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Empathy Across Chimpanzees and Human Children: Developmental, Cognitive, and Emotional Parallels

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ABSTRACT

Empathy is a foundational social capacity that facilitates cooperation, emotional resonance, and social bonding across species. This review compares the development and expression of empathy in human children and chimpanzees, two closely related species that exhibit notable emotional and prosocial behaviors early in life. Drawing on developmental and behavioral research, the following examination explores shared features such as emotional contagion, consolation, and instrumental helping, which emerge spontaneously and without external reinforcement. While both species demonstrate foundational empathic abilities, human empathy is distinguished by its greater cognitive complexity, generalizability, and integration with language, moral reasoning, and cultural learning. In contrast, chimpanzee empathy remains largely context-bound and directed toward familiar individuals. This review also explores the role of environmental influences—such as parenting practices in humans and social hierarchies in chimpanzees—in shaping empathic expression. Finally, the author addresses current methodological limitations and proposes future research directions, including longitudinal studies, cross-cultural investigations, and expanded comparative work across nonhuman primates. Together, these insights advance our collective understanding of the mechanisms underlying empathy and highlight the developmental and contextual factors that contribute to their variability across species.

Keywords: *Chimpanzee Empathy, Human Empathy, Social Cognition, Empathy Development, Chimpanzee Behavior, Emotional Contagion, Perception-action Mechanism (PAM), Prosocial Behavior, Comparative Psychology, Altruism, Emotional Resonance, Cognitive Empathy*

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INTRODUCTION

1.1 Definition and Evolutionary Origins

Empathy is the ability to understand and share the emotions of others, playing a pivotal role in facilitating social interactions and building relationships among both human and non-human animals (Riess, 2017). It encompasses emotional processes such as resonance with another's feelings, as well as prosocial behaviors including cooperation and altruism. As a critical social skill, empathy enhances communication, strengthens social bonds, and fosters group cohesion—outcomes that ultimately increase the survival and reproductive success of social species.

The evolutionary origins of empathy are thought to trace back to parental care mechanisms in mammals. For example, human infants signal emotional states such as crying or smiling to caregivers, eliciting responsive nurturing behaviors (Lesley University, n.d.). Contemporary neuroscience further emphasizes that empathy is supported by perception-action mechanisms (PAM). According to this model, observing another's state automatically activates corresponding representations in the self, providing a neural basis for shared experience. This account explains the evolutionary continuity of empathy across mammals by grounding it in basic resonance systems, while also recognizing that empathy can be modulated through context, experience, and learning (de Waal & Preston, 2017). Framing empathy in this way highlights its dual nature: an ancient mammalian adaptation as well as a flexible process shaped by individual development.

Among social species, chimpanzees and human children demonstrate some of the most complex empathetic behaviors, making them ideal subjects for comparative studies (de Waal, 2008; Warneken & Tomasello, 2006). Examining their developmental trajectories and behavioral expressions can illuminate the mechanisms that underlie social cognition and cooperative behavior.

1.2 Comparative Studies of Empathy in Chimpanzees and Human Children

Research demonstrates considerable similarities between the empathic capacities of chimpanzees and human children. Both species engage in behaviors such as consolation, emotional contagion, and altruism, which point to shared evolutionary roots underlying empathy and prosocial tendencies (Koski & Sterck, 2010; Preston & de Waal, 2002; Warneken et al., 2007). Consolation behavior, defined as increased affiliative contact directed at a distressed individual by an uninvolved bystander—has been observed in both chimpanzees and human children (Li et al., 2019). Emotional contagion, or the automatic mirroring of another individual's emotional state, is similarly documented in human and non-human primates. Altruistic behavior, characterized

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by helping others without expectation of personal gain, further exemplifies these shared prosocial capacities (Warneken et al., 2007).

Despite these parallels, chimpanzees and human children also display notable differences in the complexity and context of their empathic behaviors. The development of empathy in human children relies extensively on reciprocal social interactions, particularly with caregivers and family members, which facilitate the emergence of advanced cognitive empathy (Cotton, 1992). By contrast, chimpanzees exhibit prosocial behaviors primarily within contexts shaped by social hierarchy and group dynamics (Campbell & de Waal, 2014). The perception–action model (PAM) helps clarify these contrasts by suggesting that empathic responses are strongest when the observer has personally experienced similar states. Accordingly, while both chimpanzees and human children display behaviors such as consolation and emotional contagion, the degree and context of their empathic engagement vary according to each species' social learning environment and history of shared experiences (de Waal & Preston, 2017). Integrating this framework deepens comparative analyses by linking observable behaviors to underlying neurocognitive processes.

