

Joint Attention in Human and Chimpanzee Infants in Varied Socio-Ecological Contexts

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Contents

Abstract: Joint Attention in Human and Chimpanzee Infants in Varied Socio-Ecological Contexts	7
I. Joint Attention in Contextualized and Comparative Perspectives	10
II. The Process of Decolonizing Joint Attention	13
III. General Methods to Study Joint Attention in Context	87
IV. Joint Engagement in Human Infants	100
V. Joint Engagement in Chimpanzee Infants	120
VI. Species Comparisons of Joint Engagement	142
VII. Revisiting Normativity, Universality, and Species-Uniqueness With an Inclusive Perspective of Joint Attention	169
Acknowledgments	191
References	192
Authors	215
Supporting Information	217
Subject Index	218

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Abstract Joint attention (JA) is an early manifestation of social cognition, commonly described as interactions in which an infant looks or gestures to an adult female to share attention about an object, within a positive emotional atmosphere. We label this description the *JA phenotype*. We argue that characterizing JA in this way reflects unexamined assumptions which are, in part, due to past developmental researchers' primary focus on western, middle-class infants and families. We describe a range of cultural variations in caregiving practices, socialization goals, and parenting ethnotheories as an essential initial step in viewing joint attention within inclusive and contextualized perspectives.

We begin the process of conducting a decolonized study of JA by considering the core construct of joint attention (i.e., triadic connectedness) and adopting culturally inclusive definitions (labeled joint engagement [JE]). Our JE definitions allow for attention and engagement to be expressed in visual and tactile modalities (e.g., for infants experiencing distal or proximal caregiving), with various social partners (e.g., peers, older siblings, mothers), with a range of shared topics (e.g., representing diverse socialization goals, and socio-ecologies with and without toys), and with a range of emotional tone (e.g., for infants living in cultures valuing calmness and low arousal, and

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those valuing exuberance). Our definition of JE includes initiations from either partner (to include priorities for adult-led or child-led interactions).

Our next foundational step is making an ecological commitment to naturalistic observations (Dahl, 2017, *Child Dev Perspect*, 11(2), 79–84): We measure JE while infants interact within their own physical and social ecologies. This commitment allows us to describe JE as it occurs in everyday contexts, without constraints imposed by researchers. Next, we sample multiple groups of infants drawn from diverse socio-ecological settings. Moreover, we include diverse samples of chimpanzee infants to compare with diverse samples of human infants, to investigate the extent to which JE is unique to humans, and to document diversity both within and between species.

We sampled human infants living in three diverse settings. U.K. infants ($n = 8$) were from western, middle-class families living near universities in the south of England. Nso infants ($n = 12$) were from communities of subsistence farmers in Cameroon, Africa. Aka infants ($n = 10$) were from foraging communities in the tropical rain forests of Central African Republic, Africa. We coded behavioral details of JE from videotaped observations (taken between 2004 and 2010). JE occurred in the majority of coded intervals ($Mdn = 68\%$), supporting a conclusion that JE is normative for human infants. The JA phenotype, in contrast, was infrequent, and significantly more common in the U.K. ($Mdn = 10\%$) than the other groups ($Mdn < 3\%$). We found significant within-species diversity in *JE phenotypes* (i.e., configurations of predominant forms of JE characteristics). We conclude that triadic connectedness is very common in human infants, but there is significant contextualization of behavioral forms of JE.

We also studied chimpanzee infants living in diverse socio-ecologies. The PRI/Zoo chimpanzee infants ($n = 7$) were from captive, stable groups of mixed ages and sexes, and included 4 infants from the Chester Zoo, U.K. and 3 from the Primate Research Institute, Kyoto University, Japan. The Gombe chimpanzee infants ($n = 12$) were living in a dynamically changing, wild community in the Gombe National Park, Tanzania, Africa. Additionally, we include two *Home* chimpanzee infants who were reared from birth by a female scientist, in the combined U.S., middle-class contexts of home and university cognition laboratory. JE was coded from videotaped observations (taken between 1993 and 2006). JE occurred during the majority of coded intervals ($Mdn = 64\%$), consistent with the position that JE is normative for chimpanzee infants. The JA phenotype, in contrast, was rare, but more commonly observed in the two Home chimpanzee infants (in 8% and 2% of intervals) than in other chimpanzee groups ($Mdns = 0\%$). We found within-species diversity in the configurations comprising the JE phenotypes. We conclude that triadic connectedness is very common in chimpanzee infants, but behavioral forms of joint engagement are contextualized.

We compared JE across species, and found no species-uniqueness in behavioral forms, JE characteristics, or JE phenotypes. Both human and chimpanzee infants develop contextualized social cognition. Within-species diversity

is embraced when triadic connectedness is described with culturally inclusive definitions. In contrast, restricting definitions to the JA phenotype privileges a behavioral form most valued in western, middle-class socio-ecologies, irrespective of whether the interactions involve human or chimpanzee infants.

Our study presents a model for how to decolonize an important topic in developmental psychology. Decolonization is accomplished by defining the phenomenon inclusively, embracing diversity in sampling, challenging claims of human-uniqueness, and having an ecological commitment to observe infant social cognition as it occurs within everyday socio-ecological contexts. It is essential that evolutionary and developmental theories of social cognition are re-built on more inclusive and decolonized empirical foundations.

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Joint attention (infants engaging with a partner about a shared topic) is thought by developmental theorists to foster children's understanding of others' minds, and by evolutionary theorists to mark human-unique social cognition. However, most investigators prioritize those behavioral forms found in western, middle-class, mother-infant pairs. In their monograph, Kim Bard and colleagues decolonize the study of joint attention by using culturally inclusive definitions (joint engagement [JE]); studying samples of human (n=30) and chimpanzee (n=21) infants from diverse settings (farming communities in Cameroon, foraging communities in Central African Republic and Tanzania, and urban communities in Japan, England, & US); and conducting naturalistic observations in everyday contexts (video-recordings made between 1993 and 2010). Data showed JE occurring frequently in all infants (supporting normativity), revealed substantial within-species variation in behavioral forms (supporting contextualization), and offered no evidence of human-uniqueness. Authors argue for rebuilding developmental and evolutionary theories of social cognition on culturally inclusive foundations.