequential, rather than highly redundant static stimuli; (b) brief and easy to administer allowing children with a wide range of disabilities to be assessed without unusual preparation or unacceptable dropout rates; (c) assessment of central processing via two modalities that are crucial for future cognitive development -- vision and audition -- allows for widespread application to children with various disabilities; (d) relative comparisons of central processing of visual and auditory information can be made within children; and (e) stimuli used are constant over age indicating that observed changes are the result of the child's mental development and not stimulus alterations. Overall then, this information-processing measure, combined with conventional tests and play assessment, would afford greater diagnostic precision allowing a differential diagnosis of central processing delays from delayed expressive development (Zelazo, 1989; 1997a; 1997b).

Treatment

Zelazo, Kearsley and Ungerer (1984) developed a parent-implemented cognitive-behavioural treatment program for toddlers with pervasive developmental disorder and autism. The program is based on the premise that for certain sub-populations of children who present with PDD and autism, namely those with intact information processing and delays of unknown etiology, non-compliance is at the core of their difficulties. Thus, the treatment program is designed to turn a resistant, non-compliant behaviour style into one conducive to learning, first through actions (play) and then through language. Parents conduct 12-minute compliance training sessions at home five to seven times weekly and systematically generalise the new learning to the natural home context. Parents are trained to administer positive reinforcement in the form of praise, objects and edibles contingent upon compliance first with actions and subsequently with words. Each 12-minute session begins easily, becomes difficult and ends easy. Thus, in the beginning children are reinforced for compliance with actions such as sitting-up and making eye-contact and subsequently using objects appropriately such as pushing a toy car or banging a xylophone. After some functional play is established the objects are used to encourage naming. If the child approximates the word "car" for example, she or he is praised, given an edible and the toy car and allowed to push it for five to six seconds.

Two outcome studies have been conducted using this treatment procedure, and their results, on play, are reported in the two manuscripts that follow. The impact on other aspects of development have been reported elsewhere, but are summarised here. The first treatment outcome study investigated the impact of 10 months of treatment on children with PDD and autism and intact versus impaired processing ability. Zelazo and colleagues (Laplante, Zelazo & Kearsley, 1984; Zelazo, 1989, 1997b; Zelazo & Kearsley, 1984) reported reduction in delays on conventional tests of development, from a mean of 8.0 to 0.4 months in the group of children with intact processing by the 18th month of follow-up testing; whereas the magnitude of the delays for the group of children with impaired processing increased from a mean of 15.1 to 28.8 months. Within the sample of children with intact processing, 61% of the children eliminated their delays and achieved intelligence test scores that equalled or exceeded their chronological ages by the 18th month follow-up evaluation. Follow-up evaluations two years later, although with some sample attrition, indicated that this pattern of results continued as children entered kindergarten and first grade. The second treatment outcome study was a follow-up to the first (Lalinec, 1995). The impact of six months of treatment, on children with PDD and autism, and intact processing only, was investigated. Lalinec and colleagues (Lalinec, 1995; Lalinec, Zelazo, Rogers, & Reid,1995) reported significant decreases in externalising behaviour problems, as well as significant improvement on both language measures (i.e., auditory attention, receptive and expressive vocabulary, verbal concept formation, and word use) and non-verbal measures of development. They also reported significant decreases in maternal stress, greater feelings of satisfaction and perceived competence relative to the parenting role, and a more internal parenting locus of control. Combined, these reports indicate major improvements in several areas of functioning, but not in play.

Investigating the impact of treatment on play however, is important given the significance that is attributed to early exploration and play in promoting cognitive development (e.g., Bruner, 1973; Cooper, Moodley & Reynell, 1978; Garvey, 1977, 1990; Isenberg & Jacob, 1983; Piaget, 1962). In fact, many researchers and clinicians have stressed the importance of using play as an intervention target (Eason, White & Newsome, 1982; Eisert & Lamorey, 1996; Fenson & Ramsey, 1981; Fewell & Kaminski, 1988; Kohl, Beckman & Swenson-Pierce, 1984; Moran & Whitman, 1985; Wolery and Bailey, 1989). For instance, Wolery and Bailey (1989) have highlighted a number of specific reasons why play should be a target of intervention in children with developmental delays: (a) play is fun, therefore it improves children's quality of life; (b) play may help stimulate other developmentally appropriate behaviours; and (c) play helps children integrate more easily into their childhood environments. Thus, whether play improves with treatment is important because children who do not play appear to be missing opportunities to learn, communicate, and experience their world optimally, putting them at risk for developing larger delays, not only with language, but with cognitive, motor and social development as well.

Present Series of Papers

The manuscripts that follow report on the impact of the parent-implemented treatment program, Learning to Speak (Zelazo, et al., 1984) on play in children with PDD and autism using data from the two treatment outcome studies alluded to above. The **first paper** is based on the first treatment outcome study (Zelazo, 1989, 1997b; Zelazo & Kearsley, 1984) and had three main objectives; to further investigate the validity of the Information Processing Procedure for distinguishing children with intact versus impaired information processing ability; to test the validity of the treatment procedure for children with intact processing; and to investigate the use of the play measures as a simple diagnostic tool allowing to make a distinction between children with intact and impaired processing. The **second paper** reports two studies. Study I is based on a larger longitudinal study of normally developing toddlers (Laplante, Bédard & Moran, 1990), and Study II is based on a larger follow-up treatment outcome study (Lalinec, 1995; Lalinec, et al.,1995). Study I aimed to map the developmental progression of play in a sample of normally developing toddlers from 13 to 31 months, with the primary goal of having a normal comparison for Study II. Study II had three objectives: to investigate the impact of six-months of treatment (Zelazo et al., 1984) on play in children with PDD and autism and intact processing only; to investigate the analysis of the longest epoch of play as an alternative measure of "symbolic" play for use with children who are non-verbal and non-compliant; and to compare play of children with PDD and autism to play of normally developing children (Study I). Together, these studies allowed us to (1) compare play of normally developing children to children with delays who had intact or impaired processing ability; (2) investigate differential impact of a parent-implemented cognitive-behavioural treatment on the play of children with intact versus impaired processing; and to (3) investigate the use of information processing, and non-verbal play measures, including sustained attention, for use with children with developmental delays.

PAPER ONE: Impact of Treatment on Play in Intact and Impaired Processors with Pervasive Developmental Disorder and Autism

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Abstract

Impact of a 10-month parent-implemented cognitive-behavioural treatment program on play in toddlers with pervasive developmental disorder (PDD) and autism, and information processing and play assessment, as alternate assessment tools for children with delays, were investigated. Forty-six toddlers were recruited at 2 ages of entry (22 and 32 months) and determined to have intact or impaired information processing. Two results were expected: (1) differences in play between children with intact and impaired processing; and (2) increases in mature play following treatment in children with intact but not impaired processing. Five ANOVAs with 2 between-group factors (age of entry: 22 vs. 32 months and level of processing: intact vs. impaired) and one within-subject factor (time of testing: prior to treatment, 5, 10 and 16 months) were conducted. Results revealed Age X Level of processing interactions for stereotypical, functional and undifferentiated activity, where children with intact processing fared better than those with impaired processing in the younger, but not the older group; Age and Level of processing main effects were obtained for appropriate uses, where children with intact processing performed better than children with impaired processing in both age groups and older children displayed more uses than younger children irrespective of level of processing. Time main effects with linear trends were found for stereotypical play, functional play and appropriate uses. A cross-lag comparison of 32 month-old children following treatment with 32 month-old children before treatment revealed that for children with intact processing only play improved beyond what would be expected due to maturation. These data show that play distinguishes children with intact from those with impaired information processing and indicate that play can be facilitated in children with intact processing who have PDD or autism.

Impact of Treatment on Play in Intact and Impaired Processors
with Pervasive Developmental Disorder and Autism

Language and object-use are expressive abilities that reflect central processing and usually, children with intact central processing demonstrate these expressive abilities. However, some children with pervasive developmental disorder (PDD) and intact processing do not speak and do not use objects appropriately (Lovaas & Smith, 1988; Zelazo, 1979, 1989, 1997a, 1997b; Zelazo & Kearsley, 1980). Conventional tests of cognitive ability, such as the Bayley Mental Scale of Infant Development (Bayley, 1969; 1993) or the Griffiths Test of Intelligence (Griffiths, 1958) that are used routinely to assess these children, are inherently flawed and do not discriminate children with intact versus impaired information processing ability. The variables used to infer mental ability -- expressive language, object use, motor ability and compliance with the examiner's requests -- are confounded with the development of these expressive abilities. We know a priori that these children cannot express themselves through language. We also know that these children often display extreme forms of resistant and non-compliant behaviour (Lalinec, 1995; Lovaas & Smith, 1988; Whitehurst et al., 1989; Zelazo, 1997b) and consequently often do not imitate or display age-appropriate object use when instructed to do so. Thus, attempts to infer "mental ability" using conventional tests will result in depressed scores (Bailey, 1989; Brooks-Gunn & Lewis, 1981; Eisert & Lamorey, 1996; Garwood, 1982; Zelazo, 1979, 1982b, 1989, 1997a; Zelazo & Kearsley, 1984). At best, the assessment provides a minimal estimate of the children's ability (Lovaas & Smith, 1988; McCune et al., 1990). In fact, Zelazo and Kearsley (Zelazo, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984) reported that three of four children who presented with extreme developmental delays of unknown etiology had intact information processing and were misdiagnosed as mentally retarded. Furthermore, since norms for these standardised measures were gathered on samples of normal children, they are inappropriate for use with children with developmental disabilities (McCune et al., 1990). Moreover, studies (e.g., Bagnato & Neisworth, 1994; Greenspan & Meisels, 1994) have demonstrated that conventional tests are in fact not useful for determining early interventions. By depending solely on conventional test scores, all we are doing is confirming with a label, what we already know about these children from everyday observation (Cicchetti & Wagner, 1990).

An Information Processing Procedure

Zelazo and colleagues (Zelazo, 1979, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984; Zelazo, Kearsley & Stack, 1995) developed an information processing procedure that circumvents these limitations. It distinguishes mental ability (central information processing) from confounding expressive/communicative behaviours (Zelazo, 1989). Essentially, the goal of this procedure is to test the integrity of the child's capacity to create mental representations for sequential auditory and visual events and to measure the rate at which these representations are formed and announced (see Zelazo, Kearsley & Stack, 1995). Children with intact information processing display age-appropriate speed of processing, create mental representations for visual and auditory events, and compare the representations with the events on subsequent presentations. Children who perform at a depressed level on these tasks are diagnosed with impaired processing. This procedure has distinct advantages over conventional testing. The dependent measures used, such as elicited cardiac changes, visual fixation, smiling, vocalising, pointing, clapping and turning-to-mother, are less developmentally vulnerable than the expressive measures used on conventional tests to infer mental ability. However, the primary advantage of the information processing procedure is the capacity to differentially identify intact central processing ability in the face of serious developmental delays.

The ability to distinguish central processing from expressive ability is crucial for deciding the type of treatment that will best benefit children who present with PDD or autism (Zelazo, 1997a, 1997b). Lovaas and Smith (1988) found that the young children with autism in their study divided about equally into two groups, one with the potential to become normal functioning and one with a less favourable prognosis. This is in line with the finding (Zelazo, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984) that some children diagnosed with impaired central processing are mentally retarded and do not benefit substantially from treatment aimed at reducing non-compliant, resistant behavior and facilitating expressive development. It is likely that at least some of the children in Lovaas and Smith's study, who did not "recover" after intensive behavioural treatment were children with impaired central processing. It is clear that the ability to discriminate children with intact versus impaired processing early in life would enable therapists to identify those children who are most likely to overcome their developmental delays and autistic behaviours. A differential diagnosis would allow therapists to provide the most appropriate treatment for these children.

Treatment and play

Children with developmental delays display deficient use of objects. Rescorla and Goosens (1992) reported that play of children with expressive specific-language impairments (SLI-E) was less advanced developmentally and less rich and varied in content than the play of demographically matched comparison toddlers. Laplante, Bedard and Moran (1990) found that play abilities of infants born at both high and moderate risk were significantly more immature than that of infants born at normal risk. Krakow and Kopp (1983) found regressive, stereotypic play and episodes of aimless wandering among a sample of toddlers with developmental delays. Loveland, Landry and Hall (1988) found that in a free-play situation, children with developmental delays had more incidences of no response (i.e., failing to play with the toys) than normally developing children. Taken together, these results indicate that a child who presents with a developmental delay does not display the non-redundant, spontaneous, flexible play that characterises normal development (Fenson et al, 1976; Zelazo & Kearsley, 1980).

This fact is important because many infant researchers have attributed much importance to play in development. Piaget (1962) considered play to be crucial to a child's cognitive development, especially in the early years. Through play, young children develop particular skills and gain knowledge about how responses can be co-ordinated for better problem-solving ability (Garwood, 1992). Garvey (1990) suggested that play facilitates cognitive growth by allowing children to manipulate and control their world in ways that they cannot do in other contexts. Similarly, Bruner (1973) suggested that play is a forum through which the child develops and practices behavioural subroutines that are eventually integrated into more complex behavioural sequences. Play provides the child with opportunities to acquire skills and strategies that will later be developed into more goal-directed behaviours (Weisler & McCall, 1976). Other researchers have emphasised the significance of play for language development (Cooper, Moodley & Reynell, 1978; Vygotsky, 1967).

Given the considerable importance that is attributed to the role of early play and exploration in promoting cognitive growth, and the poor quality of play for children with developmental delays, it is surprising that few studies report the impact of treatment on play. The effectiveness of treatment on play is important because children who do not use their playtime in developmentally constructive ways fall further behind their age-mates. If play, like vocabulary, normally develops exponentially, then the child who is wandering aimlessly is falling behind at a faster and faster rate. These considerations render play worthy of investigation in its own right.

Zelazo, Kearsley, and Ungerer (1984) created a treatment program based on the hypothesis that behavioural difficulties can arrest the development of expressive abilities. Learning to Speak: A Manual for Parents describes the parent-implemented, cognitive-behavioural treatment program designed to transform a resistant, non-compliant style to a compliant, co-operative one, and to stimulate play and expressive language. Major improvements in several areas of functioning were shown previously, including scores on conventional tests of intelligence and expressive language development (Lalinec, 1995; Lalinec, Zelazo, Rogers, & Reid, 1995; Laplante, Zelazo, & Kearsley, 1984; Zelazo, 1989, 1997b; Zelazo & Kearsley, 1984). Although preliminary evidence has been presented for the effectiveness of the treatment program on object use (Kruzynski et al., 1996), these results have yet to be published.

Play as an assessment tool

Zelazo (1979; 1989) and Zelazo and Kearsley (1984) have shown that a sizeable percentage of children with pervasive developmental disorder and autism have intact information processing ability. It seems plausible to posit that children with intact information processing ability will display more mature play than children with impaired processing in a free-play situation because the former have the underlying mental ability to do so, while the latter do not. If this is the case, then these differences in object use may serve as a simple diagnostic measure in some instances for distinguishing children with intact information processing from those with impaired processing ability.

Zelazo and Kearsley (1980) argued that play is a particularly useful measure of cognitive ability for some children with delays, including children with behavioural problems who refuse to follow the examiner's requests and fail to demonstrate age-related behaviours, including appropriate object manipulations. Observations of free-play do not require compliance with the examiner or receptive or expressive language (Zelazo & Kearsley, 1980). Mature object manipulations are more likely to be observed and therefore, a less biased assessment of the child's cognitive ability is more likely to occur. Sigman and Sena (1993) found that play observations could be used for diagnostic purposes given that children with different developmental disabilities manifest different amounts and levels of play. Other researchers have argued that play measures can add richness to a standard battery of tests, especially for children with disabilities (Chichetti & Wagner, 1990; Eisert &

Lamorey, 1996; Linder, 1990; Myers, McBride & Peterson, 1996). Belsky and Most (1981) also noted that a free-play approach to assessment has motivational as well as cognitive skills built into the task. In fact, Bagnato and Neisworth (1994) reported that a survey of School Psychologists in the US revealed that play-based assessment was one of the most frequently cited alternative options used in conjunction with, or instead of, standardised measures in the assessment of infants and pre-school children.

Objectives

Our first objective was to determine whether play could differentiate between children with intact and impaired information processing; we predicted that children with intact information processing would display more mature play than children with impaired processing. The second objective was to determine whether object use changes differentially with treatment for children with pervasive developmental delays and autism and impaired or intact information processing ability. We predicted that the children with intact processing would benefit from the treatment program because they possess the underlying cognitive ability to sustain functional and symbolic play, whereas children with impaired processing would not. A differential response to treatment would support the hypothesis that the children with intact information processing ability manifest delays of expressive ability as opposed to delays of central processing and provide additional validity for the Information Processing measure of central processing (Zelazo, 1979, 1989, 1997a; Zelazo, Kearsley & Stack, 1995). Improved object use with treatment in children with intact processing would also extend the effectiveness of the parent-implemented treatment program (Zelazo, Kearsley & Ungerer, 1984) designed to replace oppositional behaviour with compliance.

Method

Participants and Design

Forty-six children with pervasive developmental disorder or autism and their mothers participated in this study. Nineteen children began the treatment at 22 months and the remaining 27 at 32 months. This cross-lag design allowed a comparison of treated and untreated 32-month-olds without involving a no-treatment control group. All the subjects for this study were selected if they were determined to have delays on the Bayley Mental Scale of Infant Development (Bayley, 1969) assessed independently and blindly. Twenty-two month-old subjects had delays exceeding 4 months and 32-month-old subjects had delays exceeding 5 months. Prior to the study, the 46 subjects had been diagnosed with developmental delays of unknown etiology (i.e., absence of congenital or acquired disorders associated with mental or motor retardation). These children also displayed characteristics associated with pervasive developmental disorder and autism: they had delayed play and expressive language and serious non-compliant behaviours including tantrums with seriously impaired social interactions.

Two levels of cognitive status were identified using the Standard-Transformation-Return (S-T-R) paradigm (Zelazo, 1979, 1989, 1997a; Zelazo, Kearsley & Stack, 1995): impaired information processing and intact information processing (see procedure for further details). Five of the 22-month-olds and five of the 32-month-olds were found to have impaired information processing; the remaining 34 participants had intact information processing.

All children were given 10 months of parent-implemented treatment and their play was assessed in a 15-min free play session prior to, midway through (5 months), immediately after (10 months), and 6 months after treatment. Thus, a one-way between groups design (level of processing: intact versus impaired) with four levels of time of testing (before, during, at the end of treatment, and follow-up) as a repeated measure was used.

Procedure.

Treatment Parents conducted 12-min compliance training sessions at home five to seven times weekly and systematically generalised the new learning to the natural home context over 10 months (see Zelazo, Kearsley & Ungerer, 1984). The cornerstone of these procedures is the conversion of a non-compliant and oppositional style to a compliant and co-operative one, as a first step towards facilitating object use and expressive language. Regular meetings and telephone conversations served to adjust behavioural goals and provide advice/coaching and/or modelling of teaching techniques. Parents were trained to administer positive reinforcement in the form of praise, objects and edibles contingent upon compliance first with actions and subsequently with words. Each 12-min session began easily, became difficult and ended easy. Thus, in the beginning children were reinforced for compliance with actions such as sitting-up and making eye-contact and subsequently using objects appropriately such as pushing a toy car or banging a xylophone. After some functional play was established the objects were used to encourage naming. If the child approximated the word "car" for example, she or he was praised, given an edible and the toy car and allowed to push it for five to six seconds.

