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Assessing toddlers' problem-solving skills using play assessment: Facilitation versus non-facilitation

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ASSESSING TODDLERS' PROBLEM-SOLVING SKILLS USING PLAY ASSESSMENT: FACILITATION VERSUS NON-FACILITATION

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Play assessment is rapidly emerging in the field of cognitive assessment in young children. One aspect of play assessment involves the identification of the types and levels of problem-solving skills children possess. Information about a child's degree of problem-solving skills could aid school psychologists in understanding the child's level of cognitive development. Research in the area of play assessment has not focused as much attention on problem solving as it has on other components of play. More research is needed in order to determine if a free play session or an adult-facilitated session is better for assessing a child's problem-solving skills using play assessment. The purpose of the present study was to identify differences in problem-solving behaviors when assessment takes place in a nonfacilitated versus a structured facilitated play assessment session. Twenty children ages 18-48 months were observed playing in either a structured facilitated or a nonfacilitated setting. It was expected that differences in the level of problem-solving behaviors would exist between the two types of play sessions and that certain toys would elicit more problem-solving behaviors than others. Results indicated that there was not a significant difference in the level of problem solving exhibited by children in the facilitated or the nonfacilitated sessions. Considerations for future research are discussed.

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Assessing Toddlers' Problem-Solving Skills Using Play Assessment: Facilitation versus Non-Facilitation

Play assessment is rapidly emerging in the field of cognitive assessment of preschool-aged children. Children's play is a natural reflection of cognitive development. Practitioners can look toward play behaviors to gain knowledge about a child's level of development. One aspect of play assessment involves the identification of the types and levels of problem-solving skills children possess. Malone and Langone (1999) expressed that there has not been enough attention devoted to researching behaviors in the context of play. Further, research in the area of play assessment has not tended to focus as much in the area of problem solving as it has in other components of play. Within the framework of play assessment, researchers should determine the optimal conditions under which to assess problem-solving skills. For example, if it is determined that some children are more apt to display problem-solving behaviors in a structured, facilitated play session rather than in a free play session, then perhaps the assessment should include a structured, facilitated component in order to effectively assess the child's problem-solving skills. The purpose of the present study was to provide information about the type of play setting that should be used in a play assessment when practitioners are interested in the problem-solving component of play.

Contributions to School Psychology

One role of the school psychologist is to provide early childhood assessment when developmental delays are suspected in preschool-aged children. Standardized tests are not always representative of the potential capabilities of a young child, especially if

the child is disabled or disadvantaged. Play assessment could be used as an accompaniment to traditional standardized measures of assessing cognitive development in preschool-aged children. Observing a child's play behaviors in a natural, non-threatening environment can provide a practitioner with information about the child's level of cognitive development in general as well as compared to the developmental level of his or her peers. School psychologists working with elementary children can use findings from preschool play assessments to help them determine the reasons children may have been eligible for services before they started school (Ross, 2002). In particular, information about a child's problem-solving skills is important to the school psychologist's understanding of the child's level of cognitive development. Children need adequate problem-solving skills to generalize problem solutions to other problems, to gather information from several situations and experiences and use that information to solve a new problem, and to generate alternative ways to solve a particular problem (Chen, Sanchez, & Campbell 1997). In order to conduct a thorough assessment and design effective interventions, the school psychologist should consider the child's competency in solving problems once this aspect of the child's cognitive functioning is known. The present study contributes to the field of school psychology and early childhood assessment by adding to the research on the specific aspect of problem solving as it is evaluated using play assessment.

Early Childhood Assessment

Assessment can be used in the preschool years to determine if early intervention services are needed to prevent childhood problems. This, in turn, may prevent later

problems (Lidz, 1977). When a parent or physician is concerned that a child is not developing in some capacity at an appropriate rate, it is necessary for school psychologists and other early childhood specialists to verify (or refute) these concerns and provide assistance with early interventions to try to alleviate or diminish future problems the child might otherwise encounter as a result of his or her developmental delays. The need for effective early childhood assessment has increased since the passage of Public Law 99-457 in 1986 that required at-risk children aged three to five to receive assistance through the public school system. More recently, the Individuals with Disabilities Education Act, 1997 (IDEA 97), was revised to include infants and toddlers from birth through age two in the early education requirements.

Common instruments that are used in the United States to assess the cognitive functioning of preschoolers are the Stanford-Binet Intelligence Scale: Fourth Edition (S-B IV) (Thorndike, Hagen, & Sattler, 1986), the Differential Ability Scales (DAS) (Elliott, 1983), and the Wechsler Preschool and Primary Scale of Intelligence – Revised (WPPSI-R) (Wechler, 1989). A primary purpose of such standardized tests is to assess a child's need for special services (Salvia & Ysseldyke, 2001).

Now that schools are focusing more on the needs of preschool-aged children, school psychologists must find reliable and valid methods of assessing the cognitive functioning of these children, a task which is sometimes difficult in cases involving young children with handicaps (Schakel 1986). Many standardized tests offer normative data as well as strong reliability and validity measures, but often the tests cannot be adapted to meet the needs of exceptional children. Furthermore, standardized testing has

received much criticism due to its limitations. Some of the limitations are as follows: (a) testing generally does not occur in the child's natural setting, (b) the test results are not appropriate for use in monitoring progress or designing interventions, and (c) the tests are often normed on a population of typically developing subjects, making assessment of cognitively delayed children difficult. Criticisms of standardized tests also focus on the difficulty in determining whether the tests really measure the constructs they are supposed to measure and the uncertainty about whether standardized tests are appropriate for assessing preschool-aged children (James & Tanner, 1993). In addition, standardized tests often lack predictive and concurrent validity, which renders them inappropriate for assessing preschool children (Neisworth & Bagnato, 1992).

