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How parents support young children's understanding of things, people, numbers and words

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Children are born with a set of skills that serves as the building blocks for all future learning. These skills include the ability to track moving objects, distinguish the features of the human face, discriminate between more and less, and recognise familiar voices. During the weeks following birth, these skills rapidly evolve into a more sophisticated set of competencies that provides the basis of children's 'core knowledge' of how the world works. These competencies include children's knowledge of objects, awareness of people, understanding of number and ability to use words.

Keywords: cognitive, development, infancy, parenting

The acquisition of competencies that provide the basis of children's 'core knowledge' of how the world works appears to occur spontaneously, in the absence of any direct instruction from parents or other caregivers. However, recent evidence shows that parents and other adults do, in fact, support the development of these competencies through their daily interactions with children. This article draws from the recent Early Intervention Foundation report, 'Key competencies in children's cognitive development: Children's understanding of things, people, numbers and words' (Asmussen et al., 2018), to consider what these competencies are, how they develop during the child's first three years and the ways in which parents and other caregivers support this early learning.

Early Intervention Foundation (EIF)

The EIF is a UK charity that supports the use of effective early intervention to improve the lives of children and young people at risk of experiencing poor outcomes

CHILDREN'S KNOWLEDGE OF THINGS

a) What is it and how does children's knowledge of things impact their development over time?

Children's knowledge of things, or objects, involves their awareness of how objects move through time and space according to the laws

of physics, as well as the ability to recognise object categories and use objects as tools (Quinn, 2011; Spelke & Kinzler, 2007). Children's knowledge of objects is frequently identified as a core component of their intelligence, as measured by IQ tests (Goswami, 1991). Recent studies show that children's object exploration at four months is associated with their problem-solving skills in primary and secondary school (Bornstein et al., 2013a; Bornstein et al., 2013b).

b) How does children's object knowledge develop during the first three years?

Children's object knowledge begins within hours of birth, when most infants demonstrate a clear preference for objects that move (Hain, 1966). Already by three months, most infants can categorise a variety of objects on the basis of appearance (Quinn et al., 1993). By nine months, many infants can also categorise objects on the basis of use (Horst et al., 2005).

During the second half of the first year, babies also become better able to use objects as tools (Bates et al., 1980). For example, it is not uncommon for infants to start using their blankets to retrieve objects that are out of reach, if the object is on top of the blanket. Children acquire much of this knowledge through trial and error 'experimentation', involving the physical manipulation of toys and other household items.

At the time of their first birthday, most children

will be able to say a handful of words which refer to the people and objects they encounter in their everyday environments (Nelson, 1973). For example, 'cup' is a common first word that infants accurately apply to various kinds of cups, despite differences in their shape and size (Perszyk & Waxman, 2018). Throughout the second year, children's vocabulary for everyday objects grows substantially, so that by their second birthday, most children will know the names of 300 or more objects (Waxman et al., 2013; Fenson et al., 1994).

Throughout the second and third years, children's knowledge of objects steadily deepens to include an understanding of the relationships between objects (Gentner & Hoyos, 2017). Eventually, this knowledge helps children recognise similarities in object relationships that provides the basis for analogical reasoning skills (for example, the relationship between bird and nest is equivalent to bear and den). The ability to draw analogies between object relationships helps children to rapidly acquire new knowledge when they are in primary and secondary school.

- c) How do parents and other caregivers support children's knowledge of objects during the first three years of life?

Parents support their children's understanding of objects in a variety of important ways. After birth, parents and other caregivers can support the baby's object knowledge by providing an enriching home learning environment that allows children to explore objects as and when they are ready (Belsky & Most, 1981). For very young infants, this may include placing a mobile above their cot, so that they can focus their attention on the shapes and movements of objects. As infants become older, children benefit from objects that can be grasped and manipulated, such as rattles and teething toys.

During the first few months of life, infants are increasingly able to engage in 'triadic' play.

Triadic play is where a toy is added to infants' play with their caregivers

Triadic play involves interactions between infants, their caregivers and various household objects or toys (Needham, 2000; Ruddy & Bornstein, 1982). For very young infants, this might involve games where the caregiver captures the infant's attention with a toy and then encourages her to visually track the object. Once the infant can sit up, object play can involve gently rolling objects towards the infant or making a toy 'talk' to her. In later infancy and toddlerhood, caregivers can initiate pretend activities with objects, where they pretend to feed a doll or talk on the phone.