Information processing Clusters of elicited behaviours to the presentation of two visual and three auditory sequences were used to establish the infant's ability to create mental representations for events at an age-appropriate rate. The presentation of the sequences required approximately 40-45 minutes per child. The setting resembled a puppet theatre. The children were seated on their mother's lap, directly in front of the stage. To avoid the mothers' influence on the children's' responses, mothers were instructed to avoid interacting with, or speaking to, their child during the experiment and to maintain a stable position during each event.

An example of a visual event is the sequential car-doll stimulus. At the beginning of this event, a toy car rests on a ramp. Concealed behind a black curtain, the presenter holds the car at the top of the ramp, then releases the car to roll down the ramp and tap over a Styrofoam object. After 4s, the presenter returns the Styrofoam object to its upright position and pushes the car up the ramp to the starting position. This event is repeated for six trials and is followed by a discrepancy on the seventh trial: the Styrofoam object does not fall over when it is hit by the rolling car. This discrepancy is repeated for three trials followed by the return to the standard sequence, which is also repeated for three trials. The child has an opportunity to create an expectancy for the Styrofoam object to fall in the first six standard trials, to recognize the reappearance of the standard sequence following the discrepant variation and finally, to assimilate the discrepant variation itself.

Visual fixation to the stimulus, smiling, vocalization and fretting were coded for all five events. In addition to these variables, during the auditory sequences, pointing to the speaker, clapping, searching, waving of the arms and twisting or extreme bending (an effort to get out of the situation) were also coded. During the visual events, anticipatory fixation, defined as the darting of the eyes ahead of the action in the sequence, was coded. Children's heart rate was monitored to provide a record of sustained cardiac accelerations and decelerations elicited by the stimulus information.

All of these dependent variables were coded on a detailed record of each stimulus event for each trial. For example, in the car-doll sequence, a signal was made on the polygraph paper (or computer) when the car was resting on the top of the ramp, a different signal when it reached the bottom and another when the Styrofoam object was knocked over by the car. The signals created a stimulus analog that was recorded on a polygraph tracing that was time-locked with the coded behavioral measures and automatic beat-by-beat recordings of heart rate. Individual behavioural measures and beat-by-beat cardiac responses were scored to identify the clusters of behaviours to occur to the stimulus sequences that indicated the formation of a mental representation for the event (Zelazo, 1988a, 1988b; Zelazo et al., 1995). A mental representation is deemed to have occurred if the child displays visual fixation, cardiac deceleration of six beats or more, and one or more other behaviours including smiling, vocalizing, pointing, clapping and/or turning to mother. For example, at 22 months, it is typical to observe the first cluster of behaviours during the third presentation of the standard. This cluster of behaviours may continue on the fourth, fifth and sixth presentations of the standard and stop during the presentations of the transformation only to re-appear to the return of the standard sequence.

In this controlled context, these clusters of behaviours permit the inference of recognition of the standard following the discrepant presentations. In other words, the children tell us non-verbally that they understand. It is not until the end of the first year of life that these clusters of behaviour appear reliably in normally developing children with intact cognitive capacity (Zelazo, 1979; Zelazo & Leonard, 1983). In our sample, five of the 22-month-olds and five of the 32-month-olds were found to have impaired information processing; all remaining subjects had intact information processing. Intact processing at 22 months was identified by the presence of one or more recognition clusters to both the Standard and Return Phases of the three auditory and 2 visual events in the battery. Intact processing at 32 months was identified when children displayed recognition clusters to all three phases of the paradigm: Standard, Return, and Transformation, similar to a normative sample (Zelazo, Kearsley & Stack, 1995). Impaired processing was diagnosed for children who failed to provide clusters to the Return Phase at 22 months and the Transformation Phase at 32 months.

<u>Play Assessment</u> The materials used were those used by Zelazo and Kearsley (1980) and included a set of toys that lend themselves to multiple functional uses. Two sets of toys were included for each of three categories (male, female, neutral) as a control for possible sex-typed preferences: tea set (neutral), telephone (neutral), truck, garage, blocks (male), baseball, glove, bat and hat (male), small doll and furniture (female) and a large doll with a bottle (female). Thirty-nine specific behaviours representing unambiguous adult determined functions for this set of realistic toys, listed in Table 1, were coded. For example, brushing a doll's hair or placing a receiver to one's ear and babbling into the telephone were considered functionally appropriate acts representing specific associations.

Coders assessed play during a 15-min free play session during which activities were recorded on a checklist for 10s periods. The parent and child were brought into a carpeted room

(3.7 by 4.6 m) with toys arranged in a semi-circular array according to theme (e.g., the truck, the garage and the blocks were clustered) with the closest points of the arc .6 m, and the farthest point 1.5 m, from the front of the parent's chair. Each toy had a specific location and orientation that was constant for all children with toys arranged so that same "gender" class toys were not adjacent. The child sat on the parent's lap until a knock on the wall signalled the beginning of the session. The parent then placed the child on the floor within reach of the toys saying, "Look at all the toys. Go play with the toys." The parent remained seated, read a magazine, and avoided interaction as much as possible. However, if the child tried to initiate contact, the parent responded naturally and redirected the child to the toys.

Measures.

The five play variables were scored by two independent coders using a checklist with 10-s periods. Stereotypical play was scored when instances of mouthing, fingering, waving and/or banging of toys occurred, relational play when the child simultaneously associated two or more objects in a non-functional manner such as putting a baseball hat over a teapot, and functional play when children used toys appropriately (see Table 1). Each of the 39 behaviours described in Table 1 is consistent with the hypothesis that the child has a cognitive representation appropriate for and associated with a particular object (see Zelazo & Kearsley, 1980 for a discussion about differences between functional play and other forms of play such as exploratory play). Undifferentiated activity was scored when the child simply held objects with or without visual regard and included ambiguous behaviours such as aimless wandering with a toy in hand or retrieving an object from behind the furniture.

Classes of activities were defined to produce mutually exclusive categories to aide data analyses. Thus, only the most mature form of activity was coded for each 10-s period with undifferentiated activity being the least mature, followed by stereotypical, relational and functional play. Percentage of total play that was stereotypical was defined as the number of 10-s units in which at least one stereotypical act occurred divided by the total number of "play acts" (stereotypical plus relational plus functional). The same formula was used to determine the percentage of total play that was relational and functional, respectively. Undifferentiated activity was defined as the total number of 10-s units in which undifferentiated activity occurred during the session. Finally the breadth of functional play was defined by the number of different appropriate uses (ideas) displayed by the child in the session.

Reliability was calculated on a clinical data set (n=13). P.Z. (author) was one of the coders for the current study, as well as for the clinical data set. Reliability was not calculated on the current data set since the archival data necessary for this analysis were not available. The 15-min play session was divided into 15 1-min segments and the number of agreements and disagreements, summed for each segment, served as the unit of analysis for a percent agreement coefficient. An agreement was indicated if P.Z. and the second coder scored the presence of an act in the 1-min segment. A disagreement was scored if one coder scored the presence of an act while the other did not. The percent agreement was 60%. However, we are confident that the current data are more reliable than indicated by this coefficient. First, one coder (P.Z.) coded in vivo, while the second coder coded from videotape. Coding from videotape allows the coder to view the session on numerous occasions and allows for less distraction. Consequently, the percent agreement is likely to be lower when one coder is more accurate than another. Second, coding for clinical purposes may not be as accurate as coding for research purposes. Prior to publication, P.Z. will re-code the sessions, for research purposes, from videotape, and Cohen's Kappa (Cohen, 1960) will be calculated. Third, a Kappa coefficient of 95% was calculated using the same play assessment procedure in another study (see Paper 2, Study 2). Finally, the play assessment procedure is objective, unambiguous and standardised thus lessening the chances of problems with inter-rater reliability. For these reasons, we can have confidence in the current data set.

Results

Two questions were addressed. First, we asked whether measures of play distinguish children with intact from children with impaired processing prior to, midway and at the end of treatment and six months later. Second, we asked whether the parent-implemented treatment was effective in children with intact and impaired processing, by examining differences over times of testing and by controlling for maturation using a cross-lag comparison of same age children, some tested before and others after treatment.

Five separate ANOVAs with two Between-Group factors (Age of entry: 22 and 32 months and Level of processing: intact and impaired) and one Within-Group factor (Time of testing: before treatment, 5, 10 and 16 months) were computed for each of the five dependent variables. Findings are summarised in Table 2.

Differential responding by children with intact and impaired processing over testings

Age X Level of Processing interactions emerged for stereotypical play ($F(1/39)=10.62$, $p<.01$), functional play ($F(1/39)=4.03$, $p<.05$), and undifferentiated activity ($F(1/39)=7.16$, $p<.01$). Inspection of Figures 1a through 1c reveals that these measures discriminated children with intact from those with impaired processing in the younger sample, but not in the older sample. However, no Age X Level of Processing interaction ($F(1/39)=1.88$, ns) was found for number of appropriate uses. The number of different appropriate uses distinguished children with impaired ($M=4.62$, $SD=4.89$) from those with intact processing ($M=12.18$, $SD=5.95$) in both the younger and older samples (Level of processing main effect, $F(1/39)=16.83$, $p<.001$). However, irrespective of level of processing or time of testing, the children in the older sample displayed more appropriate uses than the children in the younger sample ($F(1/39)=6.57$, $p<.01$; Means 11.97 and 8.55, respectively). As expected, relational play, a transitional behaviour, did not discriminate children with intact from children with impaired processing.

The Age X Level of Processing effects indicate that measures of quantity and quality of play discriminated children with intact from those with impaired processing at younger ages. Specific comparisons in the 22 months entry group at each time of testing revealed that percentage of stereotypical play did not discriminate children with intact from those with impaired processing at 38 months of age, in contrast to percentage of functional play which discriminated children from 22 through 38 months. In the 32 months entry group, percentage of stereotypical play, an extremely immature behavior, did not distinguish children with intact from those with impaired processing at any time of testing, whereas percentage of functional play differed for children with intact and impaired processing from 32 to 42 months. To summarise, these data indicate that stereotypical play discriminated children with intact from those with impaired processing from 22 to 32 months, functional play from 22 to 42 months, and appropriate uses from 22 to 48 months.

Of particular interest from a clinical perspective is whether these measures can distinguish children with intact from those with impaired processing prior to treatment. Specific comparisons using two-tailed independent samples t-tests revealed a greater percentage of functional play at 22 (43% vs. 0.4%, $t_{unequal\ variances}(13)=-6.98$, $p<.0001$) and 32 months (57% vs. 33%, $t(25)=-2.30$, $p<.05$) for children with intact relative to children with impaired information processing ability. Similarly, children with intact processing displayed a greater number of different appropriate uses for the toys than children with impaired processing both at 22 (7.7 vs. 0.2, $t_{unequal\ variances}(14)=-6.46$, $p<.0001$) and at 32 months (11.5 vs. 4.6, $t(25)=-2.64$, $p<.01$). However, the measure of less mature stereotypical play appeared to reach a ceiling in this sample distinguishing children with intact from those with impaired processing at 22 (82% vs. 32%, $t(17)=3.28$, $p<.01$) but not 32 months (19% vs. 16%, $t(25)=.-52$, $p=>.10$). These results affirm unambiguously that measures of play distinguish independently assessed children with intact from children with impaired information processing prior to and during an intervention program designed to facilitate the development of object use.

Treatment Effectiveness

The final question, whether the treatment was effective, was addressed in two ways: measurement over time of testing and cross-lag comparisons before and after treatment. First, no interaction effects involving Time emerged; therefore the predicted Time by Level of Processing effect did not materialise. Time main effects for all dependent variables, except undifferentiated activity, are illustrated in Figures 2a and b. Comparisons over time of testing, collapsed across Age and Level of Processing, for stereotypical play, functional play and number of appropriate uses clearly indicate treatment effectiveness. Trend analyses for stereotypical play collapsed over age and level of processing ($F(3/117)=8.81$, $p<.0001$) indicated a linear decline ($t_{linear}=-4.49$, $p<.00001$) from initial to follow-up testing. A quadratic trend emerged for relational play ($F(3/117)=3.88$, $p<.01$; $t_{quadratic}=3.00$, $p<.01$); children displayed higher levels prior to treatment and at follow-up, although there was a clear linear component revealing a decline from Time 1 to Time 3. Functional play increased linearly over the same time period ($F(3/117)=10.36$, $p<.0001$; $t_{linear}=5.51$, $p<.00001$) as did the number of different appropriate uses ($F(3/117)=4.83$, $p=.01$; $t_{linear}=3.39$, $p=.01$). Collectively, these results indicate that, with treatment, immature stereotypical play decreases and more mature functional play, including the number of appropriate uses, increases steadily over treatment and through follow-up.

The primary limitation of this study is the absence of an untreated control group -- a condition that was prohibited for ethical reasons. To partially correct for this limitation, a cross-lag comparison of 32-month-old children was used to assess treatment effectiveness (Table 3). Children with intact and impaired processing were examined separately, some who at 32 months had completed 10 months of treatment and others who were tested prior to treatment. Fourteen children with intact processing who had entered the study at 22 months and who had received treatment were compared with 22 children, who entered the program at 32 months. One-tailed independent samples t-tests revealed that stereotypical play ($t(34)=-2.27$, $p<.01$) was lower for treated ($M=7.8\%$) relative to untreated (M=19.4%) children. In contrast, 32-month-old children who received treatment displayed more functional play (M=74.6%) than children who did not received treatment (M=56.7%), $t(34)=2.52$, $p<.01$. Number of appropriate uses, undifferentiated activity and relational play did not differ between treated and untreated children.

Ten children with impaired information processing ability, five who received treatment and five who did not were examined at 32-months. The results were in line with predictions, in that children who were treated did not perform better than those who were not treated. In fact, for the most part, the treated children performed worse than those who were untreated. Stereotypical play ($t_{\text{unequal variances}}(4.2)=2.72$, $p<.05$) was substantially higher for treated (M=67.3%) than untreated (M=15.5%) children. Moreover, functional play ($t(8)=-1.85$, $p<.05$) was lower for treated (M=12.6%) than untreated (M=32.5%) children. Similarly, treated children had fewer different functional acts (M=1.15; $t(8)=-2.15$, $p<.05$) than untreated (M=4.6) children. Closer inspection however revealed that the younger entry (treated) group had extremely immature play relative to the older entry group, thus rendering the comparisons for the group of children with impaired processing less valid. In fact, within group comparisons for 22-month-old children pre- and post-treatment using correlated one-tailed t-tests revealed that they improved on mature play measures; both functional play (0.4% to 12.6%; $t(4)=-2.14$, $p<.05$) and number of appropriate uses increased (0.2 to 1.4; $t(4)=-2.06$, $p<.05$) with treatment. Stereotypical play, relational play and undifferentiated activity did not discriminate treated from untreated children within this 22-month sample.

The cross-lag comparison clearly demonstrates treatment effectiveness for the children with intact information processing. The results for the children with impaired processing are less clear. Although in line with our prediction that children with impaired processing would not improve comparably with treatment, the fact that the 22 and 32 month old groups were so different in their initial levels of play render this finding questionable.

Discussion

In conducting this study, we had two objectives. The first, to determine whether play could differentiate between children with intact and impaired information processing over testings, was answered positively. The second, to show that children with impaired processing would not benefit from treatment while children with intact processing would, was not answered clearly. However, we were able to demonstrate the effectiveness of the parent-implemented treatment program on object use for the children with intact processing.

Play as an assessment tool: Distinction between children with intact and those with impaired processing over testings

The measures of play unambiguously distinguished children with intact from those with impaired information processing prior to and across treatment and follow-up for children who began treatment at 22 months of age; children with intact processing were better than those with impaired processing on all five measures of play. However, for the older group (the group that began treatment at 32 months), the only measure of play that distinguished children with intact from those with impaired processing was number of appropriate uses. Combined, these results indicate that the only variable that discriminated children with intact from those with impaired processing over the 16 months of the study, for both age groups, was number of appropriate uses displayed. These data imply that once children reach 38 months, less mature forms of play occur with low frequency whether or not children had intact information processing ability and by 48 months, their functional play reached a ceiling, indicating that measures of "type of play" can no longer discriminate children with impaired from children with intact processing after 42 months of age. The only variable that discriminated children with intact from those with impaired processing reliably from 22 to 48 months of age was breadth of play, namely, the number of different appropriate uses.

These findings shed some light on the usefulness of play measures for assessment. The most useful measure of play for diagnostic purposes seems to be the measure of breadth of play. The children with impaired information processing consistently displayed less sophisticated play than children with intact information processing; that is, they displayed fewer appropriate uses for the toys prior to, during, and after treatment than did the children with intact processing. These data add credence to Zelazo and Kearsley's (1980) claim that play is a particularly useful measure of cognitive ability for non-verbal children with behavioural problems. Recently, Zelazo et al. (1997), using a similar play assessment protocol, found that breadth of play differentiated children with Down's Syndrome from both normally developing toddlers and toddlers at high-risk. These findings provide evidence for the use of play measures, especially measures of breadth of play, as simple diagnostic measures for children who are non-verbal and non-compliant from 22 to 48 months of age.

Validity of the Information Processing Procedure

The expected finding that children with intact processing would benefit from treatment but that children with impaired processing would not was not clearly demonstrated. The expected interaction between Testing and Level of Processing was not significant. However, the cross-lag comparison of 32-month-old children, done to partially correct for the absence of an untreated control group, supported this prediction in part. These results indicated that treated children with intact processing displayed less immature stereotypical play and more functional play than same age children who had not received treatment. The results for the children with impaired processing indicated *less mature* play for the treated children than the untreated children, however a larger sample size is needed to clarify this outcome because play began at an extremely immature level for the 22 month-old children with impaired processing. Consequently, the results of the cross-lag control for the children with impaired processing may not be representative of the population of children with impaired information processing.

However, the results of the cross-lag comparison are in line with a previous reporting of this same study by Zelazo (1989). Zelazo reported significant Time X Level of Processing interactions for this sample on conventional measures of mental ability. For children with intact processing, delays on the Bayley Mental and Stanford-Binet test scores decreased ($\underline{M}$=8.0 to 0.4 months) while for children with impaired processing, delays increased ($\underline{M}$=15.1 to 28.8 months) with treatment. The fact that delays on tests of mental ability increased for children with impaired processing can be explained by their stable rates of mental development (Zelazo, 1989). Rates of mental development increased from 0.70 at entry to 0.99 by the follow-up for age-mates with intact processing (thus allowing them to partially 'catch-up'). Children with impaired processing fell behind in the magnitude of their delay because a constant fraction of an older age yields a loner absolute value. Because the groups were formed on the basis of level of information processing, the distinction between the groups on a completely different dependent variable, level of play, provides validity to the information processing procedure as a measure of mental ability.

Effectiveness of treatment

The cross-lag comparisons, as well as analyses of improvement across testing together indicate improvement in play with treatment in the children with intact processing, as predicted. In general, these data support the effectiveness of the treatment manual entitled Learning to Speak: A Manual for Parents by Zelazo, Kearsley and Ungerer (1984). These data also indicate clearly that both amount and quality of play can be facilitated in children who are not mentally retarded (i.e., those with intact processing) who have pervasive developmental disorder and autism. Improvement may occur for children with impaired information processing as well, but at a much slower rate. The latter finding is in line with findings of studies that show that with treatment children with delays may eventually achieve major milestones in a similar order and with a similar organisation as their normally developing peers, but at a slower rate of development (e.g., Cicchetti & Sroufe, 1976; Cohen, 1981; Hill & McCune-Nicolich, 1981).