Play Assessment

Fortunately, many researchers and practitioners realize the limitations of using standardized testing to assess preschool-aged children and are working toward finding more reliable and valid alternatives. One alternative currently in its infancy, although gaining attention in the literature, is play assessment. Because play is a non-threatening and natural activity (Lowenthal, 1997), the child is likely to exhibit behaviors during play assessment that are typical for that child. In contrast, the child is not as likely to exhibit typical behaviors during a standardized testing procedure in which the child is providing responses to more structured, rigid questions or tasks with which the child is unfamiliar.

The theoretical roots of play assessment originated in the models of cognitive development proposed by Piaget and Vygotsky. Piaget (1962) proposed a four-stage model of cognitive development. He distinguished among types of play that emerge

during the early stages. In the first stage the child forms schemas of events that can be later applied to new situations. Grasping, shaking or moving objects are examples of play behaviors a child might exhibit during this stage. As the child learns to apply existing schemas to new situations, play becomes more functional. Symbolic play emerges during the second period, followed by more realistic symbolic play. Vygotsky (1966) also subscribed to the stage-like notion of play. He believed that play is a purposeful activity and that a child develops through play, using play as a means to learn about the environment and to eventually apply this learning to reality.

In general, play assessment involves observation of the child's behaviors while playing in a naturalistic setting in order to collect information about the child's development and cognitive functioning across several domains (e.g., early object use and symbolic play). The level and category of play the child exhibits is coded. The codes are hierarchical such that a higher play code indicates a higher level of cognitive functioning. In addition to several core domains such as exploratory or symbolic play, information can be obtained about behaviors in supplemental domains, including information about the child's ability to problem solve. Play assessment is a broad term that describes several measures that assess play in ways that are unique to each measure. Just as there are many different types of standardized intelligence tests, several types of play assessment also exist (Athanasiou, 2000).

One type of play assessment is the Play Assessment Scale (PAS), developed by Fewell (Athanasiou, 2000). The PAS was designed to be used with children ages 2 to 36 months. Each play session consists of the child engaging in spontaneous play and is

followed by a segment in which the child is prompted to play with specific toys or respond to specific verbal and/or motor items. Another type of play assessment, Transdisciplinary Play-Based Assessment (TPBA), developed by Linder (1993), involves a diverse team of people involved with several different aspects of the child's life. Transdisciplinary refers to the idea that a team of people from several disciplines are involved in the assessment of the child, including educators and parents. The involvement of parents and several disciplines in the school is an advantage over standardized testing because people that are familiar with the child across many settings can provide input about the child's needs. Several different aspects of the child's behaviors are observed as part of TPBA. The child is observed during free play as well as facilitated play, and interactions are observed between the child and a peer as well as between the child and a parent. Each team member is involved in observing the child and is subsequently involved in making educational decisions for the child.

Transdisciplinary play-based assessment formed the basis for the development of the Play Assessment of Cognitive Skills Scale (PACSS) (Kelly-Vance et al., 2000). PACSS has evolved into a scale that uses a much more specific coding scheme than Linder's. The PACSS observation sessions also differ from TPBA in that observation sessions using PACSS are limited to a free play session followed by a facilitated segment in which the child is prompted to play with specific items he or she did not play with while engaged in free play (Ryalls et al., 2000).

Practitioners have widely accepted the use of play assessment as a means of assessing preschool-aged children (Myers, McBride, & Peterson, 1996). Unfortunately,

the flexibility involved in play assessment often lends itself to subjectivity in conclusions drawn from observation, which can affect scores based on the person rating the behaviors. Kelly-Vance, Needelman, Troia, and Ryalls (1999) found that 2-year-olds who were assessed using a modified form of TPBA, Play-Based Assessment, and also using the Bayley Scales of Infant Development-II (BSID-II) scored higher on the Play-Based Assessment than on the BSID-II. Kelly-Vance et al. noted that the children may have been able to perform better during play because the play sessions did not involve the restricted format of the BSID-II; however, the authors also noted that the data from the Play-Based Assessment could have been more influenced by the rater due to the assessment's subjectivity.

Farmer-Dougan & Kaszuba (1999) took steps to minimize the subjectivity involved in assessing play behaviors and to establish the reliability and validity of play assessment. A classroom-based play observation system was used as the play assessment in their study, which consisted of 42 children ages 3 to 5. The Battelle Developmental Inventory (BDI) was used to obtain standardized scores of each child's cognitive ability. In addition the Social Skills Rating Scale – Teacher Form (SSRS-T) was used to measure the children's social skills. Play categories were defined in terms of social play and cognitive play. The children were videotaped playing over four 10-minute periods, and four independent observers later coded their play behaviors. The observers coded until a minimum interrater reliability of .90 was established. Results indicated that the children's play behaviors predicted their scores on both the BDI as well as the SSRS-T. These results strengthened the credibility of play as a viable assessment tool as long as

play categories are operationally defined. The present study adds to the limited amount of research available regarding the effectiveness of using play assessment to measure the cognitive development in preschool-aged children by looking specifically at children's problem-solving skills.

Problem Solving in Young Children

Within the area of play assessment, a child's ability to problem solve reflects the child's level of overall cognitive functioning. Research indicates that problem-solving skills develop early in childhood. Infants as young as 6 months of age have been found to actively elicit help from their mothers to achieve a goal (Mosier & Rogoff, 1994). Caruso (1993) examined the exploratory and problem-solving behaviors in a group of 11- to 12-month-old infants. To elicit exploration, the infants were presented with toys that were novel to the infants but not completely unfamiliar in terms of the infants' prior experience of objects. Exploratory play was coded based on the number of ways the infant explored a toy, the infant's use of the same exploratory behavior with different toys, and the use of an exploratory behavior that had previously been used after using new behaviors.