From 18 months, parents can support their

children's understanding of objects with toys and activities that allow them to expand their understanding of object categories and the relationship between objects. For example, blocks are useful for helping children understand how objects can be used to build things and how different shapes (e.g. rectangles, cylinders, triangles, etc) can be used in different ways. Toys that can be sorted into object categories, such as farm animals, beads, cooking equipment, etc are also useful for helping children explore the relationship between objects.

Studies show that activities which expose children to non-familiar objects – through book sharing or visits to parks, museums and zoos – additionally support children's knowledge of object categories and relationships. For example, recent findings from the Growing Up in Scotland cohort study observed that children whose parents reported taking them to parks and zoos at 22 months were better at identifying object similarities in an IQ task at age three (Melhuish, 2010).

CHILDREN'S UNDERSTANDING OF PEOPLE

- a) What is it and how does children's understanding of people impact their development over time?

Children's knowledge of people, also referred to as their 'theory of mind' (ToM) pertains to the awareness that some objects are conscious and that conscious beings differ in what they perceive and understand (Wellman, 2014). During the first three years of life, children become increasingly better at predicting the thoughts of others, even when these thoughts might be very different from their own.

Theory of Mind

Theory of mind refers to the ability to understand that we ourselves and other people are mental beings, that is, we have mental states - beliefs, intents, desires, emotions, knowledge. Crucially, developing a Theory of Mind involves growing in understanding that other people's beliefs, desires, intentions, and perspectives may be different from our own.

The child's ability to appreciate differing points of view is an important social skill which facilitates positive interactions with others. Studies show that ToM understanding at age four is associated with children's popularity and friendships in primary and secondary school (Hughes et al., 2011). ToM capabilities also appear to increase children's sensitivity to teacher feedback, which in turn, predicts their academic success in school (Lecce et al., 2011).

- b) How does children's understanding of people develop during the first three years?

Children's ToM understanding begins within hours of birth, when infants demonstrate an

observable preference for human faces (Johnson et al., 1991). By three months, infants will actively follow the gaze of others to observe what they are looking at (Shepherd, 2010). At nine months, if not before, most infants will also actively engage in 'joint attention' activities with others involving a toy, book or event (Tomasello & Carpenter, 2007). The ability to share attention with others suggests that the child understands that people have interests and knowledge that are worth knowing and sharing (Goldman, 2006). The ability to point at 10 months is further evidence of this knowledge (Baron-Cohen, 1989).

Joint attention

Joint or shared attention is achieved when one person alerts another to an object by means of eye-gazing, pointing or other verbal or non-verbal signs and the two then focus on the object.

Throughout the second year, toddlers become increasingly good at anticipating the thoughts and feelings of others and behaving in altruistic ways (Eisenberg & Fabes, 1998). For example, it is not uncommon for a toddler to spontaneously comfort someone who is hurt or sad, or try to assist in cleaning up. Once children acquire language, they also become increasingly able to share information about thoughts, feelings, desires and past and future events (Taumoepeau & Ruffman, 2006; Ridgeway et al., 1985). However, it is not until the fifth year that children are able to accurately predict thoughts and feelings that are different from their own (Wellman, 2014).

- c) How do parents and other caregivers support children's understanding of people during the first three years of life?

Parents and other caregivers support children's ToM by responding positively to their social cues and treating them as members of the family with a valid point of view. Parents do this through 'mind-minded' conversations which acknowledge that the baby is an intentional being with a unique mental state. For example, the statement, 'Oh, what a sleepyhead!' addressed to an infant who is tired draws attention to the child's mental state and communicates a sense of empathy.

Studies show that mind-minded parenting behaviours at six months predict children's ToM understanding at four years (Meins et al., 2003). Other caregiving behaviours occurring during infancy found to be associated with later ToM development include (Ereky Stevens, 2008):

- Mindful facilitation: engaging and maintaining the infant's attention in activities that he finds interesting.
- Joint attention commenting: showing sensitivity to the infant's internal states by asking questions about what the infant sees, thinks or feels.
- Pacing: maintaining the pace of interaction so

that the infant is not over- or under-stimulated.