On a final note, these two forms of assessment, Information Processing and Play, are used in our clinic to supplement traditional measures of IQ. Cicchetti and Wagner (1990) urge clinicians and researchers to work together in an effort to close the "schism that exists between professionals involved in research and those engaged in the service profession" (p. 270). We have found this research-clinical interface to effectively enhance the assessment possibilities for young children with PDD and autism, and, in return to both provide validation of our measures and information on the role of development in these disorders.

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Table 1
Toy sets and behaviours

Toy Set	Appropriate Uses
Cup, spoon and pot	Stir spoon in cup/pot
	Pour from pot to cup
	Drink from cup
	Drinking sounds
	Offer drink from cup
	Set cup in saucer
	Feed self with spoon
Telephone	Receiver to ear
	Pushes number buttons
	Converse (babble)
	Present telephone to other
	Replace receiver
	Press receiver buttons
Small doll, furniture	Sit doll in chair/bed
	Lay doll in bed
	Arrange furniture
	Stand and walk doll
	Child sit on toy chair
Large doll, bottle	Undress
	Dress
	Brush hair
	Feed with spoon
	Feed with bottle
	Feed with cup
	Cradle in arms
	Kiss doll

(Table continues)

Truck, garage, blocks	Push truck Truck noises Put truck in garage Open/close doors Place block in truck Place others in truck Dump block(s) from truck
Ball, bat, glove, hat	Throw ball Roll ball Place glove on hand Place ball in glove Hit ball with bat Place hat on head

Table 2

ANOVA Summary Table (Time X Age X Processing Level)

Source	Df	F
Stereotypical Play		
Age (A)	1/39	15.37***
Processing Level (P)	1/39	21.42***
A x P	1/39	10.62**
Time (T)	3/117	8.81***
A x T	3/117	2.37+
P x T	3/117	1.71
A x P x T	3/117	0.95
Relational Play		
Age (A)	1/39	0.13
Processing Level (P)	1/39	0.62
A x P	1/39	1.70
Time (T)	3/117	3.88**
A x T	3/117	1.91
P x T	3/117	1.33
A x P x T	3/117	1.69
Functional Play		
Age (A)	1/39	11.51**
Processing Level (P)	1/39	24.85***

A x P	1/39	4.03*
Time (T)	3/117	10.36***
A x T	3/117	0.65
P x T	3/117	1.38
A x P x T	3/117	0.68
Undifferentiated Activity		
Age (A)	1/39	7.29**
Processing Level (P)	1/39	2.07
A x P	1/39	7.16**
Time (T)	3/117	0.15
A x T	3/117	0.35
P x T	3/117	0.61
A x P x T	3/117	0.19
Appropriate Uses		
Age (A)	1/39	6.57**
Processing Level (P)	1/39	16.83***
A x P	1/39	1.88
Time (T)	3/117	4.83**
A x T	3/117	0.21
P x T	3/117	0.63
A x P x T	3/117	0.69

Note. Age = Age at Entry 22 versus 32 months; Time = Time of testing; Processing Level = Children with Intact versus Impaired Information Processing.

+$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

Table 3a

Cross-lag control for maturation: Children with Intact Processing

		Pre[a] (n=22)		Post[a] (n=14)		
Variable	df	M	SD	M	SD	t[b]
Percentage of total play that is:						
Stereotypical	34	19.4	16.5	7.8	12.3	-2.27**
Relational	34	23.9	21.1	17.7	15.4	-0.95
Functional	34	56.7	21.4	74.6	19.7	2.52**
Undifferentiated Activity	15.1[d]	10.4	7.7	15.2	22.0	0.79
Appropriate Uses	34	11.5	5.6	12.1	6.0	0.30

[a]Pre: Group whose age of entry was 32 months tested prior to treatment at 32 months; Post: Group whose age of entry was 22 months tested after treatment at 32 months.

[b]one-tailed

[c]Unequal variances

+$p<.10$, *$p<.05$, **$p<.01$

Table 3b

Cross-lag control for maturation: Children with Impaired Processing

		Pre[a] (n=5)		Post[a] (n=5)		
Variable	df	M	SD	M	SD	t[b]
Percentage of total play that is:						
Stereotypical	4.2[c]	15.5	7.0	67.3	41.9	2.72*
Relational	8	52.0	23.0	20.1	32.4	1.80+
Functional	8	32.5	20.1	12.6	13.2	-1.85*
Undifferentiated Activity	8	13.6	18.9	27.4	23.8	1.02
Appropriate Uses	8	4.6	3.0	1.4	1.5	-2.15*

[a]Pre: Group whose age of entry was 32 months tested prior to treatment at 32 months; Post: Group whose age of entry was 22 months tested after treatment at 32 months.

[b]one-tailed

[c]Unequal variances

+$p<.10$, *$p<.05$, **$p<.01$

Figure captions

Figure 1. Age X Processing Level Interactions.

(a) Mean percentage of stereotypical play (±SE) collapsed over testings in children with impaired versus intact processing in both the younger and older samples.

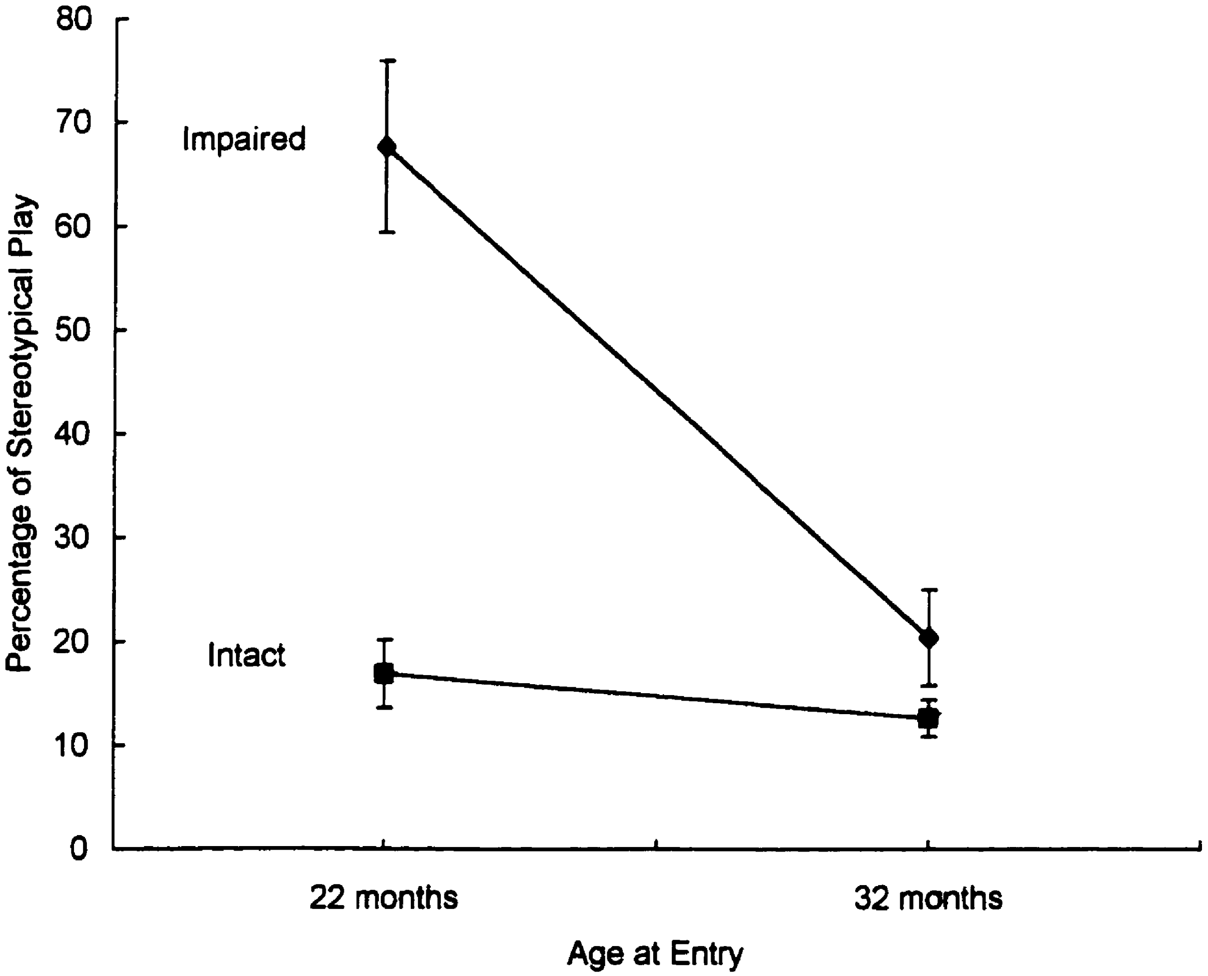
(b) Mean percentage of functional play (±SE) collapsed over testings in children with impaired versus intact processing in both the younger and older samples.

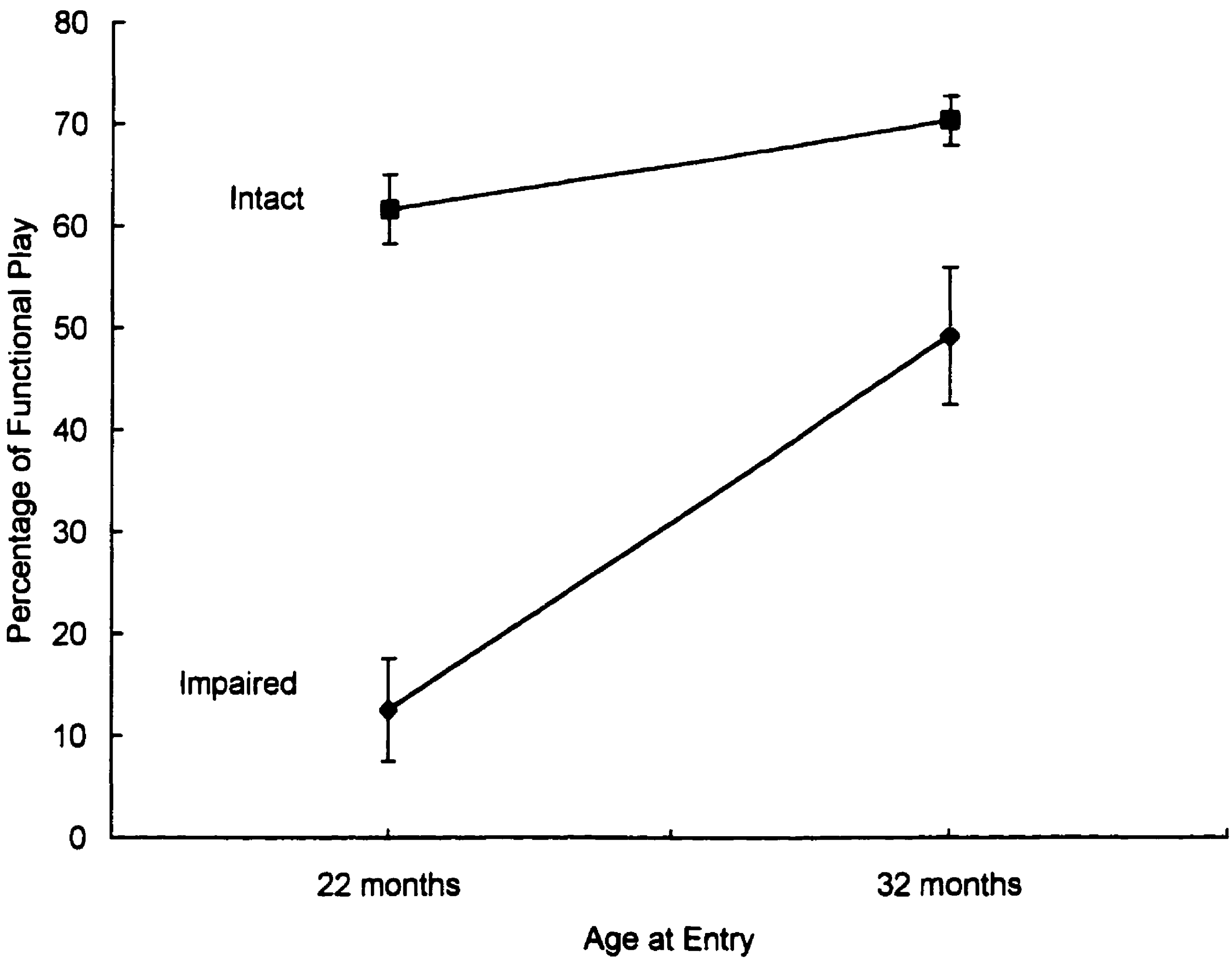
(c) Mean number of 10s units of undifferentiated activity (±SE) collapsed over testings in children with impaired versus intact processing in both the younger and older samples.

Figure 2. Time main effects and trends.

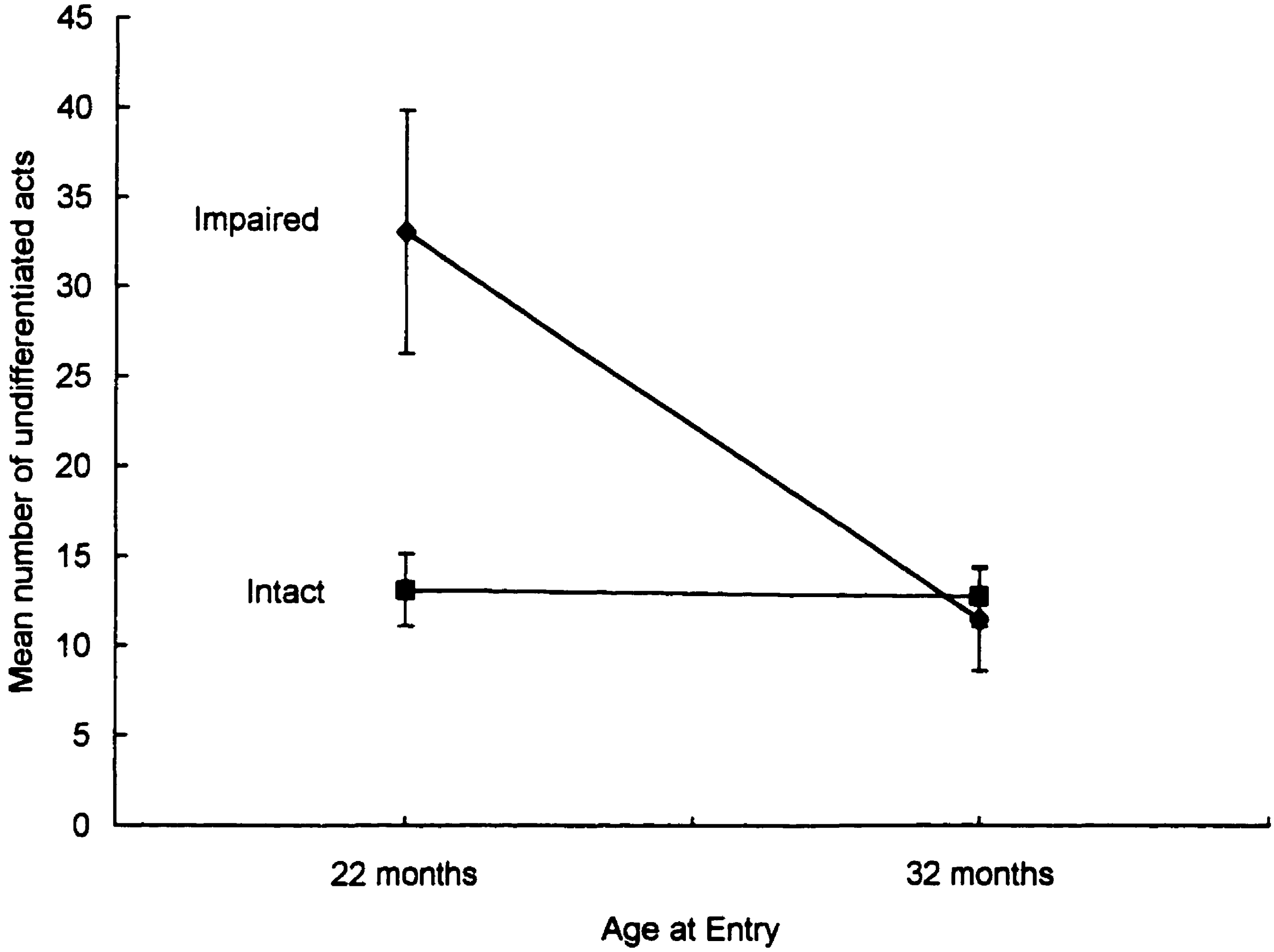
(a) Mean percentages of functional, relational and stereotypical play (±SE) collapsed over Age and Level of Processing prior to, 5 months into, immediately after, and 6 months after treatment.

(b) Mean number of appropriate uses (±SE) collapsed over Age and Level of Processing prior to, 5 months into, immediately after, and 6 months after treatment.