Next, problem solving was examined by using tasks specifically designed to elicit problem solving. First, the infant was presented with a Plexiglas box that contained a small toy. The box contained two openings, and the toy would only fit through one of the openings. Infants were prompted to retrieve the toy from the box. The second task involved two Plexiglas shields placed parallel to each other and attached to a wooden base. The shields were close enough together that an infant's hand would not fit between

them. A toy was placed between the two shields with a string attached to the toy and draped over the top and to the outside of one of the shields. The child was again encouraged to retrieve the toy from the apparatus. Problem-solving behaviors were then coded according to the child's looking behaviors at both the apparatus and the toy, behaviors directed toward the apparatus, reaching, touching, successful and unsuccessful attempts to remove the toy, and absence of behaviors directed at the apparatus. Information about persistence, strategy use, and sophistication in problem solving were gathered from the coding. Problem solving was represented by the infant's persistence in trying to retrieve the toy, the number of different strategies the infant tried, and whether the infant solved the problem right away, after some or lots of trial and error, or not at all. The infant's breadth and depth of exploratory play was then compared to the problem-solving variables to determine if relationships existed between the two types of play. The major finding was that as early as one year of infancy the child's breadth of exploratory behaviors, or the number of different schemes used to explore an object, were related to the child's problem-solving behaviors.

DeLoache, Sugarman, and Brown (1985) studied the corrections 18- to 42-month-old children made to errors that occurred while trying to nest a set of seriated cups. The cups were placed in front of the child and the child was told that the cups were for him or her to play with. If after two minutes the child did not spontaneously try to nest the cups, the experimenter fully nested the cups out of the child's sight and then presented them to the child. After the child could see the end result, the experimenter again took the cups out of the child's sight, disassembled them, and placed them back on the table. Findings

indicated that the children's error correction strategies became more flexible with age, meaning the younger children tended to focus on the fact that two of the cups did not fit together, while the older children incorporated strategies that involved using all of the cups. The authors concluded that more extensive research is needed regarding children's problem solving in terms of how children correct errors made while attempting to achieve a goal.

Children not only develop strategies used to correct errors when attempting to achieve a goal, but through this experience there seems to be a period in development when they begin focusing on producing expected outcomes (Bullock & Lutkenhaus, 1988). Bullock and Lutkenhaus observed 15- to 35-month-old children as they participated in play and clean-up tasks. Tasks involved using blocks to build a tower and to dress a wooden figure. For the tower-building task, five trials were presented. Each trial consisted of three blocks, each of which was painted in such a way that when the blocks were stacked into a tower they would form a picture. The children were also presented with unpainted blocks. The experimenters were looking to see if the children would stop building the tower once the desired outcome was reached or if they would keep working by using the unpainted blocks. For the figure-dressing task, the children were presented with a wooden figure that was surrounded by a box. The box contained four blocks of different colors, and their positions in the box were marked with matching colors painted on the inside of the box. The children were told that the blocks were the figure's clothes and the figure needed them to stay warm. The children were also presented with extra blocks not needed to dress the figure. After being asked to dress the

figure, the experimenters again looked for whether the children stopped once the desired outcome was reached. A clean-up task involved cleaning a blackboard with chalk scribbled on it. The children were shown how to dunk the sponge in a bucket of water, wring it out, and use it to clean the chalk off the board. The experimenters looked to see whether the children would clean with the goal to get the chalk off the chalkboard and not just move the sponge around haphazardly. Results indicated that the younger children were more activity-oriented in that they focused on the activity in which they were engaged rather than the outcome they were expected to produce. The older children showed more outcome-oriented tendencies in that they stopped playing when the desired outcome had been reached. The authors concluded that children begin to structure their activities in relation to a desired or expected outcome around three years of age. This is an important finding to consider when gathering information about a preschooler's development of problem-solving skills. According to Bullock and Lutkenhaus, one would expect that a 4-year-old would attempt to solve problems with outcome-oriented goals rather than activity-oriented goals.

Research regarding young children's development of problem-solving skills goes beyond preschool as well. Results of Klahr and Robinson's (1981) study revealed that by first grade, children have acquired a vast array of problem-solving schemes that can be applied to novel tasks. The subjects in the study ranged from 3.6 to 6.3 years of age. A modified version of the original Tower of Hanoi task (Simon, as cited in Klahr & Robinson, 1981) was used. The tasks consisted of three pegs, one of which contained a stack of disks ranging in size. The tasks varied in goal type. The directions of one task

were to move the disks one at a time to a second peg, and at no time could a larger disk be stacked on top of a smaller disk. In a simpler version of the task, the directions were to make sure all the pegs were occupied by disks. The tasks also varied in difficulty, ranging from one to seven moves required to complete the task. In order for a young child to solve this type of problem, the child must be able to use problem-solving skills including systematic trial and error and planning. Results indicated that the 6-year-olds were successful in completing the tasks involving up to six moves, but the 4-year-olds were successful only in completing the tasks involving up to two moves. This type of research demonstrates that the knowledge a school psychologist gathers about a child's ability to problem solve will reveal information about that child's level of cognitive functioning. This type of knowledge is imperative for designing effective interventions because the intervention must be matched with the child's ability to succeed with the intervention.

Facilitation in Play Assessment

One aspect of play assessments that varies among different types of assessment is the level of facilitation involved in the play session. Specifically, play assessments tend to differ with regard to the amount of directions that are given, the toys provided, and the ways in which behaviors are elicited from the child (Athanasiou, 2000). Facilitation is sometimes performed, for instance, by an adult experimenter modeling behaviors for the child (Ungerer, Zelazo, Kearsley, & O'Leary, 1981; Watson & Fischer, 1977; and Watson & Jackowitz, 1984) and sometimes by the child's mother participating in play with the child (Fein & Fryer, 1995).

