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Imagining Other Minds: Anthropomorphism Is Hair-Triggered but Not Hare-Brained

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[–] Abstract and Keywords

Nonhuman agents are sometimes attributed humanlike characteristics, particularly mental states of thoughts, feelings, intentions, and conscious experience. Because such anthropomorphism emerges early in life and continues through adulthood in at least some cultures, it may appear to be an innate and automatic phenomenon. However, the psychological processes that enable people to reason about the minds of others suggests that such inferences require cognitive effort and motivation, meaning that anthropomorphism arises only when triggered by one's goals or the situational context to consider the mind of another agent. These triggers identify important moderators of anthropomorphism in adulthood, providing insight into when people are likely to attribute humanlike minds to nonhuman agents and when they are not.

Keywords: anthropomorphism, mind perception, social cognition, theory of mind

Any parent knows how easily children can form imaginary friendships with everything from stuffed animals to robots to television characters. More than just companions, these characters become infused with both life and humanlike characteristics (see chapter 17). One of the current authors (Epley), for instance, vividly recalls the first parent-teacher conference to discuss his son's progress in preschool. The teacher explained that she had asked his son to describe whom he lives with at home. Instead of saying, "Mom and Dad," he said, "Pat," a love-worn stuffed animal that he had not only named, but had given a complete set of emotions, preferences, and personality strengths (and weaknesses) to as well.

The ease with which children imagine such humanlike capacities in nonhuman agents suggests that they are likely to see humanlike states in nearly everything they encounter. Indeed, Piaget (1929, p. 375) argued that, "From the very beginning of its development...the child endows things with human activity." Children, in Piaget's view, are innate and indiscriminate anthropomorphizers.

The defining feature of anthropomorphism is not so much seeing a humanlike body or other physical appearances in nonhumans, but rather attributing uniquely human mental characteristics to nonhumans. Personhood is defined on philosophical (Dennett, 1978; Locke, 1841/1997), legal (Universal Declaration of Human Rights, 1948), and intuitive grounds on the basis of mental attributes rather than physical ones. For example, when people are asked to identify the characteristics they consider to be uniquely human, two basic factors consistently emerge, both of which pertain to mind. Although psychologists have defined these characteristics using different terms, they consist of (1) mental states that imply agency (such as plans, intentions, thoughts, or beliefs) and (2) inner conscious experience (e.g., feelings, secondary emotions of joy or shame, or self-reflective experiences of suffering or pride; Farah & Heberlein, 2007; (p. 273) Gray, Gray, & Wegner, 2007; Haslam, 2006; Waytz, Gray, Epley, & Wegner, 2010). Anthropomorphism, by definition, is attributing humanlike capacities or properties to nonhuman agents. Rampant anthropomorphizers are therefore those who intuitively and easily attribute higher-

order mental capacities of thought and/or feeling to nonhumans.

Since Piaget, theoretical discussion of anthropomorphism has continued to describe it as an automatic process used almost indiscriminately by children and adults alike (Guthrie, 1993). These accounts are based largely on the ease with which children acquire a sophisticated ability to reason about the minds of others, often referred to as a theory of mind (Leslie, 1994). Children, in this view, are seen as coming into the world equipped with a theory of mind module that, once fully developed, is “rapid...automatic, requiring no effortful attention...and universal” (Stone, Baron-Cohen, & Knight, 1998, p. 640). Sperber and Wilson (2002, p. 8) note that “much developmental evidence...suggests that infants and young children come equipped with domain-specific cognitive mechanisms... Mind-reading is one of the best-evidenced cases in this respect.” These accounts imply that children rapidly and intuitively imagine the mental states of nearly any living agent. Employing one’s theory of mind is seen to be automatic, effortless, and virtually inevitable.

We believe that the existing empirical evidence, however, paints a different picture. Imagining the mental states of others is not automatic, effortless, or inevitable (although it may be universal in typically developing populations; Callaghan et al., 2005). Instead, research has shown that the ability to reason about other minds emerges in infancy (Gergeley, Nadasdy, Csibra, & Biro, 1995; Onishi & Baillargeon, 2005), becomes more developed in the preschool years (Gopnik & Wellman, 1992) and may be applied to both human and nonhuman agents. When applied to nonhuman agents, theory of mind produces anthropomorphism. Having an ability and actually using that ability are, however, two very different things. For instance, people learn stereotypes quite readily (Devine, 1989), forming impressions of others based on these generalizations and retaining stereotypes about race, gender, occupation, and essentially any other possible group. However, people do not apply these stereotypes to a person they are evaluating unless a relevant stereotype is activated by some trigger in the surrounding situation or environment (Gilbert & Hixon, 1991; Macrae, Milne, & Bodenhausen, 1994).

In this chapter we argue that the same is true for imagining the mental states of others in both children and adults. Normally developed adults have the capacity to imagine the minds of others, but they require a trigger to use it and attentional resources to sustain its use. Understanding these triggers allows psychologists to predict when people will attribute minds to others—from people to pets to gods—and think of them as thoughtful, intentional, and emotional agents. It also allows psychologists to understand when people will *fail* to attribute minds to others, thinking instead of them as mindless animals or objects. This chapter describes the factors that trigger people’s capacity to perceive the minds of others, shows how these triggers relate to both anthropomorphism as well as dehumanization, and explains why these triggers matter for behavior in everyday life.

Triggering Anthropomorphism

Some triggers require a great deal of force to activate, whereas others require almost no force at all. Triggering an earthquake requires a lot of force. Triggering a gun requires almost no force at all. Using one’s theory of mind to reason about the mental states of others requires a trigger, but it is more like the hair-trigger of a gun than the tectonic trigger of an earthquake. Considering the minds of others is critical for accurately understanding their behavior, and is also the critical difference between representing others as humanlike versus as animals or objects. Triggering one’s capacity to reason about other minds may therefore mean the difference between representing other entities as humans versus nonhumans (Epley, Waytz, & Cacioppo, 2007; Guthrie, 1993; Mitchell, Thompson, & Miles, 1997). The factors that trigger this capacity to reason about other minds may therefore be as consequential for behavior in everyday life as the factors that trigger guns.