80
70
60
50
40
30
20
10
0
Percentage of Stereotypical Play
Impaired
Intact
22 months
32 months
Age at Entry



80
70
60
50
40
30
20
10
0
Percentage of Functional Play
Intact
Impaired
22 months
32 months
Age at Entry


45
40
35
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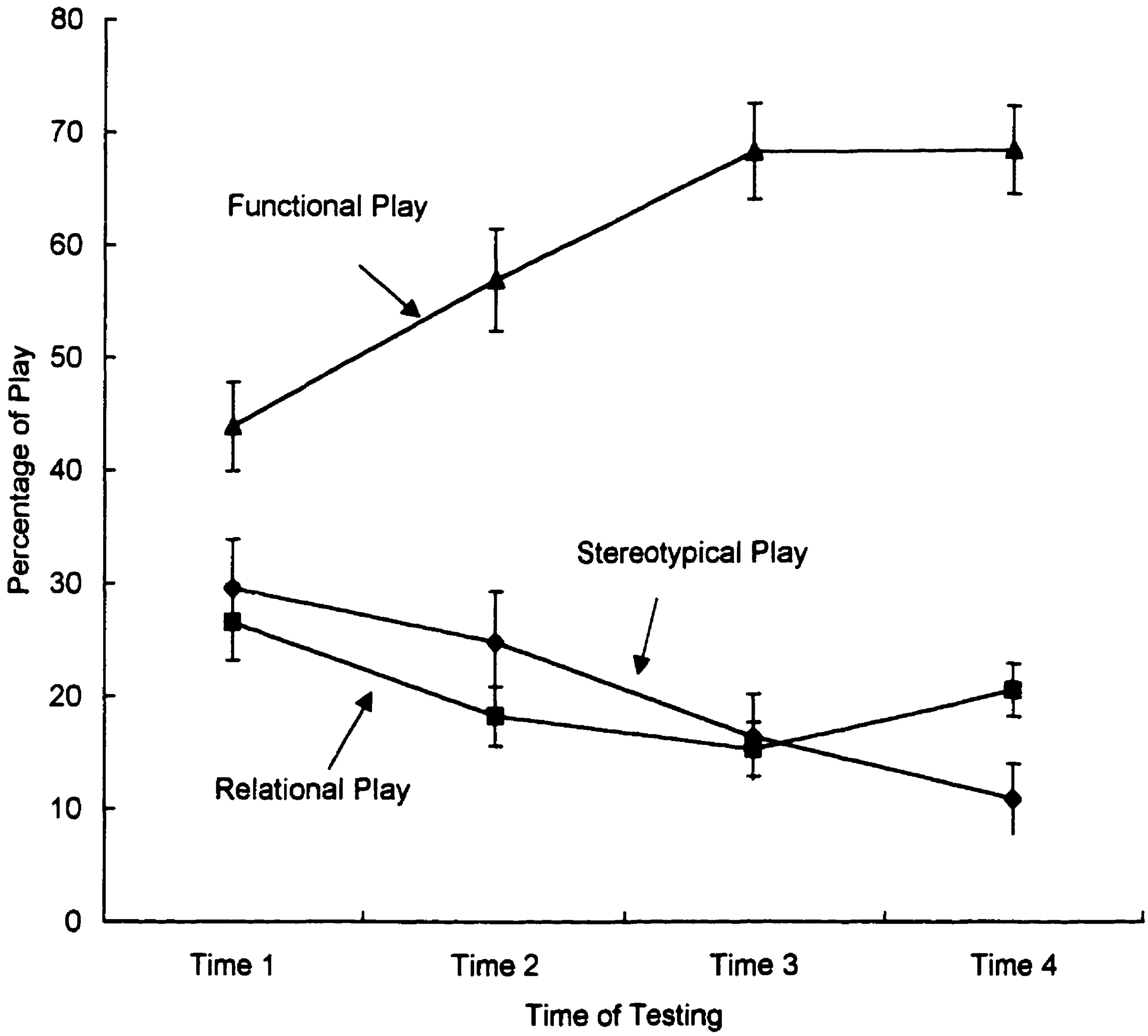
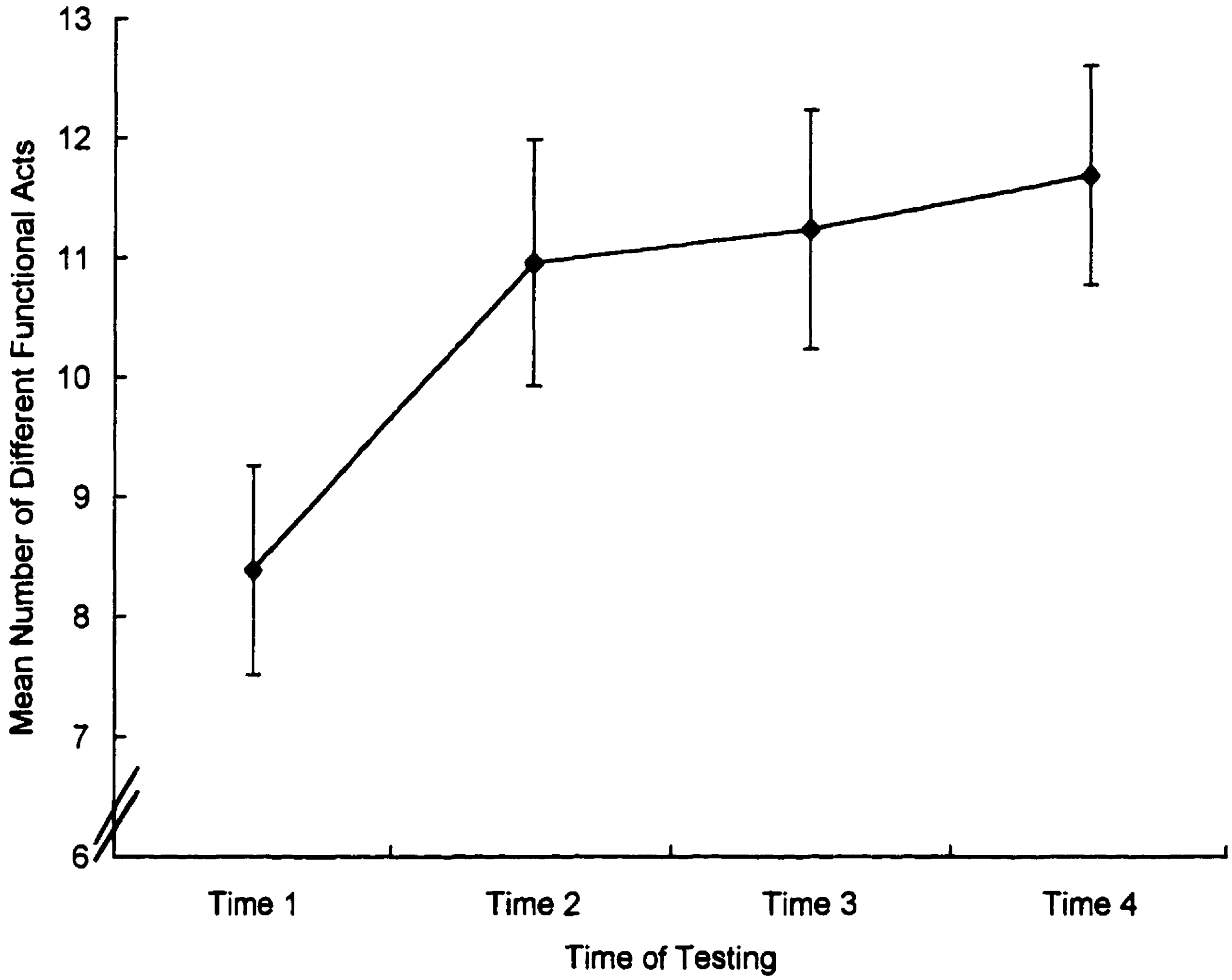
25
20
15
10
5
0
Mean number of undifferentiated acts
Impaired
Intact
22 months
32 months
Age at Entry


80
70
60
50
40
30
20
10
0
Percentage of Play
Functional Play
Stereotypical Play
Relational Play
Time 1
Time 2
Time 3
Time 4
Time of Testing



Mean Number of Different Functional Acts
13
12
11
10
9
8
7
6
Time 1
Time 2
Time 3
Time 4
Time of Testing

LINKING TEXT

It was reported in the first paper that the treatment program Learning to Speak had a positive impact on play in toddlers with pervasive developmental disorder and autism who had intact information processing, but not so on children with impaired processing. This result, coupled with the findings reported elsewhere (Zelazo, 1989; 1997a; 1997b) that the delays of children with impaired processing, as measured by conventional tests of mental ability increased while the delays of children with intact processing decreased, demonstrates that the treatment program is not effective with children with impaired processing. Presumably, children with impaired information processing ability are mentally retarded, whereas children with intact processing have normal intelligence but impaired expressive development. Findings from the first paper also indicate that play can be a useful non-verbal measure for assessing mental abilities in toddlers with PDD and autism.

In light of the findings that children with impaired processing did not benefit from the treatment program, all the participants in the second treatment-outcome study had intact information processing abilities. Furthermore, the length of treatment was reduced to six months to determine if substantial statistical significant improvement could be achieved over a shorter duration. In the second paper we attempt to clarify and extend the treatment findings from the first study. Furthermore, we map the developmental progression of object use in a sample of normally developing children from 13 to 31 months of age, and compare the play of normally developing toddlers to children with PDD and autism. Moreover, we investigate a non-verbal measure of pretend play, the analysis of the longest epoch of sustained play, as an alternative to conventional testing for children with developmental delays. Together, these studies will enable us to draw conclusions on (1) play of normally developing children versus that of children with delays and intact versus impaired processing; (2) differential impact of a parent-implemented cognitive-behavioural treatment on the play of children with intact versus impaired processing; and on (3) the use of information processing, and non-verbal play measures, including sustained attention, for use with children with developmental delays.

PAPER TWO: Play in Toddlers with Pervasive Developmental Disorder and Autism: Alternate Measure of Symbolic Play and Effects of Treatment.

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Submitted to Developmental Psychology, May 1998

Abstract

Impact of a 6-month parent-implemented cognitive-behavioural treatment program on play in toddlers with developmental delays, and the duration of sustained play as an objective measure of pretend play, were examined. In Study I, free-play of 43 normally developing toddlers was assessed during 15 min of observation, at 13, 22 and 31 months. In Study II, twenty-two male toddlers with developmental delays of unknown etiology (mean age at entry 34 months) were videotaped during 8 min of free play prior to, and after treatment. The procedures and measures were identical for the two studies. Coders recorded the toddlers' play every 10-s, using previously determined categories. Results from Study I indicate that stereotypical play decreased while functional play increased from 13 to 22 months, but reached a plateau thereafter. Breadth of play increased linearly from 13 to 22 to 31 months, and children played at more sophisticated levels for increasingly longer periods without interruption. Study II revealed that, after treatment children spent less time in immature activity, and more time in functional play. Breadth of play increased and children displayed longer, more sophisticated epochs of play. The treatment program improved play in children with delays. Moreover, the longest epoch of sustained play appears to be a valid objective measure of pretend play, applicable to both special and normal populations.

Play in Toddlers with Pervasive Developmental Disorder and Autism:
Alternate Measure of Symbolic Play and Effects of Treatment.

Children with developmental delays display deficient use of objects. Rescorla and Goosens (1992) reported that play of children with expressive specific-language impairments (SLI-E) was less advanced developmentally and less rich and varied in content than play of demographically matched comparison toddlers. Similarly, Li (1981), in a review of the literature on play activities of children with mental retardation found that their activities were characterised by a restricted repertoire of play skills. Laplante, Bédard and Moran (1990) found that infants born at risk displayed less mature play than infants born without complications and Krakow and Kopp (1983) found regressive, stereotypic play and episodes of aimless wandering among a sample of toddlers with delays. Taken together, these results indicate that many children with developmental delays do not display the spontaneous, flexible functional and pretend play that characterises normal development (Fenson, Kagan, Kearsley, & Zelazo, 1976).

Play is considered an essential part of cognitive development by many infancy researchers (e.g., Piaget, 1962). Garvey (1990) suggested that play provides opportunities for children to manipulate and control the world in ways that are not possible in other contexts. Similarly, Bruner (1973) suggested that play is a forum through which children develop and practice behavioural subroutines that are eventually integrated into more complex behavioural sequences. Other researchers have emphasised the significance of play for academic development. For instance, Isenberg and Jacob (1983) claimed that symbolic play provides opportunities for children to use skills that serve as the basis for representation in literacy and provides a safe environment in which social behaviours associated with literacy activities (e.g., reading, writing) can be practised. Fewell and Rich (1987) argued that it is within and through the context of play that social behavior develops. Eisert and Lamorey (1996) asserted that play is a "prerequisite" skill for pre-school settings. Still others have emphasised the significance of symbolic play for the development of language (e.g., Cooper, Moodley, & Reynell, 1978; Vygotsky, 1967).

Given the considerable importance that is attributed to the role of early play and exploration in promoting cognitive growth, and the poor quality of play for children with developmental delays, it is surprising that few researchers have evaluated the impact on play of treatment efforts to overcome developmental delays. Many researchers and clinicians however have stressed the importance of using play as an intervention target (Eason, White & Newsome, 1982; Eisert & Lamorey, 1996; Fenson & Ramsey, 1981; Fewell & Kaminski, 1988; Kohl, Beckman & Swenson-Pierce, 1984; Moran & Whitman, 1985; Wolery and Bailey, 1989). Whether play improves with treatment is important because children who do not play appear to be missing opportunities to learn. communicate, and experience their world optimally, putting them at risk for developing larger delays, not only with language, but with cognitive, motor and social development as well.

Play and Treatment

Children with developmental delays often concurrently display resistant or non-compliant behavior (Lalinec, 1995; Lovaas & Smith, 1988; .Whitehurst, Fischel, Caulfield, DeBaryshe, et al., 1989; Zelazo, 1989). Zelazo (1979; Zelazo, 1989; Zelazo, Kearsley & Ungerer, 1984) posited that resistant and non-compliant behavior may arrest or retard the development of expressive abilities in children with delays of unknown etiology, particularly those who have intact central processing. Intact processing can be assessed using a procedure developed by Zelazo and colleagues (i.e., Kagan, Kearsley & Zelazo, 1978; Zelazo, 1979, 1989, 1997a; Zelazo, Kearsley & Stack, 1995). This procedure tests the integrity of the child's capacity to create mental representations for events and measures the rate at which these representations are formed and announced. Zelazo (Zelazo & Kearsley, 1984; Zelazo, 1997b) has shown that children with developmental delays of unknown etiology and intact central processing have the potential to benefit from a treatment program aimed at reducing non-compliant behavior and at stimulating appropriate object use and expressive language. They reported mental age gains that equalled or exceeded their chronological ages on the Stanford-Binet Test of Intelligence (Form B, 1973 Revision, Terman, & Merrill, 1973).

Learning to Speak: A Manual for Parents (Zelazo, et al., 1984) describes the cognitive-behavioural treatment program that was implemented by parents in the Zelazo-Kearsley (1984) study. This program was designed to stimulate both productive language and age-appropriate object use by eliminating maladaptive resistant and non-compliant behaviours. Because children who are non-compliant spend most of their time defying authority by ignoring them, having temper tantrums, and not doing what is asked of them, they do not learn readily. The cornerstone of the treatment is the conversion of a resistant, non-compliant behavioural style to a compliant, co-operative one. When compliance with actions and efforts to make sounds is established, children begin to imitate adults and learn both functional uses and words (Zelazo, et al., 1984). Major improvements in several areas of functioning were shown previously, including scores on conventional tests of intelligence and expressive language development (Lalinec, 1995; Lalinec, Zelazo, Rogers, & Reid, 1995; Laplante, Zelazo, & Kearsley, 1991; Zelazo, 1989, 1997b; Zelazo & Kearsley, 1984). Although preliminary evidence has been presented for the effectiveness of the treatment program on object use (Zelazo, et al., 1996; Zelazo, et al., 1998), these results have yet to be published.

Developmental Progression of Play

The developmental progression of play in normative samples has been studied extensively over the last two decades (e.g., Belsky & Most, 1981; Lowe, 1975; Fenson, et al., 1976; Sinclair, 1970; Zelazo & Kearsley, 1980). Fenson, et al. (1976) described a developmental progression for manipulative play from banging at 7 months to simple relational acts at 9 months, followed by accommodative relational play at 13 months and symbolic gestures at 20 months. Zelazo and Kearsley (1980) subsequently focused on the progression from stereotypical to relational to functional play from 9 1/2 to 15 1/2 months. They also clarified and operationalised the notion of "hypothesis activation" (Kagan, 1971, 1972; Zelazo, 1982) as the "frequency and variety of appropriate uses displayed for a set of realistic toys in a free play setting" (p. 96). They found that appropriate uses of toys were rare at 9 1/2 months, appeared reliably at 11 1/2 months, and increased linearly through 15 1/2 months.

Initial exploratory behavior is usually regarded as the onset of play. At nine months of age, children explore objects by putting them in their mouths and by touching, waving and banging them. When children move beyond this stereotypical behavior, their acts change from exploration to object use. At first, children put two objects together in a non-functional manner (e.g., they put a cup and a ball together), called relational play. Later, they put objects together in meaningful ways, showing knowledge of functional use of objects (e.g., they "stir" a spoon in a cup). By the time children reach 20 months of age, they usually display "symbolic" or "pretend" play (Belsky & Most, 1981; Fenson, et al., 1976; Zelazo & Kearsley, 1980). Traditionally, pretend play has been defined as the representation of an absent object and/or make-believe representation; the child substitutes objects or events for other objects or events (Casby & Ruder, 1983; Fein, 1975; McCune-Nicolich, 1981). Other researchers (Garvey, 1990; Haight & Miller, 1993) expanded this definition to include actions, objects, persons, places or other aspects of the here and now that are transformed or treated non-literally. For example, a stuffed animal is animated or a cup is put to a doll's mouth while saying "mmm good". Bornstein, Haynes, O'Reilly and Painter (1996) recently operationally defined symbolic play as follows: (a) simple pretense scenarios about self (e.g., child pretends to drink from an empty toy cup); (b) simple pretense scenarios about other things (e.g., child puts doll to sleep); (c) sequences of pretense (e.g., child pours into empty cup and then pretends to drink); and (d) substitution (e.g., child talks into a block as if it were a telephone).

Pretend Play

The paradigms used to study symbolic and pretend play are varied, and their definitions are vague and tied to expressive language. Whereas the distinction between relational and functional play is relatively clear-cut, the next step in the developmental progression, the onset of pretend play, is extremely difficult to identify. When children bring a toy cup to their lips, are they pretending to drink or are they merely performing a learned association (i.e., that is what you do with a cup)? McCune-Nicolich (1977) identified this problem noting that some activities placed theoretically in different levels within her scale are in fact superficially quite similar making the distinction between them difficult. Typically, researchers depend on the child's spontaneous verbalisations to clarify these ambiguous distinctions. Normally developing children with good expressive language often provide clues such as "mmm, good juice", while holding a cup to their lips, indicating that they are in fact pretending that there is juice in the cup.

The paradigms used to study pretend play most often involve different scenarios with each one introducing several toys, each on a gradient of similarity (dissimilarity) to a standard toy. For example, Casby and Ruder (1983) used a comb as the standard, a small toy plastic saw as the similar object and a small plastic bolt as the dissimilar object. Golomb (1977) had children feed a hungry baby with items ranging from optimal choices (e.g., bottle) to neutral (e.g., a blob of plasticine) to incongruous substitutes (e.g., toy car). However, one might question whether children would use objects symbolically in a free-play situation. For example, Golomb (1977) acknowledged that the children in her sample were probably complying with the examiner's requests to such an extent that certain findings may have been artifacts of the paradigm. The protocols used to elucidate advanced forms of pretend or symbolic play are often very unnatural and structured. Cohen's (1987) argued that children often are made to feel uncomfortable during symbolic play procedures such as substituting one object for another, and that these situations often reflect responses to problem solving demands more than typical free play. Moreover, whereas these pretend play paradigms may be useful for mapping the developmental progression of play in normally developing children, they are inappropriate for use with children who are non-verbal and non-compliant.

Most of the pretend play paradigms require expressive language. Often coding depends on the child's spontaneous verbalisations and examiners ask children to clarify acts or to confirm hypotheses during the procedure (e.g.,. Fein, 1981; Ungerer, Zelazo, Kearsley & O'Leary, 1981). For instance, Golomb (1977) reported that "pretence was frequently maintained by purely verbal means without gestural role enactment" (p. 184). Lewis, Boucher and Astell (1992) attempted to deal with this problem by designing a test that can be administered using a minimum of language. Modelling, a non-verbal means of communication, was used in the hope that the child would imitate the examiner. Although this protocol may be useful for children who are non-verbal, it still requires compliance with the examiner's requests and is therefore not useful for children who are non-compliant. Unfortunately, there is strong evidence that many children who are non-verbal also display behaviour problems, particularly non-compliance and resistance to demands (Whitehurst et al., 1989; Rogers, Zelazo, Mendelson & Rotsztein, 1998)

Moreover, compliance with the examiner's requests is almost universally required in pretend play paradigms. For example, Casby and Ruder (1983) studied symbolic play by issuing the following command in different stimulus situations: "N, play N" (e.g., "Hat, play Hat"). A correct response was scored when the child selected the appropriate object and performed a recognisable conventional action with it. It is obvious that children who are resistant and non-compliant will not display the requested behavior, not necessarily because they do not know how, but because they do not comply with requests. That is their disability. Thus, children with behavioural difficulties may be judged to be unable when they may be "unwilling". Because of the lack of expressive language and compliant behavior, the progression from functional play to pretend play is obscured in children who are non-verbal and resistant even more so than in normally developing children. The conceptual and methodological limitations of pretend play paradigms are exacerbated by the confounding between the measures used to infer symbolic play ability and the disabilities presented by children with developmental delays.

