“Watch me, Mom!”
The Development of Infants’ Skills in Eliciting Others’ Attention

by

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B.A. (With Distinction, Psychology), Simon Fraser University, 2022

Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

in the
Department of Psychology
Faculty of Arts and Social Sciences

SIMON FRASER UNIVERSITY
Spring 2023

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Abstract

During the first years of life, typically developing infants respond to and actively engage their caregivers' attention in increasingly complex ways, leading to mutually enjoyable interactions. How infants learn to understand others' attention is an important developmental milestone, but this process is not well understood and has generated considerable debate. I critique a cognitivist theory and endorse an action-based, relational approach, according to which infants' understanding of others' attention develops gradually as they learn how others respond to their actions. This perspective informs my analysis of three longitudinal case studies of infants and caregivers engaged in typical daily interactions. These observations are consistent with the view that practical, lived experience of interaction helps infants to learn how they can engage others' attention to themselves. Although each infant developed ways of eliciting others' attention, they did so in different ways based on their experiences of familiar social routines with their caregivers.

Keywords: social development; developmental psychology; parent-child interaction; joint engagement; attention; qualitative research

Dedication

To Jeff. Thank you for your unfailing support and belief in me!

Acknowledgements

It took me a long time to get to graduate school, so there are a lot of people I need to recognize for their help in getting me to this point.

Thank you to Dr. Jeremy Carpendale, who helped me to realize that I had a theoretical orientation about development, who helped to motivate me to finally finish my undergraduate degree, and whose good-humoured and patient guidance has opened my mind to so many interesting ways of understanding how humans learn to think about each other. I am inestimably grateful for your support and trust in me as I have entered the world of research and academic writing.

Thanks also to Dr. Tanya Broesch, for her support, knowledge, and passion for including a broader variety of perspectives in developmental research, and for always asking questions that encourage me to explore my assumptions. Thank you to Dr. Vasudevi Reddy for doing so much of the research that inspired me, writing about things that are so often overlooked in this field, and also for being part of my examining committee. It was wonderful to have conversations with you about this study.

Thank you to Beau Wallbridge and Dr. Viktoria Kettner for their mentorship, many valuable and interesting conversations, and for sharing countless references and resources (not to mention their data sets!) Beau, thank you for filming the videos that made my study possible. Thank you to my research assistants, Jacob Angeles and Anastasia (Ana) Zhukova, for your commitment to my research, and for your excitement and enthusiasm while discussing the many wonderful things we were seeing in the data. Thanks to Emre Aydin and to Dr. Vanessa Fong for helping me to learn about qualitative methods. Thank you to Kristin Simpson for many valuable conversations and for helping me to improve my writing, and to Dr. Robyn Long for so generously sharing insight from your dissertation research and writing.

Thanks to Dr. Stuart Shanker, who ignited the fire that guided my journey back to academia, and to Dr. Susan Hopkins, for your enthusiastic support for my ideas. Your work has changed the lives of countless families for the better and has also changed my life in ways I am still discovering.

Special thanks to Dr. Veselin Jungic for teaching me to love mathematics and to believe in myself as a learner. Dr. J, I promise I will never mis-apply the chain rule again!

Last but certainly not least, thank you to my family: my husband, Jeff, and my children, Megan and Calum, who believed in my ability to return to formal academic learning and achieve my goal of attending graduate school, even after many years away. Thanks also to my mother, Maureen, for never giving up on seeing her daughter graduate from university, and for being a “beta reader” for this research.

This research was partially supported by a Spring 2022 Special Graduate Entrance Scholarship and a Summer 2022 Graduate Fellowship from Simon Fraser University.

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Chapter 1.

Introduction

Young infants are highly social. Their helplessness, their need for physical care and comfort, and their tendency to gaze at other people's faces and at eyes captures their caregivers' attention. During the first year of life, typically developing infants respond to and actively engage their caregivers' attention in increasingly complex ways, leading to emotionally rich, mutually enjoyable interactions. Around one year of age, most Western infants begin to integrate gestures such as pointing and verbal language into these interactions. Learning to understand others' attention is part of an important developmental milestone known as joint attention, typically defined as an infant's ability to coordinate their own attention with that of another person to share interest in an object or event in their environment. Sharing attention with others allows infants and young children to develop deep relationships and to figure out what is important to attend to in complex and new environments (Deák et al., 2013); it is also a foundation for the ability to use language (Bates et al., 1975; Charman, 2003; Mundy et al., 1994, 2007). When infants learn to coordinate their own and others' attention, and to engage other people's attention in complex ways, they have achieved a pivotal milestone in the development of human forms of communication and social interaction. Yet how they achieve this is not well understood, and is a matter of considerable debate in developmental literature.

In this thesis, I explore a relatively less studied aspect of this foundational skill: How infants learn to engage others' positive attention to themselves. I will discuss theories from recent developmental literature regarding how infants learn about others' attention, and critique some assumptions about infants' understanding of other people embedded in popular cognitivist theories. I will use longitudinal case studies of three infants to explore an alternative, action-based perspective, according to which infants' learning about other people's attention emerges within the mutually enjoyable, everyday social interactions between themselves and their caregivers. Finally, I will discuss the implications of these case studies for the ongoing theoretical debate within developmental literature and explore how the evidence presented in the current study can provide support for the action-based, relational view of development which I endorse.

Chapter 2.

Previous Research on how Infants Learn About Others' Attention

Joint attention first caught the interest of developmental researchers and theorists in the 1970s (e.g., Scaife & Bruner, 1975); a significant number of joint attention studies have since shown that being able to coordinate attention with other people is an important foundation for development in a variety of areas such as language development, cognitive development, social competence, self-regulation, learning, and behavioural inhibition (Bakeman & Adamson, 1984; Dawson et al., 2002; Morales et al., 2005; Mundy et al., 2007). Joint attention continues to be an important focus of developmental research. For example, one recent study explored possible links between the development of joint attention, language, and motor development in children considered at higher risk of developing autism (Bruyneel et al., 2019); another investigated whether mobile phone use by primary caregivers could affect infants' development of joint attention (Krapf-Bar et al., 2022).

Skills that will later be critical to joint attention, such as sharing gaze with others, emerge early in the first year. For example, newborn infants show a preference for gazing at faces with open eyes, and within a few weeks after birth tend to gaze more at eyes than at other parts of the face (Batki et al., 2000; Farroni et al., 2004; Haith et al., 1977; Kobayashi & Kohshima, 2001). As caregivers hold and care for young infants, this creates many opportunities for face-to-face interaction. There is evidence that newborn infants can learn to recognize faces, particularly those of primary caregivers, within hours of birth (Farroni et al., 2004), and that by 2 months, they have developed an expectation of attention from their caregivers. When a previously responsive caregiver becomes impassive as part of the "still face" paradigm, 2-month-old infants will gaze and smile, then become increasingly distressed if the adult fails to respond (Melinder et al., 2010). However, these infants exhibited much less distress if the interlocutor was an unknown adult, suggesting that their experiences had led them to have distinct expectations of attention from familiar caregivers (Melinder et al., 2010). Mcquaid et al. (2009) found that infants under 6 months seem to expect their caregiver's attention, and also appear to have developed expectations of how successful their own attention-

seeking gazes and smiles will be depending on the responsiveness of their primary caregivers. They found that infants whose mothers showed high levels of contingent responsiveness in normal face-to-face social interactions gazed longer and were more likely to pair smiling and gazing toward their mothers in a bid to re-engage her social attention when she adopted a still face (Mcquaid et al., 2009).

Reddy (2003, 2011) has also shown that 2-month-old infants are very aware of being the focus of others' attention: they will smile, vocalize, and make eye contact, and may avert their gaze or exhibit distress if others' attention overwhelms them. She found that infants try to "direct" others' attention to themselves and to their own actions by vocalizing shrilly at 2 months, and infants will later expand from vocalizations to taking actions that can initiate familiar interactive routines and games by about 4 months (Reddy, 2011).

These studies suggest that young infants develop expectations that they can use certain actions and behaviour to reliably engage others' attention to themselves, and that emotional attunement is an expected aspect of these interactions. Reddy (2003, 2011) has argued that infants learn about others' attention first by being attended to by others, and that their understanding of how to engage and coordinate with others' attention gradually emerges over the first year of life. Bates and colleagues (1975) described how the emotionally rich and enjoyable nature of face-to-face interaction between infants and caregivers plays an important role in establishing "the formulation of social interaction as a goal in itself" (p. 213).