Imagining the mental states of others occurs in the mind of a person perceiving another agent, whether the target is human or nonhuman. The triggers of this capacity can therefore stem from both the person perceiving, such as the motivation to explain or understand another’s behavior, as well as from the entity being perceived, such as similarity in motion or morphology to a mindful humanlike agent (Waytz, Gray, et al., 2010). Developmental psychologists studying infants and children have focused primarily on triggers that come from the agent being perceived, what we will call *target triggers*. Social and cognitive psychologists studying adults have discovered more (p. 274) varied and diverse triggers by focusing also on triggers that stem from the person perceiving an agent, what we will call *perceiver triggers*.

Target Triggers in Children

Similarity

If humans are the prototypical mind-havers (Dennett, 1995), then agents that move or look like humans should therefore trigger the tendency to anthropomorphize those agents. For example, one study demonstrated that 12-month-olds tracked the apparent intentions underlying the movements of a furry object when the object had humanlike features and action, namely, a face and responsive movement characteristic of a human (Johnson, Slaughter, & Carey, 1998). Experimenters introduced children to the object for one minute, and after this familiarization period used a hidden remote control to orient the object toward one of two targets. In conditions in which the object possessed a face, children shifted their attention toward the same target as the object. Similarly, in conditions in which the object displayed contingent behavior during the familiarization period—beeping and flashing in response to the infant's vocalizations and actions—children shifted their gaze to follow the object's orientation. When facial features or responsive behavior were absent, however, infants seemed less likely to track the object's apparent intentions. A similar study demonstrated that 15-month-olds inferred the intentions of a stuffed orangutan toy with clear humanlike features such as a face, contingent behavior, and autonomous movement typical of humans and other mentalistic entities (Johnson, Booth, & O'Hearn, 2001). In these studies, infants showed the ability to reenact the orangutan toy's goal-oriented actions (grasping an object) even when the orangutan had tried and failed to complete its intended action.

Just as the presence of a face and contingent movement can trigger the perceptions of intentions in a nonhuman, the biological motion of a human being is sufficient to trigger the perception of intentions of that human being. In one experiment (Yoon & Johnson, 2009), for instance, 12-month olds reliably followed the apparent gaze of a human outlined only as a point-light figure. It is unclear at this point whether biological motion of any agent, human or not, is merely sufficient to trigger the perception of intentions, or whether humanlike biological motion is a necessary feature.

It is not simply similarity in appearance or movement to a human, however, that triggers the perception of humanlike minds in others. Behaving in ways that suggest or imply goal-directed action is sufficient as well. One set of studies demonstrated that 12-month-olds formed impressions about the future intentions of an animated shape based on movement cues (Kuhlmeier, Wynn, & Bloom, 2003). In these studies, children observed a triangle or square apparently "help" or "hinder" a ball that was moving up a slope. In a subsequent presentation of the shape stimuli, infants became surprised when the ball moved toward ("approached") the shape that had hindered its path in the previous scene. These findings suggest that children understood the apparent goals of each shape, and understood that once a nonhuman entity moves in a way that "helps," the "helped" entity should like it more than another entity that hinders.

Even children as young as nine months of age seem able to infer intentionality from the movement of objects by relying on a theory of rational action (that entities will take the most efficient or "rational" path toward a goal) to understand whether or not movement is intentional (Csibra, Gergeley, Biro, Koos, & Brockbank, 1999; see also Gergeley et al., 1995). In these studies, children observed an animated circle moving toward a second circle to make contact with it. In some cases, the primary circle confronted an obstacle in its path, and successfully avoided this obstacle by "jumping" over it. When the experimenters removed the obstacle in subsequent trials, nine-month-old children appeared surprised when they saw the circle "jump" over an obstacle that was no longer there. This finding suggests that children habituated to the goal of the circle's action and not merely to the path of its motion. Although this study's authors emphasize that this demonstrates children's inference of goals in the absence of cues to agency, the circle's use of rational action (taking the shortest path possible to reach a goal) is actually a very clear cue to the object's mindfulness. Motion that looks like the path a mindful agent would typically take is a trigger for infants to use their theory of mind.

A central concern for developmental psychologists is the age at which psychological processes arise; therefore, much effort is spent trying to time stamp research findings. Piaget believed that the ability to reason about others' intentions developed several years into life, but that time stamp has been getting younger and younger as measurements become more and more sensitive. There is much more happening on the inside of young children than the outside perspective of researchers armed with imprecise tools might suggest. In studies using (p. 275) such sensitive measures (Woodward, 1999), even five-month-old children differentiated between goal-directed

movement (a hand grasping toward a toy) and accidental or purposeless movement (a hand grasping in apparently random directions). These infants even appeared to interpret the actor dropping his or her arm near the toy to be goal-directed, even though this dropping action appears far less purposeful than a more active grasping motion. A study using a similar paradigm demonstrated that infants as young as six months old inferred intentions underlying this purposeful grasping motion, but only when the entity conveying the motion was a human arm: Infants did not infer intention from a mechanical claw or a wooden rod (Woodward, 1998). Both movement and appearance seem to work in concert to trigger attributions of intention. These triggers are being discovered using subtle measures earlier and earlier in the course of human development. This does not mean, however, that the triggers to imagining of other minds become less powerful as people age. Indeed, we discuss later how these same triggers—humanlike appearance such as a face, or movement such as goal-directed activity—also guide anthropomorphic mental state inferences in adulthood.