Analysis of Sustained Play

The reliance on compliance with an examiner's requests and age-appropriate expressive language facility render current practices for examining discrete distinctions between functional and symbolic play in children who are non-verbal and resistant inappropriate. It may not be necessary, for assessment purposes, to make qualitative distinctions between functional and symbolic play in the traditional sense. Enough information may be gathered by providing a detailed analysis of the longest period of uninterrupted free-play (sustained epoch of play). Rosenblatt (1977) found, based on her observations, nine month-old infants lacked sustained attention as they changed toys and responses every few seconds, sustained attention for 1 minute or so by 18 months and for 5 minutes or more by 2 years. Similarly, Tamis-LeMonda and Bornstein (1993) found that in situations of free-play that permit toddlers to explore actively, sustained interest seems to index greater competence. They suggested that "assessment of play that considers attention and sophistication together can provide a more comprehensive picture of the changing nature of children's early exploration" (p.18). They argued that duration of attention (time that children spend engaged with an object) and level of play sophistication (symbolic versus nonsymbolic play) are the two core indices of children's play and investigated their interrelations in the first 2 years of life. In a cross-sequential study of play in a normative sample, they found that duration of attention during play was associated with level of play sophistication ($r=.38$, $p<.05$). Haight and Miller (1993) also investigated duration of play in a naturalistic, longitudinal study of play in a normative sample. They suggested that the duration of individual episodes of pretend play may reflect the players' abilities to sustain and elaborate play. In line with their predictions, they found marked developmental increases not only in the overall frequency of pretending, but also in the mean duration of children's episodes of pretend play. Similarly, Fiese (1987 cited in Haight & Miller, 1993) found a positive relation between the duration of episodes of pretend play and their level of symbolic maturity. All of these studies support the notion that the analysis of a sustained period of play provides important information about symbolic play and should be developed further.

We suggest that the analysis of a period of sustained play is a valid way of describing the increasing sophistication of play in children with developmental delays without resorting to more subjective, arbitrary language-based distinctions. Sophistication can be defined objectively and measured by the duration of the longest epoch and the number of different appropriate functions and toy sets used. This definition is based on the assumption that in order to sustain a long sequence of play, a child must have an increasing number of associations or be perseverative with only one or two toys. Thus, breadth of play (number of different toy sets and number of different appropriate uses) is a correction for redundant use. Gesell (1929) mapped the developmental progression of play in toddlers and found that as they matured, children combined toys into longer sequences further assuring that longer epochs of play typically reflect mature use of objects. For instance, simply drinking from a cup is less sophisticated than drinking from a cup while feeding a doll and answering a telephone. The second scenario is longer and qualitatively more complex than the first. We suggest then, that rather than deciphering what the child may be imagining – a difficult subjective task at best - that measuring the duration and complexity of sustained play is a more objective way to assess symbolic and pretend play.

Two studies were conducted. Study I extends the work of Zelazo and Kearsley (1980) beyond 15 1/2 months to 31 months and demonstrates the validity of the longest epoch of play as a measure of symbolic use in a sample of normally developing children. Specifically, this study maps the progression from stereotypical to functional to symbolic play by demonstrating that the length and breadth of the longest epoch of sustained play increase with age and constitute an objective, non-verbal index of symbolic play. Study II demonstrated the effectiveness of a parent-implemented cognitive-behavioural treatment program for children with delays on the quality of object use. This study also attempted to show that the longest epoch of sustained play is a particularly useful measure of play sophistication for children with developmental delays who are non-verbal and non-compliant. Because the materials, procedures and measures of both studies were identical, we compared the play of the children with delays and the normally developing toddlers as well.

Study 1

Method

Participants. The participants were drawn from a larger longitudinal study. Forty-three normally developing toddlers (19 girls and 24 boys) were assessed at 13, 22 and 31 months of age. Recruitment criteria were as follows: (a) full-term (38-48 weeks gestational age); (b) uneventful delivery and perinatal history; and (c) Apgar scores of 7 or greater (1 and 5 min).

Materials. The materials used were those used by Zelazo and Kearsley (1980) and included a set of toys that lend themselves to multiple functional uses. Two sets of toys were included for each of three categories (male, female, neutral) as a control for possible sex-typed preferences: tea set (neutral), telephone (neutral), truck, garage, blocks (male), baseball, glove, bat and hat (male), small doll and furniture (female) and a large doll with a bottle (female). Thirty-nine specific behaviours representing unambiguous adult determined functions for this set of realistic toys are listed in Table 1. For example, brushing a doll's hair or placing a receiver to one's ear and babbling into the telephone were considered functionally appropriate acts representing specific associations.

Procedure. Children's free-play was assessed live by two independent coders during a 15 min free play session repeated at all three ages. Activities were recorded, through a one-way mirror, using a checklist for 10s periods. The parent and child were brought into a carpeted room (3.7 by 4.6 m) with toys arranged in a semi-circular array according to theme (e.g., the truck, the garage and the blocks were clustered) with the closest points of the arc .6 m, and the farthest point 1.5 m, from the front of the parent's chair. Each toy had a specific location and orientation that was constant for all children. The toys were arranged so that same "gender" class toys were not adjacent. The child sat on the parent's lap until a knock on the mirror signalled the beginning of the session. The parent then placed the child on the floor within reach of the toys saying, "Look at all the toys. Go play with the toys." The parent was asked to remain seated, read a magazine, and avoid interaction as much as possible. Moreover, parents were told to respond naturally and redirect the child to the toys if the child initiated contact.

Measures. Stereotypical play was scored when instances of mouthing, fingering, waving and/or banging of toys occurred. Functional play was scored when children used a toy appropriately; however, these acts were limited to the occurrence of one or more of 39 conservatively defined behaviours in order to allow for direct comparison with Zelazo and Kearsley's normative study (1980) and with Study II. Each of the 39 behaviours described in Table 1 is consistent with the hypothesis that the child has a cognitive representation appropriate for a particular object. Relational play is a transitional measure that does not provide useful information over and above that gained from an analysis of stereotypical and functional play (Zelazo, & Kearsley, 1980), and therefore is not reported here.

For the overall play session, the classes of activities were deliberately defined to produce mutually exclusive categories; that is, only the most mature form of play was coded for each 10-second period (i.e., stereotypical play being the least mature and functional play being the most mature). Percentage of total play that was stereotypical was defined as the number of 10-s units in which at least one stereotypical act occurred divided by the total number of "play acts" (stereotypical plus functional). Similarly, the percentage of total play that was functional was defined as the number of 10-s units in which at least one functional act occurred divided by the total number of "play acts". Finally the breadth of functional play was defined by the number of different appropriate uses (ideas) displayed by the child and by the number of different toy sets used in the session.

The longest epoch of sustained play was defined as the longest series of consecutive 10-s units of functional play. If two or more epochs of the same length were found, the one with the highest number of different appropriate uses was chosen. The breadth of play, as defined above, was included to confirm that the longest epoch was a measure of symbolic play and not perseveration of one or two functions.

In order to make the results of Study I comparable to those of Study II, only responses during the first eight min of the 15-min sessions were transcribed, summarised and analysed.

Reliability was calculated on a clinical data set ($\underline{n}$=13). P.Z. (author) was one of the coders for the current study, as well as for the clinical data set. Reliability was not calculated on the current data set since the archival data necessary for this analysis were not available. The 15-min play session was divided into 15 1-min segments and the number of agreements and disagreements, summed for each segment, served as the unit of analysis for a percent agreement coefficient. An agreement was indicated if P.Z. and the second coder scored the presence of an act in the 1-min segment. A disagreement was scored if one coder scored the presence of an act while the other did not. The percent agreement was 60%. However, we are confident that the current data are more reliable than indicated by this coefficient. First, one coder (P.Z.) coded in vivo, while the second coder coded from videotape. Coding from videotape allows the coder to view the session on numerous occasions and allows for less distraction. Consequently, the percent agreement is likely to be lower when one coder is more accurate than another. Second, coding for clinical purposes may not be as accurate as coding for research purposes. Prior to publication, P.Z. will re-code the sessions, for research purposes, from videotape, and Cohen's Kappa (Cohen, 1960) will be calculated. Third, a Kappa coefficient of 95% was calculated using the same play assessment procedure in another study (see Study 2). Finally, the play assessment procedure is unambiguous and standardised thus lessening the chances of problems with inter-rater reliability. For these reasons, we can have confidence in the current data set.

Results

Overall Play Session. A one-way repeated measures MANOVA with time as repeated measure on four dependent variables, followed by ANOVAs, was conducted. The MANOVA and ANOVAs were all significant (see Appendix). Given that the assessments were made at three points in time, specific planned comparisons between means were conducted, and Bonferroni critical values were used in order to maintain family-wise alpha levels at .05 (df=1,80). Unless otherwise mentioned, all effects were significant at the .05 level or lower.

We predicted that children would spend less time in stereotypical play and more time in functional activity as they developed and that breadth of play would increase, including more appropriate uses for toys and a wider variety of toy sets. Descriptive analyses of percentage of total play revealed that stereotypical use declined over the three ages from 43% to 14% to 5%. Specific comparison between means revealed that the declines between 13 and 22 months [$F(1,80)=57.1$] and 13 and 31 months [$F(1,80)=92.8$] reached statistical significance, while the decline between 22 and 31 months did not. The percentage of total play that was functional increased over the three ages also from 57% to 86% to 95%. The increases in functional play between 13 and 22 months [$F(1,80)=16.4$] and 13 and 31 months [$F(1,80)=41.8$] reached statistical significance, but the increase from 22 to 31 months did not. Similarly, the breadth of play increased as the children developed; the number of different appropriate uses for the toys increased from 3.9 to 8.5 to 12.7, and the number of different toy sets used increased from 2.3 to 3.8 to 4.7. Specific comparisons between means revealed statistically significant differences between all ages [Fs (1,80) ranged from 16.1 to 215.4]. These results are displayed graphically in Figures 1 and 2 (Pages 87 & 88).

Analysis of the longest epoch of sustained play. A one-way repeated measures MANOVA with time as repeated measure on three dependent variables, followed by ANOVAs, was conducted. The MANOVA and ANOVAs were all significant (see Appendix). Given that the assessments were made at three points in time, specific planned comparisons between means were conducted, and Bonferroni critical values were used in order to maintain family-wise alpha levels at .05 (df=1,80). Unless otherwise mentioned, all effects were significant at the .05 level.

We predicted that the duration of sustained play would increase over age and that play would become more sophisticated. Descriptive analyses revealed that the length of the longest epoch of sustained play increased across the three ages, from 48 to 56 to 86-s. Specific comparisons between means revealed that the increases between 22 and 31 months [$F(1,80)=6.8$], and 13 and 31 months [$F(1,80)=10.8$] were statistically significant. The breadth of activity within the longest epoch increased also; the number of different functions displayed increased from mean of 2.0 to 3.2 to 5.2, and the number of different toy sets used increased from a mean of 1.2 to 1.6 to 2.1, at 13, 22 and 31 months, respectively. Specific comparisons between means revealed that both measures of breadth of play (i.e., number of different appropriate uses and number of different toy sets used) increased significantly over each age [Fs (1,80) ranged from 7.2 to 56.1].

Discussion

As children developed, their play became less stereotypical and more functional, and the breadth of their play increased. All changes were linear, although the decrease in stereotypical play and increase in functional play nearly reached a ceiling at 22 months; 86% of play was functional by 22 months increasing non-significantly to 95% by 31 months. However, the breadth of play, that is, the number of different appropriate uses displayed and the number of different toy sets used, continued to increase measurably between 22 and 31 months indicating that children do not merely increase the number of functional uses, but the relation of the objects to each other.

Duration of the longest epoch of sustained play was the same at 13 and 22 months. This is in line with Tamis-LeMonda and Bornstein's finding (1993) that duration of attending to the toys does not change across age from 5 to 21 months of age. At 32 months, however, the children in our study sustained play longer than at 22 months. While at both 13 and 22 months of age, children's longest epoch of play was 1 min long, at 22 months the children integrated twice as many ideas into that epoch of play than they did at 13 months, indicating increasing sophistication of play.

Most noteworthy is that, even though the amount of time spent in functional play reached a ceiling at 22 months, we were able to continue mapping the developmental progression of play using objective measures to 31 months using length of the longest epoch of sustained play and measures of breadth of play. Since symbolic or pretend play generally appears around 20 months of age (Largo & Howard, 1979; Lowe, 1975; Rosenblatt, 1977; Sinclair, 1970), our findings provide preliminary evidence of the validity of analysis of the longest epoch of sustained play as a measure of symbolic play. Further research can more specifically validate children's linguistic descriptions with our measures using normally developing children.

Study II

Study II reports on the impact on play of a six-month parent-implemented cognitive-behavioural treatment program on children with pervasive developmental disorder (PDD) and autism. Also, it investigates the use of the longest epoch of sustained play as a measure of symbolic play for use with children who are non-verbal and non-compliant.

Method

Participants

The participants were drawn from a larger treatment-outcome study (Lalinec, 1995). Twenty-two boys with developmental delays (mean age at entry = 34 months) and their parent(s) participated. All consecutive referrals to the Psychology Department of the Montreal Children's Hospital between October 1992 and April 1994 were considered. Referrals were from various professionals within the hospital: affiliated pediatricians, pediatric neurologists, and the multidisciplinary Developmental Progress Clinic. In order to facilitate subject recruitment, all hospital related referral sources within our area were sent letters explaining the purpose of the study.

Subjects were excluded from the sample if they had a known diagnosis with a biological association to mental retardation (e.g., congenital infections, inborn errors of metabolism, neurocutaneous disorders, chromosomal anomalies), evidence of hearing impairment, or evidence of clear neurological disability (e.g., seizures, neuromotor impairment). Inclusionary criteria were as follows: minimum 6-month delay on the Griffith's Hearing and Speech Scale and Practical Reasoning Scale, or pervasive developmental delay of unknown etiology. At entry, the mean quotient on the Griffiths Hearing and Speech Scale was 49.4, and 64.6 on the Practical Reasoning Scale. All children presented with pervasive developmental disorder (PDD) or autism and were determined to have intact central information processing ability despite clear delays with expressive development (Zelazo, 1979; 1989, 1997a; Zelazo, Kearsley & Stack, 1995).

A control group was not recruited for both ethical and practical reasons. First, it is unethical and illegal to withhold an effective treatment from children seeking help in a tertiary care pediatric hospital. Second, we did not have a waiting list that equalled the duration of treatment (i.e., six months).

Parents were asked to provide consent by signing a comprehensive consent form explaining details of the study.

Procedure.

Parents conducted 12-min compliance training sessions at home five times weekly, for six months (see Zelazo, et al., 1984). Regular meetings with their therapist (Lalinec, 1995) served to adjust behavioural and communication goals and provide advice/coaching and/or modelling of teaching techniques. The cornerstone of this cognitive-behavioural therapy is the conversion of a non-compliant and oppositional style to a compliant and co-operative one, initially with actions and objects and then with words, as a first step towards facilitating expressive language. Briefly, two principals underlie the program's procedures: the need to demand more developmentally advanced behavior from the children, and the need to develop procedures for working through the children's resistance to increased demands.

Materials and procedures for the coding of the free-play sessions were identical to those used in Study I. However, the coding was not done in vivo, as in Study I. Instead, children were videotaped during 8 min of free play in our laboratory, before and after treatment. The video camera was mounted at ceiling level to provide a wide scan of all available floor space.

Measures.

Measures were virtually identical to those in Study I with one exception. Aimless wandering was scored when children wandered around the room unoccupied or when they stared off into space. Percentage of time spent in aimless wandering was defined as the number of 10-s units in which at least one instance of aimless activity occurred divided by the total number of 10-s units in the session. The coders were blind to the experimental condition (pre- or post-treatment) and due to the variability of ages, functioning and improvement, it is highly unlikely that the coders were able to identify the experimental condition.

Reliability was calculated on 20% of the data (five children pre and post-treatment) using Cohen's Kappa (Cohen, 1960). An agreement was indicated if two independent coders scored the presence of an act in a 10-s unit. The 10-s units served as the unit of analysis. The Kappa Coefficient was 95%, indicating very high inter-rater reliability.

Results

Overall Play Session.

We predicted that children would spend less time off-task and more time in functional activity after treatment and that breadth of play would increase, including more appropriate uses for toys and a wider variety of toy sets. A one-way repeated measures MANOVA on five dependent variables was conducted, followed by ANOVAs. The MANOVA was significant [$F(4,18) = 3.72$, $p<.05$]. The mean percentage of total play that was stereotypical declined from 28.3% to 12.5% [$F(1,21) = 5.06$, $p<.05$], and the mean percentage of total play that was functional increased from 71.7% to 87.5% [$F(1,21) = 5.06$, $p<.05$]. Play sophistication improved also; after treatment, children used a greater number of toy sets [$M=3.7$ versus 2.9, $F(1,21) = 4.80$, $p<.01$] and displayed more appropriate uses [$M=8.5$ versus 5.0, $F(1,21) = 6.64$, $p<.05$] than before treatment. These results are displayed graphically in Figures 3 and 4 (Pages 89 & 90).

Analysis of the longest epoch of sustained play.

We predicted that duration of sustained play and breadth of play within the period of sustained play (i.e., appropriate uses and toy sets) would increase with treatment. Three children in the sample clearly deviated from the norm (more then 3 SD from the mean) creating a non-significant result. Inspection revealed that although these children were "playing" for extremely long periods relative to the other children (i.e., 310, 190 and 180s), their play was primitive. The perseverative nature of this activity is exemplified by the small number of appropriate uses displayed (i.e., 3, 2, 1 respectively) relative to the lengths of their epochs of play and that all three children used only one toy set. Because perseveration of a few responses for long periods is an obvious contradiction of the intent of this measure, and the reason that the criterion for increased breadth was included, the data for these children were eliminated from the analyses of the length of the longest epoch of play.

A one-way repeated measures MANOVA on three dependent variables was conducted, followed by ANOVAs. The MANOVA was significant [$F(2,17) = 4.04$, $p<.05$].Both the duration and breadth of the longest sustained epoch of play increased with treatment. The mean length of the longest epoch increased from 43-s pre-treatment to 59-s post-treatment [$F(1,18) = 5.42$, $p<.05$]. The mean number of different appropriate uses within the epoch increased from 2.1 pre-treatment to 3.3 [$F(1,18) = 4.58$, $p<.05$]. Similarly, the mean number of different toy sets used increased from 1.3 to 1.9 following treatment [$F(1,18) = 4.14$, $p<.05$]; see Figure 5 (Page 91).

Control for maturation.

Because this study lacked a control group, it was important to consider whether the improvements were due to other factors than treatment, such as maturation. In this sample, age of entry varied from 27 to 44 months, making it possible to compare the performance of the group of older children (above median of 33.5 months), before treatment, with the performance of the group of younger children, after treatment. If the observed improvements are due to the treatment procedures, the younger children tested after treatment would be expected to perform as well as or better than the older children who had not yet had treatment. If, on the other hand, the effects are due to maturation, the group of older children would perform better than the group of younger children.