- Affect catching: demonstrating sensitivity to the infant's emotional states by sharing positive or negative affect.

Once children start to acquire language, caregivers are increasingly better able to engage them in conversations about mental states. The subject-matter of these conversations follows a predictable trajectory (Taumoepeau & Ruffman, 2008). During the child's first year, mental-state conversations principally involve discussions about what the child or parent might want (for example, 'Do you want the juice?' or, 'I want you to come here'). However, by the age of two, most children have acquired the words that will allow them to talk about emotions and events they have remembered.

CHILDREN'S UNDERSTANDING OF NUMBERS

- a) What is it and how does children's understanding of number impact their development over time?

The development of children's numerical understanding involves their awareness of the concepts of **more** and **less**, the ability to count, perform basic addition and subtraction operations, and know how specific Arabic number symbols correspond with specific cardinal values (Siegler & Lortie Forgues, 2014).

The child's awareness of cardinal values develops gradually throughout the first three years of life (Siegler & Braithwaite, 2017). It is not until four or five that most children can accurately count and perform simple addition and subtraction operations. Studies show that children's mastery of these capabilities at the age of four is consistently associated with their mathematical achievement in primary and secondary school (Duncan et al., 2007). Mathematical achievement in turn is consistently found to be the strongest predictor of children's overall school achievement and their success in entering the workforce (DeVries, 2014).

- b) How does children's understanding of numbers develop during the first three years?

Infants are able to discriminate differences between more and less (Dehaene, 2011) and by four months, most demonstrate a rudimentary understanding of the principles associated with addition and subtraction (Wynn, 1992). Once children acquire language, they quickly master number-related words such as 'more' and 'less' as well as the use of plurals (Slusser et al., 2013). However, children's understanding of the correspondence between the number names and number values develops slowly (Wynn, 1992). While many two-year-olds can accurately recite the number list, very few will understand that each number word corresponds with a specific numerical value. For example, while most two-

year-olds will understand that the word 'one' describes a single item and that 'two' pertains to two items, few will understand the values associated with 'three' and 'four' until the fourth or fifth years. Few will understand how counting corresponds with the addition of a single value.

- c) How do parents and other caregivers support children's understanding of numbers during the first three years of life?

Studies show that parent-child conversations about numbers and magnitude are helpful for supporting children's knowledge of numbers. In particular, studies show that conversations which emphasise cardinal values when counting objects increase children's awareness of numerical values (Gunderson & Levine, 2011). For example, a parent might invite a toddler to join in a counting game:

'Let's see how many buttons you have on your coat. (counting while touching each button) You have one, two, three, four buttons on your coat. That's right, you have four buttons on your coat!'

Such a conversation not only helps the child practise counting, but also emphasises the total cardinal value of all the buttons.

Studies show that conversations about large numerical values also increase the toddler's knowledge of cardinal values and later numerical capabilities (Levine et al., 2010). Examples of this 'large number talk' include conversations about amounts that cannot easily be counted – for example 100 beads, thousands of people, millions of stars, etc, etc. Such conversations increase children's awareness of large values and their relationship to specific words and help them further refine their knowledge of more and less.

CHILDREN'S UNDERSTANDING OF LANGUAGE

- a) What is it and how does children's knowledge of language impact their development over time?

Language development has four separate components (Saxton, 2010):

- phonology involves the ability to perceive differences between sounds and words, as well as reproduce these sounds
- semantics refers to the knowledge of vocabulary
- pragmatics involves children's knowledge of the communicative functions of language
- grammar involves knowledge of the rules which govern the ways in which words are put together in sentences to convey specific meanings.

Language initially develops as a result of children's understanding of objects, people and numbers but:

'the emergence of a language-cognition link in infancy... reveals a dynamic developmental cascade in infants' first

year, with each developmental advance providing a foundation for subsequent advances' (Perszyk & Waxman, 2018:231).

Children's language capabilities become strongly predictive of their cognitive development, as well as their social, emotional and self-regulatory development (Law et al., 2017). Once in school, children's language capabilities are highly associated with their academic achievement and entry into the workforce (Snowling et al., 2001).

