Joint Attention: The Building Block of Human Connection

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A parent and child engage in joint attention

Joint attention or shared attention is the shared focus of two individuals on an object. It is achieved when one individual alerts another to an object by means of eye-gazing, pointing or other verbal or non-verbal indications. An individual gazes at another individual, points to an object and then returns their gaze to the individual. Scaife and Bruner were the first researchers to present a cross-sectional description of children's ability to follow eye gaze in 1975. They found that most eight- to ten-month-old children followed a line of regard, and that all 11- to 14-month-old children did so. This early research showed it was possible for an adult to bring certain objects in the environment to an infant's attention using eye gaze.

Subsequent research demonstrates that two important skills in joint attention are following eye gaze and identifying intention. The ability to share gaze with another individual is an important skill in establishing reference. The ability to identify intention is important in a child's ability to learn language and direct the attention of others. Joint attention is important for many aspects of language development including comprehension, production and word learning. Episodes of joint attention provide children with information about their environment, allowing individuals to establish reference from spoken language and learn words. Socio-emotional development and the ability to take part in normal relationships are also influenced by joint attention abilities. The ability to establish joint attention may be negatively affected by deafness, blindness, and developmental disorders such as autism.

Other animals such as great apes, orangutans, chimpanzees, dogs, and horses also show some elements of joint attention.

Humans

Levels of Joint Attention

Defining levels of joint attention is important in determining if children are engaging in age-appropriate joint attention. There are three levels of joint attention: triadic, dyadic, and shared gaze.

Triadic joint attention is the highest level of joint attention and involves two individuals looking at an object. Each individual must understand that the other individual is looking at the same object and realize that there is an element of shared attention. For an instance of social engagement to count as triadic joint attention it requires at least two individuals attending to an object or focusing their attention on each other. Additionally, the individual must display awareness that focus is shared between himself or herself and another individual. Triadic attention is marked by the individual looking back to the other individual after looking at the object.

Dyadic joint attention is a conversation-like behavior that individuals engage in. This is especially true for human adults and infants, who engage in this behavior starting at two months of age. Adults and infants take turns exchanging facial expressions, noises, and in the case of the adult, speech.

Shared gaze occurs when two individuals are simply looking at an object. Shared gaze is the lowest level of joint attention.

Individuals who engage in triadic joint attention must understand both gaze and intention to establish common reference. Gaze refers to a child's understanding of the link between mental activity and the physical act of seeing. Intention refers to the child's ability to understand the goal of

another person's mental processes.

Gaze

A parent and child engage in joint attention through pointing

For an individual to engage in joint attention they must establish reference. Following the gaze or directive actions (such as pointing) of others is a common way of establishing reference. For an individual to understand that following gaze establishes reference the individual must display:

Recognition that looking is intentional behavior directed to external objects and events. Following gaze serves the purpose of establishing reference.
An understanding that looking results in the mental experience of seeing an object or event.
Recognition that eyes are responsible for seeing.
Recognition that others share in the capacity to see things.
An understanding that voice direction helps determine whether the speaker is talking to them and what he or she is referring to or focused on.

Gaze becomes more complex with age and practice. As gaze increases in complexity, individuals

are better able to discriminate what others are referring to. Joint attention is also important for social learning. Gaze following reflects an expectation-based type of orienting in which an individual's attention is cued by another's head turn or eye turn. Individuals are motivated to follow another's gaze and engage in joint attention because gaze is a cue for which rewarding events occur.

Intention

The ability to identify intention is critical to joint attention. When individuals understand that others have goals, intentions, and attentional states, they are able to enter into and direct another's attention. Joint attention promotes and maintains dyadic exchanges and learning about the nature of social partners. The ability to engage in joint attention is crucial for language development.

Individuals who are intentional in their actions display regularity in their behavior. Individuals locate objects with their eyes, move towards the object, and then use hands to make contact with and manipulate the object. Change in gaze direction is one of several behavioral cues that individuals use in combination with changes in facial and vocal displays and body posture to mark the intention to act on an object. Individuals who seek or follow a joint focus of attention display knowledge that what is in their awareness is also in another's awareness. They believe that they are experiencing the same world as others.

Joint attention plays an important role in the development of theory of mind. Theory of mind and joint attention are important precursors to a fully developed grasp of another individual's mental activity.

Language Comprehension

Two teenagers engage in joint attention by reading a book.

The ability of children to extract information from their environment rests on understandings of attentional behaviors such as pointing. Episodes of joint attention provide children with a great deal of information about objects by establishing reference and intention. Joint attention occurs within particular environments. The items and events in that environment provide a context that enables the child to associate meaning with a particular utterance. Joint attention makes relevant aspects of the context salient, helping children comprehend what is taking place.

Language Production

An infant's social environment relates to his or her later language development. Children's first words are closely linked to their early language experience. For children with typically developing language skills, there is a close match between maternal speech and their environment: up to 78% of maternal speech is matched to the object the child is focusing on. In children with delayed language development, only 50% of maternal speech is matched to the object the infant is focusing

on. Infants are more likely to engage in joint attention when the parent talks about an object that the child is attending to as opposed to an object outside of the infant's attention. This increased level of joint attention aids in encouraging normal language development, including word comprehension and production. When joint attention is present, it plays an important role in word learning, a crucial aspect of language development.

Relationship to Socio-emotional Development

Joint attention and the ability to attend to an aspect of one's environment are fundamental to normal relationships that rely on the sharing of experience and knowledge. Infants are highly motivated to share experience. An infant's motivation to engage in joint attention is strong enough that infants voluntarily turn away from interesting sights to engage in joint attention with others.