As infants learn to anticipate, enjoy, and then elicit others' attention in response to their actions, this provides a foundation for future communicative, social, and cognitive development. I argue that being attended to, and attending to others, is an essential element of the human developmental system. Caregivers attend to infants, who are born helpless and therefore need to develop in a social environment. The mutually enjoyable experience of attending to an infant and of having them respond with gaze, vocalizations, and social smiles motivates caregivers to continue attending to infants, which in turn creates opportunities for infants to learn increasingly complex ways to elicit and engage the attention of their caregivers (Carpendale, 2018). Reddy (2001, 2003, 2011) has described a gradual developmental progression where infants first experience themselves as the objects of others' attention; by about 2 months, infants respond to and

act upon others' attention to themselves. This expands over the first year as infants respond to others' attention to actions they themselves take, to objects they are holding and manipulating, and then to distant objects or events (Reddy, 2001, 2003, 2011). This explanation moves the infant's embodied, practical understanding of attention gradually away from themselves and outward. As the infant begins to use gestures such as pointing, and later, verbal language, they can expand their ability to direct others' attention to increasingly distant events or objects.

However, very little research has been conducted into the emergence of infants' skills at eliciting and maintaining others' attention. This could be because the perspective that infants gradually learn to engage others' attention, through practical experiences of mutually enjoyable social interaction, is at odds with the generally accepted cognitivist explanation found in recent developmental literature.

2.1. A Cognitivist Explanation of the Development of Joint Attention

In recent decades, the cognitivist perspective has been perhaps the most widely cited explanation of how infants come to learn about others' attention. Cognitivist theorists typically begin by presupposing the individual, isolated mind (Carpendale & Lewis, 2004). They assume that infants face what is known as the "problem of other minds": the idea that each of us has private access to only our own minds, and that we need to infer the existence of others' minds based only on our own mental experiences (Carpendale & Ten Eycke, 2020). Any theorist starting from this assumption needs to propose a possible solution to the "problem of other minds", and various explanations can be found in the developmental literature. One prominent and frequently cited cognitivist theory was developed by Tomasello and colleagues (Carpenter, 2009; Tomasello, 1999; Tomasello et al., 2005; Tomasello & Carpenter, 2014. They suggested that somewhere between nine and twelve months, a "revolution" takes place in an infant's understanding of others. They claimed that infants start out with a "motivation to share psychological states and activities with others" (Carpenter, 2009, p. 384) which is unique to human beings (Tomasello et al., 2005). According to this theory, infants must later achieve a certain level of cognitive understanding of others' psychological states, based on reasoning from analogy: "Infants begin to understand particular kinds of intentional and mental states in others only after they have experienced them first in their

own activity and then used their own experience to simulate that of others" (Tomasello et al., 2005, p. 688).

Tomasello and other cognitivists who share his view of development have argued that at a crucial turning point late in the first year, infants achieve the insight that others have mental states such as thoughts, intentions, and attention. They assume that infants come to understand the social world as something "outside" of themselves, that they achieve this understanding by simulation of others' mental states (making analogies through observation of others' behaviour, which they compare to their own experiences), and that a person's behaviour results from an underlying mental state which must be inferred by an observer (Tomasello et al., 2005).

Jopling (1993) cautioned that "starting points have a tendency to haunt us all the way through to our theoretical conclusions" (p. 290). The cognitivist theories described above have been extensively criticized for having starting points leading to theoretical conclusions that overlook or ignore many important aspects of development. I will explore several of these criticisms below to explicate an action-based, relational explanation of development, which avoids many of the problems resulting from cognitivists' starting points.

2.2. Criticisms of Cognitivist Theories

Tomasello claimed that infants become motivated to draw others' attention to objects and other elements of the environment only after a new form of understanding of other people has developed (Tomasello, 1999). Carpenter (2009) explained infants' skill at sharing emotions and attention in similar terms: "If infants understand others' emotions, they will be able and motivated to share emotions with others, if they understand goals they can and will share goals, and if they understand attention they will engage in joint attention" (Carpenter, 2009, p. 384). These statements appear to define "understanding" in a fixed way: it is something that infants either possess, or not, and once they possess it, it is assumed to be an underlying cause of certain behaviours (Bibok, 2011). However, "understand" is both a noun and a verb: "understanding" can be viewed as an action or process, instead of a static, all-or-nothing phenomenon (Bibok, 2011). Infants can demonstrate practical understanding through activity: As they learn to anticipate that others will respond in certain ways when they take certain actions, they

are showing an active form of understanding of others' attention (Carpendale & Lewis, 2004). Through such experiences, infants can more gradually develop the ability to reflect on others' mental states.

Another starting point of cognitivist theories is the assumption that infants have the ability to distinguish between self and other. Tomasello and colleagues suggested that infants can simulate others' mental states by analogy based on their own experiences (Tomasello et al., 2005). However, Tomasello and others adopting a cognitivist perspective have been criticized for presupposing what they are trying to explain (Carpendale & Lewis, 2015b; Zahavi, 2008): To recognize that others' actions are similar to their own experiences, infants need a sense of self and other, but no explanation is provided by these theorists about how infants' self-other distinction develops (Carpendale et al., 2018; Müller & Carpendale, 2004). Hobson (1991) pointed out that infants would need a high level of introspective self-awareness to engage in the type of analogic reasoning proposed by cognitivists. In critiquing the cognitivist perspective, he suggested an alternative explanation: children gradually learn that others have thoughts, beliefs, and intentions, and this developing understanding could be necessary in order to facilitate their own self-awareness. In other words, infants first learn about others' minds, and this helps them gain insight into themselves (Hobson, 1991).

Cognitivists also start from an assumption that minds truly are private. However, this assumption has been criticized for overlooking the ways that human beings can perceive thoughts, emotions, intentions, and other mental states in the actions of other people, particularly people we know well. This is especially true of infants, whose emotions, thoughts and interests are often quite "public" and transparent. While older children and adults can conceal their own mental states from others, and can recognize that another person's behaviour may reflect private thoughts, goals, or intentions, this could be explained as a developmental outcome rather than as the starting point from which infants learn to understand others (Carpendale & Lewis, 2015a, 2018). Older children's ability to develop theories about others' mental states when they grow up to be scientists may result from active participation in shared experiences and shared actions (Hobson, 1991; Reddy, 2008, pp. 15–16).

Theorists who propose that humans simulate others' mental states in order to engage in a broad variety of social interactions have also been criticized for focusing too much on humans' ability to explain and predict others' behaviour. People can understand each other in a variety of ways, because of the fundamentally embodied nature of the human mind: Our experiences are not purely cognitive or mental, but are centered within our actions (Müller & Carpendale, 2004; Zahavi, 2008). There is evidence that infants as young as 3 months have learned to adjust their posture and muscle tension in response to signs they are about to be picked up when an adult caregiver approaches, reaching for them and lifting them into their arms (Lock, 1992; Reddy, 2003; Reddy et al., 2013). From an action-based perspective, these infants are showing an active understanding of others' attention, which is emerging gradually as a result of their experiences of social interaction. An intermediate step, where the infants engage in reflection about or simulation of the mental states of their caregivers while they are being picked up, seems unnecessary. Rather than assume that infants must learn to understand the existence of others' unseen mental states in order to engage in joint activity with others, we can instead view these infants as active participants in experiences that help them learn that others have thoughts and intentions (Hobson, 1991; Reddy, 2008).

From this perspective, the relations between infants and others are primary (Jopling, 1993). Jopling (1993) suggested that perhaps the reason we would treat others as "minded" (rather than as mindless automatons) is not because we have developed a theory that they have a mind—instead, we first experience other people as *people*, rather than as minds or as bodies. Based on this "primary fact of human experience" we can then learn to infer other people's thoughts and intentions (Jopling, 1993, p. 297). Because human infants are born helpless and rely on responsive caregiving to survive, they need other people to notice and respond to their signals to ensure their basic needs are met; as caregivers reliably do so, this helps the infant to learn that their actions in the world can have consequences, and they learn to expect that other people will respond when they take certain actions (Broesch & Carpendale, 2022; Carpendale & Lewis, 2012; Mesman et al., 2017).

2.3. An Action-Based, Relational View of How Infants Learn About Others' Attention

I argue, along with others, that the relations between people and active engagement in the process of interaction are the starting points for infants' understanding of others' attention (Carpendale & Lewis, 2015a; Reddy, 2003, 2011). Infants develop in a social world of relationships; communication and emotional engagement are woven into the fabric of their daily lives. Adults respond to infants' actions within a social and relational context, rich with emotion. This is the milieu in which infants' understanding of others' perspectives, intentions, goals, and experiences gradually emerges (Carpendale & Lewis, 2004). Infants learn that certain things they do will reliably get an enjoyable response from other people, and as they continue to actively engage in interaction with others, their caregivers respond in ways that motivate the infant to keep the interaction going. Gradually, infants learn increasingly complex ways to elicit further engagement from their caregivers and others (Bakeman & Adamson, 1984; Bates et al., 1975; Carpendale, 2018). This is a mutually enjoyable experience, which makes social interaction a goal in itself for the infant (Bates et al., 1975, p. 213).