1.3 Purpose of This Review

This review synthesizes key similarities and differences in empathic and prosocial behaviors between chimpanzees and human children. By situating these behavioral observations within both evolutionary and neurocognitive frameworks, we aim to clarify the emotional and cognitive underpinnings of empathy and the contextual factors that guide its expression in two closely related species. Such insight contributes not only to evolutionary psychology and developmental science but also to broader theories of social behavior.

HOW EMPATHY DEVELOPS IN HUMANS

2.1 Emotional Foundations in Children

Empathy in human children emerges gradually, beginning with reflexive responses and progressing toward increasingly sophisticated cognitive and affective forms. The earliest manifestation is emotional contagion, observed in newborns who automatically mirror the emotions they perceive in others. This stage, often described as egocentric empathy, reflects infants' limited ability to distinguish their own feelings from those of others, leading them to experience another's distress as if it were their own (Koski & Sterck, 2010). For example, six-month-old infants frequently cry in response to another child's crying (Simner, 1971).

By approximately 14 months, children transition into quasi-egocentric empathy. At this stage, they attempt to comfort others in distress, often by offering self-soothing objects or behaviors (e.g., giving a favorite

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toy) (Koski & Sterck, 2010). Although these responses remain somewhat self-referential, they mark the first intentional efforts to alleviate another's suffering and highlight a growing recognition of others' needs.

2.2 Advanced Empathy and Complex Emotions

During the second year, empathy development accelerates with the emergence of self-conscious emotions (e.g., pride, guilt, embarrassment) and mirror self-recognition. Both milestones indicate increased self-awareness and a clearer differentiation between self and other (Courage & Howe, 2002; Johnson, 1983; Nielsen et al., 2006). Around the same time, toddlers begin to recognize intentionality, distinguishing between accidental and deliberate actions (Carpenter et al., 1998; Meltzoff, 1995; Tomasello et al., 2005). These advances enable children to interpret others' goals and respond with greater social sensitivity.

By the end of the second year, children typically reach the vertical empathy stage (Koski & Sterck, 2010), characterized by improved emotional regulation and an enhanced ability to distinguish between their own feelings and those of others. This shift allows children to engage in prosocial behaviors such as sharing, comforting, and helping, even without explicit emotional cues (Vaish et al., 2009). Between 14 and 18 months, many children also begin to exhibit instrumental helping behaviors, assisting adults with simple tasks without expectation of rewards, a clear indication of emerging altruism (Warneken & Tomasello, 2006; Warneken et al., 2007).

Between ages three and four, children begin to develop advanced cognitive empathy, characterized by the ability to represent others' mental states more fully. At this stage, they start to understand complex emotions such as shame, embarrassment, and disappointment, as well as their causes and consequences (Hoffman, 1996). Importantly, they also recognize that individuals may attempt to conceal or regulate emotions, demonstrating an appreciation for the distinction between surface-level expressions and underlying feelings (Wellman et al., 1995).

Beyond early childhood, empathy becomes increasingly sophisticated. By approximately ages eight to ten, children recognize that inner emotional states may diverge from outward expressions. For example, empathizing with someone who appears cheerful while actually feeling unwell (Harris, 1989). This capacity reflects a critical milestone in emotional understanding, enabling children to navigate complex and sometimes conflicting social cues.

2.3 Environmental and Neurobiological Influences

The trajectory of empathy development is strongly shaped by social learning environments, particularly parenting. Children raised in responsive, nurturing, and authoritative households display higher levels of both affective and cognitive empathy and engage more frequently in prosocial behaviors (Eisenberg et al., 1983;

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Eisenberg-Berg & Mussen, 1978). Parental practices involving inductive discipline, discussing the emotional consequences of a child's actions rather than emphasizing punishment, are especially effective in promoting empathy and moral reasoning (Krevans & Gibbs, 1996). These findings reinforce the view introduced earlier that empathy, while grounded in basic neural mechanisms, is also shaped by experience and context.

Empathy's progression further reflects neurobiological maturation. Early empathic responses are supported by the developing mirror neuron system, which underlies emotional contagion and imitation, whereas later advances in perspective-taking depend on the maturation of the prefrontal cortex and limbic networks (Rizzolatti & Craighero, 2004). Together, these systems enable regulation of one's own emotions and more complex forms of social reasoning (Decety, 2010; Singer & Lamm, 2009). This neurodevelopmental trajectory aligns with PAMs of empathy, emphasizing both its evolutionary continuity and its developmental flexibility.