The sample was split in half at the median age (33.5 months) and t-tests for independent samples were conducted on all variables. A comparison of older children with the younger children in the sample prior to treatment revealed no significant differences (Table 2) suggesting that both groups displayed similar levels of play. The lack of a significant difference can be interpreted to imply that the younger and older children were drawn from the same population. However, in spite of the non-significant results, there is a chance that there were initial differences between the groups that were missed because of the large variation. Unfortunately, pre-scores cannot be used as covariates since, for the older children, these pre-scores are the dependent variables. Consequently, the best we can do, given the design of this study, is use a contrived cross-lag control design.

Comparisons of the older part of the sample prior to treatment with the younger part of the sample after treatment are summarised in Table 3. For all variables except percentage of total play that was stereotypical and percentage of total play that was functional, the younger children who had had treatment fared better than the older children who had not. Younger children, who had been treated, spent less time wandering around aimlessly, played for longer periods without interruption, integrated more toys into their play and displayed more appropriate uses for those toys that did older children who had not yet been treated. These findings suggest that improvements with play are due to treatment rather than to maturational factors.

Comparison of Studies I and II

Given that identical materials, procedures and measures were used in Studies I and II, we are able to compare and contrast the play of the normal sample with that of the delayed sample. Table 4 outlines the descriptive statistics.

Overall play session Correlation analyses on all the overall play session variables revealed that number of appropriate uses and number of toy sets were significantly correlated at most testings, but that the percentage of play spent in stereotypical/functional play was an independent variable. Consequently one-way ANOVAs were conducted for the latter, and MANOVAs for the former set of variables.

Given that percentage of the session spent in stereotypical play and percentage time spent in functional play are correlated perfectly, analyses needed to be conducted on only one of the variables. The ANOVA comparing the amount of time spent in stereotypical (or functional) play by the children with delays prior to treatment with that of the average of the performance of the control children at 13 and of their performance at 22 months revealed no significant differences [$F(1, 62) = 0$, $p = .997$]. A second ANOVA, comparing the amount of time spent in stereotypical (or functional) play prior to treatment with that of the average of the performance of the control children at 22 months and of their performance at 31 months revealed that the children with delays fared significantly worse than the control children [$F(1, 62) = 16.82$, $p = .0001$]. Specifically, the children with delays, prior to treatment spent 28.3% of their play time in stereotypical play and 71.7% of their play time in functional play ($SD = 28.0$). This is in contrast to the average of the performance of the control group at 22 and 31 months of age; 9.5% of play was stereotypical while 90.5% was functional ($SD = 7.6$). These results, combined, indicate that before treatment 34-month-old children with delays resembled 17.5 (mid-point between 13 and 22 months) month-old normally developing children more than 26.5 (mid-point between 22 and 31 months) month-old children on measures of type of play.

A third ANOVA, comparing the amount of play time spent in functional (or stereotypical) play by the children with delays after treatment with that of the average of the performance of the control children at 22 months and of their performance at 31 months revealed no significant differences [$F(1, 62) = .63$, $p = .43$]. In contrast, a final ANOVA indicated that the children with delays, after treatment, performed significantly better than the average of the performance of the control children at 13 and 22 months [$F(1,62) = 10.57$, $p = .002$]. In particular, the children with delays, after treatment, spent 12.5% of their play in stereotypical play and the rest in functional play (SD = 22.1); in contrast, for the control group, the average of the play time at 13 months and of the play time at 22 months spent in stereotypical play was 28.3% with the rest of the time in functional activity (SD = 16.3). These results combined show that the children with delays, after treatment, performed more like 26.5 month-old children than like 17.5 month old children on measures of type of play.

The first MANOVA compared the breadth of play of the group of children with delays prior to treatment with that of an average of the performance of the group of control children at 13 and 22 months. This analysis revealed that the group of 34-month-old children with delays, prior to treatment, was functioning between 13 and 22 months of age in their breadth of play [$F(2, 62)=2.46$, $p=.10$]. Furthermore, a second MANOVA, comparing the performance of the children with delays prior to treatment with that of the children in the control group at 22 months of age, found that their performance differed significantly [$F(2, 62) = 7.74$, $p=.001$]. Specifically, prior to treatment, the children with delays displayed fewer appropriate uses ($M = 5$, $SD = 3.4$ vs. $M = 8.4$, $SD = 3.5$), and used fewer toy sets ($M = 2.9$, $SD = 1.6$ Vs $M = 3.7$, $SD = 1.4$) than normally developing 22-month-old children, Fs (1, 63) = 13.79 and 4.92 respectively and ps = .0001 and .03 respectively. These results combined demonstrate that the group of 34-month-old children with delays was functioning more like a group of 17.5 month-olds than like a group of 22 month-olds on the measures of breadth of play prior to treatment.

A third MANOVA, comparing the breadth of play of the children with delays, after treatment, with that of the control group at 22 months of age revealed that their performances were similar [$F(2,62) = .09$, $p=.90$]. Moreover, a fourth MANOVA, comparing the performance of the children with delays after treatment with that of the average of the performances of the control group at 13 and 22 months of age, revealed that children with delays who received treatment fared better than the young control group [F (2, 62) = 3.14, $p=.05$). Specifically, children with delays who received treatment displayed a greater number of appropriate uses (M = 8.45, $SD = 5.4$ Vs. $M = 6.02$, $SD = 2.4$), and used more toy sets ($M = 3.7$, $SD = 1.7$ Vs. $M = 3.0$, $SD = 0.9$) than normally developing 17.5 month-old children, Fs (1, 63) = 6.39 and 4.54, respectively and ps = .01 and .04, respectively. These results, taken together, indicate that after treatment, the children with delays performed more like 22 month-old normally developing children than like 17.5 month-old normally developing children on the measures of breadth of play.

Analysis of the longest epoch of play Correlation analyses revealed that the three variables related to the longest epoch of play (i.e., length of the longest epoch, number of appropriate uses within that epoch and number of toy sets used within that epoch) were highly correlated at most testings. Consequently, these variables were analysed together using MANOVAs.

The first MANOVA, comparing the performance of the children with delays, prior to treatment, with the normally developing children at 13 months revealed no significant differences [$F(3, 58) = .89$, $p = .453$]. A second MANOVA indicated that although the performance of the children with delays did not differ significantly from that of the 22 month-old normally developing children prior to treatment, 22 month-old normally developing children tended to perform better than the children with delays prior to treatment $F(3, 58) = 2.25$, $p = .092$. Of the univariate tests however, the only significant difference was for number of appropriate uses; specifically, prior to treatment, the children with delays displayed fewer appropriate uses for the toys ($M = 2.1$, $SD = 1.8$) than normally developing children at 22 months of age ($M = 3.2$, $SD = 1.6$), $F(1, 60) = 4.80$, $p = .032$. Although not conclusive, these results indicate that prior to treatment, children in the delayed sample tended to resemble 13 month old normally developing children, more than 22 month-olds on the longest epoch of play variables.

The third MANOVA, comparing the performance of the children with delays after treatment to that of the normally developing children at 22 months of age revealed no significant differences, $F(3, 58) = .96$, $p = .418$. A final MANOVA, comparing the performance of the children with delays after treatment with that of the normally developing children at 13 months revealed that following treatment, children with delays performed better than 13 month-old normally developing children [$F(3, 58) = 6.96$, $p = .0001$]. The univariate analyses revealed that although the children with delays did not differ from the control group on length of the longest epoch of play [$F(1,60) = 1.79$, $p = .185$], they displayed more appropriate uses ($M = 3.3$, $SD = 2.2$ versus $M = 2.0$, $SD = 1.0$) and used a greater number of toy sets ($M = 1.9$, $SD = .9$ versus $M = 1.2$, $SD = .4$) than normally developing 13-month-old children [$Fs(1, 60) = 12.53$ and 21.34, respectively, $ps = .001$ and $.0001$, respectively]. Clearly, these results indicate that, on the longest epoch of play variables, the children with developmental delays, after treatment, performed more like 22 month-old normally developing children than 13 month-olds.

Discussion

Object use in toddlers with pervasive developmental disorder and autism improved as a result of participation in a 6-month parent-implemented treatment program. After treatment children spent less time wandering aimlessly and mouthing, waving, and banging toys indiscriminately, and more time using toys appropriately. Moreover, their breadth of play, defined by the number of different uses for the toys and the number of toy sets used, increased. Children integrated the toys in more complex pretend scenarios; they mixed imaginary tea while talking on the telephone, for example. They also displayed longer, more sophisticated epochs of play after treatment, lending support to the analysis of the longest epoch of sustained play as an alternate measure of pretend play, a particularly useful measure for children who are non-verbal. In fact, there was no change in the amount of functional play; it was the breadth of play that changed with treatment. These findings indicate that the cognitive-behavioural treatment program Learning to Speak, designed to facilitate compliance with requests for specific actions and expressive language also facilitated object use. This result lends further support for the efficacy of the cognitive-behavioural treatment for reducing severe developmental delays.

General Discussion

This research demonstrated the effectiveness of the parent-implemented cognitive-behavioural treatment program Learning to Speak for object use in toddlers with PDD and autism. It also confirmed and extended the longest epoch of play as an objective measure of pretend play in both normally developing children and children with developmental delays, and showed that these variables are particularly useful measures of play sophistication for children with delays who are non-verbal and non-compliant.

Impact of Treatment on Play

It is clear from the comparisons between Studies I and II, that the children with PDD and autism were extremely delayed in their object use when they entered the study. In fact, it appears that prior to treatment, the group of 34-month-old children with delays functioned between 13 and 22 months of age (17.5 months) both in the percentages of play displayed, and the breadth of play. Moreover, they were functioning at about 13 months-of-age on the measures of the longest epoch of play. These findings are in line with other studies that have reported delayed play in toddlers with developmental disabilities (e.g., Laplante, et al., 1990; Krakow & Kopp, 1983; Rescorla & Goosens, 1992).

However, after only six months of treatment, play for the children with delays was virtually identical to that of the normally developing children at 22 months. The children in the delayed sample did not catch up to their normally developing age-mates, but their improvement was substantial. Indeed, the split-group control for maturation indicated that, without treatment, the children with delays would have continued to play as 17.5-month-old children do, even at 41 months of age. Thus, the treatment, which targeted compliance and language development through play, also effectively improved object use. Once non-compliance was diminished, and compliance achieved through operant shaping, children with PDD and autism began to manipulate objects in more meaningful ways. Given the importance attributed to play and early exploration for further cognitive growth (e.g., Bruner, 1973; Garvey, 1990; Isenberg & Jacob, 1983; Cooper, et al., 1978), evidence that play can be facilitated among children with delays is of major clinical benefit.

Other studies have found the treatment program described in <u>Learning to Speak: A Manual for Parents</u> (Zelazo, al., 1984) to be effective at overcoming mental delays and at improving language abilities (Lalinec, 1995; Lalinec, et al., 1995; Laplante, et al., 1991; Zelazo, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984). The present investigation extends these findings by providing evidence for the effectiveness of this program for object use. Throughout treatment, facility with play was encouraged as a vehicle by which to shape compliance with actions and as a basis for the acquisition of meaningful first words such as "ball" and "cup" for example. This increased compliance allows for imitation to occur, thus setting the stage for further learning, especially naming of objects.

The results of this study show that this parent-implemented treatment plan not only encouraged the acquisition of functional and symbolic object use, but facilitated the display of these skills in free play context where the child was left to her/his own means. This latter result indicates that the children with PDD and autism incorporated these new skills into their daily existence and could display them in an unfamiliar context. This finding is important because one of the key elements of the treatment program is the generalisation of what the child learns in treatment to everyday life.

<u>Analysis of the Longest Epoch of Sustained Play as a Measure of Pretend Play</u>

Given that length of longest epoch of play continues to increase beyond 22 months of age, the standard age at which pretend play begins to manifest itself, and given that other studies

(Haight & Miller, 1993 for example) have shown that length of sustained play is positively correlated with traditional measures of play, our results suggest that length of the longest epoch of play and an analysis of the breath of the play within that epoch could be used as measures of symbolic play in both normal and delayed samples.

In general, we found, as have other researchers (Haight & Miller, 1993; Tamis-LeMonda & Bornstein, 1993), that when children sustained play longer, they used objects in more sophisticated ways; that is, they integrated more toys into their longest epoch of play and generated more ideas for their play. Our findings show that the longest epoch of sustained play is a useful measure for children from 13 to 31 months. Sarid and Bregnitz (1997) reported a linear increase in sustained attention up to 48 months, levelling off around age five and continuing through age six. Although their paradigm was different (free-play in a naturalistic setting) these results, coupled with our findings, imply that length of the longest epoch of sustained attention could be used to assess play in children up to four years of age. Moreover, this measure could, feasibly, be used for older children with developmental delays.

In the delayed sample, there were instances where extremely long epochs of sustained play included very few ideas and toy sets. This type of perseveration is common among children with developmental delays. For instance, Riguet, Taylor, Benaroya and Klein (1981) found that children with Down's Syndrome tended to elaborate the same idea repeatedly through a play period. Similarly, Krakow and Kopp (1983) found that some toddlers with developmental delays produced perseverative patterns such as repetitive bathing and feeding. Cunningham, Glenn, Wilkinson and Sloper (1985), recognising perseveration as a problem, urged researchers and clinicians to take these sorts of problems into account in scoring schemes in order to make protocols more informative for both theoretical studies and intervention programs for children with developmental disabilities. Consequently, if length of sustained play is used as a measure of symbolic play in delayed samples, it is important to correct for perseveration by including measures of breadth as we did. We found that, with the correction for redundancy, the measure of duration of the longest epoch of sustained play could be used to assess children who were non-verbal and non-compliant. Zelazo, Rotsztein, Reid and Carlin (1997, 1998) recently used this same measure to successfully discriminate children with Down's Syndrome from normally developing age-mates, implying that this measure could be used as a simple screening tool.

There are additional advantages to using the longest epoch of sustained play as a measure of symbolic play. First, the variables proposed here are quantitative and thus, more objective than traditional measures of pretend play.. This set of objective measures can be used beyond 22 months of age, when other objective measures such as functional play reach a ceiling, thereby lessening dependence on traditional, more subjective, measures of pretend play. Second, these measures are collected in a free-play paradigm, reducing the likelihood of artifactual data that may be created by paradigms where significant interaction with the examiner occurs. Instead, the free-play setting ensures spontaneity and facilitates the generalisability of findings within a less structured format. Third, because the analysis of the longest epoch of sustained play in a free-play situation does not require compliance or expressive language on the part of the child, it is a dependent variable that can be used to study play in children who are non-verbal and non-compliant and to compare play sophistication across populations. Traditional measures of pretend play depend heavily on expressive language and on compliance with the researcher's requests, rendering these measures less applicable to populations of children who are non-compliant and verbally delayed. Indeed, the findings from our treatment outcome study indicate that this measure can be used with children with delays to capture pretend play despite limited expressive language. As with normally developing toddlers, the children in Study II displayed more sophisticated play for longer temporal sequences once they became more compliant.

The information found in an epoch of sustained play is important in that it involves a sequencing of ideas and toys into a coherent action. This method of scoring, albeit seemingly less rich qualitatively than more traditional pretend play scoring methods, appears to be a more valid means for assessing mental ability among children with expressive language delays and non-compliant behavior patterns. Additional research is needed to determine the ceiling age for the longest epoch of sustained play and to further validate its relation to more traditional subjective measures of pretend play using both normally developing children and children with developmental delays.

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Appendix

Analysis of Variance

	Df	MS	F	p
Overall session				
MANOVA	6/37		40.94	.0001
ANOVAs				
Percentage of Total Play that was Stereotypical	2/84	319.30	51.37	.0001
Percentage of Total Play that was Functional	2/84	319.30	51.37	.0001
Number of Appropriate Uses	2/84	7.50	110.82	.0001
Number of Toy Sets	2/84	0.92	68.71	.0001
Longest Epoch				
MANOVA	4/39		12.01	.0001
ANOVAs				
Length (seconds)	2/84	2901.03	6.01	.004
Number of Appropriate Uses	2/84	3.95	28.63	.0001
Number of Toy Sets	2/84	0.66	13.35	.0001

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Table 1
Toy sets and behaviours

Toy Set	Appropriate Uses
Cup, spoon and pot	Stir spoon in cup/pot
	Pour from pot to cup
	Drink from cup
	Drinking sounds
	Offer drink from cup
	Set cup in saucer
	Feed self with spoon
Telephone	Receiver to ear
	Pushes number buttons
	Converse (babble)
	Present telephone to other
	Replace receiver
	Press receiver buttons
Small doll, furniture	Sit doll in chair/bed
	Lay doll in bed
	Arrange furniture
	Stand and walk doll
	Child sit on toy chair
Large doll, bottle	Undress
	Dress
	Brush hair
	Feed with spoon
	Feed with bottle
	Feed with cup
	Cradle in arms
	Kiss doll

(table continues)

Truck, garage, blocks	Push truck
	Truck noises
	Put truck in garage
	Open/close doors
	Place block in truck
	Place others in truck
	Dump block(s) from truck
Ball, bat, glove, hat	Throw ball
	Roll ball
	Place glove on hand
	Place ball in glove
	Hit ball with bat
	Place hat on head

Table 2

Younger part of the sample versus older part of the sample prior to treatment

		Younger[a]		Older		
Variable	Df	M	SD	M	SD	t
Overall Play Session						
Percentage of Time Spent in Aimless Wandering	20.0	11.3	19.1	9.4	12.7	0.28ns
Percentage of Total Play that was Stereotypical	20.0	21.3	21.5	34.1	32.1	-1.07ns
Percentage of Total Play that was Functional	20.0	78.7	21.5	65.9	32.1	1.07ns
Number of Appropriate Uses	20.0	6.3	3.9	3.9	2.6	1.73ns
Number of Toy Sets	20.0	3.4	1.7	2.5	1.4	1.37ns
Longest Epoch						
Length (seconds)	9.9[b]	80.0	95.2	42.5	23.8	1.21ns
Number of Appropriate Uses	20.0	2.6	2.3	1.6	1.1	1.36ns
Number of Toy Sets	11.4[b]	1.6	1.1	1.0	.4	1.66ns

[a]"Younger" represents the younger children in the sample (i.e., children whose age at entry was below 33.5 months), "Older" represents the older children in the sample (i.e., children whose age at entry was above 33.5 months).

[b]unequal variance

Table 3

Control for maturation in delayed children

		Untreated[a]		Treated		
Variable	df	M	SD	M	SD	t
Overall Play Session						
Percentage of Time Spent in Aimless Wandering	12[b]	9.4	12.7	1.3	2.6	-2.16*
Percentage of Total Play that was Stereotypical	20	34.1	32.1	16.1	30.6	-1.33
Percentage of Total Play that was Functional	20	65.9	32.1	83.9	30.6	1.33
Number of Appropriate Uses	12[b]	3.9	2.6	9.3	6.0	2.66*
Number of Toy Sets	20	2.5	1.4	4.2	1.7	2.60*
Longest Epoch of Play						
Length (seconds)	20	42.5	23.8	80.0	47.4	2.41*
Number of Appropriate Uses	13[b]	1.6	1.1	3.6	2.0	2.91**
Number of Toy Sets	13[b]	1.0	.4	1.8	.8	2.88**

[a]"Treated" is the younger part of the sample (i.e., children whose age at entry was below 33.5 months), after treatment; "untreated" is the older part of the sample (i.e., children whose age at entry was above 33.5 months), prior to treatment.