Reddy (2003, 2010, 2011) argued that rather than learning about others' attention by observing and making inferences about how the people around them attend to objects in the environment, infants learn to understand others' attention through repeated social experiences in which they, themselves, are the object of attention. Reddy described attention as a process, rather than something static that occurs within a single moment (Reddy, 2011). Our awareness of another person's attention to ourselves is an awareness of being part of this process; attention can shift in focus, intensity, or quality rather than being an "all-or-nothing" phenomenon (something that is either present, or absent) (Reddy, 2011). Reddy suggested that it would be more accurate to describe this dynamic, embodied, and relational process as a verb ("attending") instead of a noun ("attention"). This shift to seeing attention as a process that changes over time means that learning about others' attention could also be viewed as a developmental process (Reddy, 2011). Reddy described attending as perceivable, experienceable, and engageable. If infants might learn about these three elements of attention through their experiences of others' attending to themselves, this might help them to discover, over time, that they can *jointly* attend with other people (Reddy, 2011).

In summary, I endorse the viewpoint that predictable daily interactions with caregivers, rich with the mutually enjoyable nature of positive attention to one another, is the context within which typically developing infants come to learn that others' attention is something they can actively engage in order to initiate and prolong social interaction (Bates et al., 1975; Reddy, 2003, 2011). Infants' experiences of engaging others in this way lead to a practical, active understanding that they can elicit others' attention in an increasingly complex variety of ways, such as showing or giving objects to others, joking or teasing, directing others' attention elsewhere, and eventually incorporating gestures and language. From this foundation, they gradually learn more (and more complex) ways that they can gain others' attention, which is a starting point for social understanding and for development in a variety of domains (Bates et al., 1975; Reddy, 2003, 2010, 2011). This understanding is an essential aspect of human forms of communication (Carpendale & Lewis, 2004).

Chapter 3.

Current Study

My main objective for the current study was to identify and describe, in detail, infant actions that attracted adult attention in mutually enjoyable social interactions and that helped to keep these interactions going. Studying three infants and their caregivers over time provided an opportunity to document developmental shifts in the quality of the dyad's interaction over time (de Barbaro et al., 2013a, 2013b, 2015) and to identify patterns and individual variations in this process from one infant and one dyad to the next (Carpendale & Carpendale, 2010).

Adopting an action-based theoretical perspective means that I did not always expect that any particular behaviour that successfully captured adults' attention would have been deliberately used by the infants for that purpose. However, I expected that over time, the infants' ways of getting and keeping adult caregivers' attention would become broader and more complex as they discovered that these actions resulted in enjoyable social exchanges, then began engaging in these actions more deliberately to serve a variety of social purposes (Carpendale & Ten Eycke, 2020; Clark, 1978). I assumed that the behaviours I observed would form part of the infants' emerging ability to engage others' attention, as each infant learned to anticipate adults' responses to their behaviour in the context of the unique social environment provided by their caregivers.

Our current understanding of how infants learn about others' attention is largely reliant on research using the traditional definitions of joint attention critiqued by Reddy (2003, 2010, 2011). Because I am interested in documenting the emergence of infants' practical understanding of how they could capture and keep other's attention within emotionally laden everyday interactions with caregivers, I chose an observational, descriptive approach to this study. This helped to illustrate the dynamic and highly individual progression of each infant's skill at gaining and maintaining attention to themselves as part of these interactions. Specific examples from each infant's interactions with adult caregivers were used to illustrate this progression and to inform a

discussion about the action-based, relational developmental systems explanation which I endorse.

3.1. Participants and Procedure

Infants between ages 9-14 months provide an ideal sample to document the processes of interest for this study. Previous research suggests that between these ages, I could expect to see infants' ability to engage adults by capturing attention to themselves gradually shifting toward triadic engagements and joint attention episodes (Adamson & Bakeman, 1985; Cohn & Tronick, 1987; Stern, 1985).

3.1.1. Participants

The sample consisted of video data obtained from a previous research study, featuring three infants (one female and two male) and their primary caregivers. The data set included longitudinal, home-based video footage of the infants engaged in typical daily routines such as eating and playing. All three families were recruited by word-of-mouth, and the parents were White, university-educated professionals of European backgrounds living in a large city in western Canada.

The video footage for all three infants included the infant, one or more adult caregivers, and a researcher, Beau Wallbridge (hereafter referred to as BW), who was conducting a graduate research project on communicative development, exploring how infants learn to show and give objects to others. BW actively engaged with the parent and infant throughout the filming sessions to increase the family's comfort level with his presence, to observe how the infants interacted with adults other than their primary caregivers, and to increase the chances of capturing moments where infants coordinated interactions with multiple people (Wallbridge, 2022). There was always at least one parent present during data collection.

The video clips were each about one hour in length and were filmed at intervals of between 2 and 4 weeks, with some longer gaps in filming due to illness or family vacations. There were approximately 17.5 hours of video footage in total, including about 3.5 hours of footage of the female infant ("CR"), 4.5 hours of footage of the first male infant ("DL"), and 9.5 hours of footage of the second male infant ("AM").

3.1.2. Procedure

I undertook a recursive video observation and review process. To gain familiarity with the content of the videos and develop initial research questions, I previewed a selection of video clips of each of the infants. I identified two broad categories of situations where an infant would play an active role in engaging the attention of an adult caregiver: first, by capturing attention from an adult who was not directly or obviously attending to the infant, and second, by taking actions that would maintain or prolong the engagement with an adult who was already attending to the infant. I worked with an undergraduate research assistant to develop a qualitative coding scheme (see Appendix A), which was later used by two research assistants to code the video data; each research assistant coded half of the videos.

Coding involved identifying moments where the infant appeared to capture adult attention, as well as moments when the infant's behaviour appeared to contribute to maintaining adult attention on themselves. Using a spreadsheet, the coder noted the precise time at which these behaviours occurred, along with a brief description of the infant's behaviour, including specific details such as vocalizations, gestures, use of objects, and affective cues such as smiles, as well as the actions taken by the adult in response to the infant. The coders were encouraged to use an additional column in the spreadsheet to identify any other aspects of the interactions that struck them as important or noteworthy.

Meanwhile, I viewed all of the video footage and wrote detailed notes about the interactions, to check and supplement the coded observations. I identified elements of the social and physical environments, such as the availability and placement of objects like toys or furniture, that might have influenced the way in which the infants engaged the attention of others. I met frequently with both research assistants to discuss our observations of the infants in the videos and to identify and "bracket" ways in which our own experiences and opinions may have influenced our viewing of the video data (Creswell & Poth, 2017; Giorgi, 2009). As recommended by Corbin and Strauss (2008), I used reflective journaling to record my reactions after each session of data analysis and after meeting with the research team and with my supervisor.

The resulting analysis contained both general descriptions of each infant's attention-getting behaviour, as well as more detailed descriptions of specific moments that illustrated unique interaction patterns within each family. I reviewed the analysis to identify developmental changes in each infant's attention-getting behaviour. The following section includes a summary and discussion of the analysis.

Chapter 4.

Analysis and Results

4.1. Infant 1: “DL”

4.1.1. Background

DL was the third child in his family (with siblings aged 3 and 10 years at the time of data collection). He was 10 months old at the first date of data collection and 13 months, 3 days old at the end of data collection. His video data consisted of six filming sessions. At the first three sessions, only the infant and his mother were at home. In later sessions, other family members were present, including DL’s father and two older siblings, although they were not always in the room during filming. DL’s mother was attentive and available to her infant throughout the filming sessions. However, as the parent of three children she had many competing demands on her attention and time.

Data collection for this infant took place on the main floor of the family’s suburban house, which had a long, open living and dining room with access to the kitchen. Baby gates prevented DL from accessing the rest of the home. The living area was uncluttered and decorated with a large sofa, a recliner, and rugs on a hardwood floor; toys and books were accessible on low shelves, on the fireplace mantle, and in baskets on the floor.