Fein and Fryer (1995) were interested in finding out the effects of parental facilitation on a child's level and amount of pretend play, so they reviewed research that involved parents in the play assessments of 12- to 36-month-old children. The authors found that the mother's involvement increased the amount of the child's pretense but that results were inconclusive regarding the influence of parental involvement on the child's level of sophistication in play. Watson and Jackowitz (1984) examined children's use of spontaneous play by having the experimenter model talking on the phone to children ages 14 to 25 months. Then, immediately prior to leaving the room, the experimenter asked the children to imitate the behavior while waiting for the examiner to return. Various agents and objects were used for this task, ranging from least to most difficult in terms of symbolic substitutions. For example, the items ranged from the experimenter talking into a toy telephone to a doll talking to a toy banana to a wooden block talking to a toy car, to name a few of the steps. The children were then observed for spontaneous symbolic play. Findings revealed that all children showed some form of symbolic play after the modeling occurred. Even on tasks that they performed incorrectly, they still demonstrated some type of symbolic play. For example, children may have failed a task in which they were asked to make the doll talk to the toy banana, but they still may have demonstrated use of symbolic play by talking into the toy banana themselves. Similarly, Watson and Fischer (1977) examined the effects of modeling symbolic behaviors to children aged 14 to 24 months. The experimenters used themselves, a doll, and a wooden block as agents and sleeping, eating and washing as the pretend activities. These activities were modeled to the children, and then the experimenter left the children to

play freely for several minutes. Findings indicated that the modeling elicited pretend play in the majority of the children studied. Ungerer et al. (1981) also used modeling to examine the effects of age on symbolic play. They studied children of 18, 22, 26, and 34 months of age. First, the children engaged in free play for several minutes. Next, the experimenter modeled four different play behaviors before leaving the children to play freely again. As age increased, children used more imaginative substitution in their play. All of these studies are examples of how facilitation has been used to study different aspects of children's play.

Whether facilitated or non-facilitated play assessments are better for gaining a true representation of a child's skills is not clear. Research regarding play assessment involving typical children tends to involve non-facilitated play. On the other hand, research regarding play assessment involving exceptional children often involves facilitation (e.g., Beeghly, Weiss Perry, & Cicchetti, 1989; Roach, Stevenson, Barratt, Miller, & Leavitt, 1998; Rosenburg, Robinson, & Beckman, 1986; Spencer, 1996; and Ungerer & Sigman, 1981). Some believe that facilitators provide the child with the necessary assistance to allow the child to demonstrate a higher level of skills than he or she would without facilitation during play (Linder, 1993). Others, however, believe this is not always the case. For example, Roach et al. (1998) found that the interactions of mothers and their children with Down syndrome did not significantly affect the children's play behaviors. Some researchers use facilitation only after observing the child during free play to encouraged the child to play with toys or perform certain tasks not observed during free play (Linder, 1993; Ryalls et al., 2000).

Problem Solving and Facilitation

Whether a child's play is facilitated or not during a play assessment could have an impact on the developmental level that is displayed by the child during play. As discussed earlier, facilitation has been used to study various aspects of children's play (e.g., Fein & Fryer, 1995; Ungerer, Zelazo, Kearsley, & O'Leary, 1981; Watson & Fischer, 1977; Watson & Jackowitz, 1984). Whether facilitation has an impact on the degree and amount of problem-solving a child displays during play, however, has not been given attention in the play assessment research. Malone, Stoneman, and Langone (1994) suggested that play behaviors were more reflective of true developmental level in free-play settings in which the child is allowed to play independently at home rather than in more structured classroom settings in which the child is allowed to interact with peers. In the free play sessions, adults were discouraged from interacting with the child as well. Taking these findings into consideration, perhaps an adult-facilitated play setting would hinder a child's demonstration of higher-order play skills than if the child were left to play alone with no facilitation (Malone et al., 1994). Hanline (1999), while discussing the use of play as a learning tool, stated that in order to be effective in engaging children in active participation in play for learning purposes, the play setting needs to be carefully planned. This could also mean for the present study that a structured, facilitated session would be better for engaging children in problem-solving tasks than a free-play session in which the children may or may not engage in problem solving. While these ideas may seem logical, the problem still exists that there is no empirical research to date that suggests whether or not facilitation is necessary to assess a child's problem-solving skills.

The current study utilized the PACSS method to answer questions about whether or not facilitation is necessary or beneficial in eliciting problem-solving behaviors in children during play assessment.

Summary

Information about a child's problem-solving skills is an integral part of an overall assessment of the preschool child's cognitive development. If the level of problem solving is to be examined as a component of play assessment, the optimal type of play setting for inviting problem-solving behaviors must be determined. Furthermore, the child's skill level in problem solving without facilitation versus the child's potential skill level when provided with adult facilitation and prompting must be examined. The present study examined two types of play sessions, non-facilitated versus structured facilitated, in an attempt to determine which setting is more conducive to eliciting problem-solving behaviors using the PACSS method.

The Present Study

The present study used PACSS to evaluate the problem-solving behaviors in toddlers across two different types of settings, nonfacilitated and structured facilitated. Participants engaged in free play sessions and were divided into two groups. In the nonfacilitated group, the participants were subject to minimal interaction with adults in the room. In the structured facilitated group, a session facilitator adhered to structured guidelines with respect to the toys and types of play toward which the participants were directed.

The purpose of the present study was to determine whether the level of problem-solving behaviors would differ in a nonfacilitated play session versus a structured facilitated play session. No previous research has been conducted in the area of problem solving with respect to session facilitation, and the need for research in this area has been expressed (Kelly-Vance et al., 2000). It was expected that the results of the study would answer the question about whether the level of problem solving behaviors displayed throughout a play assessment would differ significantly between the two types of sessions.

