

UC Berkeley

2016 SURF Conference Proceedings

Title

Developmental Changes in Joint Visual Attention

Permalink

<https://escholarship.org/uc/item/55c705jk>

Author

Woo, Jacqueline

Publication Date

2016-10-01

Undergraduate

Developmental Changes in Joint Visual Attention

My study deals with a very important but very neglected cognitive skill, namely the development of the infant's ability to follow another's pointing gaze or gesture. This skill of "joint visual attention" (JVA) is crucial for the development of language and emotion, but is relatively understudied despite its importance.

There is a french proverb that says, "when the finger points at the moon, the idiot looks at the finger." A young infant less than 8 months of age, is like the proverbial french idiot. When the mother points to or gazes at a target in the world, the young infant looks at the finger or the face. Only starting at 8 ½ to 9 months of age do infants begin to leap from the finger or the gaze gesture to the region that the person is gazing at or pointing toward.

JVA is important for language acquisition and emotion. If a mother says, "look at the book," the baby who can participate in JVA can learn the meaning of the word "book" in this way (Mundy et. al, 2007). Similarly, if the mother points at an insect and communicates disgust, the baby will learn to be disgusted by similar insects in the future (Vaughn et. al., 2003).

Despite a large volume of empirical research on JVA, there is a lack of systematic review of the developmental progression of this particular skill during infancy. I conducted a 46-article literature review, and summarized the developmental trajectory of joint visual attention. The phenomenon of JVA develops as follows (Figure 1), with emergence occurring just before 9 months, most rapid development occurring between 12 and 15 months, and development asymptoting off at about 18 months.

Responsive joint attention (RJA) is JVA in the communicative direction from mother to infant. However, communication is typically bi-directional from adult to infant, and infant to adult. Likewise, there is also an infant-to-mother communication known as infant-initiated joint attention (IJA) that involves an infant's ability to point. An infant must learn to point in order to indicate interest in an object and gain visual attention from his caregiver. Pointing develops later than JVA beginning at 11 months of age. Whereas in JVA, the adult is imposing information on the infant, an infant's pointing communicates the infant's search for meaning from the adult, i.e., "What is that?"

Previous research from my lab has found that JVA is affected with crawling onset (Campos et. al, 2000). Preliminary data suggests that walking onset also affects JVA. This study will attempt to show that the infant's acquisition of walking mediates improvement in both JVA and pointing.

The basis of this study is that motor activity greatly expands the visual world of the infant in two dimensions, from left to right and forward to backward (Campos, 2007; Butterworth &

Jarrett, 1991). Crawling proves crucial in bringing about the first developmental transition in JVA, at 8 ½ to 9 ½ months (Campos, 2007; refer to Figure 2). Walking not only involves much greater movement in the visual world than crawling, but also frees infant's hands and arms for pointing, which is difficult to do so when crawling (Adolf, 2013; Kretch, 2013). This allows me to propose that walking is responsible for the next major developmental change in joint visual attention, just before 12 months (Figure 2).

Therefore, the current study attempts to assesses both aspects of JVA (RJA and IJA) with 13 month old infants, when typically developmental infants start to walk according to the Bayley Scales of Infant Development. This means measuring both the baby's success in RJA, that is, following the point and gaze of an adult, as well as IJA, the baby's initiation of pointing to an interesting event that the adult must shift their attention toward.

My proposed study tests the following hypothesis:

1. Concerning RJA ability, walking infants will follow point and gaze with greater accuracy than crawling infants.
2. Concerning IJA ability, walking infants will point to novel and interesting objects outside a mother's visual field more than crawling infants.

Ideally, this study should be done longitudinally in order to depict how joint attention does at each level in relation to its locomotor antecedent. However this is time consuming, and I do not have the resources and amount of babies to do a longitudinal study emphatically, so, as a first step, I propose a cross-sectional study with babies of the same age divided into two groups: crawlers and walkers, with walkers must having been walking for at least four weeks. The criteria of walking is set up such that infants must be able to walk a set distance fluidly two out of three trials.

In order to ensure a solid sample size to achieve significance in my data, my target sample is 20 of each group — that is, 20 crawlers and 20 walkers. In each of the two groups, I will be testing half males and half females.

My set-up, has been colloquially dubbed 'The Halloween Paradigm.' In a rectangular enclosed area, the mother sits directly across, facing the infant, with blank curtains around them (Figure 3). To control the setting, the mother will read a storybook to the infant.

Behind each participant there are two targets to either side of the participant attached to the ceiling that can be remote controllably dropped down, inspired by those halloween spiders meant to scare trick-or-treaters. Cameras can be found directly behind each participant for later coding. In each trial, one target will drop down when certain cue words are read from the storybook.