Importantly, early empathy is also predictive of long-term outcomes. Longitudinal research shows that empathic sensitivity in early childhood is associated with greater social competence, more cooperative behavior, and reduced aggression in later childhood and adolescence (Eisenberg et al., 2005; Zhou et al., 2002). These findings underscore the adaptive value of empathy for social cohesion, reinforcing its role as both an ancient evolutionary adaptation and a skill that continues to be shaped throughout development.

DEVELOPMENT OF EMPATHY IN CHIMPANZEES

3.1 Emotional Foundations in Chimpanzees

Empathy is not exclusive to humans; many of its foundational components are also evident in chimpanzees, our closest evolutionary relatives. Like human children, chimpanzees display emotional contagion (Koski & Sterck, 2010), respond to others' distress (Campbell & de Waal, 2014), and engage in prosocial behaviors such as consolation and cooperation (Warneken et al., 2007). These parallels support the PAM, which posits that observing another's state activates corresponding representations in the observer (de Waal & Preston, 2017). Yet, important differences in scope and complexity distinguish chimpanzee empathy from the developmental trajectory seen in humans.

A clear example of emotional resonance is contagious yawning. Chimpanzees, like humans, often yawn in response to seeing others yawn (Anderson et al., 2004; Campbell & de Waal, 2011; Campbell & de Waal, 2014). While this may reflect automatic contagion, it may also involve more complex social processes (Senju et al., 2007).

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Physiological studies further indicate that chimpanzees experience vicarious emotional arousal. For example, they show decreased skin temperature when viewing emotionally evocative stimuli and increased tympanic membrane temperature in affective contexts (Parr, 2001). These responses parallel human autonomic reactions to emotional cues, suggesting that empathic resonance in chimpanzees is supported by neurophysiological mechanisms consistent with PAM.

3.2 Cognitive Empathy and Mental State Attribution

Chimpanzees demonstrate elements of cognitive empathy, including aspects of theory of mind. For example, they can discriminate and match facial expressions to emotional states, in some cases more accurately than individuals with autism spectrum disorder, who often struggle with this task (Parr, 2001). They also display second-order intentionality. Savage-Rumbaugh (1988) observed a chimpanzee exploiting another's fear of the dark to reverse their dominance hierarchy, suggesting an ability to infer and manipulate another's emotional state.

At the same time, more recent comparative studies highlight limitations in chimpanzee emotion perception. Chimpanzees show a strong attentional bias toward fearful expressions but do not flexibly integrate bodily cues with facial expressions in the way humans do, indicating a narrower or more rigid perceptual system for processing emotions (Heesen et al., 2024; Parr, 2003). Taken together, these findings suggest that while chimpanzees possess important components of cognitive empathy, their mechanisms for integrating multimodal emotional signals differ from those of humans.

3.3 Social and Developmental Contexts

Chimpanzees also engage in altruistic helping behaviors, at times assisting conspecifics without expectation of direct reward (Warneken et al., 2007). However, their empathic concern is largely confined to in-group members. Unlike humans, whose empathy extends across groups and even species boundaries, chimpanzees rarely direct empathic behaviors toward non-conspecific primates (Campbell & de Waal, 2014). This boundary underscores both the evolutionary continuity of empathy and its species-specific limitations.

Experimental comparisons with human infants further highlight both shared foundations and divergences. Warneken and colleagues (2007) tested altruistic helping by examining whether chimpanzees and 18-month-old infants would assist an unfamiliar adult in retrieving an out-of-reach object. Twelve of eighteen chimpanzees and sixteen of eighteen infants helped at least once, with helping frequencies remaining stable across trials, indicating intrinsic motivation rather than expectation of reward. However, chimpanzees required contextual cues to initiate helping, whereas infants responded more spontaneously. These findings suggest that

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while both species possess empathically motivated prosocial tendencies, human children develop greater flexibility and generalization earlier in life.

COMPARATIVE ANALYSIS

4.1 Early Empathic Behaviors and Prosociality

Chimpanzees and human children both exhibit early emerging empathic behaviors, reflecting a shared evolutionary foundation. Emotional contagion is observed in infants' reflexive crying and chimpanzees' contagious yawning (Anderson et al., 2004; Koski & Sterck, 2010). Instrumental helping behaviors appear in both species, with toddlers and chimpanzees assisting others in retrieving objects without direct rewards (Warneken et al., 2007). Consolation behaviors also occur across species: by 14 months, human infants attempt to comfort others using self-soothing strategies, while chimpanzees approach and physically comfort distressed peers (Li et al., 2019). Collectively, these behaviors illustrate convergent capacities for emotional responsiveness and prosocial concern, rooted in the cooperative demands of social living.