Within the structured facilitated sessions, children were asked to play with specific toys that typically elicit problem-solving behaviors (e.g., nesting cups, blocks, mechanical toys, and puzzles). The same toys were available to the children in the nonfacilitated sessions, but only in the structured facilitated sessions was the children's attention specifically directed to those toys by an adult facilitator. Even though there is not empirical research as of yet to link facilitation to problem-solving behaviors in play, it was hypothesized that a higher level of problem-solving behaviors would be exhibited during the facilitated sessions than in the nonfacilitated sessions because in the former condition participants were specifically directed toward toys that have been demonstrated to elicit problem-solving behaviors.

It was expected that certain types of toys would elicit more problem-solving behaviors than others. For example, puzzles (Carlson et al., 1998) and nesting cups (DeLoache et al., 1985) have been demonstrated to elicit problem-solving behaviors. Because the participants in the structured facilitated sessions were guided specifically

toward these types of toys, it was expected that the participants would engage in a greater number of problem-solving behaviors in the structured facilitated setting and that those behaviors would be more complex than in the nonfacilitated play setting.

Method

Participants

A total of 20 typically developing children (12 boys; mean age: M = 28.00, SD = 9.18 and 8 girls; mean age: M = 27.75, SD = 10.51) participated in the study. The sample consisted of two groups of children who were Caucasian and from a middle-class background as determined by maternal occupation. The groups consisted of a nonfacilitated group and a structured facilitated group. Each group consisted of ten 18- to 48- month-old children. The participants were further divided into the following age categories to be used as an initial screening for matching purposes: (a) 18-24 months, (b) 24-30 months, (c) 30-36 months, (d) 36-42 months, and (e) 42-48 months. The participants were matched by gender as well as by standard scores as measured by the Vineland Adaptive Behavior Scales (see Table 1). The Vineland scores were used solely to match participants based on their composite scores and was not used as a comparison to their PACSS score. The Vineland measures the child's adaptive behavior skills in the areas of Communication, Daily Living Skills, Socialization and Motor Skills (Sparrow, Balla, & Cicchetti, 1984). A purpose of the Vineland is to provide a norm-referenced assessment and detailed information about a child's adaptive skills relative to other children that child's age (Harrison & Boan, 2000). In an attempt to control for the wide range of developmental abilities that surface in preschool children at varying ages, the

participants in the two groups were matched according to their Vineland composite scores to within two standard deviations instead of being matched by chronological age. It is important to study cognitive development in typically developing children so that those children who have deficits in cognitive development can be easily identified as a first step to intervention. In particular, a child's ability to problem solve can reveal information about the level of cognitive development that the child has reached.

Participants were recruited through word-of-mouth. The experimenters obtained referral lists from relatives, friends and neighbors consisting of the contact information for people who had children ages 18-48 months. Each parent who participated in the study was given a referral list and was asked to provide names of people who might also be interested in participating.

Setting

The sessions took place in a playroom that was used for play assessment research at the University of Nebraska at Omaha. The room consisted of a variety of toys that have been shown to elicit various types of play. Included in the toy selection, but not limited to these items, was a kitchen set with dishes and pretend food; dolls and related toys such as a high chair, stroller, blanket, and bottles; a doctor's bag and veterinary kit; a tool bench with plastic tools; mechanical toys such as a pretend gumball machine and pop-up toy; trucks and cars; a barnyard set; play telephones; and blocks and puzzles, which tend to elicit problem-solving strategies (Carlson, Taylor, & Levin, 1998). Present in the playroom during each session was a camera operator, a session facilitator, and a parent/guardian of the child.

Measures

A portion of the PACSS coding scheme was used and is presented in Appendix A (Kelly-Vance et al., 2000). The PACSS coding scheme is intended to operationalize cognitive development in toddlers in the area of problem solving. The coding scheme was selected because of its established use in prior related research (Kelly-Vance et al., 2000) examining play assessment.

Behaviors sampled by the PACSS coding scheme include those codes listed in the problem solving and planning subdomain of the coding scheme (see Appendix A). The overall coding scheme encompasses several aspects of play including exploratory and symbolic play as well as several subdomains including problem solving and planning, categorization, and imitation. The present study is part of a larger study comparing the overall effects of facilitation on children's play, which utilizes all of the core domains of the PACSS coding scheme. Of specific interest to the present study was the problem solving and planning subdomain. Thus, for the present study, the problem solving and planning subdomain is the only category from the coding scheme that is addressed.

Procedures

An experimenter interviewed one parent of each of the participants using the Vineland Adaptive Behavior Scales to determine an Adaptive Behavior Composite score for each participant. The interview was conducted within one week of each session. In addition, during each session the parent was given a consent form to read, sign and date and was asked to fill out a demographics questionnaire, a checklist of toys the child had at home, and a referral list.

Nonfacilitated group. In the nonfacilitated group, the children were allowed to play freely for the entire session with minimal interaction with adults. No specific guidelines were set with regards to the type of play in which the child was allowed to engage or the specific toys with which the child was allowed to play. Present in each session was a session facilitator, whose main role was to answer parent questions; a camera operator; and a parent/caregiver. Adults were instructed not to guide the child's play. General statements that adults were allowed to communicate to the child during the nonfacilitated sessions were posted on the wall. These statements consisted mostly of one- to two-word phrases (e.g., "wow!", "good job") and instructions (e.g., "smile", "you can imitate") and are not thought to facilitate play behaviors in the child.