4.1.2. Observation and Analysis

Throughout data collection, DL seemed to want to be physically close to his mother and to be most comfortable when he could see or touch her. This was evident from the first session, when he was tired and irritable and spent most of the time being nursed or held in arms or in a baby carrier while his mother chatted with the researcher. His mother commented early in this first session that DL liked to be near her; she had tried to help him be more comfortable being on his own so that she could do housework, but generally kept him in the carrier to care for him while attending to other tasks. At subsequent sessions, DL was more active, with free rein to explore the living area, but he continued to seek and maintain proximity to his mother. If she was seated, he would

sit or stand in her lap and she usually put an arm around him. If his mother was standing or moving around the room, DL often insisted on being held and carried. When he explored the room, sometimes seeking out toys and other objects, he would bring these to his mother and "check in" with her. At other times, when DL's mother was attending to something else, or talking with BW, he would call out to her with increasingly louder vocalizations until she showed her attention by talking to him, looking at him or coming to join him.

DL frequently engaged his caregivers' attention through mutually enjoyable, familiar routines involving toys. These routines evolved over time. One example was a "hugging routine" with stuffed toys. At the second filming session (10 months, 7 days old), his mother introduced a stuffed bear and took an active role in scaffolding DL to engage in the routine. DL made soft "haaa" vocalizations and smiled at the bear as he held it in one hand, and his mother suggested that she could hug the bear. She proceeded to take the bear, saying, "Here. Can I give your bear a hug? Awwww." DL gazed at her attentively as she hugged the bear several times, but moved away when she held the bear out and offered it to him to hug. About three weeks later, DL successfully engaged his mother's attention by initiating this play routine:

> DL and his mother have been sitting face-to-face for several minutes, with a selection of toys on the floor between them. BW is sitting close by, and the adults are engaged in animated conversation. DL's mother occasionally picks up and takes a few actions with some of the toys, which briefly captures DL's attention, but she is clearly distracted by the conversation with her adult visitor.
>
> DL makes a slightly frustrated vocalization, drops the toy he is using and reaches over to a nearby bin, pulling out a stuffed toy elephant. He turns toward his mother with a broad, coy smile, and she notices his glance and chuckles. She immediately stops talking to BW, faces the infant, sits up straighter, and opens her arms wide with her palms out, saying, "Whaaat?" in a playful voice. DL makes a brief chuckling sound and crawls toward her, holding the elephant in one hand. "What did you find? What is that? That was a funny look you just gave me. Is that an elephant?" She takes the toy from her infant and waves it in front of him. DL gurgles happily and sits back. He reaches for the toy as she holds it out toward him. DL hugs the toy, saying "Haaaa." His mother replies, "Are you giving it a hug—awwww!" She pretends to hug an invisible toy, clasping her arms in front of herself and leaning to one side, smiling at DL.

After several moments where DL explored the elephant's face and his mother made positive comments about DL's interest in the toy, he offered it to her to hug:

> DL says, softly, “Ah-ahhh!” His mother opens her hands out in front of the infant, asking, “Can I see?” He holds the elephant up and leans forward, pressing it toward her, and she reaches out to hug the elephant, saying, “Ohhh.” She and DL are very close together now, and he leans his face against hers. She says, “So nice!” in a high-pitched, soft voice, and asks, “Do you want to give it a hug?”

At a later session, (11 months, 28 days old), DL sought his father out and introduced the hugging routine again:

> DL walks into the kitchen. His father, who is occupied preparing food, looks up and says, “Hey, buddy!” DL takes a stuffed unicorn toy from a bag hanging nearby. He approaches his father, holding the toy out toward him. His father says, with exaggerated enthusiasm, “Mmm!” Smiling, he bends down to DL’s eye level, asking, “Are you sharing with me? Thank you!” He takes the toy and holds it out facing DL, saying, “It’s a unicorn!” DL makes an excited vocalization and takes the toy, pulling it into a quick hug and making a soft “Ahhh” noise. His father says, “Yeah! …Ohh, are you giving it a hug?” DL steps forward, pushing the unicorn toward his father’s chest. His father says, “Oh, you want to share. Thank you.” He gives the unicorn a brief hug, and DL turns to gaze at BW, apparently checking to see whether he is watching this routine. “Am I going to give it a hug? Oh, that’s nice… You want it back?” DL takes the unicorn from his father, makes the same soft cooing “Ahh” sounds, and sits down, hugging the unicorn. DL notices a garbage bin nearby, and pulls himself up to a standing position, looking intently at it. His father tries to distract the infant; he picks him up, saying, “I know! You want the garbage! You can’t have it, sweetheart. I’m sorry.” He kisses DL and offers him the unicorn. DL takes the toy, makes the soft “Ahhh” sound he made earlier while hugging the unicorn, and leans against his father. They hug each other as DL continues to say “Ahhhh.”

These examples demonstrate DL’s increasing flexibility and expertise in using a familiar, emotionally rich and enjoyable routine to engage his parents’ attention. The first time this routine was captured on video, DL’s mother was attentive to his signals when he responded to her presentation of the toy with soft vocalizations that were likely part of his previous experience of the hugging routine. His mother had to play a more active role in getting the routine going in the first example, but by the next session, DL showed he not only knew how to initiate and encourage this routine, but also that he had developed an expectation that he could capture his mother’s attention in this way. He first handed over the toy and used facial expression, eye contact, smiles and laughter to engage his mother’s attention before they began the routine, and he signaled his interest in engaging in the hugging routine by using the same soft, low-voiced vocalization that he used previously. The final example of this routine suggests that DL had developed confidence that he could initiate the routine independently: He showed his father what he

wanted to do together by hugging the stuffed toy while saying, “Ahhh,” then invited his father to take his turn in the routine by pushing the toy back toward his father. Another interesting element of this final example was that DL made efforts to engage BW’s attention, turning to look at him before and afterwards to see whether he was watching. DL proactively sought to initiate the routine and to make sure the other person in the room was attending to (and, presumably, reacting positively to) his actions.

4.2. Infant 2: “CR”

4.2.1. Background

CR was the only child in her family; she was aged 9 months, 12 days at the start of data collection. Data collection for this infant ended prematurely due to the onset of the COVID-19 pandemic, so no video data were available beyond age 11 months, 7 days.

Filming took place at the family home. CR’s mother was present at each filming session, and most of the time during these sessions was spent playing on the living room carpet inside a large, sturdy fenced play enclosure with translucent mesh fabric wall. This arrangement was apparently in place to ensure CR’s safety, as the house was not fully baby-proofed, and to prevent unsupervised interaction with the family dog, who was not yet comfortable around CR. CR’s mother placed a selection of toys inside the enclosed play area, and she and the researcher, BW, generally sat inside the play area with the infant.

CR’s mother clearly prioritized focusing on the infant during data collection sessions, minimizing small talk and social interaction with the researcher. CR’s mother tended to respond verbally to most of CR’s actions and particularly to her vocalizations, treating these as a “conversation” and making comments such as “Uh huh? Tell us more!” If CR faced away from her or seemed socially disengaged, her mother would gently draw her infant back into engagement by commenting on what CR was doing, perhaps reaching out to touch or manipulate a toy the infant was holding or looking at, or she would move herself slightly to stay in CR’s field of view.

4.2.2. Observation and Analysis

CR persistently worked to be included in any social activity that was happening around her. At every session, she frequently smiled and vocalized cheerfully to both adults, gazed at them or visually “checked in” while playing with toys, and elicited eye contact and verbal comments from her mother either by taking actions on toys, touching her mother’s hand, or moving closer to her mother.

Although her mother’s focus on CR and her tendency to respond quickly to any cues from her infant meant that CR did not have to make much effort to attract a distracted parent, she demonstrated that she understood how to engage her mother’s attention using strategies that she appeared to expect would be effective. For example, during the first session (9 months, 12 days old), CR was quickly able to re-engage her mother’s attention while the adults were briefly distracted by a conversation. CR was seated with her back to both adults, so she could not see them or make eye contact, but nonetheless perceived that she was not being attended to through auditory cues alone. She began making a series of increasingly louder frustrated vocalizations until her mother stopped talking to BW, turned the infant to face both adults, and started speaking directly to the infant. CR could perceive her mother’s attention shifting away from, then back toward herself without any need to perceive or engage her mother’s eye contact. After this episode, CR’s mother told BW that making urgent vocalizations like this was a common strategy her infant used when her mother was engaged in “anything where my attention is being taken from her.”