Perceiver Triggers in Children

Explanation

Infants lack sophisticated language capacities and psychologists must therefore rely on nonlinguistic measures, such as eye gaze, to understand their mental processes. However, as children learn to speak, they can use their voices to reveal their propensity for anthropomorphism. Researchers can then listen to their explanations of events for signs of attributing minds—intentions, goals, and motives, in particular—to nonhuman agents. These voices can also reveal the triggers of anthropomorphism in ways that researchers may routinely fail to hear.

For instance, a large body of evidence demonstrates that children are prone to a teleological bias when explaining the natural world (see Kelemen, 2004 for a review). That is, children tend to describe nonhuman artifacts and entities as intentionally designed for a purpose, much like William Paley (1802/2006) famously argued that the complexity of the natural world reveals the existence of an intelligent designer (God). One study showed children a picture of a pointy rock and asked whether it was pointy “so that animals would not sit on it and smash it” or “because little bits of stuff piled up over a long period of time” (Kelemen, 1999a). The latter description is a purely physical explanation, whereas the former description implies an intentional purpose, even a designer. Young children preferred the description implying intentional purpose.

Indeed, evidence of this teleological bias emerges as early as age three (Kelemen, 1999b, 2004; Kelemen & Di Yanni, 2005). Young children appear to be “intuitive theists,” well prepared to explain the creation of the world as the product of an omniscient designer (Kelemen, 2004). As children age and acquire alternate understandings of their natural world, these intuitive teleological explanations diminish. By age 10, children at least in the empirically dominated cultures of the West are markedly less likely to offer teleological responses. This variety of anthropomorphism is, as Piaget argued, something that children grow out of rather than grow into.

Although evidence for a teleological bias is pervasive, it is important to note the conditions under which this bias emerges. In particular, it emerges in contexts in which children are asked explicitly to explain the existence or purpose of an artifact. A pointy rock is unlikely to trigger thoughts of an intending God all on its own, for instance. But once asked to explain why that rock is pointy, visions of an intelligent designer may come quite quickly and easily to mind. The need for explanation appears to trigger inferences about intentions in the design of an artifact. In fact, overcoming these teleological explanations, once triggered, appears to require deliberate and effortful reasoning. People who are unable to do much effortful reasoning, either because they are temporarily under cognitive load (Kelemen & Rossett, 2009) or have a degraded capacity for explanation because of Alzheimer disease (Lombrozo, Kelemen, & Zaitchik, 2007), tend to show stronger teleological biases. Teleological biases therefore seem to be “conditionally automatic” (Bargh, 1994). This trigger of explanation becomes even clearer among adults, as the need or motivation to explain another agent’s behavior is also a critical trigger for anthropomorphizing it as a mindful and intelligent agent (Epley et al., 2007).

The assumption that children intuitively create a mindful God is implicit in the work on teleological bias, but other work examines children’s willingness to perceive minds in supernatural agents such as ghosts and spirits more explicitly. One study described to kindergartners a mouse that was eaten by an alligator and asked the children whether or not the mouse’s biological capacities (such as the capacity to be sick) continued to function after death (p. 276) (Bering & Bjorklund, 2004). The majority of children responded “no” to questions about these capacities.

When asked about mental capacities, however, such as if the dead mouse felt hungry or sad, the majority said “yes.” Children appear to understand that bodies stop functioning after death, but seem readily inclined to believe in a mind that continues after death. Subsequent research found similar patterns of reasoning among both religious and secular children, suggesting that belief in the continuity of mental states after death is an intuitively developed response rather than a culturally learned response (Bering, Hernandez-Blasi, & Bjorklund, 2005). This response appears to be unlearned, or more likely suppressed as with teleological reasoning, as children age. Ten-year-olds and adults are considerably less likely to believe that the mind of a mouse continues after death.

Notably, these experiments describe this mouse in highly anthropomorphic terms that, we believe, initially triggers the perception of mental states in the mouse. These results therefore seem more informative for revealing the *kinds* of humanlike mental states children and adults believe continue after death (as the authors themselves argue), rather than as evidence of children’s rampant anthropomorphism (as Piaget might have argued).

Although children are more likely than adults to anthropomorphize supernatural beings (Goldman, 1964; Shtulman, 2008), this anthropomorphism does not necessarily decrease linearly from young childhood to older childhood. In one study, experimenters told three- to nine-year-old children that an invisible agent named Princess Alice would guide their performance on a forced choice game in which they were to choose one of two boxes (Bering & Parker, 2006). When an unexpected event (e.g., lights flickering) occurred while children made their choice, only the oldest group of children (M_{age} = seven years, four months) seemed to interpret this event as a sign from Princess Alice and chose the other box. Both this group of children and slightly younger children (M_{age} = five years, six months) suggested that the invisible agent caused the event. The oldest children, however, inferred that Princess Alice acted because of something *they* did, whereas the slightly younger group inferred that Princess Alice simply acted on her own volition. The unexpected event triggered attributions of intentionality to this agent, but for different reasons in the two age groups. Interestingly, the youngest group (M_{age} = four years and one month) was least likely to infer that the invisible agent caused the unexpected event. These findings suggest that young children do not automatically attribute mental states to supernatural entities. Instead, contextual cues to an agent’s intentions (e.g., an unexpected event) trigger anthropomorphism only when children understand that these cues may be meaningful.

Knowledge and Experience

Perhaps the strongest evidence *against* universal, rampant, and automatic anthropomorphism among children comes from their reasoning about nonhuman animals. Although this work does not necessarily define anthropomorphism as mental state attribution, it addresses anthropomorphism in terms of whether children use the concept of *human* as a default concept for reasoning about nonhuman animals.

