The Role of Play in Cognitive Development

Categorized by Developmental Domains
(From Bayley-III Users Manual)

Cognition/Intellect

Play in early childhood is believed to promote cognitive growth (Bruner, 1972; Piaget, 1952; Singer, 1973). Vygotsky (1978) argued that play contributes to a child’s ability to understand and develop symbols. Among preschool-age children, social make-believe play has been correlated with indexes of cognitive ability (Johnson, 1976).

Play with objects begins early in infancy, with 6-month-olds capable of playing with a single object (Piaget, 1952). Children interact with an object first by banging it. A few months later, the child can combine or relate two or more separate objects, beginning to show an interest in the similarities of objects. Around 9 months of age, relational acts (e.g., placing a spoon in a cup, putting a lid on a pot) begin to emerge (Fenson, Kagan, Kearsley, & Zelazo, 1976). By 2 years of age, the child begins to incorporate symbolic or pretend play (Belsky & Most, 1981). Children pretend to drink from a cup and put dolls to bed. Symbolic play becomes more complex with age, incorporating substitutions and fantasy in pretense. For example, a child age 36 months may hold a hand to the side of his or her face and pretend to call someone on the make-believe telephone.

Problem-solving may be viewed as higher order information processing that involves thinking and reasoning, memory, and synthesis of information (Aylward, 1988). As the child develops, he or she can engage in increasingly more complex problem-solving. For example, around 6 months of age, a child can retrieve an object that is partially hidden; around 9 months of age, he or she will search for an object that has been completely hidden from view. By 2 years of age, the child is able to find a hidden toy even after it has been displaced from the original point of disappearance (Dunst, 1982; Piaget, 1952).

Number Concepts and Counting in Cognitive Development

Items in the Bayley-III Cognitive Scale measure skills in one-to-one correspondence, counting and cardinality. During the first few years of life, a child first learns one-to-one correspondence, then stable number order, and finally cardinality (Wynn, 1990). Children as young as 2 ½ years of age appear able to identify one object and to show stable number order, even if they do not count the numbers in their consecutive order (e.g., 1, 2, 3). Children 2 ½ to 3 ½ years of age perform much better when asked to count tangible objects (Wynn), and through the age of 3 are more inclined to count overtly (Gelman & Tucker, 1975). Subitizing (i.e., identifying a number of objects without counting) is more difficult. Children age 3 ½ years can subitize when there are no more than three objects (Silverman & Rose, 1980).

Cardinality, or the ability to assign a number accurately based on the numerosity of a set of items, develops after age 3. Assessing the child’s acquisition of cardinality is more difficult than testing earlier counting skills because the child may learn how to answer the question without understanding the problem. Children can learn to respond with the number they assign to the last object they count, without understanding that the last number also represents the total number of objects counted (Wynn, 1990).
Receptive Communication

The Bayley-III Receptive Communication subtest begins with items that assess auditory acuity, including the ability to respond to the sound of a person’s voice, to respond to and discriminate between sounds in the environment, and to localize sound. Newborns can turn their eyes and head in the general direction of a sound, with the ability to localize sound improving over the first 6 months (Clifton, Rochat, Robin, & Berthier, 1994; Litovsky & Ashmead, 1997). Over the course of the first year, infants become attuned to the overall patterns and rhythms of speech in their native languages (Jusczyk, Houston, & Newsome, 1999; Kuhl, Williams, Lacerda, Stephens, & Lindblom, 1992; Mattys & Jusczyk, 2001; Werker & Tees, 1984). By 1 year of age, infants can discriminate between patterns of sounds, such as musical melodies (Morrongiello, 1986).

Infant comprehension precedes the regular production of speech by several months (Goldin-Meadow, Seligman, & Gelman, 1976). Infants begin to respond to words and short phrases (e.g., simple questions and commands in familiar contexts) around 9 months of age, with a receptive vocabulary of about 50 words around 1 year of age (Bates et al., 1988; Chapman, 2000; Oviatt, 1980). Because nonlinguistic behaviors and cues can make it appear that the child understands more words than he or she truly knows (Miller & Paul, 1995), items assess the child’s comprehension in the absence of contextual cues (e.g., identifying the ball from an array of objects when told, “Show me the ball,” without the examiner looking at or pointing toward the ball).