As CR’s motor skills and mobility developed, she was able to do more things by herself and in her own environment. Even with increasing independence, she still tended to prioritize social engagement, making sure to capture and maintain attention from others as part of play, including more active play. This is seen in how she played with balls at the final filming session (11 months, 7 days old). CR’s mother offered her a pink rubber ball, covered with spikes, which was slightly larger than the infant’s hand. While CR was clearly excited to play with the ball, she seemed equally invested in having others be part of her activity:

> CR turns to look at BW as she grasps the ball. “Can you throw it to BW?” her mother asks, pointing briefly at BW. CR mouths the ball while gazing at their visitor. BW says “Yeah! Come on. Throw it at me.” CR steps toward

> BW, still mouthing the ball while holding tightly to her mother's hand. BW says, "I can catch." CR removes the ball from her mouth and stretches her arm out, waving it back and forth in front of her. BW stretches his hand out, ready to take the ball. CR makes a shy gesture with her arm, curling it in toward her face, and holding the ball tightly under her chin as she babbles and gazes at BW's hand, then away from him. She looks down toward the basket of toys and releases the ball onto the floor. Looking down, she steps forward, and her mother says, "Oh, are you gonna kick it?"

CR found it difficult to kick this ball, so she carefully stepped over it and retrieved a larger "oball" (a flexible ball-shaped toy with large geometric holes). She then engaged both her mother and BW in her activity, checking to see if they were attending to her before she began to try to kick the ball toward their visitor:

> CR's mother says, "Ohhh… the big one? Okay." CR turns toward her mother, holding the ball and babbling softly while waving it back and forth. Her mother says, "That's a big ball." CR turns to gaze at BW with a slight smile and carefully releases the ball onto the floor in front of him. She gazes down at the ball in concentration, stepping forward, and successfully kicks the ball toward BW. He says, "Oh! That's good for kicking!" and gently rolls the ball back toward her. They spend several minutes engaged in back and forth play as CR attempts to kick the ball and the adults gently roll it back to her.

CR continued to make use of the dynamic and active nature of others' attention, even when she achieved a level of motor development that allowed her to do things she could not previously do without help. She didn't need her mother to reach for a ball that was too far away; she could now get the ball herself. When she found it difficult to throw or kick the smaller ball originally chosen by her mother, she could solve this problem independently by getting the larger ball. However, almost every action CR took with the balls during this play session showed that she didn't simply want to play with the balls on her own, or have the adults serve as an audience for her actions. For CR, the play experience was enriched by having her mother and BW actively attending to her and participating in her activity. She took actions that ensured her play partners were engaged in what she was doing, leading them to comment on her actions, respond to her expressions of frustration and happiness, and encourage her to practice the skills she was learning. CR demonstrated that she valued social interaction as a goal in its own right, not just as something that would help her to achieve instrumental goals.

4.3. Infant 3: “AM”

4.3.1. Background

AM was the only child in his family, and was 9 months, 30 days old at the start of data collection and 14 months, 5 days old on the last date, with a total of 12 filming sessions. All sessions included AM’s father, AM’s mother was also present at seven of the sessions, and two sessions included family friends (all adults).

Video data for this infant were collected in the family’s apartment, which had an open kitchen/living room area. AM had free rein of the living area, and his parents closed doors or set up pieces of furniture as obstacles to limit unsupervised access to some parts of the home.

AM’s father engaged in animated conversation with BW during most of the sessions where he was the only parent present; when both parents were present or there were other adult guests present, AM’s parents tended to spend most of the sessions chatting with their visitors. While still caring and attentive to their infant and responsive to his needs, AM’s parents also took advantage of opportunities for adult conversation with their visitors.

4.3.2. Observation and Analysis

AM showed a very strong interest in practicing walking during the early part of data collection, and this priority is evident in the videos captured during the first six weeks of his family’s participation in the study[1]. His parents facilitated this by placing chairs and large, sturdy toys strategically around the living area, so that AM could cruise around the space unassisted. AM also spent a lot of time engaging his parents in a “walking routine”: holding his parents’ hands or fingers so that they could walk him around the family’s apartment. AM clearly understood how to quickly get his parents’ attention so that he could get them to help him walk. He would frequently express frustration at not being able to reach some area of the home on his own, sometimes

[1] AM did not seem to crawl on all fours as most infants do—any crawling captured in the videos seemed to be more of a “combat crawl” or belly crawl, pulling himself along the floor mainly using his arms. This kind of crawling probably involved increased effort and slower progress around the room than AM might have preferred, which could explain his high motivation to walk.

shouting or grumbling loudly to add emphasis while reaching toward his parents' hands. At the start of the study, the walking routine was firmly established: AM's parents understood that when the infant reached out toward their hands, he was usually asking them to walk him around. AM, in turn, learned to see an outstretched hand as a sign that an adult was offering to engage in this preferred routine.

AM also engaged others' attention during an object exchange routine. Perhaps because the video data were collected as part of a study on how infants learn to show and give objects to others, AM's parents and BW were all curious to observe this skill developing in the infant and frequently tried to engage AM in passing objects back and forth. This routine began with an adult extending an object toward the infant; if he took it, they held out an open hand toward him and asked for the object. AM would sometimes take these objects, but then not hand them back. At other times, he would ignore the offered item, keeping his hands free so that he could continue to cruise around the room. Because this routine and the walking routine both involved an adult extending a hand toward AM, sometimes their efforts to initiate the object exchange routine led to misunderstandings. During the fourth session (10 months, 24 days old), this happened when BW tried to initiate an object exchange by holding out a block to AM, who knocked it to the floor several times before finally grabbing BW's outstretched hand to begin the walking routine.

AM's parents persisted with the object exchange routine, and the infant began to understand and more frequently engage in this routine. Whereas the object exchanges might have previously been initiated only by adults, AM also began to initiate the routine. AM's father mentioned to BW during the sixth session (11 months, 2 days old) that AM had apparently learned that the adults expected him to engage in this routine and had started to spontaneously place objects in their hands: "Because we keep doing it, he's starting to just automatically hand things to us, because it feels like what he's supposed to do."

Through repeatedly offering their infant social attention by initiating the object exchange routine, AM's parents helped him to recognize that this was a way that he could expect to engage their attention toward him. However, in contrast to DL and CR, who tended to pair these types of object exchanges with positive emotional expressions, at first AM didn't typically make eye contact or smile during this routine. Later in the

study, though, he integrated social overtures with offering objects to others. He initiated social interaction several times with BW and one of his mother's visiting friends during one later filming session (13 months, 6 days old) by bringing toys over to them while smiling and making eye contact, then observing their reactions.

AM's way of showing interest in other people changed over time so that he began to more overtly initiate social interaction as a way of getting more adult attention. During the first phase of the study, he spent a lot of time quietly observing others, especially while eating in his highchair. At these times he often used relatively subtle bids to engage adults' attention compared to those used by DL and CR. For example, at the first session (9 months and 30 days old), AM's father and the researcher, BW, were eating lunch at the dining table with AM in his highchair nearby, facing toward them. The adults were discussing a shared interest (sports) for most of the session. AM gazed and occasionally smiled at the adults while eating. He engaged his father's attention by dropping his food and cup on the floor, then leaning toward his father and looking toward him expectantly until his dad picked up the cup and placed it on the tray of AM's highchair, at which point AM would grin at his father. AM repeated this ritual several times, smiling broadly each time his father picked up the cup.

At later sessions, AM expanded his use of social cues to initiate mutually enjoyable social interactions with others: he captured others' attention using vocalizations, smiles, shared enjoyment, and eye contact. One such interaction happened with BW at the fifth session (10 months, 28 days old). AM was sitting on his dad's lap after drinking a bottle of milk, but he was not getting direct attention from either his father or BW. The infant leaned toward BW with outstretched arms and vocalized loudly, which led BW to stop talking and look at AM. AM grinned, laughed, and waved his arms up and down. When BW imitated this action, the infant giggled and watched BW in fascination. This led to a brief, enjoyable game where BW continued to imitate AM's vocalizations and flap one arm up and down while AM laughed and smiled.

AM's parents mentioned during several of the sessions that he was not a "cuddly" baby; however, he showed interest and motivation in engaging their attention in other ways. For example, his mother came home from running errands partway through the eighth session (11 months, 12 days), and AM showed obvious pleasure to see her, turning quickly to look toward the door when she called a greeting, then standing nearby

watching her remove her coat and shoes, leaning his body toward her, reaching out with his arms extended, babbling softly and then calling out more loudly until she entered the room and picked him up. He shrieked and kicked his legs in obvious excitement as she lifted him for a hug. While he did not seem to want to be held for very long, he very quickly engaged his mother in the walking routine to travel up and down the hallway of their apartment. When she went to the kitchen to prepare food afterward, he checked in with her frequently by calling out to her and watching for her response. Later, he joined his mother in the kitchen, wanting to be picked up, hugging her legs, and showing obvious interest in what she was doing.