In many urban parts of the modern world, contact with nonhuman animals occurs largely through books or television rather than through direct and frequent interactions. Perhaps not surprisingly given the environment they inhabit, studies with urban children demonstrate that a “person” is viewed as the prototypical animal. Urban children therefore rely very heavily on their concept of a person to reason about other animals (Carey, 1985, p. 104, 126). When asked in one experiment to say all the things they knew that exhibited certain biological properties, children overwhelmingly responded “people” for each property (Carey, 1985). In addition, when both children and adults were asked if a variety of living and nonliving things possess properties typical of animals (a heart, the capacity to breathe), they almost unanimously attributed such properties to humans (Carey, 1985; Inagaki & Sugiyama, 1988). As urban children age, their tendency to anthropomorphize declines as they acquire more basic biological knowledge about nonhuman animals and recognize these animals as distinct from the “prototypical animal,” human beings (Carey, 1985; Inagaki & Hatano, 1987).

Notice that anthropomorphism appears to be the default concept used to reason about nonhuman animals when little else is known about these animals. In cultures with more direct interactions with animals, such as rural farming communities or preindustrial cultures, children acquire alternate understandings of nonhuman animals more quickly. As a result, children in cultures with more direct familiarity with nonhuman animals are considerably less likely to anthropomorphize. Direct experience through cultural practices can foster the development of sophisticated concepts about these (p. 277) animals that can displace *self* or *human* as bases for inductive reasoning. A young child in the city whose only experience with a cow is through a car window, for instance, may find it easy to anthropomorphize cows because he or she has so little other information to use other than

themselves as a basis of projection. A young child on a farm with considerably more direct experience may be considerably less likely to anthropomorphize.

Consistent with this idea, studies of biological reasoning and categorization with rural Wisconsin children, Menominee Native American children, and Yukatek Mayan children (Atran, Medin, Lynch, Vapnarsky, Ucan Ek, & Sousa, 2001; Medin & Waxman, 2007; Ross, Medin, Coley, & Atran, 2003) show considerably weaker evidence of anthropomorphism than studies of children from urban industrialized populations (Carey, 1985; Inagaki & Sugiyama, 1988). This reduced anthropomorphism seems to arise from greater experience in agriculture and hunting, familiarity with culture-specific creation myths about animals, and more frequent interactions with a wider variety of plants and animals (Medin & Atran, 2004). Increased exposure to the natural world allows these children to develop more complex biological concepts. The need to explain the properties of various animals may trigger anthropomorphism, but only when lacking more appropriate and useful explanatory concepts.

A more recent study argues even further against an anthropomorphic default even among young urban children (Herrmann, Waxman, & Medin, 2010). This study demonstrated that three-year-olds were less likely than five-year-olds to generalize from humans to nonhuman animals when reasoning about biological properties. These findings suggest that the concept of “human” as the prototypical biological agent may be one that urban children acquire between the ages of three and five, and anthropomorphism in biological reasoning will emerge only if children maintain an anthropocentric theory about other biological entities.

Anthropomorphism: Intuitive but Not Inevitable

The research discussed to this point suggests that children are ready and willing to attribute distinctively human capacities such as mental states to objects, animals, and supernatural beings. Still, children anthropomorphize only when triggered to do so, whether cued by features of an entity that suggest the presence of mind or motivated to explain the behavior of an entity. These findings from developmental psychology are complemented by research with adult populations showing that (1) anthropomorphism needs to be triggered just as with children, and (2) once triggered, reasoning about the minds of others can require effortful cognitive processing. The remainder of this chapter expands on these two points. These triggers matter because they predict both when full-grown adults are likely to anthropomorphize nonhuman animals by attributing minds to them, but perhaps more important when people are likely to dehumanize other people by failing to attribute minds to them and instead think of them as animals or objects.

Triggering Mind Perception in Adulthood

Target Triggers in Adults

Similarity

Just as morphological cues such as appearance and movement trigger mind perception for children, so too do these cues trigger mind perception in adults. In a classic demonstration, Heider and Simmel (1944) played adult participants an animated scene of shapes behaving interdependently and asked them to report what they saw. All participants but one described the scene in anthropomorphic terms, noting the goals, intentions, and beliefs of particular shapes. A more recent set of studies demonstrated that people perceive nonhuman objects that move at a humanlike speed to be more mindful than similar objects that move more slowly or faster than humans typically do (Morewedge, Preston, & Wegner, 2007). People are also more likely to anthropomorphize robots that look like humans compared with machines (Kiesler, Fussell, Powers, & Torrey, 2008). The presence of a humanlike face, voice, and interactive capacity on a robot increases perceptions of humanness, and even increases people’s emotional responsiveness and physiological arousal (heart rate, skin conductance) to these robots as if they were interacting with another human (Zhang, Kaber, et al., 2010).

In studies using avatars (computerized visual representations of people), the more humanlike the avatar appears, the more likely people are to perceive it to be credible (Koda & Maes, 1996; Nowak & Rauh, 2008). People perceive avatars that look like humans to be more competent and more intelligent than avatars that do not resemble humans (Nowak, Hamilton, & Hammond, 2009), are more likely to comply with a computer’s instructions

when it “speaks” with a human voice (Lee, 2010), and evaluate computers that display real human faces compared with cartoon faces to be more influential, competent, (p. 278) and trustworthy (Gong, 2008). These results are also consistent with findings from a study showing that participants using computers for a simulated desert survival task felt more “understood” when a computer interface had more (vs. fewer) anthropomorphic features (Burgoon, Bonito, Bengtssen, Cederberg, Lundeborg, & Allspach, 2000).

Further evidence that similarity increases anthropomorphism comes from research showing that people treat computers as humanlike agents based on identity-specific features of the computer (see Nass & Moon, 2000; for review). For example, people treat computers consistent with the gender identity that they convey, evaluating a male-voiced computer to be more competent than a female-voiced computer and evaluating praise from the male-voiced computer to be more compelling than praise from the female-voiced computer (Nass, Moon, & Green, 1997). Even sharing the ethnicity of a computerized avatar can influence interactions. In one study, participants rated a computer as more trustworthy, attractive, and persuasive when the avatar’s ethnicity matched participants’ own ethnicity than when the ethnicity differed (Nass, Isbister, & Lee, 2000). In another, people displayed an in-group bias toward computers that bore the same color as a randomly distributed armband that they were asked to wear (compared with computers with dissimilar colors). Participants cooperated more with an in-group computer, conformed more to its instructions, and rated it as more friendly and likeable than an out-group computer (Nass, Fogg, & Moon, 1996). Another study demonstrated that people exhibited greater liking for and assigned more intelligence to vocal computers that displayed a similar “personality” to them (Nass, Moon, Fogg, Reeves, & Dryer, 1995). Such in-group biases are well known in human interaction, and appear to emerge similarly in human–computer interaction as well.