Fine Motor

Several Fine Motor items for young infants assess the coordination and control of eye movements. When scanning an object, infants as young as 1 month of age will focus on areas of high contrast, with eye movements becoming more controlled and accurate with time (Aslin & Salapatek, 1975). When tracking slow-moving objects, continuous owsuit eye movement (as opposed to saccadic eye movement) is evident as early as 2 months of age (Dayton & Jones, 1964). Between 2 and 4 months of age, infants are able to follow objects that move more rapidly (Aslin, 1981).

Reaching and grasping, like other motor skills, are exhibited first as gross, diffuse activities that shift to more controlled movements with increasing age (Berk, 1998). Newborns will respond to an object within their gaze by producing an increase in arm movements, such as swiping the arms in the general direction of the object, but rarely making contact with it (Bertenthal & Clifton, 1998). These types of pre-reaching behaviors decline between 1 and 4 months of age. Intentional reaching begins to emerge around 3 to 4 months of age and gradually becomes more refined. By 5 months, infants can successfully reach for moving objects and will reduce their reaching attempts when an object is moved just beyond their reach (Robin, Berthier, & Clifton, 1996).

Along with the mastery of reaching skills emerges the modification of hand grasp (Bertenthal & Clifton, 1998). By 3 to 4 months of age, infants can intentionally grasp objects, but will generally use a whole hand grasp. Around 5 months of age, an infant can hold an object in one hand and will frequently transfer objects from hand to hand (Rochat & Goubet, 1995). Until about 6 months of age, however, infants have not yet mastered voluntary release of objects that they are grasping. Around 1 year of age, infants can oppose the thumb and forefinger, allowing them to grasp small objects easily.
Expressive Communication

The Expressive Communication subtest includes items that assess the young infant’s ability to vocalize. Cooing begins in the second month, consisting of repeated, drawn-out vowels (e.g., oooh-oooh). Coos are shorter than cries, and unlike crying—which is just blowing air along the vocal tract—cooing involves the articulatory apparatus (mainly the tongue).

Babbling begins around 3 to 4 months of age and comes to resemble human speech as the child ages. The infant progresses from odd single sounds to sequences of sounds that are like syllables. At 4 or 5 months, babbling often consists of a single consonant and vowel, like da or ba. But by 7 or 8 months, the infant starts to string the sounds together into longer and longer chains (e.g., dadada). At the most advanced level, around 10 months of age, the infant starts to string together different syllables, like dadamaga (Oller, Eilers, Neal, & Schwartz, 1999).

Babbling represents active experimentation with newly acquired units of language (Oller & Eilers, 1988). Infants imitate what they hear, modify their vocalizations based on feedback, and gradually learn to produce sounds that are recognizably close to actual words (Poulson, Kymissis, Reeve, Andreatos, & Reeve, 1991).

Speaking begins a few months after the child begins to demonstrate comprehension. First words tend to appear by about 1 year of age. First words often refer to objects such as animals, food, and toys (Nelson, 1973). Action words also appear early, and are used to describe the child’s own actions before they are used to describe the actions of others (Huttenlocher, Smiley, & Charney, 1983). Between 1 and 2 years, there is an explosion in the number of words a child understands and produces (Owens, 2001). The number of words comprehended and produced quadruples, and for each new word produced, five new words are comprehended (Bates et al., 1988; Bloom & Markson, 1998). Word comprehension develops prior to word production.

Although there is great variation in the age at which children acquire language, the general sequence of the phases of language development is preserved. The rate of new word acquisition is influenced by genetic factors and by the child’s opportunity to engage in reciprocal vocal interchange with caregivers (Bloom, 1989). When the child’s vocabulary reaches 50-100 words, the child begins to produce two-word combinations. Less than 10% of 1-year-olds can combine two words, but almost all children do so by 2 years of age (Herschkowitz, 2000). By age 3, most English-speaking children are able to produce all the different types of simple sentences that appear in English, and 10- and 11-word sentences are not uncommon (Owens, 2001).