After a six-week break in filming, at the ninth session (12 months, 22 days), AM was walking proficiently without help. AM now seemed much more motivated to have others attend to his activity for social purposes, and he was now using a combination of smiles, eye gaze and shared emotion to ensure others' engagement in his activity. He also used his own actions on objects to capture and maintain others' attention during these enjoyable social exchanges. One example from this session shows how AM had begun to prioritize social interaction as he engaged in trying out a new skill:

> AM toddles into another room, watching BW, who is sitting nearby. AM approaches a small, wheeled table, grabs one table leg, then turns around, smiling, to look back at BW. AM's mother says to BW, "Oh, yeah, this [pulling out the table] is his newest skill!"
>
> AM pulls the table toward himself and walks backwards so that he can turn around to face BW. He gazes briefly at the adults who are all watching him from the other room, then babbles and looks down at some toy blocks on the floor, which are preventing him from rolling the table. He moves the table carefully, clearly very focused on solving the problem of how to roll the table past the obstacles on the floor, but also continues to look back toward his parents and BW frequently, smiling and babbling. BW directs a couple of enthusiastic comments to AM, who grins excitedly as he manages to turn the table around and begins to pull it into the living room, giggling and extending one arm to point at BW as he brings the table toward the visitor. Once AM has pulled the table most of the way into the living room, he catches sight of his mother, who is watching nearby, and he lets go of the table and walks over to her, laughing and flapping his arms to share his pleasure and excitement at his accomplishment.

This was an activity that AM's parents had clearly observed several times and which AM had learned would elicit positive attention from adults. For AM, it wasn't enough to move the table around the apartment while others watched him; he wanted to

share the experience with others, to show his excitement at what he could do with the table, and to have other people respond with their own positive feelings. Like CR, he began to demonstrate that he valued social interaction as a goal, and that he wanted to engage others socially while he played, rather than simply have an audience.

AM also showed that he could create his own play routines involving positive attention and shared emotion. At the 11th session (13 months, 20 days old), AM and BW spontaneously developed a short, playful routine that was mutually enjoyable:

> AM approaches BW and reaches for the handheld video camera, then briefly hesitates as BW moves the camera back out of the infant's reach. AM gazes at the camera briefly before grinning and reaching out to grab it again. BW moves the camera back. AM coos and grins, reaching for the camera a third time; this time, as BW moves it out of reach, he says "Noooo" in a low, playful voice. AM steps back a bit self-consciously, grinning broadly, and flaps his arms, looking over toward his parents. AM turns and walks into the kitchen, then returns and makes a beeline for the camera again, avoiding direct eye contact with BW and rubbing at his face with one hand, smiling a bit shyly. BW says, in a playful voice, "Uh-uh! Noo!" AM gazes at him for a moment, then makes another grab for the camera, a cheeky expression on his face. BW pulls the camera out of reach again, saying, "Nooo!" AM again steps back and flaps his arms, grinning and chuckling slightly. AM's parents and BW burst out laughing. AM seems encouraged by this reaction and grins up at BW, flapping his arms up and down and breathing excitedly, then turning to grin at his parents. He moves forward quickly and reaches out for the camera, and BW pulls it back again, saying, "Noooo!" in a silly voice. AM grins and steps back, flapping his arms and looking over at his parents again. BW adds, "Oh no!" in a slightly lower-pitched voice. AM appears to be a bit overwhelmed and steps back with a concerned facial expression. He walks into the kitchen making a distressed sound, and his parents call out to him reassuringly. He approaches his parents and spends a couple of minutes playing and having his dad read him a book. AM then walks back over toward BW, grinning, and initiates the game with the video camera again. At one point, he tumbles to the floor and makes a sad noise, holding one hand to his head as he sits up, and his parents and BW express concern. AM turns toward BW, grins and chuckles suddenly, and all three adults laugh.

AM discovered early in the session that his interest in the camera, and the way an adult reacted to his efforts to touch it, could initiate an enjoyable new social routine of teasing BW by reaching for the camera. AM repeated this routine several times throughout the filming session; he had quickly learned that he could engage others' attention in this way, making him the centre of attention as he elicited laughter, smiles and positive verbal feedback from everyone in the room.

AM's high motivation to move around, explore his environment, and learn how to walk during the first phase of data collection meant that he engaged adults' attention in different ways than the other two infants involved in the study. After he could walk independently, AM began to capture and engage others' attention for more obviously social purposes, and to include much more shared emotion in his exchanges with others.

Chapter 5.

Discussion

Above, I explored two different explanations for how infants learn about others' attention and how they become able to engage their caregivers in joint attention. I discussed some criticisms of cognitivist theories which begin from the assumption that the starting point is the individual mind, and that infants need to mentally simulate others' thoughts based on analogy with their own experiences before they can learn about others' attention. I endorsed an alternative, action-based, relational explanation of development according to which infants' understanding of others' attention is a practical, active understanding that develops through social activity with other people. Based on this perspective, I assumed that the three infants in this study would show understanding of others' attention during everyday moments of social interaction with their caregivers, and that over time, based on these experiences, they would begin to engage others' attention in increasingly complex ways.

The case studies summarized above illustrate various ways that each infant learned how to attract adults' attention to initiate mutually enjoyable social interactions and demonstrated that they valued social interaction as a goal in itself (Bates et al., 1975, p. 213). Each of the three infants demonstrated ample interest in, and awareness of, the attention of others on themselves throughout the study. They each captured their caregivers' attention to initiate familiar play routines: hugging stuffed toys, playing with balls, walking around, or giving and taking objects. A common theme in all three case studies was the mutually enjoyable shared emotion that suffused social interactions: the infants engaged and charmed others using eye contact, physical contact, smiles, and interesting objects, and their caregivers responded in a variety of positive ways. These responses not only helped to keep an enjoyable interaction going, but also helped the infant to learn that they could expect certain positive responses if they took the same actions again.

In many ways, the strategies all three infants used to engage others' attention were typical of the face-to-face affective exchanges valued in most Western families (Kärtner et al., 2010; Mesman et al., 2017). From the beginning of the study, both DL

and CR frequently used eye contact with adults and shared their enjoyment of activities by smiling and laughing to maintain adults' attention. CR showed a high level of interest in others' activities, often joining in or imitating the things her mother was doing, and often abandoning her own independent play in order to watch or imitate her mother's demonstrations of actions on toys. AM was less assertive in trying to join others' activity than CR, and in some ways may have appeared to be less social than DL and CR. However, he still showed interest in others, liked to observe what others were doing, and tried to imitate their actions on objects (such as at the fifth session, when he reached for BW's coffee cup and tried to drink from it). AM enjoyed sharing smiles and eye contact with other people. Still, prior to the ninth session (when AM had become able to walk fully independently), compared to the first two infants he was overall less engaged in trying to involve adults in watching him play with a toy, and seemed less insistent on adults including him in their own social interaction. This was reflected in his parents' describing him as "not cuddly" and joking to BW that their infant saw other people as a "means to an end"—even when engaging others, his priority was clear: He wanted to walk and explore his environment. However, by the end of the study, there seemed to be a significant expansion of AM's strategies for getting and keeping others' attention: He started to engage others in more social smiling and shared eye contact, wanting them to look at him and respond to what he was doing, and pursuing social interaction in itself as more of a priority.

Even though all three infants used eye contact, smiles and exchanges of positive emotion to engage others' attention, there was variability in the ways that they employed these strategies. The individual differences in how each infant experienced and learned ways to engage others' attention suggest that the developmental process of learning about others' attention is highly flexible, based on individual experiences and norms within a family and culture.

For example, DL seemed to experience his mother's attention in a variety of ways, not limited to eye contact or verbal responses: she could hold him, touch him, or move closer to him to show that he had engaged her attention. When he was fussy, he seemed to demand more of her attention, but again, this didn't necessarily need to involve face-to-face engagement with shared gaze: DL's mother could hold and carry him while helping his siblings, and this would calm him. This is an example of the *perceivability* of attention, as described by Reddy (2011): We can attend to others, and

experience their attention to us, in a variety of embodied ways. CR also showed non-visual ways of seeking out and receiving attention from her mother, using frustrated vocalizations at increasing volume and frequency until her mother verbally responded to show that she was giving the infant more attention. Similarly, AM didn't necessarily want or need to be held, be close, or to make eye contact with his mother to get her attention. He understood that he could capture her attention simply by vocalizing from another room and hearing her response, or by having her lift him up and let him watch her actions while she cooked. These infants' expectation that a caregiver would respond to their vocalizations is consistent with previous studies demonstrating that by 9 months, infants are aware of the social impact of their own vocalizations and will expect differential responses from other people depending on the timing, quality, and content of their own speech-like vocalizations (Gros-Louis et al., 2006; Goldstein et al., 2009).