Structured facilitated group. In the structured facilitated group, the conditions were the same as for the nonfacilitated group except that the facilitator initiated play with the participants by following a structured set of guidelines (Appendix B). The facilitator made a maximum of two attempts at facilitating the child toward a particular activity or toy. If the child did not demonstrate interest after the two attempts, the facilitator moved on to another activity or toy from the list of guidelines.

Coding. Each play session was videotaped and lasted a minimum of 30 minutes. Videotapes were then observed and problem-solving behaviors were coded by a PACSS team member. The codes are hierarchical from the least to the highest level of problem solving. The highest code observed during 30 minutes of play was recorded for each child.

Interrater Reliability. Interrater reliability was established through extensive training and was maintained at a level of .90 or greater by calculating the reliability between two independent observers for all of the play sessions coded. To become proficient in using the PACSS coding scheme, the experimenters were trained by coding videotaped play sessions obtained from a separate play assessment study. Codes were assigned for every 30-second interval of play, and a group of play assessment team members discussed the codes and any discrepancies among the team members until overall reliability of .90 was established for the group. In the current study sessions were coded simultaneously by two observers. One of the observers took descriptive notes of the session, including the amount of time spent in certain types of play. At the same time, a second observer took informal notes about the child's activities. At the end of each session, the observers separately recorded the highest level of play from the core subdomains as well as the highest level of problem solving observed during the 30-minute session, and the two observers checked for agreement. Overall reliability is determined by dividing the total number of agreements by the total number of agreements plus disagreements, then obtaining a percentage. Interrater reliability was maintained at a level of 100% both overall and specifically for problem solving.

Data Analyses. Two analyses were conducted. A quantitative analysis consisted of obtaining codes for each play session from the Problem Solving and Planning subdomain. From these codes, the highest level of problem solving behavior displayed in each 30- minute session was determined. Of specific interest were the highest level of problem solving and the types of toys that elicited the problem-solving behaviors. For

the first analysis, the independent variable was the type of session (nonfacilitated versus structured facilitated). The dependent variable was the level of problem-solving behaviors. A one-way analysis of variance was conducted to compare the highest level of problem solving in the facilitated group with the highest level of problem solving in the nonfacilitated group. The second analysis was qualitative in nature and provides descriptive data regarding toy type.

Results and Discussion

The highest level of problem solving was coded for each 30-minute play session. On average, the highest level of problem solving for the facilitated group ($\underline{M} = 9.20$, $\underline{SD} = 1.87$) was comparable to that of the nonfacilitated group ($\underline{M} = 9.00$, $\underline{SD} = 0.94$), and a one-way analysis of variance confirmed that the differences were nonsignificant, $\underline{F}(1,18) = 0.09$.

The second analysis was qualitative in nature and provides descriptive data regarding toys that elicited problem-solving behaviors. Participants in the facilitated group were specifically directed toward, but not restricted to, the toys and activities listed in Appendix B. Of those toys, problem-solving behaviors as defined by the PACSS scheme were elicited by puzzles, a gumball machine, a Disney pop-up toy, nesting cups, shape sorters, blocks, and Velcro food from the kitchen area. The only toy included in the facilitated guidelines that did not appear to elicit problem-solving behaviors in either session type was the bucket of bears. Further, of the toys used to facilitate the participants in the facilitated group, all of those that elicited problem solving in the facilitated group also elicited problem solving in the nonfacilitated group except for the

blocks. This does not mean that children did not play with the blocks; however, it simply means that they did not problem solve or plan with the blocks. Other toys in the playroom that elicited problem-solving behaviors for both groups included a pop-up toy, a vase of plastic flowers, a train set, a tool set, and baby bottles. Most of the problem-solving behaviors included either systematic or nonsystematic trial-and-error problem solving with these toys, although the children who placed the flowers in a vase received higher-level codes for being able to put objects into small openings. In addition, the pop-up toy and the gumball machine elicited higher codes than trial-and-error problem solving for the children who were able to successfully operate the toys on the first try. Children would often turn puzzle pieces and try them in different positions until the pieces fit. The train track easily came apart, and children would try putting different pieces of the track together to reassemble it.

It was expected that a higher level of problem-solving behaviors would be seen during the facilitated sessions than the nonfacilitated sessions because of the facilitator's direction toward specific toys that were believed to elicit problem solving. However, this was not the case. Participants tended to play with the toys in which they were interested. Appendix C illustrates which toys elicited the highest levels of problem-solving behaviors within each session type. There are some differences, as would be expected due to individual differences within each group, but overall the two groups did not differ greatly in their selection of toys. One interesting observation is that puzzles elicited the most instances of problem solving of any of the toys, and the majority of these instances occurred in the facilitated group.

The question of whether facilitation has an impact on the degree of problem solving a child displays during play has not previously been given attention in the play assessment research. In the current study, free play sessions involved adults who were discouraged from interacting with the child to the extent that the child's play would be guided or facilitated. Malone, Stoneman, and Langone (1994) suggested that play behaviors are more reflective of true developmental level in free-play settings in which the child is allowed to play independently at home rather than in more structured classroom settings in which the child is allowed to interact with peers. Although these authors were not referring to play assessment, their findings still apply. According to those findings, it would be expected that structured facilitated sessions would hinder a child's problem-solving behaviors. This was not necessarily the case because problem-solving behaviors did not differ between the two types of settings. According to these results, facilitation did not help nor hinder problem solving.

In contrast to the views of Malone et al. (1994), Hanline (1999) stated that in order to effectively engage children in active participation in play for learning purposes, the play setting needs to be carefully planned. Again, the author was not referring specifically to play assessment as it was used in the current study; however, the idea that play needs to be structured in order to engage children to participate applies directly to the reasoning behind examining facilitation in play assessment as part of the current study. However, the play assessment used in the current study was not set up for the child's learning purposes, and the type of facilitation used in the facilitated sessions might not coincide with what Hanline (1999) would consider "carefully planned". To

date there is no empirical research that suggests whether or not facilitation is necessary to assess a child's problem-solving skills in the form of play assessment. Results of the present study provided a foundation for future research to answer this question; in this study, problem solving was not significantly affected by session type.