- b) How does children's understanding of language develop during the first three years?

Children's understanding of language begins at 23 weeks' gestation when the foetus can first hear the mother's voice and other sounds outside of the womb (Moore & Linthicum, 2007). At birth, the baby is able to distinguish differences in phonology (Mehler et al., 1988), eventually leading to the ability to replicate these sounds when the infant starts to babble at around six months (Kent, 1992). Six months also marks the time when most infants understand that their name refers to them (Bortfeld et al., 2005).

The start of pointing at nine or 10 months is considered a watershed moment in children's language development, as it indicates that the child understands that knowledge can be communicated (Tomasello et al., 2007). Children's first words then rapidly follow, with most children having a vocabulary of five words by the time of their first birthday (Nelson, 1973). The toddler's vocabulary then steadily increases until around 18 months, when they undergo a word 'spurt', and may learn up to 20 new words per day (Reznick & Goldfield, 1992). This process of 'fast mapping' enables children quickly to acquire new words after hearing them only once or twice (Mervis & Bertrand, 1994). Thus, by the time of their second birthdays, most children will be able to understand and say approximately 300 words that predominantly include nouns, but also verbs, pronouns and negations (Fenson et al., 1994).

Throughout the third year, children's use of language become increasingly sophisticated as they start to put words together in simple sentences. Initially, these sentences are filled with grammatical errors (Hoff, 2013). However, by the end of the third year, many children are communicating confidently, and more or less accurately, in the languages they have been exposed to in their homes.

- c) How do parents and other caregivers support children's understanding of language during the first three years of life?

During the first year of life, parents and other caregivers support children's phonological awareness through child-directed speech that exaggerates the vowels and consonants of words (Singh et al., 2009). Studies show that child-directed speech helps the infant differentiate

phonemes and words and understand the role of language in communication. By contrast, words heard through normal adult speech or television are of little value to children's early language learning (Weisleder & Fernald, 2013).

During later infancy, parents support children's language development through joint attention activities which make clear that objects and events have specific names (Munday, 2007; Morales et al., 2000). Book sharing is an example of a joint attention activity with consistent evidence of facilitating children's early understanding of language (Bus et al., 1995). However, recent studies show that conversations taking place during joint attention activities may be better facilitators of language learning during the first three years than are joint reading activities (Farrant & Zubrick, 2012; 2013).

During toddlerhood, children continue to benefit from conversations with their caregivers and other adults. While book reading activities also support children's mastery of language, conversations give children more opportunities to practise language and receive feedback from the parent. Recent evidence also shows that toddlers benefit the most from conversations that are responsive to their particular interests (Swingle & Humphrey, 2018; Cartmill et al., 2013; Rowe, 2012; Hurtado et al., 2008). Not only do these conversations increase children's knowledge of language, they also increase children's understanding of objects, people and numbers, as described previously.

IMPLICATIONS FOR PRACTICE

Early learning begins in the womb and then continues after birth as a result of the child's interactions with his or her caregivers. This not only underscores the important role parents play in their babies' early learning, but also the essential role health visitors and early years specialists play in supporting families with young children.

In particular, studies show that high-quality early years and health visiting care is especially necessary for children growing up in disadvantaged circumstances (Asmussen & Brims, 2018). This is because low-income parents may lack the financial resources to provide an enriching learning environment, as well as the education to support their young child's language needs (Violato et al., 2011; Waldfogel & Washbrook, 2010; Lacroix et al., 2002).

Studies also show that this support needs to be sufficiently intensive for it to make a measurable difference (Asmussen et al., 2016). Families are rarely able to implement advice they hear only once or twice, with studies showing that low-dosage activities, such as book gifting, often provide little value (Goldfield et al., 2011). Disadvantaged children benefit in measurable ways when their parents receive support that is individualised and offered on a frequent basis from birth until the child's second birthday (Asmussen et al., 2016).

Collectively, these findings highlight the need for more intensive health visiting support for low-income families. Health visitors not only have the knowledge to support parents' understanding of their child's cognitive needs, but also have the skill to provide this information in a way that is non-stigmatising and recognised by parents as providing value.

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