The type of physical responsiveness seen between DL and his mother reflects a caregiving style that is often less recognized in studies of Western parenting, which tend to focus more on parents showing responsiveness through eye contact, positive emotional displays, and talking to infants (Kärtner et al., 2010; Mesman et al., 2017). However, in non-Western cultures where caregivers typically engage in fewer face-to-face affective exchanges, infants learn to expect caregiver responses that can be perceived through their vestibular sense or sense of touch (Kärtner et al., 2010; Mesman et al., 2017). DL's expectation of physical responses from his mother suggests that even in Western families, individual factors within a family—such as how many demands there may be on a mother's visual attention—can also influence how parents show responsiveness to their infants. Infants like DL may learn to expect their actions to lead to increased attention in the form of touch and physical proximity, and this can affect how they seek out attention from their caregivers.

The three infants in the study illustrated the active, dynamic and emotionally rich elements of engaging other people's attention. For DL, experiencing others' attention, engaging others to attend to himself and his actions, seemed intimately linked to his anticipation of successfully drawing adults into shared enjoyment of familiar routines, such as the hugging routine with a stuffed toy. Over the course of the study, DL began to show how he understood that he could bring others into his *own* action, too, by retrieving a stuffed toy and bringing it to his parent, thereby initiating the routine himself.

The infants' use of objects as part of the play routines described in this study illustrate each infant's expanding understanding of the ways that they could engage and direct others' attention (Reddy, 2003). DL's hugging routine is a rich example of this phenomenon. Initially, DL and his mother engaged in the hugging routine after she introduced a stuffed toy, but later, he began to recognize that he could pick up and hold out a stuffed toy toward her to engage her attention and initiate the hugging routine. Later, he walked across the room to retrieve another stuffed toy, then bring it to his father, who followed DL's cues to engage in this familiar routine. These examples are consistent with previous research mentioned above, demonstrating that infants' understanding of the objects of others' attention gradually expands during the first year, from attention to the infant themselves, to actions they themselves take, to objects in their hands, and then toward more distant objects (Reddy, 2001, 2003, 2011). This developmental skill progression can form a foundation into which infants can later integrate pointing and verbal language. It is not difficult to imagine that once DL began using pointing gestures, he could have used this new way of communicating with his caregivers to show them a stuffed toy across the room, which could become another new way of initiating this familiar, enjoyable routine.

Rodriguez and colleagues (2015, 2018) have also argued that familiar objects play a vital role in an infant's communicative development, and that infants begin to use these objects for pragmatic communication with others before they begin to use verbal language. CR's use of ball play with her mother and BW showed an emerging understanding that she could take specific actions on familiar objects that would be significant to other people and elicit praise and positive attention. As her motor skills developed, this led to an increased repertoire of actions and activities CR could initiate that could result in this enjoyable type of social attention. At earlier sessions, CR played with balls and engaged others in observing her actions with the balls, with frequent gazing and smiling at others. By the final filming session, CR integrated a more interactive use of ball play after assuring herself of others' social attention: she used a ball to fully engage BW's attention, smiling and gazing at him, then threw the ball toward him before engaging both adults in a reciprocal game where she kicked the ball and they rolled the ball back to her, offering verbal praise and feedback as they observed her actions on the ball. Her clear enjoyment of the shared activity embedded in emotionally rich social interaction demonstrated that CR wanted to engage others in what she was

doing because she valued the social element of this play routine. It also demonstrated a growing recognition that by taking certain kinds of actions on the ball (throwing, kicking) which were demonstrated and encouraged by her caregivers, she could receive praise and positive feedback. Reddy (2001, 2003) has documented other examples of infants repeating actions that have previously elicited praise. She has also observed that infants will check for others' attention and show pleasure at receiving positive feedback after taking a difficult action (Reddy, 2003). AM's actions with the rolling table illustrate this phenomenon: He frequently checked to ensure others were watching as he approached the table and maneuvered it around some toys on the floor, then after successfully moving the table into the room where his caregivers were watching, he abandoned this object and ran toward his mother for praise, using his whole body to express his joy and pride in his own actions.

DL's "hugging routine" with stuffed toys is another example of how the infants in this study garnered positive attention to themselves using objects. When DL initiated the hugging routine, and his parents' response involved using verbal cues and actions on the stuffed toys, he was not just learning that they would respond to him with positive attention; he also demonstrated that he was learning family norms of use for this particular type of object (Rodriguez, et al., 2015): One of the things we do with a stuffed toy is we hug and show love toward it. The use of a stuffed animal in each of these examples may have been linked to DL's expectation that his parents would be more likely to respond with positive attention, as previous studies suggest that Western caregivers typically respond with more positive affect and increased engagement during play routines involving an object that can be animated by the adult (Adamson & Bakeman, 1985). The final example of the hugging routine concluded with DL's father holding the infant, who hugged the toy then hugged his father; this suggests that DL also understood the emotional and relational meaning of his actions on the toy. He was not merely taking an action that he knew would get a certain response from a caregiver, but also paired this action with a display of affection toward his parent.

AM's spontaneous invention of a playful teasing game with BW over the handheld video camera also demonstrates the importance of the emotional element of others' attention to oneself and one's actions (Reddy, 2001, 2011). It was clear that AM was initially just curious about the video camera, and that he was motivated to approach BW to see if he could touch or take this object. Later, he began to initiate this routine

because it was fun, not because he necessarily wanted the camera. AM persisted in initiating the routine even though BW's reactions were sometimes overwhelming, leading him to withdraw into another room for a brief time and seek reassurance from his parents; this reaction showed the emotional intensity AM clearly experienced within these interactions (Reddy, 2001). This playful teasing and clowning has been argued to be an important means of infants engaging adults' attention, because it carries a higher level of risk: It can elicit unexpected and intense reactions, and can also lead the adults to themselves engage in gentle teasing and provoking of the infant (Reddy, 2001, 2011; Reddy & Vanello, 2022). AM's playful teasing of BW also demonstrated a practical understanding that he could repeat certain actions that violated a rule. That he did so deliberately to elicit laughter suggests that he was developing a more complex understanding of how he could take unexpected actions within a safe social context, which could lead to emotionally intense, yet enjoyable interactions within which he would be the centre of attention (Reddy, 2001).

5.1. Implications of Current Study

All three infants approached similar developmental achievements—learning to walk, starting to use gestures such as pointing, and engaging in increasingly complex social interactions with adults—by the end of the study. They engaged in unique play routines with their caregivers to pursue the goal of social interaction, and demonstrated a high level of interest in engaging others' attention from the onset of the study, although they showed this interest in a variety of ways. This has been observed in previous studies demonstrating that in the second half of the first year, infants show a gradually increasing interest in social interactions (Bakeman & Adamson, 1984; Thiele et al., 2021) and gradually begin to take more overt actions such as gaze, smiling, and other positive affective cues to initiate social engagement with others, particularly with familiar social partners (Striano & Bertin, 2005; Thiele et al., 2021). The current study therefore contributes to a growing body of literature that questions the commonly accepted cognitivist assumption that infants' motivation to engage others in joint engagement by coordinating attention with others develops later in the first year, rather than gradually developing over many months.

The current study also supports previous work arguing that practical experience plays a key role in how an individual infant learns to understand others' attention. My

results suggest that the unique experiences of each infant will lead them to show that understanding in different ways. For each of the three infants in this study, their engagement of others' social attention included unique, familiar routines, which then evolved over time as the infants learned different ways to coordinate attention within joint social activity. The variability within and between these routines illustrates a dynamic and flexible aspect of attention. From a relational, action-based perspective, familiar social routines are a step along the road to more complex forms of communication: Infants learn to initiate preferred, enjoyable routines, and to do so in different ways; within these routines, adults' responses to their actions and vocalizations help to shape infants' understanding of reciprocal communication and, in time, their ability to use gestures and words as they expand the complexity and flexibility of their communicative repertoire (Canfield, 1995; Carpendale & Ten Eycke, 2020).