Limitations and Considerations for Future Research

Results revealed that problem-solving behaviors exhibited during play assessments did not differ significantly with respect to session type when the sessions examined were purely non-facilitated versus structured facilitated. Toys that elicited problem solving also did not differ greatly between the two types of sessions (see Appendix C).

A possible limitation of the study is that because of the small sample size, generalizability of the findings is limited. It was decided that a small sample would be selected due to the exploratory nature of the study. A wider range of problem-solving behaviors might be found in a larger sample size. Future research should include larger samples.

Another possible limitation concerns the internal validity of the study. It is possible that the two types of play sessions being compared did not differ enough to be certain that any differences found in problem-solving behaviors can be attributed to the type of play session. In fact, since no significant differences were found, it is possible that the construct of problem solving was not sufficiently tapped in either session type. Future research should include comparisons between several different types of play sessions.

A third possible limitation concerns the number of opportunities available for problem solving in each session. Perhaps future research could include longer play sessions, allowing more time for children to engage in problem-solving behaviors. Future research should also address situations in which specific problem-solving tasks have been set up and requests made of the child to problem solve. For example, one of the toys included in the present study was a train set. Although unintended by the examiners, the train as well as the train track easily came apart while being played with. As a result, children who wanted to continue playing with the train set were forced to problem solve to put the set back together. This illustrates one type of task that could be included to facilitate problem solving. Other ideas should be explored in future research.

Problem solving is sometimes difficult to define in terms of a child's behaviors and whether or not the child's actions actually constitute problem solving or some other type of cognition. For example, a child's temperament could have more to do with his or her apparent ability to solve a problem than actual cognitive ability. The child could have the cognitive skills available to solve a challenging problem but perhaps a low tolerance for frustration or a tendency to give up easily, which could limit his or her success in solving the problem. Due to the subjective nature of the phenomenon, finding objective means of ranking problem-solving behaviors from least to most sophisticated is difficult. More research in the area of problem solving is vital in this aspect. Without a great deal of empirical evidence regarding problem solving and play assessment, researchers and practitioners should interpret a child's level of problem solving with caution when using a hierarchical coding system for problem-solving behaviors.

Some observations were made throughout the process of collecting data for the present study regarding the PACSS coding scheme (see Appendix A) and some ways in which it might be revised to diminish the amount of subjectivity in some of the codes. For example, the first three levels of problem solving were never used in the current study and should be given careful consideration, if not completely omitted, in future research. The code "Searches for an object after seeing it disappear" would not be appropriate in an assessment unless the assessment protocol called for the facilitator to purposefully hide an object. The code "Repeats behavior in order to repeat an initially accidental consequence" is highly subjective because of the difficulty in determining whether a consequence was accidental. Likewise, the code "Performs a behavior in order to produce an anticipated result" is highly subjective due to the difficulty in determining if the child was anticipating a result.

Another consideration is that the use of the term "achieve goal" in two of the codes in the hierarchy should be more clearly defined, again due to its subjectivity. Unless a child specifically states his or her intentions, it is often difficult to determine the reasons for the child's behaviors. If a child achieves an obvious goal, then the problem-solving behaviors will probably be easily noticed; however, if the child does not achieve a goal and that goal was not obvious to the coders, the child's attempts at achieving that goal could easily go unrecognized as problem solving.

Some of the codes in the hierarchy are not especially subjective, but whether they represent true problem-solving ability and are truly hierarchical should be further explored. For example, a child who "Successfully operates a mechanical toy on the first

attempt and attempts thereafter" would receive a higher level of problem solving than a child who does not successfully operate the toy on the first attempt but uses systematic trial-and-error problem solving in an attempt to operate the toy. The child who tries several different methods until he or she successfully operates the toy is clearly problem solving, but the child who is able to operate the toy on the first try has not solved a problem. Likewise, putting small objects into small openings probably requires good fine motor skills, but if a child is able to put a small object into a small opening with no problem, it seems unlikely that the child is exhibiting problem-solving behaviors. Most likely, the child has problem solved in the past in order to be able to put small objects into small openings, but once the skill is mastered, the problem no longer exists.

It could be that the codes are measuring too narrow of a construct. For example, a child who exhibits nonsystematic trial-and-error problem solving simply gets a lower-level code than a child who exhibits systematic trial-and-error problem solving. However, the child who exhibits systematic trial-and-error problem-solving might give up a lot easier and never solve the problem, while the nonsystematic trial-and-error problem solver might demonstrate persistence in trying to solve the problem. A child who knows how to problem solve but lacks persistency might not function as well as a child who has less-developed problem-solving skills but is persistent when faced with a problem. Hupp and Abbeduto (1991) studied persistence in young children with developmental delays. They hypothesized that children who demonstrate persistence in solving a particular problem are also demonstrating motivation to achieve a goal. The authors found that persistence was a reflection of mastery motivation and posited that

children's mastery behavior, or persistence, is important in helping them to learn about their environment. Likewise, the child who "Uses an adult to achieve a goal" receives a much lower code than the child who exhibits nonsystematic trial-and-error problem-solving, but what about the child who first uses nonsystematic trial-and-error and, upon failure to solve the problem, asks an adult for help? It seems that this child is capable of trying more than one approach to solve the problem, but he or she only receives credit for nonsystematic trial-and-error problem solving.