Gestures, another form of symbolic representation, are observed shortly before the child’s first birthday (Acredolo & Goodwyn, 1998). Lip-smacking to indicate hunger or waving bye-bye when leaving are considered gestures because they are instances in which a message is conveyed. In many cases, gestures work as well as words do, and gestures can reflect the child’s developing ability to use symbols to represent actions and objects. Development of utterances and gestures is similar: at 20 months, utterances average 1.1 words and 1.3 gestures; the longest utterance averages 2.4 words and 2.5 gestures (Shore, O’Connell, & Bates, 1984).
Social-Emotional

Knowledge about emotional and social functioning in infants and young children has grown enormously in the past forty years as researchers and practitioners have come to understand better how a young child progresses through social and emotional milestones. For example, infants and young children not only learn to engage in relationships, but also learn to signal with their emotions and to negotiate complex emotional and social patterns. Yet there remains challenges to assessing emotional functioning (Greenspan & Meisels, 1996). In particular, critical aspects of emotional functioning are best observed in naturalistic setting rather than in controlled experimental setting. For example, the true intimacy of a parent and baby cuddling or playing together cannot be created, it must be observed or reported by parents and other caregivers.

By 3 months of age, children exhibit growing self-regulation and interest in the world (Stage 1). When the child cries, he or she can be comforted; the child can focus and attend to sensations, including sights, sounds, and touch; and the child can direct attention to and receive attention from others with pleasure. Sensory and emotional response become organized and regulated; the child remains calm (rather than becoming agitated or appearing overstimulated) when provided with visual, physical, or auditory experiences.

By 5 months, children can engage in relationships (Stage 2). Children display positive emotions toward caregivers; learn to engage others; and display physical signs of satisfaction in response to caregiver’s attention (e.g., smiles, positive glances, cooing, blowing bubbles).

By 9 months of age, the child can use emotions in an interactive, purposeful manner (Stage 3). The child is able to communicate with others using purposeful motor acts (e.g., reaching for a caregiver, crawling, Toddling towards others) and emotions in his or her interactions. He or she is able to initiate and exchange a few emotional expressions and respond purposefully to the signals of others.

By 14 months, the child is able to use a series of interactive emotional signals or gestures to communicate (Stage 4a), the child organizes behavior and emotions to form social interactions that lead to chains of communication as part of these interactive patterns. For example, the child demonstrates a variety of socially meaningful behaviors and emotions such as warmth, joy, assertion of needs and wants, exploration or anger.

By 18 months of age, the child can use a series of interactive emotional signals or gestures to solve problems (Stage 4b). The child constructs patterns of social problem-solving interactions that include a range of emotions (e.g., pleasure, curiosity, assertiveness, anger, sadness) and a continuous back-and-forth flow of emotional signals involving facial expressions, motor gestures, and sometimes a few words.

By 24 months, the child is able to use symbols or ideas to convey intentions or feelings (Stage 5a). The child collaborates with others to construct a simple pretend play pattern of at least one idea and the child can perform pretend play alone. He or she uses words or symbolic means to communicate basic wishes, intentions, or feelings; understands simple questions; uses simple two-word sentences; and begins to use some pronouns.

By 30 months of age, the child can use symbols or ideas to express more than basic needs (Stage 5b). The child’s symbolic communication contains two or more ideas in terms of intentions, wishes, or feelings. He or she can deal with more complex emotional themes (e.g., anger, dependency, closeness, separation, self-pride). The child understands directions with two or more ideas and organizes sentences into two or more ideas.

By 42 months, the child is able to create logical bridges between emotions and ideas (Stage 6). He or she is able to connect symbolic elaboration and expression of complex intentions, wishes, or feeling in pretend play and in verbal expressions. The child is able to form logical bridges or connections between his or her own emotional ideas and those of others, and thereby understand the difference between fantasy (e.g., pretend play) and reality.