As with technological agents, people anthropomorphize nonhuman animals that look and behave like humans more than those that do not. People attribute more sophisticated mental capacities to animals that have increased phylogenetic similarity to humans (Eddy, Gallup, & Povinelli, 1993), such as stating that mammals are more capable of recognizing themselves in the mirror than are invertebrates. People also report that animals with greater genetic similarity to humans are more capable of empathy than animals lower in genetic relatedness (Harrison & Hall, 2010).

Just as morphological similarity increases anthropomorphism, interpersonal similarity triggers mind perception toward humans as well. People are more likely to consider others who hold the same political views to be more rational and logical (Kennedy & Pronin, 2008) than those who hold different views. People also consistently attribute more higher-order mental states to in-group members than to out-group members. For example, people see more secondary emotions such as shame and humiliation (compared with basic emotions like fear and anger) in people of their own nationality than people of a different nationality (Leyens et al., 2003). Thinking about in-group members (such as middle-class Americans for middle-class university students) is correlated with increased activation in the medial prefrontal cortex, a brain region that is active when thinking about the minds of others, compared with observing out-group members (such as drug addicts; Harris & Fiske, 2006). And people are more likely to see in-group members as possessing fundamentally human traits (such as being *imaginative* and *analytic*) that involve mental capacities (Haslam, Kashima, Loughnan, Shi, & Suitner, 2008). Other humans who are similar, or in some way connected, to the self are readily attributed the higher-order mental capacities by which people intuitively define humanity, just as nonhumans who are similar to the self are humanized (or anthropomorphized). Other humans who are dissimilar or disconnected, however, are attributed less of the higher-order mental capacities by which people intuitively define humanity; thereby people represent these more distant others as more similar to animals or objects (Boccatto, Capozza, Falvo, Durante, 2008; Goff, Eberhardt, Williams, & Jackson, 2008; Viki et al., 2006). This inverse process of dehumanization results, we argue, from failing to trigger people’s capacities to reason about the minds of others.

Sense-Making

Although adults possess more elaborate knowledge for generating causal explanations of events and behaviors than do children, the motivation to explain, understand, and predict one’s environment is still very strong in adulthood. The motivation to make sense of an entity’s behavior triggers mind perception because knowing another entity’s thoughts and intentions gives insight into the meaning of that entity’s behavior and into what it will do next (Dennett, 1987; Epley et al., 2007). Events and behaviors that violate expectancies or increase uncertainty should therefore trigger mind perception. One’s computer, for instance, is likely to seem mindless until

it starts crashing unpredictably, (p. 279) at which point one might start to worry that it has a mind of its own. Indeed, the more participants in one experiment reported having unexpected problems with their computer, the more they reported it as having its own beliefs and desires (Waytz, Morewedge, Epley, Monteleone, Gao, & Cacioppo, 2010).

Consistent with this idea, participants in one experiment reported that a dog was more consciously aware and had more free will when it behaved unpredictably in a video compared with a dog that behaved predictably (Epley, Waytz, Akalis, & Cacioppo, 2008). In another experiment, participants rated a gadget as having more emotions and intentions when it was described as behaving unpredictably than when described as behaving predictably (Waytz, Morewedge, et al., 2010). People are also more likely to attribute intentions to an agent that behaves unfavorably toward them in an economic exchange compared with one that behaves favorably because this unfairness seems to violate people's expectations (Morewedge, 2009). Finally, people are more likely to invoke the intentions of God to explain an event that naturally triggered a need for sense-making—a random disaster with substantial human suffering—than an event that did not trigger such a strong motivation for sense-making—a random disaster without human suffering (Gray & Wegner, 2010).

Similar effects emerge when people try to explain the behavior of other humans. Unexpected events, such as violations of moral or social norms, seem more intentional and mindful than actions that go along with moral and social norms. For example, people are more likely to think that a CEO acted intentionally when a company's behavior inadvertently harms the environment than when it inadvertently helps the environment (Knobe, 2006). When other people go with the flow and follow norms and conventions, there is no need to explain their behavior and therefore no trigger to think about others' underlying mental states. But when other people behave inconsistently with strong norms and conventions, then observers attempt to explain such inconsistent behavior by appealing to underlying intentions, goals, or other states of mind (Uttich & Lombrozo, 2010).

Perceiver Triggers in Adults

Effectance Motivation

Effectance motivation—the basic motivation to understand, predict, and control another entity's behavior—underlies people's tendency to attribute minds to targets that violate expectancies or behave unpredictably. This motivation can be stimulated by properties of the target being perceived, as we have just described, but effectance motivation can also be increased by factors specific to the perceiver and independent of the target being perceived. Simply being paid an incentive to accurately understand an agent's behavior increases attributions of mental states to that agent. People report that a gadget seems more mindful, for instance, when they are paid to predict its behavior compared with when they are not paid (Waytz, Morewedge, et al., 2010). Likewise, effectance motivation increases when people experience a loss of personal control. In one experiment, people who had no sense of control over a set of moving marbles rated them as more intentional than people who were given an (illusory) sense of control over those same marbles (Barrett & Johnson, 2003). In another, those who were dispositionally high in the need for control were most likely to perceive intentions and other higher-order mental states in the behavior of a relatively unpredictable dog (Epley, Waytz, et al., 2008). Other studies have shown that depriving people of personal control increases the need for some external source of control, thereby increasing willingness to believe in an agentic God capable of planning (Kay, Gaucher, Napier, Callan, & Laurin, 2008; Kay, Moscovitch, & Laurin, 2010).