[b]unequal variance

*$p < .05$, **$p < .01$

Table 4

Comparison of Study I with Study II

Variable	Study I 13ms	Study I 22ms	Study I 31ms	Study II Pre[a]	Study II Post
Overall Play Session					
Percentage of Total Play that was Stereotypical	43.0	13.5	5.4	28.3	12.5
Percentage of Total Play that was Functional	57.0	86.5	94.6	71.7	87.5
Number of Appropriate Uses	3.9	8.5	12.7	5.0	8.5
Number of Toy Sets	2.3	3.8	4.7	2.9	3.7
Longest Epoch of Play					
Length (seconds)	47.9	55.8	86.1	43.2	59.5
Number of Appropriate Uses	2.0	3.2	5.2	2.1	3.3
Number of Toy Sets	1.2	1.6	2.1	1.3	1.9

[a]Pre, mean age 34 months; Post, mean age 41 months.

Figure Captions

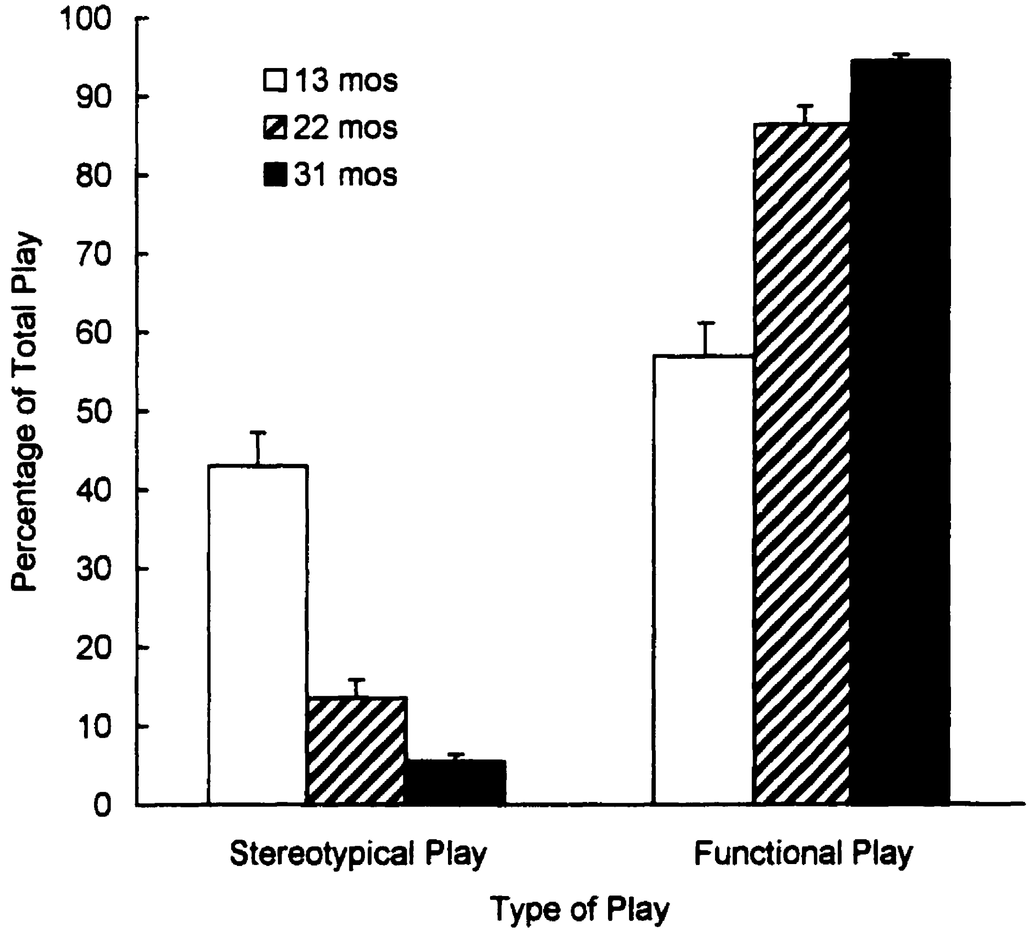
Figure 1. Mean percentage of total play (Stereotypical plus Functional) for each type of play (+SE) at 13, 22 and 31 months of age.

Figure 2. Mean number of different functional uses displayed and number of different toy sets used (+SE) at 13, 22 and 31 months of age.

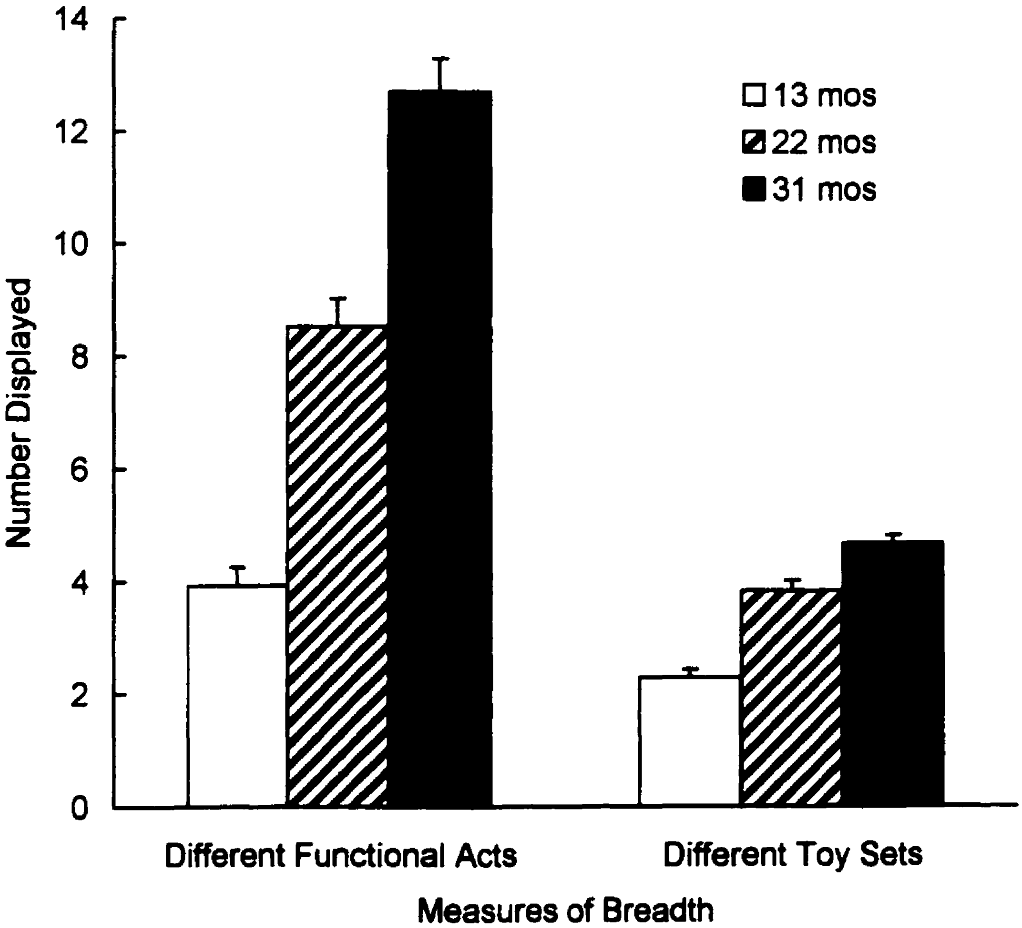
Figure 3. Mean percentage of total play (Stereotypical plus Functional) for each type of play (+SE) pre- and post-treatment.

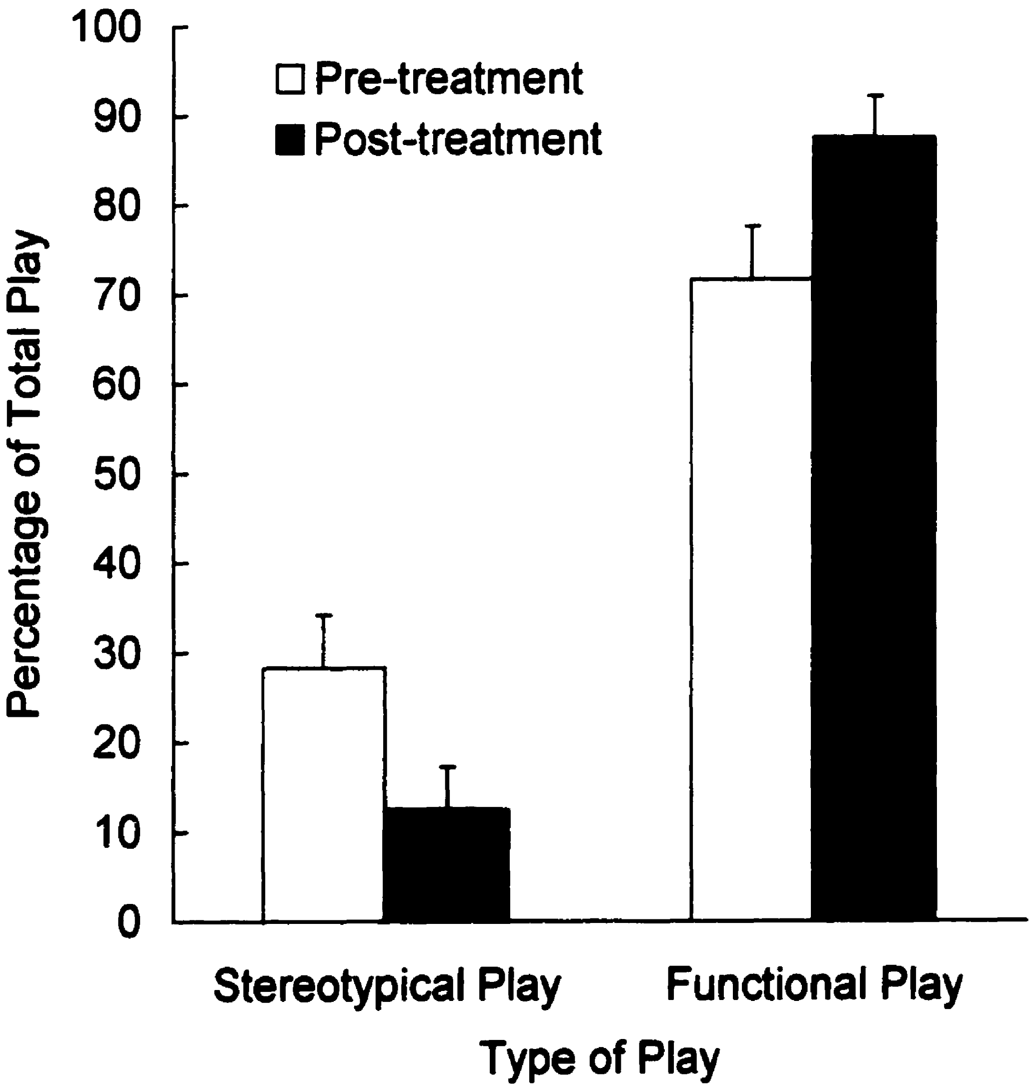
Figure 4. Mean number of different functional uses displayed and number of different toy sets used (+SE) pre- and post-treatment.

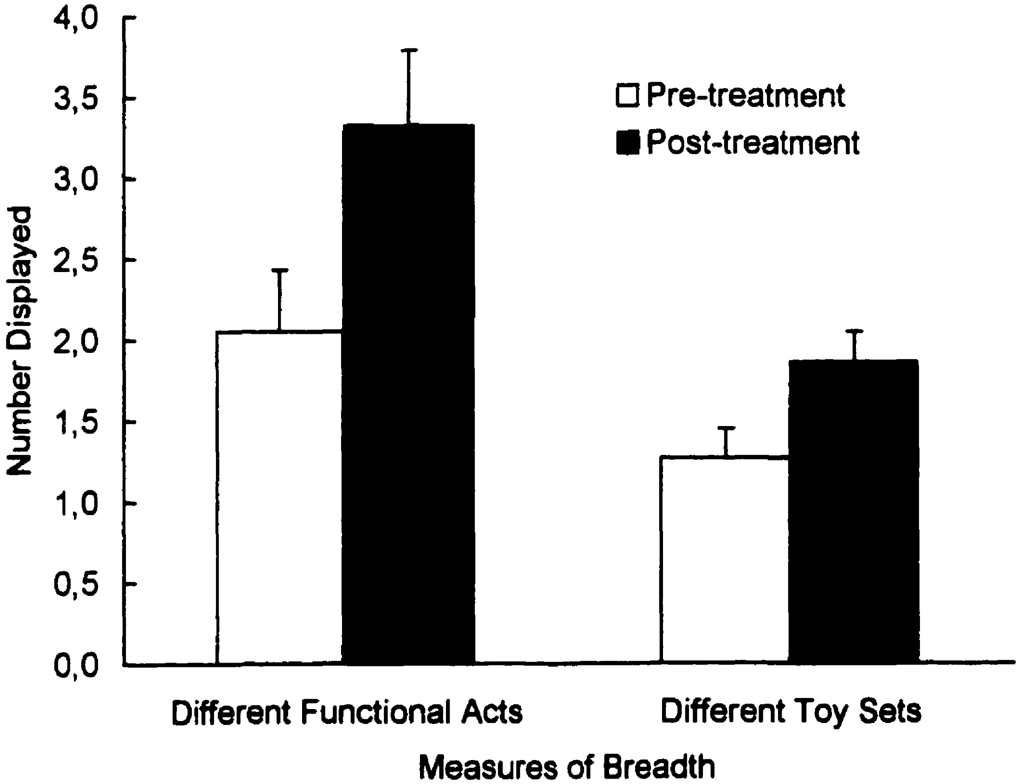
Figure 5. Mean number of different functional uses displayed and number of different toy sets used in the longest epoch of play (+SE) pre- and post-treatment.

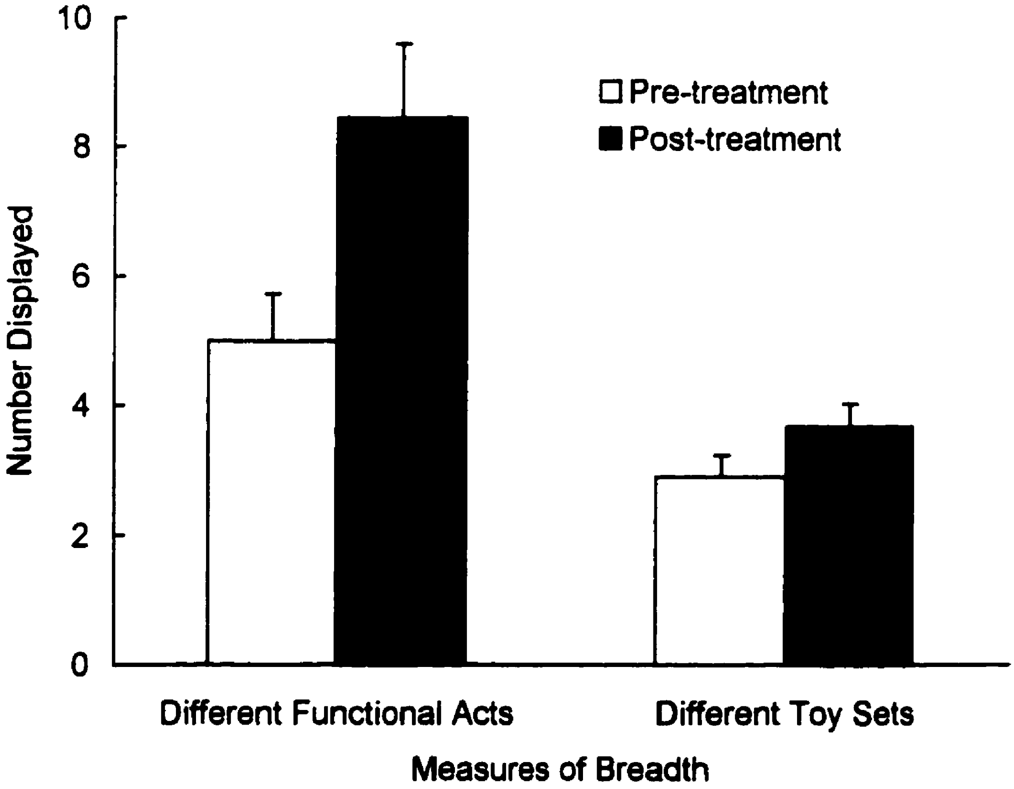


100
90
80
70
60
50
40
30
20
10
0
13 mos
22 mos
31 mos
Percentage of Total Play
Stereotypical Play
Functional Play
Type of Play


14
12
10
8
6
4
2
0
Number Displayed
13 mos
22 mos
31 mos
Different Functional Acts
Different Toy Sets
Measures of Breadth


100
90
80
70
60
50
40
30
20
10
0
Percentage of Total Play
Pre-treatment
Post-treatment
Stereotypical Play
Functional Play
Type of Play


4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
Number Displayed
Pre-treatment
Post-treatment
Different Functional Acts
Different Toy Sets
Measures of Breadth



10
8
6
4
2
0
Number Displayed
Pre-treatment
Post-treatment
Different Functional Acts
Different Toy Sets
Measures of Breadth

GENERAL DISCUSSION

Play data from two larger treatment-outcome studies on toddlers with pervasive developmental disorder and autism, and from a larger normative longitudinal study, were analysed in order to: (1) compare play of normally developing children to play of children with delays with intact versus impaired processing; (2) investigate differential impact of a parent-implemented cognitive-behavioural treatment on the play of children with intact versus impaired processing; and to (3) investigate the use of information processing, and non-verbal play measures, including sustained attention, for use with children with delays. The **first paper** examined the impact of 10 months of parent-implemented treatment on play in children with impaired and intact processing, and demonstrated clear improvements for children with intact processing and less improvements for those with impaired processing. Moreover, the findings revealed that breadth of play, as measured by the number of appropriate uses displayed for a set of toys, reliably discriminated children with intact from children with impaired processing prior to, during, immediately after treatment, and at follow-up. The **second paper** investigated the impact of six months of treatment on children with intact processing only, and demonstrated clear improvements in play with treatment. Findings also revealed that children with PDD and autism displayed delayed play relative to normally developing age-mates. Of particular interest is the finding that the analysis of the longest epoch of play was a useful measure for both the normal and delayed sample, even after a ceiling had been attained on other measures of play.

Diversity and Levels of Play in normally developing children and children with PDD and autism

Normally developing children The findings revealed, that for the sample of normally developing toddlers, the amount of stereotypical play decreased from 13 to 22 months, while the amount of functional play increased from 13 to 22 months at which point it reached a ceiling; 95% of the children's play was functional by 22 months. This pattern, outlining the quantity of types of play from 13 to 31 months of age, is in line with previous findings. For instance, Rosenblatt (1977) reported that functional play (appropriate toy play) increased steadily from 12 to 18 months and remained stable from 18 to 24 months, while stereotypical play (indiscriminate play) decreased sharply from 9 to 18 months and remained stable thereafter. By 24 months, almost 80% of the children's play was functional, and the children displayed almost no stereotypical play. Similarly, Largo and Howard (1979) reported that by 21 months, no children in their sample were displaying stereotypical play (mouthing, manipulatory play), while all the children were displaying functional play (functional play, representational play). Belsky and Most (1981) reported that stereotypical play (mouthing, simple manipulation) showed a large linear decrease from 7 1/2 to 15 months, and levelled off at 16 1/2 months. Finally, Fenson et al. (1976) found that by 20 months, only 12% of children displayed stereotypical play, while all the children displayed functional play (accommodative relational, symbolic acts).