Responsive joint attention, RJA, is tested by one of the targets behind the baby dropping down. With a controlled distance marked off in tape, the mother is instructed to point at the toy during the time period the toy crosses that distance. RJA will be measured by coding the number of trials the infant looks at the correct region (aka the dropping target).

Infant-initiated joint attention, IJA, is tested by one of the targets behind the mother dropping down. As the toy drops, IJA will be coded by whether the baby looks back and forth at the mother and the target, whether the baby points at the toy, and whether the baby vocalizes, all these actions serving as a demonstration of intentional IJA. Each target will drop down twice; with four targets, this constitutes eight total trials.

Over the course of this semester, I will focus my energy on data collection and analysis. I previously discussed how JVA is important for language learning and emotion. After this study is completed, following studies should look into how and why through mediation models. Another implication is to study children at risk for early childhood autism; these children are notoriously lacking in RJA and IJA ability, and it is important to see how we can make up for this deficit.

I would like to thank my mentors Professor Joseph Campos, Professor David Anderson, and Dr. Minxuan He.

Figures

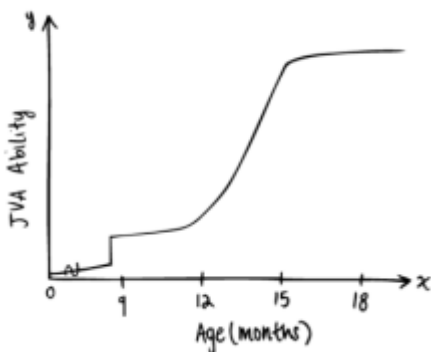


Figure 1. The developmental trajectory of joint visual of joint visual attention (JVA).

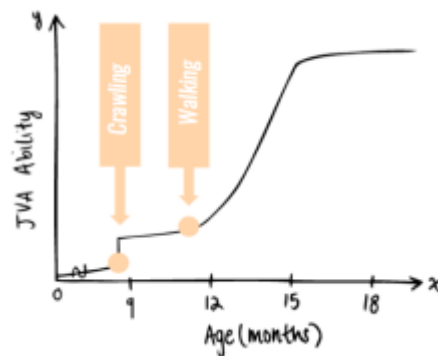


Figure 2. The developmental trajectory of attention (JVA) in relation to locomotion.

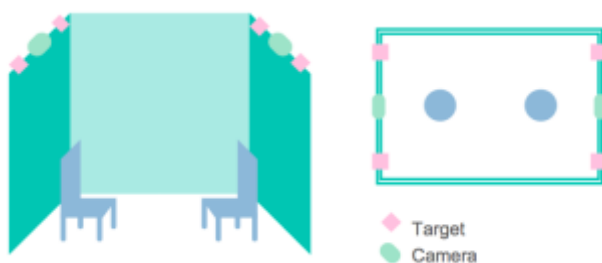


Figure 3. The Halloween Paradigm (Right: Side View; Left: Top Down)

References

- Adolf, K.E. & Robinson, S.R. (2013). The road to walking: What learning to walk tell us about development. In P.Zelazo (Ed.) Oxford handbook of developmental psychology. NY: Oxford University Press
- Butterworth, G., & Jarrett, N. (1991). What minds have in common is space: Spatial mechanisms serving joint visual attention in infancy. *British Journal of Developmental Psychology*, 9(1), 55-72. doi:10.1111/j.2044-835x.1991.tb00862.x
- Campos, J. J., Anderson, D. I., Barbu-Roth, M. A., Hubbard, E. M., Hertenstein, M. J., & Witherington, D. (2000). Travel Broadens the Mind. *Infancy*, 1(2), 149-219. doi:10.1207/s15327078in0102_1
- Kretch, K. S., Franchak, J. M., & Adolph, K. E. (2013). Crawling and Walking Infants See the World Differently. *Child Dev Child Development*, 85(4), 1503-1518. doi:10.1111/cdev.12206
- Mundy, P., Block, J., Delgado, C., Pomares, Y., Hecke, A. V., & Parlade, M. V. (2007). Individual Differences and the Development of Joint Attention in Infancy. *Child Development*, 78(3), 938-954. doi:10.1111/j.1467-8624.2007.01042.x
- Toth, K., Munson, J., Meltzoff, A. N., & Dawson, G. (2006). Early Predictors of Communication Development in Young Children with Autism Spectrum Disorder: Joint Attention, Imitation, and Toy Play. *J Autism Dev Disord Journal of Autism and Developmental Disorders*, 36(8), 993-1005. doi:10.1007/s10803-006-0137-7
- Vaughn, A., Mundy, P., Block, J., Burnette, C., Delgado, C., Gomez, Y., Meyer, J., Neal, R., Pomares, Y. (2003). Child, caregiver, and temperament contributions to infant joint attention. *Infancy*, 4, 603-616.