Each of the infants showed, in various ways, that they recognized that others' attention could vary in availability and intensity. When they only had partial attention from a caregiver, and wanted more attention, they knew how to increase the chances of an adult being fully attentive to them. The conversations BW had with caregivers while visiting the families at their homes created opportunities for the infants to work to gain attention from their parents, or to increase the attentiveness of a distracted parent. DL used a coy smile toward his mother, coupled with a familiar, enjoyable routine of taking turns hugging a stuffed toy, to draw more of her attention toward himself when his mother was distracted by one such conversation. CR used a series of increasingly loud, long, and frequent vocalizations to redirect her distracted mother's attention toward herself. AM's teasing game with BW and the video camera successfully captured positive attention when the adults were talking to each other; suddenly, he became the focus of everyone's social attention, to the point that the intense emotional element of this routine briefly became overwhelming for him.

The active, embodied nature of attention was also highlighted in the current study. In various ways, these three infants showed that they understood attention could be shown and elicited in ways that are not traditionally studied in Western developmental psychology. DL's mother had many demands on her attention; her infant sought out physical contact with his mother, sitting or standing in her lap, or asked to be held when she was standing. AM understood that he could engage an adult's attention whenever he took their hands and used movement, vocalization, and gaze to show them that he

wanted to walk. The current study highlights some limitations of focusing mainly on indicators of attention such as eye contact in research, as this may neglect other ways that human beings attend to one another (Reddy, 2011). Attention is perceived and communicated in a variety of ways, by both caregiver and infant. DL understood that his mother was attending to him when he was close to her, being held. CR understood that her mother's attention could be engaged simply by making a few pointed vocalizations; she did not need to make eye contact or take any physical action. AM and his parents could not share eye contact when they were both walking around the room, looking in the same direction. Yet he still managed to engage their attention and to learn ways he could get social interaction going with his caregivers. These observations support the idea that attention from and to others can be an embodied and nonvisual phenomenon (Reddy, 2011). Reddy (2011) has criticized the almost exclusive focus on visual attention in most joint attention research, which has led to a preoccupation with gaze toward an "object of attention" (generally, this means another person's face, or an object such as a toy) as one of the primary indicators of attention in studies. She argued that this has led to a relative lack of research into other, nonvisual ways of attending, such as through touch or voice (Reddy, 2011).

Chapter 6.

Limitations and Future Research

The current study may have several limitations. First, there are the limitations inherent in using video data. This type of data is necessarily influenced by the researcher's interests and focus: The person holding the camera decides where to place and direct the camera, and what to record, which influences later data analysis. Also, the very presence of the camera and of the researcher will influence how people behave (Ramey et al., 2016; Creswell & Poth, 2017). There were unavoidable interruptions in filming due to illness and vacations, and the data may have been affected by the constraints of each family's availability and their level of willingness to welcome a researcher with a video camera into their home. More frequent, longer data collection sessions may have yielded different data, and the times of day or days of the week during which filming took place may have led to only certain types of interactions being filmed. Since there is evidence that parents interact with their infants more and differently during short periods of recorded observation like those used in this study (Bergelson et al., 2019), future studies may benefit from including at least one longer recording session, or from using less obtrusive means to obtain a recording (such as audio recordings), which could identify possible differences in caregiver-infant interactions when the caregivers are less conscious of being observed. However, the infants appeared unaware of being filmed, and BW's decision to film multiple sessions relatively close together allowed the infants and parents participating in the study to become comfortable with the presence of the researcher and of the video camera. It appears reasonable to assume that the interactions filmed as part of this study were representative of how these three infants and their caregivers would typically interact.

The approach to qualitative analysis used in this study is time-consuming and intensive, so only a small number of infants could be included in the final analysis. However, there are benefits to following just a few infants and families longitudinally, as this approach allowed me to observe the individual differences in each family and to document developmental change at a more granular level than is possible in studies using larger samples (Carpendale & Carpendale, 2010). In this thesis I do not claim to describe universal aspects of human development, but to apply an action-based,

relational framework to detailed observation and description of a small number of infants in order to document a *process* of development (Carpendale & Carpendale, 2010). Therefore, case studies of just three infants and their families was an ideal approach to meeting the goals of the current study.

Given that the sample represents a population that has been over-studied in developmental psychology—urban, educated, middle-class North Americans (Nielsen et al., 2017)—it could be argued that the generalizability of the study's implications to children and families from other backgrounds and cultures is limited. However, cross-cultural studies suggest that caregivers in a diverse variety of societies typically to respond to infants' actions in a consistent, emotionally attuned, and predictable manner, just as the parents in the current case studies did. There is value in observing the variability in how individual caregivers interpret and respond to infant behaviour, as this helps to show how cultural factors may influence caregiving practices and to identify commonalities and differences in caregivers' responsiveness to infants (Broesch & Carpendale, 2022; Mesman et al., 2017). Future longitudinal case studies like this one, observing participants from diverse backgrounds, could identify cross-cultural similarities in how infants learn to initiate social engagements by eliciting attention from others. Studies collecting similar observational and longitudinal data of younger infants from both Western and non-Western backgrounds could also provide valuable insight into the emergence of attention-capturing skills that were already developed in the infants described the current study.

Chapter 7.

Conclusion

The three infants described above demonstrate what is suggested by the title of this paper, “Watch me, Mom!”: Infants and young children enjoy attracting their caregivers’ attention to themselves. While these three infants were not yet using verbal language, their actions in capturing and engaging others’ attention very clearly communicated that they wanted people to watch them—to show attention by looking, and in other ways.

I have argued throughout this thesis that infants’ understanding of others’ attention is a gradual developmental process that does not begin late in the first year as a result of a cognitive or mental insight, as popularly cited cognitivist theories suggest. Instead, I propose that these observations of DL, CR, and AM tell a story of practical, embodied understanding of how to engage other people’s attention which began long before the onset of the study and which expanded and became more complex throughout the time of data collection. These three infants have demonstrated that humans’ attention to one another is part of the dynamic system of development, and that this development is inseparable from the context within which it takes place.

A significant body of joint attention research relies on highly structured situations and strict definitions of infant behaviour that researchers believe are most likely to clearly show that the infant intends to share their own interests, emotions, or intentions with another person. While these studies play an important role in identifying certain behaviours that are associated with specific developmental milestones, this type of research can tell only one small part of the developmental story. Observational, descriptive studies such as those included above help to illustrate how attention is experienced and deployed by humans within a rich social milieu. By focusing too much on pointing, eye gaze, or other behaviours, typical joint attention coding schemes often inadvertently strip away many of the very elements that make social interaction so enjoyable, and this may have led many researchers and theorists to downplay the significance of shared emotion and mutual joy, which are laden throughout the observations included in this study. Emotion and mutual joy are observed in parent-

infant interactions in diverse cultures around the world (Broesch & Carpendale, 2022) and thus, like attention, are an essential part of the context within which infants learn the social and communication skills that allow them to become active participants in human society.

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Appendix.

Infant Attention-Capture: Coding Scheme

Rationale

This study aims to identify attention-getting behaviours in pre-verbal infants prior to and during the development of pointing gestures, and to identify how these behaviours change over time. The ways that infants capture and use adult attention to initiate and prolong enjoyable social interactions have important implications for their future social development. However, few studies have provided a qualitative, narrative-style description of the rich social interactions within which infants attract attention from their caregivers. Typical joint attention studies of infant-parent interaction code only a small number of infant behaviours, such as making eye contact with an adult or pointing at an object, and a small number of adult responses, such as verbal responses or providing the infant with the object the infant pointed at.

Goal

To identify instances where the infant's behaviour attracts positive attention from an adult. If the infant maintains the adult's attention, identify behaviours that may have contributed to this, and briefly note how the adult responded to the infant.

Positive attention is defined as the adult stopping or changing what they were previously doing (e.g. talking to another person nearby or occupied with a household task) to respond to the infant. A response can include talking to the infant, laughing, smiling, moving closer to the infant, offering an object to the infant, engaging in the infant's play.

Coding Procedure

- Use a new spreadsheet page for each video.
- Identify specific episodes where the infant gains positive attention from the adult, and code as follows:

- Code the time point (minutes and seconds) where the infant's attention-getting behaviour begins (regardless of whether or not this seems intentionally aimed at gaining adult attention).
- Code the time point marking the end of the episode.
- Identify whether the infant's behaviour captured (C) or maintained (M) the interaction; if this is ambiguous, use the code A.
- Include brief notes about what the infant is doing that captures adult attention; a single word or very brief phase may be sufficient (e.g. "vocalization", "pointing", or "dropped cup on floor").
- Include brief notes about affect shown by parent and child: a single word or short phrase may be sufficient (e.g. "smiling" "laughs" "looks surprised").
- Feel free to add any notes about the incident that help to explain what is going on or seem noteworthy, and you are welcome to note your own reaction to a specific moment in the video in an additional column.