Our findings also revealed that the "diversity" or "breadth" of play, as measured by the number of different appropriate uses the children displayed for the toys, and the number of different toys used during the session increased linearly from 13 to 22 to 31 months. Fenson et al. (1976) reported similar findings. They found that the number of different acts displayed increased significantly from 13 to 20 months in their cross-sectional study. Similarly, Rosenblatt (1977) reported a linear increase in the number of toys used and in the number of responses generated by toddlers from nine to 13 to 18 to 24 months. Our findings, coupled with those of other researchers, indicate that amount of functional play reaches a ceiling around 22 months of age, while breadth or diversity of play continues to increase linearly after 22 months. Unfortunately, there is a paucity of studies reporting diversity of play, as defined here, beyond 24 months.

We also investigated the length of the longest epoch of sustained play. We found that, at both 13 and 22 months, children sustained play for approximately 1 minute; however, at 22 months they integrated 63% more ideas into their play, and 75% more toys, indicating greater sophistication of play. The length of the longest epoch of sustained play increased from 56 seconds at 22 months to 86 seconds at 31 months. Moreover, they integrated more toys into their play and more uses as well. Other studies that have considered sustained attention in play, have used different definitions of epoch of sustained play than we did here. Although this makes comparison with the literature more difficult, the general trend is the same -- as children mature, they are able to sustain play longer. Haight and Miller (1993) measured the mean duration of pretend play episodes in a longitudinal study of normally developing children at 12, 24, 36 and 48 months. They defined an episode of pretend play as a "continuous stretch of pretending on a given theme or topic" (p. 21). They found that mean duration increased from 0.2 minute per episode at 12 months to 0.9 at 24 months, 1.5 at 36 months, and 2.8 at 48 months. Rosenblatt (1977) studied 20 children longitudinally from 9 to 24 months in their homes. She defined sustained play as the amount of time that the child spent actively engaged with toys and found that at nine months, there was virtually no sustained attention with infants changing toys and responses every few seconds. By 18 months, however, children sustained play for one minute and by 48 months, five minutes or more.

In sum, by 22 months of age, the normally-developing children in our study were no longer engaging in stereotypical play -- all their play time was functional. From 22 to 31 months of age, they played for longer periods of time without distraction, and their play continued to diversify. Future studies are needed to map the length of sustained epochs of play beyond 31 months.

Children with intact versus impaired processing The toddlers with PDD and autism in both treatment outcome studies displayed extremely delayed play prior to treatment when compared to normally developing toddlers. Thirty-four month-old children, with intact information processing, from the follow-up treatment study, prior to treatment, were functioning at 17.5 months both in amount of different types of play and in diversity of play, while they were performing in the 13-month-old range on measures of the longest epoch of play. Although it is not possible to compare the play of the toddlers with delays in the initial treatment outcome study with the normally developing toddlers in the longitudinal study reported here because of different procedures, a rough comparison can be made with a cross-sectional study of 9 1/2 to 15 1/2 month-old infants conducted by Zelazo and Kearsley (1980) using the same procedures. The 22 month-old children with intact processing in our study, prior to treatment, were performing more poorly than the 15 1/2 month-old normally developing children in Zelazo and Kearsley's study. Similarly, the children with intact processing at 32 months were clearly delayed, as their play was only a margin better than that of the 15 1/2 month-old normally developing children. It is interesting to note that the results for the 32-month old children with PDD and autism and intact processing in the initial treatment outcome study and the 34-month old children with intact processing in the follow-up treatment outcome study were functioning at approximately the same level -- that of a 17 month old child. This concordance in findings adds credence to our results.

The children with impaired information processing had extremely delayed play across the board. The 22 month-old children with impaired processing, spent 0.4% of their time in functional activity, 82% in stereotypical activity, and displayed 0.2 appropriate uses for their toys prior to treatment. This put them at 9 1/2 months when compared with Zelazo and Kearsley's normative sample. Moreover, the 32 month-old children with impaired processing spent 33% of their time in functional play and 16% in stereotypical play; and they displayed 4.6 appropriate uses, placing them below what would be expected at 13 1/2 months.

Our findings indicate that children with PDD and autism who have intact processing display better play than those with impaired processing. No other studies have investigated the distinction between children with intact and impaired processing. However, our overall finding, that children with PDD and autism are delayed in their play relative to normally developing age-mates, is in line with other studies (Casby & Ruder, 1983; Cunningham, Glenn, Wilkinson, & Sloper, 1985; Fewell, Ogura, Notari-Syverson, & Wheeden, 1997; Fewell & Rich, 1987; Hill & McCune-Nicolich, 1981; Lombardino & Sproul, 1984; Odom, 1981; Sigman & Sena, 1993; Wing, Gould, Yeates & Brierly, 1977). For instance, Sigman and Ungerer (1984) compared the play of children who were matched on mental age (Mental Age was 25 months) and who had autism [Chronological Age (CA) 50 months], mental retardation [CA 50 months] or who were developing normally [CA 21 months]. They demonstrated that although children with mental retardation did not differ in their play from that of normally developing age-mates, the play of the children with autism was significantly worse. Specifically, children with autism displayed five different functional acts; while children with mental retardation and normally-developing children displayed 11 and 10 respectively. Children with autism spent 29% of their play time in functional activity; while children with mental retardation and normally-developing children spent 54% and 46%, respectively. Sigman and Ungerer's definition of functional play was similar to ours, however, it did not include such acts as pouring imaginary tea from a teapot into a cup as we did; this difference may account for the comparatively lower percentages of functional play displayed by the children in their sample. Also, Krakow and Kopp (1983) conducted two studies (Mental Age 17 and 28, respectively) comparing the play of mental-age-matched normally developing children, children with Down's Syndrome, and children with developmental delays of unknown etiology. They found that children in all three groups, in both studies, engaged in similar amounts of developmentally appropriate manipulative and functional play. However, they found a different pattern when they compared the groups on sustained attention (total time that the infant remained engaged with toys). In the first study, they found no difference in the duration of engagement in play between children with Down's Syndrome and normally developing children, but they found that children with developmental delays of unknown etiology spent less time engaged in play with toys than did the children with Down's Syndrome. However, in the second study they found that all three groups displayed similar amounts of sustained attention during play. Notwithstanding the ambiguous results, what is clear is that the children with developmental disabilities, both Down's Syndrome and developmental delays of unknown etiology, did not sustain attention during play at an age-appropriate level. In line with the latter, Sigman and Sena (1993) reported that children with mental retardation also displayed shorter "duration of play acts" when compared to normally developing toddlers.

Overall, our findings, in the context of available literature, indicate that children with developmental delays, including PDD and autism, are delayed in their play relative to normally developing age-mates. The literature generally indicates that children with developmental disabilities play at a level that is commensurate with their mental age (e.g., Casby & Ruder, 1983; Cunningham, Glenn, Wilkinson, & Sloper, 1985; Fewell, Ogura, Notari-Syverson, & Wheeden, 1997; Fewell & Rich, 1987; Hill & McCune-Nicolich, 1981; Lombardino & Sproul, 1984; Odom, 1981; Sigman & Sena, 1993; Wing, Gould, Yeates & Brierly, 1977). Some findings however, seem to indicate that children diagnosed with autism differ in their play from children diagnosed with other disorders (e.g., Baron-Cohen, 1987; Leslie 1987, 1988; Sigman, 1994). The DSM IV (APA, 1994) identifies, as one of the symptoms of autism, abnormal functioning in symbolic or imaginative play. Our findings that children with PDD and autism who also have impaired processing have extremely immature play relative to that of children with intact processing adds a piece to the puzzle. Future research with children with developmental disabilities should take into account the fact that within a seemingly homogenous population, that of children with PDD and autism, there are at least two subgroups of children: those with intact and those with impaired processing that have very different play profiles.

<u>Treatment</u>

Findings from both treatment-outcome studies revealed improved play with treatment in children with PDD and autism and intact processing. These findings extend previous findings (Lalinec, 1995; Lalinec, Zelazo, Rogers, & Reid,1995; Laplante, Zelazo & Kearsley, 1984; Zelazo, 1989, 1997b; Zelazo & Kearsley, 1984) of improvements in several areas of functioning, including scores on conventional tests of intelligence, both verbal and non-verbal scales, expressive language, behaviour, and mothers' psychological functioning. Thus, the treatment, which targeted compliance and language development through play, was also effective in improving play; once non-compliance was diminished, and compliance achieved through shaping, children with PDD and autism began to manipulate objects in more meaningful ways. The fact that children's object use in a free-play setting improved with treatment indicates that the treatment program was successful in generalising what the child learned in treatment to the child's real world. The children incorporated the skills learned during the treatment session into daily existence and showed that they could display them in an unfamiliar context.

Others have reported similar results with different early intervention programs. Although a thorough review of these studies is beyond the scope of this paper (for a comprehensive list of reviews see White, Bush & Casto, 1985-86), two will be described here. Moran and Whitman (1985) investigated the impact of a six-week parent-implemented behaviour-modification approach with children with developmental delays. They found that (a) mothers increased prompting and rewarding of appropriate behaviours in their children; (b) infants increased their appropriate toy play (i.e., they played more frequently and more appropriately but also more frequently initiated play); (c) mother-child interactions improved; and that (d) mothers' sense of self-efficacy increased. Lovaas and Smith (1988) conducted a two year treatment outcome study using an intensive 40-hour a week behavioural program. The children in the sample were diagnosed with autism, were below 46 months of age, and had a mental age of 11 months or more. Participants were assigned to either an intensive-treatment experimental group (n=19) which received 40 hours of one-to-one treatment per week or to a minimal treatment control group (n=19) which received 10 hours a week or less of one-to-one treatment. A second control group (n=21) did not receive any treatment by the Lovaas and Smith team. Results after treatment indicated full education and intellectual recovery for nine of the 19 participants in the experimental group; partial recovery for eight and no recovery for two of the participants. In contrast, only one participant in the control group achieved normal functioning, 18 partial and 21 no recovery. It is interesting to consider what characteristics discriminate the three subgroups within the experimental condition. It is plausible to hypothesise that some of the children who did not recover from their delays had impaired information processing ability.

The advantages of the treatment program described in Learning to Speak are numerous. First, this program is parent-implemented, a characteristic that many feel is very important (e.g., Bronfenbrenner, 1975; Revill & Blunder, 1979). In fact, White, Bush and Casto (1985-86) in a review of reviews of early interventions found that 26 out of 27 reviewers who reached a conclusion on parent-involvement agreed that more is better. Second, it is intended to be implemented as early as possible in a child's life, another characteristic that is considered crucial (e.g., Beller, 1979; Brassell & Dunst, 1978; Gray & Wandersman, 1980; McCune et al., 1990); White and colleagues found that 18 out of 24 reviewers agreed that the earlier the better. Third, this program has been shown to impact positively on the mother's psychological functioning (Lalinec, 1995). Fourth, the treatment program satisfies most of the criteria identified as important by Kysela and McDonald (1987). That is, it is implemented in the home, therefore within the child's natural environment rather than within the "unnatural" clinical setting; integrates generalisability of both targets and methods; and focuses on functional results, thus preparing the child to interact and function within her or his natural environment. Finally, the treatment program has been shown to be effective after ten and after six months. "This has clinical importance give the high demands made on public health care providers with resulting waiting lists and push for rapid turnover" (Lalinec, et al., 1995). However, White, et al. (1985-86) found that 12 out of 17 reviewers agreed that longer and more intensive treatments were better. Lovaas' (Lovaas, 1987; Lovaas & Smith, 1988) program is considerably more intensive (40 hours per week) and much longer (2 years) than ours, but is consequently much more expensive ($40 000 per child). Nevertheless, given ambiguous findings about the import of intensity and duration, it would be useful to conduct a study comparing the effectiveness of a treatment such as the one described in Learning to Speak with the Lovaas program.

Assessment

Information Processing Procedure. Although the predicted interaction, that children with intact processing would benefit from treatment while children with impaired processing would not, did not materialise, the differential impact of treatment on the play of the two subgroups of toddlers with PDD and autism was clear in the cross-lag comparisons. The children with impaired processing had extremely delayed play and improved much less than did the children with intact processing. Because the groups were formed on the basis of level of information processing, the distinction between the groups on a completely different dependent variable, level of play, provides validity to the information processing procedure as a measure of mental ability. Zelazo and colleagues (Zelazo, 1989, 1997a; Zelazo & Kearsley, 1984) previously reported a clear interaction for IQ and rate of development: children with intact processing improved, and some even "caught-up", while children with impaired processing got worse. Taken together, these findings validate the impaired/intact distinction that is made using the Information Processing Procedure.

These findings are significant for the assessment of toddlers with PDD and autism, as well as for children with other disabilities. Zelazo (1989) reported that three out of four children who presented with PDD and autism, as diagnosed with conventional tests, had intact processing. Our findings, and those of Zelazo and colleagues (Zelazo, 1989, 1997a, 1997b; Zelazo & Kearsley, 1984), support the hypothesis that it is possible for mental ability to be normal – that is, for a child to have intact information processing ability – and to display delayed development on conventional tests. When one considers other studies of children with mental retardation, autism or developmental delay, it becomes evident that there are significant amounts of disagreement about diagnosis, especially around autism. Bernheimer and Keogh (1986) stated that "In terms of diagnosis [...] autism is the most ambiguous" (p.71). The intact/impaired processing distinction may, however, shed some light on this problem. For example, Lovaas and Smith (1988) found that out of 19 toddlers with autism, nine recovered, eight recovered partially, and two did not recover at all with treatment. Bachevalier (1994) found that 60 to 70% of the children with delays in his sample had distinct signs of neurological dysfunction with accompanying mental retardation, while 30-40% had no mental retardation. Niemann (1996) claims that there are two subclasses of autism that should be placed along a continuum from severe to minor intellectual deficits. How many of these children had intact versus impaired processing? The importance of distinguishing children with intact from those with impaired processing early on cannot be overemphasised. The consequences of labelling a cognitively intact 20 month old child as "autistic" or "mentally retarded" simply because the child lacks speech and fails to comply with the examiner's demands are disastrous (Zelazo, 1979). Instead of depending solely on expressive language and compliance as ways of inferring mental ability, clinicians should attempt to use alternate assessment procedures such as information processing and play, that are less dependent on developmentally vulnerable behaviours to supplement their assessments.

Play assessment The findings of all the studies revealed that our free-play assessment paradigm, including the measure "longest epoch of sustained play", is objective and easy to administer, and has clinical validity. Based on the measures from this paradigm, a developmental progression among normally developing toddlers that is in line with the literature was produced. Furthermore, the paradigm was shown to be sensitive to changes due to treatment in toddlers with PDD and autism. Finally, and perhaps most interestingly, the paradigm clearly distinguished children with intact from those with impaired processing prior to, during, and after treatment, as well as at follow-up.

From all the studies reported here, it is clear that one of the most reliable measures of play, for the purposes of assessment, is "diversity" or breadth of play (Zelazo & Kearsley, 1980) -- whether it is diversity within the entire session or within the longest epoch of sustained play. However, it is likely that, as children grow older and more mature, the diversity of their play within the play session will reach a ceiling; that is, they will display all of the appropriate uses that are delineated by the paradigm. Yet the measure "length of the longest epoch of sustained play", analysed for diversity or breadth, may continue to change as children mature. In line with this prediction are findings of a linear increase in sustained attention in free-play up to 48 months (Haight & Miller, 1993; Sarid & Bregnitz, 1997). Consequently, the measurement of the length of the longest epoch of sustained play, along with an analysis of the "diversity" of play within the longest epoch, may be the most parsimonious measure to assess level of play sophistication from a very early age to at least 48 months in normally developing children and beyond in children with delays. In fact, the finding that length of the longest epoch of sustained play continues to change beyond the plateau in amount of functional play is a sign that these longer epochs may in fact represent symbolic play. It is plausible to conjecture that these "longer" epochs of play are reflective of an increasing sequencing of play acts, as is seen in symbolic play. In line with this is Haight and Miller's (1993) argument that while overall frequency of play reflects children's tendency to play, the duration of individual episodes may reflect the players' ability to sustain and elaborate play. Because the variable "longest epoch" is non-verbal, and generated from a free-play context, it is a promising measure for the assessment of symbolic play in children who cannot confirm that they are in fact pretending by vocalising their intent or who are too non-compliant to follow the examiner's request to imitate symbolic acts.

This same paradigm has been used, experimentally, in a number of studies over the years (e.g., Laplante et al., 1990; Zelazo & Kearsley, 1980). It has also been used clinically for many years with much success. Moreover, Zelazo, Rotsztein, Reid and Carlin (1997, 1998) used this same paradigm to compare the play of normally developing children, children with Down's Syndrome and children who were at high-risk of delays. They found that the children with Down's Syndrome displayed the fewest different appropriate uses, shortest sustained "longest epoch of play", and the greatest amount of immature stereotypical play when compared with the normally developing and high risk toddlers. Furthermore, Zelazo and Kearsley (1980) used a similar paradigm to assess play skills in a child who had spent the first 380 days of his life in an intensive care unit and whose neuromotor and psychosocial experiences were severely limited. The procedure proved highly useful for highlighting the child's intact cognitive abilities despite clear delays in expressive abilities. Coupled with these finding, our results, that children with PDD and autism play significantly worse than normally developing children, and that children with impaired processing perform more poorly than children with intact processing, provide evidence for the discriminative validity of this procedure.

The advantages of this particular paradigm are numerous. First, this procedure is brief and effective at screening to determine whether or not more lengthy and expensive assessment procedures are warranted. Second, it uses a representative sample of toys that possess unambiguous object-specific uses. Realistic toys are a crucial prerequisite for this kind of assessment since they can elicit relational and stereotypical play, along with functional play, but non-functional objects, such as a toy bug or a "slinky" are biased toward less mature use (Zelazo, 1979), thus severely limiting the generality of the results. Thus, the toys we use lend themselves to all three forms of play and are necessary for a representative sampling of capacities for object use at early ages. Finally, and most importantly, it circumvents most of the problems identified with conventional tests and is therefore highly appropriate for children who are non-verbal and non-compliant.

Conclusion

Play data from two larger treatment outcome studies of children with PDD and autism, and one normative longitudinal study were analysed to (1) compare play of normally developing children to play of children with PDD and autism with intact versus impaired processing; (2) investigate differential impact of a parent-implemented cognitive-behavioural treatment on the play of children with intact versus impaired processing abilities; and to (3) investigate the use of information processing, and non-verbal play measures, including sustained attention, for use with children with PDD and autism. Findings highlight immature play for children with impaired and intact processing relative to normally developing children, with children with impaired processing performing significantly worst. With treatment, sophistication of play improved substantially for children with intact processing, less for children with impaired processing. Finally, the usefulness of both information processing and play as alternative assessment procedures for children who are non-verbal and non-compliant was demonstrated. Future studies should attempt to validate further the use of the "longest epoch of play" variable as a measure of symbolic play by comparing it to traditional measures of pretend play. Moreover, norms for the free-play assessment paradigm should be established in order to make it more useful clinically.

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