4.2 Cognitive Complexity and Human Theory of Mind

Despite these parallels, humans surpass chimpanzees in the complexity and flexibility of empathic responses. Between ages four and six, human children reliably acquire theory of mind abilities, including false belief understanding, enabling them to infer unobservable mental states and empathize even without explicit cues. Later in middle childhood, around six to ten years, they also develop recognition of hidden emotions, understanding that outward expressions can diverge from inner states (Wellman et al., 2001).

By contrast, while chimpanzees can recognize goals and respond to visible emotions, they do not consistently attribute unseen mental states (Krupenye et al., 2016). Furthermore, human empathy is generalized and extended through language, symbolic thought, and moral reasoning, allowing empathic concern toward strangers, out-group members, and even abstract entities (Decety & Cowell, 2014). In contrast, chimpanzee empathy remains largely confined to immediate social partners and contexts.

4.3 Influence of Social Environments on Empathy Development

The social environment plays a decisive role in shaping empathy across species. In human development, parenting practices, particularly inductive discipline and emotional dialogue, foster advanced empathic and prosocial skills (Krevans & Gibbs, 1996; Eisenberg et al., 1983). In chimpanzees, empathy is modulated by social hierarchies and affiliative bonds: dominance rank and grooming relationships often determine who receives consolatory or helping behaviors (Campbell & de Waal, 2014). Thus, whereas human empathy is broadened

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through reciprocal caregiving and cultural scaffolding, chimpanzee empathy is more context-specific, reflecting adaptive strategies within hierarchical social groups.

Taken together, these comparisons reveal both continuities and divergences. Both chimpanzees and human children demonstrate foundational empathic behaviors, emotional contagion, consolation, and instrumental helping, indicating deep evolutionary roots. Yet human empathy follows a distinct developmental trajectory, becoming increasingly cognitively complex, flexible, and generalized through the interplay of theory of mind, language, moral reasoning, and social learning. Chimpanzee empathy, while sophisticated, remains bounded by immediate contexts and in-group relationships. This contrast underscores empathy's dual nature: an ancient mammalian adaptation grounded in perception–action mechanisms, and a uniquely human capacity expanded through developmental, social, and cultural influences.

DISCUSSION

5.1 Development of Empathy Across Species

This comparison provides valuable insight into the diversity and plasticity of empathic behavior across species. The presence of spontaneous prosociality, emotional responsiveness, and goal-directed helping in both groups highlight the early-developing, socially embedded nature of empathy. However, the ability of human children to generalize empathy across social, temporal and even fictional boundaries reflect the influence of higher cognitive processes, cultural transmission, and moral reasoning.

5.2 Current Limitations and Future Directions

Despite these groundbreaking findings, current research on chimpanzee empathy is limited by methodological factors. Studies on chimpanzee empathy rely on behavioral observations, with limited access to neurological or physiological data that could clarify internal emotional states. Similarly, most research on children's empathy is based on Western, Educated, Industrialized, Rich, and Democratic (WEIRD) populations, limiting cross-cultural generalizability. Moreover, short-term designs also obscure the long-term developmental trajectory of empathy.

Future research should pursue longitudinal designs to investigate the trajectory of empathic development over time and across diverse environmental settings. Additionally, it would be valuable to explore individual differences, such as the influence of gender, temperament, or other early life experiences, on the development of empathy. Furthermore, extending research to include other nonhuman primates and to explore non-traditional empathy contexts (e.g., responses to unfamiliar species or interactions with robots) could add another layer of our understanding of how empathic behaviors emerge, vary, and adapt.

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CONCLUSION

The comparative examination of empathy in humans and chimpanzees underscores both shared foundations and unique elaborations. Both species demonstrate early-emerging empathic behaviors, such as emotional contagion, instrumental helping, and consolation, that reflect deep evolutionary roots consistent with perception–action mechanisms. Yet, whereas chimpanzee empathy remains largely context-specific and bounded by in-group relationships, human empathy becomes increasingly abstract, flexible, and morally guided, expanding through language, symbolic thought, and cultural scaffolding. These divergences are shaped by distinct cognitive capacities and social environments. By examining empathy across species, we not only illuminate its evolutionary continuity but also deepen our understanding of the developmental and environmental factors that shape what it means to care for others.

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