Describing another agent's behavior simply requires attending to the agent's observable behavior. But truly understanding and gaining a sense of predictive control over that agent requires attending to the agent's psychology—the inner mental states and capacities that guide behavior in everyday life. Increasing the motivation to understand and predict another's actions therefore triggers anthropomorphism. Lacking that trigger can reduce the perception of mind in others, resulting in dehumanization when evaluating other people. This is why, we believe, that being in a position of power increases the tendency to dehumanize and objectify others, such as when employers think of employees as tools to achieve a goal rather than as persons with motives, intentions, and desires (Gruenfeld, Inesi, Magee, & Galinsky, 2008; Lammers & Stapel, 2011). Power enables control over others, reducing the need to understand, predict, or accommodate the other person's perspective. Lacking a trigger to get over one's own egocentric perspective and into the minds of others may reduce the extent to which others are seen as having minds at all.

(p. 280) **Sociality Motivation**

Perhaps the most basic function of mind perception in general, and anthropomorphism in particular, is to enable a deep and empathic connection with another agent. Getting over one's own egocentric perspective to anticipate and appreciate the inner perspective of another is central to strong social relations. Remaining completely egocentric and inattentive to another's perspective is a good way to end up lonely. People motivated to establish a social relationship with another agent should therefore be more likely to trigger the tools, such as mind perception, necessary for establishing such relations.

Consistent with this idea, people who are motivated to make friends with others are more attentive to another person's emotions, and more accurate in identifying another person's inner emotional state from vocal and facial cues (Pickett, Gardner, & Knowles, 2004). People are also more likely to attribute basic mental capacities such as intention, cognition, and emotion to people they like as opposed to people they dislike and would prefer to avoid (Kozak, Marsh, & Wegner, 2006). The motivation to connect with others also increases anthropomorphism of nonhuman agents (Epley et al., 2007). People who report being lonely in daily life are more likely to attribute mental states to technological gadgets and pet animals than people who are not lonely (Epley, Akalis, Waytz, & Cacioppo, 2008; Epley, Waytz, et al., 2008). Inducing a sense of loneliness experimentally also increases people's belief in spiritual agents and attribution of mental states to pet animals (Aydin, Fischer, & Frey, 2010; Epley, Akalis, et al., 2008). Given that most people are not naturally lonely (Boomsma, Willemsen, Dolan, Hawkey, & Cacioppo, 2005), people may not necessarily be motivated to seek out other minds for social connection. However, when the motivation for social connection is triggered, other humanlike minds may start to emerge through one's imagination (see chapter 17).

As with effectance motivation, reducing sociality motivation also reduces the tendency to attribute minds to others. When people feel sufficiently socially satiated, they no longer seek social connection (Brewer, 1991; DeWall, Baumeister, & Vohs, 2008) and therefore attend less to the minds of potential affiliates. In a series of studies, we (Waytz & Epley, 2012) tested the hypothesis that making people feel socially connected increases dehumanization directly. In one study, participants who were asked to recall an experience of social connection versus those who recalled an experience that did not involve social connection described others in more animalistic terms and as less mentally capable. In another experiment, people who completed the study materials in a room with a close friend compared with those who completed the study in a room with a stranger were more likely to dehumanize suspected terrorists and report more willingness to torture these suspects. These findings suggest that just as sociality motivation triggers mind perception and anthropomorphism, diminishing this motivation reduces mind perception and thereby enables dehumanization.

Thinking Effortfully About Other Minds

Once triggered to think about other minds, one could still argue that the process is relatively automatic if it requires little cognitive effort to keep the process going. Rolling yourself down a hill is not automatic in the sense that it requires a trigger to get you rolling, but it is automatic in the sense that once someone nudges you along, you will make it to the bottom without any additional effort on your part. Rolling yourself up a hill, in contrast, requires both a trigger to get you started and effort to keep you going. Nobody would consider rolling up a hill to be an automatic process. We believe that reasoning about other minds is more like rolling up a hill than like rolling down a hill. It requires a trigger to start and effort to maintain.

When left to their own devices, adults do not naturally consider the feelings or needs of others. In one classic study that supports this point, Darley and Batson (1973) examined whether seminary students told to walk between two campus buildings would stop to help a person slumped on the sidewalk, in clear need of assistance. In this study, researchers measured a variety of individual differences related to religiosity, and also manipulated situational variables such as whether participants had just read the Parable of the Good Samaritan (a biblical passage that emphasizes the importance of helping others) before meeting the person in need of help. Neither the individual difference measures of religiosity nor reading the parable had any significant influence on helping. The only variable with meaningful effect on helping was whether or not participants were in a hurry. When in a hurry, only 10 percent helped. When *not* in a hurry, 63 percent stopped to help. This simple finding provides a profound insight into the nature of prosocial behavior and empathy—people showed a willingness to help only when they had (p. 281) the resources and motivation to stop and consider the other person's needs.

The findings of Darley and Batson's (1973) study corroborate a large body of research demonstrating that adults, at least in Western cultures, appear naturally inclined to evaluate the world from their own egocentric perspective. Considering others' thoughts, beliefs, attitudes, intentions, and goals requires both time and effortful cognitive processing to overcome that egocentric default. Adults respond more slowly to questions about another person's false beliefs than to questions about reality (Apperly, Simpson, Riggs, Chiavarino, & Sampson, 2006). In addition, adults with higher working memory capacity are better able to consider the thoughts and intentions of others than people low in working memory capacity (Lin, Keysar, & Epley, 2010; see also German & Hehman, 2006), and paying people incentives for accurately predicting others' thoughts reduces egocentrism in judgment (Epley, Keysar, Van Boven, & Gilovich, 2004). In contrast, making people respond quickly (Epley, Keysar, et al., 2004), distracting them with a concurrent processing task (Lin et al., 2010), or putting them in a positive mood that induces more quick, heuristic processing (Converse, Lin, Epley, Keysar, 2008) increases egocentrism in judgment and diminishes the capacity to reason about other minds. Even the observed differences in perspective-taking ability between children and adults seems to emerge from differences in effortfully correcting an initial egocentric default in judgment rather than from differences in the initial tendency to reason egocentrically (Epley, Morewedge, & Keysar, 2004). Of course, because such effortful processes are difficult to maintain, they are also prone to error. Even full-grown adults show less than perfect performance on standard tests of false-belief reasoning that are analogous to those used by children (Birch & Bloom, 2007).