As described in attachment theory, infants need to develop a relationship with a primary caregiver to achieve normal social and emotional development. A key part of the ability to develop this relationship may be joint attention. In addition to language development, joint attention serves the function of preparing infants for more complex social structures involved in adult conversation. Children's skills in initiating and responding to joint attention predict their social competence at 30 months of age. Anticipatory smiling (a low level form of joint attention involving smiling at an object then turning the smile to one's communicative partner) at 9 months positively predicts parent-rated social competence scores at 30 months in infants. Early joint attention abilities account for differences in social and emotional abilities in later life.

Developmental Markers in Infancy

At the age of 2 months, children engage in dyadic joint attention and conversation-like exchanges with adults during which each is the focus of the other's attention and they take turns exchanging looks, noises and mouth movements. At age 3 months, children display joint attention skills by calling to a caregiver when they are not perceivable. When caregiver does not respond in a similar manner, child exhibits a series of responses that were first studied in early 1970s by Edward Tronick in collaboration with pediatrician T. Berry Brazelton at the time when the latter was creating the Neonatal Behavioral Assessment Scale. At age 6 months, infants display joint attentional skills by:

Orienting themselves in the same general direction (in their visual field) as another person. Infants also cease to focus on the first interesting (salient) object they encounter.
Following outward directed gaze of adults.
Extending more sophisticated behaviors, such as gaze checking, when initial gaze following is not successful.
Paying more attention to eyes, responding to shifts in eye gaze direction, and directing their own

attention based on another's gaze.

At age 8 months, infants demonstrate joint attention through proto-declarative pointing, particularly in girls. At 9 months of age, infants begin to display triadic joint attention. Infants also will display joint attention activities, such as communicative gestures, social referencing, and using the behavior of others to guide response to novel things.

At one year of age, joint attention is displayed through a child's understanding of pointing as an intentional act. One-year-olds also establish joint attention for objects within their visual field before objects beyond their current visual field. At this age, infants are not yet able to represent their entire environment, only what they can see. At age 15 months, children recognize the minds of others. At this age, children also recognize the importance of eyes for seeing and that physical objects can block sight. At age 18 months, infants are capable of following an individual's gaze to outside their visual field and establishing (representative) joint attention. 18-month-olds also grasp the intentional, referential nature of looking, the mentalistic experience of seeing and the role of eyes and are skilled at following both gaze and pointing with precision. At two years of age, children display joint attention by extending attention beyond the present and understanding that the targets of other's attention extends to the past as well. Two-year-olds are also capable of representational thought or increased memory.

Individuals with Disabilities

Several studies have shown that problems with joint attention are associated with developmental processes. Difficulties in establishing joint attention may partially account for differences in social abilities of children with developmental disorders (i.e. Autism spectrum disorders). A core deficit noted in autism is eye gaze. Autistic children have difficulty alternating their attention towards a partner and third object. This difficulty is attributed to their deficiencies in following gaze, resulting in difficulty initiating and maintaining joint attention. Deaf infants are able to engage in joint attention similar to hearing infants; however, the time spent engaged in joint attention is often reduced in deaf infants born to hearing parents. Hearing parents of deaf infants often are less likely to respond and expand on their deaf infants' initiative and communicative acts. Deaf infants of deaf parents do not show reduced time spent in joint attention. Auditory input is not critical to joint attention but similar modes of communication and understanding are vital. Furthermore, mothers who are unable to successfully establish regular joint attention with their child rate that infant lower on scales of social competence. Judgement of low social competence can be made as early as 18 months of age. In blind infants, joint attention is established by means of auditory input or feeling another person's hand on an object and may be delayed compared to sighted infants.

Other Animals

Triadic joint attention is the highest level of joint attention and involves two individuals looking at an object. Each individual must understand that the other individual is looking at the same object and realize that there is an element of shared attention. Triadic attention is marked by the individual looking back to the other individual after looking at the object. Dyadic joint attention involves mutual gaze between the parent and infant. Mutual gaze is marked by both the parent and infant looking at each other's face. If two individuals are simply looking at an object, it is referred to as shared gaze.

Dyadic Joint Attention

Infant and parent chimpanzees show dyadic joint attention in an affectionate manner by looking at each other's eyes Non-human animals such as Japanese monkeys, baboons, and other Old World monkeys seldom engage in dyadic joint attention. For these animals, the eye contact involved in dyadic joint attention is deemed threatening.

Shared Gaze

Gaze following, or shared gaze, can be found in a number of primates.:155-71 Domesticated animals such as dogs and horses also demonstrate shared gaze. This type of joint attention is important for animals because gaze shifts serve as indicators alerting the animal to the location of predators, mates, or food.

Chimpanzees are capable of actively locating objects that are the focus of another individual's attention by tracking the gaze of others. They are not limited to following eye gaze to the first interesting object in their view. They use a number of different cues to engage in shared focus, including head movement and eye gaze. Infant chimpanzees start to follow tap, point, and head turn cues of an experimenter by nine months of age. By 13 months of age, they show following responses to glance cues without a head turn. There is no evidence to support that infant chimpanzees are able to use eye gaze alone as a cue for following responses. By 20 months of age, infant chimpanzees are able to follow an experimenter's cues to a target behind the chimpanzee but infant chimpanzees do not look back to the experimenter after looking at the target. Moving targets are more salient than stationary targets for infant chimpanzees. Chimpanzee infants are sensitive to faces which are gazing at them, but chimpanzees less than three to four years old only look within their visual field when using the experimenter's head turn as their cue.