Finally, a code that was rarely used in this study was "Uses blocks to build complex structure [of nine or more pieces]". Again, it is difficult to determine exactly what constitutes problem solving with this code. The subdomain includes planning as well as problem solving, and a child who builds a complex structure has probably used some planning skills; however, this seems difficult to determine objectively. A child could easily use nine blocks to build a structure that was not planned. Again, the question arises as to whether this constitutes problem solving in the same sense as the other codes in the hierarchy. For example, a child who completes a complex, non-inset puzzle using systematic trial-and-error problem solving would receive a lower level code than a child who puts nine blocks together to make a wall.

The hierarchical nature of the codes in the problem-solving and planning subdomain was not supported by the current study, as is evident by the previously mentioned limitations involving the problem-solving codes. This is not surprising considering that the coding scheme, as developed by Linder (1993), has little empirical support for its hierarchy. The codes were established from one study, which was limited

in sample size and heterogeneity of participants. In fact, the participants used in the study had hearing impairments, which limits the generalizability of the coding scheme to other populations. If hierarchical codes are going to be used when assessing problem-solving skills in play assessments, further research is needed to determine a more concrete hierarchy of problem-solving skills. Practitioners and researchers should also consider whether a code level is even necessary. A detailed description of the child's problem-solving behaviors and strategies may be more valuable in evaluating a child's skills and designing interventions than a standard score. Further, practitioners and researchers must consider the generalizability of the problem-solving skills elicited during play assessment to the types of problems encountered in everyday life and in the classroom. Although the coding scheme did not prove to be an objective measure of complexity in problem-solving skills, a hierarchical measure of problem solving may not be necessary in play assessment.

Summary

The purpose of the present study was to gain information about whether problem-solving skills would be better assessed in a structured facilitated play session or in a nonfacilitated play session. Research in the area of problem solving and play assessment is scarce, yet play assessment in general is gaining popularity in the field of early childhood assessment. Although the sample size was small and homogeneous with regard to ethnicity and socioeconomic status, results indicate that facilitation did not significantly affect the level of problem solving exhibited by the participants. As play assessment becomes more widely used, it is important for practitioners to know what type

of play assessment will yield results that are the most reflective of the child's abilities and skills.

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Appendix A

Problem-Solving Skills and Planning

1. Searches for an object after seeing it disappear
2. Repeats behavior in order to repeat an initially accidental consequence
3. Performs a behavior in order to produce an anticipated result
4. Attempts to use an adult to achieve a goal (with or without success)
5. Makes a single attempt to activate mechanical toy or achieve goal, unsuccessfully
6. Uses nonsystematic trial-and-error problem-solving without systematically changing behavior
7. Uses an object or toy to obtain an object
8. Uses systematic trial-and-error problem-solving (e.g., alters behavior in an attempt to solve problems)
9. Successfully operates a mechanical toy on first attempt and attempts thereafter (e.g., gumball machine, Disney pop-up toy)
10. Puts small objects into little openings (the size of a golf ball or smaller)
11. Solves problems by logically relating one experience to another (child states that present situation is like a previously experienced situation)
12. Uses blocks to build complex structure (minimum of nine pieces or a structure that can easily be identified)

Appendix B

Facilitation Guidelines

- Encourage the child to play with the specific toys contained in the following toy list by saying, *"Here, let's play with these."*
- If they do not play with the toys, say,

  "What can you do with this toy?"

  Toy List
  Nesting cups
  Bears
  Blocks
  Puzzles
  Shape sorter
  Gumball machine or Cash register (child must play with one)
  Drawing

- When you are playing with the bears and/or blocks, give the following specific commands:

  "Hand me the _____ one."

  Big
  Little
  Tall
  Short
  Tallest
  Shortest
  First, middle, last (you will have to line up 3 bears)

- Go to the kitchen area and say:
  "Let's make dinner."

- During this time you may say:
  "What are you doing?" and *"What else can you do?"*

Appendix C

Highest Level of Problem-Solving Behaviors Elicited by Each Toy for Each Session Type:

		Session Type			
		Facilitated		Nonfacilitated	
		Highest Level	# of Sessions Highest Level Demonstrated	Highest Level	# of Sessions Highest Level Demonstrated
Toys:	Airplane	-	-	8	1
	Blocks*	12	1	-	-
	Bottles	6	1	6	1
	Car and people	6	1	-	-
	Carwash	6	1	-	-
	Cash register*	-	-	4	1
	Comb	-	-	10	1
	Farm set	-	-	8	1
	Flowers in vase	10	3	10	2
	Gumball machine*	9	2	9	2
	House	6	1	-	-
	Legos	12	1	-	-
	Nesting cups*	8	2	8	3
	Pop-up toy	8	1	9	3
	Puzzles*	8	6	8	2
	Shape sorter*	8	1	8	2
	Tool set	10	2	8	1
	Train set	4	1	8	3
	Velcro food*	8	3	-	-

Note: Toys listed in the Facilitation Guidelines (Appendix B) are denoted with an asterisk (*).

Table 1

Participant Age, Gender, and Vineland Adaptive Behavior Composite (ABC) Score

Participant Code	Age (months)	Gender	Vineland ABC Score
1N	32	F	111 ± 4
1F	29	F	84 ± 4
2N	22	F	85 ± 5
2F	18	F	112 ± 5
3N	26	M	102 ± 4
3F	27	M	99 ± 4
4N	18	F	112 ± 5
4F	18	F	109 ± 5
5N	30	M	101 ± 4
5F	30	M	104 ± 4
6N	44	M	90 ± 5
6F	48	M	104 ± 5
7N	19	M	104 ± 5
7F	19	M	110 ± 5
8N	43	F	94 ± 5
8F	42	F	107 ± 5
9N	25	M	104 ± 4
9F	24	M	110 ± 4
10N	22	M	98 ± 5
10F	22	M	87 ± 5

Note. In the participant codes, F = Facilitated, N = Nonfacilitated.