One recent theoretical account suggests that people possess two different systems for reasoning about other minds (Apperly & Butterfill, 2009), one that is relatively effortless and intuitive and another that is highly effortful and deliberate. These two systems are analogous to many two-system theories of adult human judgment that imply both intuitive and deliberate forms of reasoning for the very same kinds of problems (Epstein, 1994; Kahneman & Frederick, 2002; Sloman, 1996; Stanovich & West, 2000). On this account, both children and some nonhuman primates possess an intuitive and relatively effortless ability to monitor belief-like states in others based solely on watching their behavior, but that a full understanding that other agents have intentions, goals, and minds of their own requires further development into adulthood and more effortful cognitive processing.

Although studies have shown that infants—even those only 13 to 15 months of age—appear to pass tests that require understanding false beliefs—a capacity previously thought to develop around age four (Onishi & Baillargeon, 2005; Surian, Caldi, Sperber, 2007), Apperly and Butterfill's (2009) dual-systems account of belief understanding suggests that infants pass these tests by using a cognitively efficient system attuned to particular triggers that signal "belief-like states" rather than beliefs per se. In tests of whether an infant understands another person's false belief about the location of an object, factors such as the other person's engagement with the object (whether the person is facing the object) and features of the object (that the object has a particular shape or color) may signal the presence of such belief-like states. Complete belief understanding, however, requires executive function capacities that infants likely do not yet possess. Even adults possess executive functioning in limited quantities, and therefore do not fully infer and understand others' beliefs when they are unable or unmotivated to think about the minds of others.

Insights Into Childhood from Adulthood

One conventional view characterizes children as seeing minds indiscriminately, whereas adults know better than to apply minds to every entity they encounter, and are more tempered in their use of theory of mind. Our account suggests that neither characterization is accurate. Rather, adults require only a slight nudge to begin talking to their car like a three-year-old talks to his teddy bear, and yet neither children nor adults consider the minds of others automatically. Studies on children's capacity and willingness to use theory of mind suggest a basic set of target and perceiver factors that create hair-triggers for perceiving other minds. Studies with adult populations demonstrate that even though adults have developed greater cognitive capacities and have more experience interacting with other minds, they too require triggers to use their theory of mind.

The idea that perceiving other minds is not automatic, but triggered very easily poses a number of questions for future research. First, if people do not automatically reason about other minds, then is dehumanization—the relative absence of mind compared with one's own mind—the default state (p. 282) for evaluating other people? Second, if theory of mind can be triggered, can increased use of this capacity also be taught? Third, to what extent does culture influence and provide triggers for mind perception? Fourth, to what extent do adults intuitively

dehumanize children, underestimating their higher-order cognitive capacities? And finally, to what extent does mind perception, in both children and adults, influence behavior? The remainder of this chapter addresses these questions.

Question 1: Is Dehumanization the Natural State of People's Perception of Others?

If people do not naturally attend to the minds of others, then they may also fail to automatically think of others as fundamentally human. A number of findings suggest this may be a possibility. First, as noted throughout the chapter, theory of mind is a capacity that people must be triggered to use, and when triggers are not in place people remain engulfed in their own thoughts and feelings (Epley, Keysar, et al., 2004; Gilovich et al., 2000; Nickerson, 1999; Piaget, 1929). Given that people are largely egocentric in their natural state, they may not consider others' thoughts and feelings, particularly when those thoughts and feelings differ from their own. Second, as the Good Samaritan study (Darley & Batson, 1973) demonstrates, people do not necessarily take the concerns of others into mind unless they have the time and cognitive resources to do so (see also Darley & Latane, 1968; Latane, Williams, & Harkins, 1979; List, 2007). Third, a growing body of research demonstrates that people preferentially attribute uniquely human traits and traits characteristic of human nature to themselves compared with others (Haslam & Bain, 2007; Haslam, Bain, Douge, Lee, & Bastian, 2005), such that people view themselves as more human than they view others. Dehumanization is typically linked in both popular and academic accounts to animosity or prejudice toward others, but the emerging literature suggests that dehumanization may arise simply from a detached apathy to others as well.

Question 2: If Mind Perception Can Be Triggered, Can It Be Taught?

Given that mind perception needs to be triggered, then training an increased or decreased sensitivity to these triggers should alter the activation of this capacity. Research demonstrating that adults instructed to adopt the perspectives of others actually do so is direct evidence for this claim (e.g., Batson, 1994). Other studies with people who lack basic theory of mind capacities also suggest that mind perception can be taught. Ozonoff and Miller (1995), for example, implemented a social skills training program for autistic adolescents. The ability to understand complicated mental states, such as false beliefs, improved significantly after four and a half months of training. Other studies have demonstrated effective emotion-recognition training programs for autistic children (Baron-Cohen, Golan, & Ashwin, 2009; Ryan & Charragain, 2010).

Although studies with autistic populations focus on more explicit instructions to identify and attend to others' mental states, it may be possible to merely implement the triggers that enable accurate mind perception. For example, asking people to adopt a "big-picture" perspective, thinking about themselves in more general and abstract terms, improves people's ability to infer others' impressions of them (Eyal & Epley, 2010). Activating motivational triggers of mind perception such as accuracy motivation, effectance motivation, or sociality motivation may similarly improve people's ability to perceive and understand mental states. Emphasizing target triggers of mind perception may also improve people's theory of mind capacity. For example, highlighting another person's similarity to the self or their desirable attributes may encourage perspective taking. It is unclear whether activating the triggers of mind perception could improve this capacity permanently, or whether the effects of these triggers would be momentary. For now, in fact, it is unclear whether training among normal populations would affect theory of mind use at all.

Question 3: To What Extent Is Culture a Trigger of Mind Perception?

Culture operates as a broad psychological construct that encompasses a number of subordinate factors such as values, practices, and beliefs that can trigger mind perception. Culture, therefore, should constitute a superordinate trigger of mind perception, but research to this point has demonstrated cultural differences only in the tendency to consider others' perspectives rather than differences in mind attribution and anthropomorphism per se. One major component of culture, self-construal—the extent to which people think of the self as an independent entity, a member of a dyad, or a member of a broader collective—influences engagement in perspective taking, and may account for differences in mind perception—both anthropomorphism as well (p. 283) as dehumanization—across cultures. Differences in independent self-construal and interdependence self-construal are most salient between collectivist culture that predominates in East Asian and Latin American countries and individualist culture that predominates in the United States and Western Europe. In describing the difference in self-

construal across culture and its effect on perspective taking, Markus and Kitayama (1991, p. 229) state, “The reciprocal interdependence with others that is the sign of the interdependent self... requires inhibiting the ‘I’ perspective and processing instead from the ‘thou’ perspective... The requirement is to ‘read’ the other’s mind and thus to know what the other is thinking or feeling.”

A number of studies demonstrate that this difference in orientation toward one’s own perspective versus others’ perspectives differs by culture. In one set of studies, Asian participants were more likely than Western participants to recall memories from another person’s perspective than from their own perspective, and were less egocentric when inferring others’ emotions as well (Cohen & Gunz, 2002). In another study, people played a communication game with a partner. Chinese participants paid more attention to the eye gaze and visual perspective of the partner than did Americans (Wu & Keysar, 2007). These findings suggest at least one prediction about culture as a trigger of mind perception in that the salience of a collectivist cultural orientation should increase anthropomorphism, and perhaps reduce dehumanization as well. Although this hypothesis has not been tested directly, anecdotal evidence that Japanese primatologists engage in more anthropomorphism of primates than American primatologists (Asquith, 1996) supports this prediction.

Question 4: To What Extent Do Adults Dehumanize Children?

Few statements have been ridiculed by developmental psychologists as vigorously as William James’ (1890/1950, p. 442) characterization of the life of an infant as a “blooming, buzzing, confusion.” Because children lack language, look different, and lack many of the motor skills that adults possess, it may be especially easy for adults to underestimate their cognitive capacities. Since James, developmental psychologists have been busy revealing a much more sophisticated mind in young infants than an outside observer relying only on language and behavior might imagine.

Indeed, recent research suggests that adults subtly dehumanize children, but in a somewhat complicated fashion. In particular, adults in one set of experiments associated children with common human emotions and traits (such as being friendly, curious, emotional, and ambitious), but they failed to associate children with distinctively human mental capacities (such as self-control, civility, and politeness; Loughnan & Haslam, 2007). In these experiments, children were associated with the same traits that people in this experiment associated with animals. Indeed, one way to dehumanize other adults is to associate them with children, or to infantilize them (Saminaden, Loughnan, & Haslam, 2010). Given the degree of sophistication observed by developmental psychologists in the cognitive capacities of children—including the emergence of a sophisticated theory of mind at earlier ages than previously thought—coupled with the stereotypes associated with children, it is possible that the diminished capacities that adults see in children are exaggerated. Of course, it is also possible that children are every bit as impulsive, uncivil, and impolite as adults expect. Do parents, relatives, teachers, and neighbors underestimate the humanlike mental capacities of children in their midst, or not? No research that we know of systematically compares adult predictions with children’s actual performance across a wide range of tasks that would allow researchers to tell whether the stereotypes of children are generally correct or are systematically misguided. We believe this could be a very interesting program of research.

Question 5: To What Extent Does Anthropomorphism in Particular, and Mind Perception in General, Influence Behavior?

Asking whether mind perception affects behavior may seem absurd given how much of social life requires the mutual recognition of mental states for effective communication, coordination, and comprehension of behavior (Epley & Waytz, 2010). Certainly people’s understanding of others’ thoughts, emotions, goals, and motives exerts some influence on social interaction in everyday life. For instance, the more people anthropomorphize nonhuman animals, and the more higher-order mental capacities they attribute to other humans, the more people treat those others as moral agents worthy of care and concern (Waytz, Gray, et al., 2010). However, a disconnect exists between research on when people perceive other minds, and research on behavioral implications of perceiving other minds, leaving the strength of this association unclear. Given that (p. 284) reasoning about other minds needs to be triggered so as to influence behavior, much social behavior is likely to be relatively mindblind—insensitive to the preferences, goals, and motives of others.

Like other psychological constructs such as attitudes (Wicker, 1969) and personality (Mischel, 1968), the

association between the perception of mental states and the influence of this perception on behavior may be smaller than assumed by researchers of mind perception (including us). Research on attitudes has made it clear that they predict people's behavior only when the attitudes are accessible and activated at the time of judgment. Whether someone is a Republican or Democrat may not influence their voting unless they are reminded of their status as a Republican or Democrat. Similarly, thoughts about other minds are likely to guide behavior only when those thoughts are readily accessible and triggered by the person or situational circumstance. Understanding how much anthropomorphism and dehumanization in particular are likely to influence behavior toward nonhumans and humans, respectively, requires understanding precisely when thoughts about the minds of these other agents are triggered and when they are not. As we have argued in this chapter, being able to think about the minds of others is very different from actually doing so.

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