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Understanding the Minds of Others:

Activation, Application, and Accuracy of Mind Perception

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In 2011, the Marist Institute for Public Opinion asked over a thousand randomly selected Americans to indicate which of 5 superpowers they would want most: invisibility, teleportation, flight, time travel, or reading others' minds. Although most movie super heroes possess one of the first three, most Americans opted for one of the last two: time travel and mind reading tied for the top spot, each selected by 28% of respondents. This is somewhat ironic because thousands of psychology experiments have documented the many ways in which most people already possess an ability to read the minds of others whereas not one experiment has identified even a single person with any of the other superpowers. Most people are readily able to make inferences about another person's thoughts, beliefs, attitudes, motivations, intentions, and other mental states, with at least some above-chance accuracy. Mind reading is a superpower that most already possess.

Indeed, the human brain stands out in the animal kingdom for its relatively large cerebral cortex (Jerison, 1971; Herrmann, Call, Hernández-Lloreda, Hare, & Tomasello, 2007), an adaptation that enables the sophisticated social cognition necessary to function effectively in large social groups (Dunbar, 1993). These neurons are not involved in any sort of supernatural psychic activity but instead are involved in the kind of mind reading that each person does every day of their lives when wondering what another person thinks, believes, feels, or wants. By 2 years of age, human toddlers are similar to our nearest primate relatives in their ability to reason about physical objects, but they stand out for their ability to reason about others' mental states (Herrmann et al., 2007). If a human toddler, for instance, watches another person reach for a glass of water but miss it, then he or she is likely to recognize that another person *wants* a drink

or *feels* thirsty and so will pick up the glass and hand it to the person. You can do this all day long in front of a chimpanzee and they will only rarely hand you the glass of water.

This almost magical ability to go beyond a mere observation of behavior to infer an underlying mental state allows us to understand what another person is doing in the present, to predict another person's behavior in the future, and to arrive at a shared understanding of reality (Echterhoff, Higgins, & Levine, 2009; Hudson, Nicholson, Ellis, & Bach, 2016; Wegner, 2002). By age 4, human children have developed a fairly sophisticated set of beliefs that explains both their own and others' actions in terms of underlying mental states (Frith & Frith, 2005). These beliefs about how minds work is often referred to by psychologists as a Theory of Mind (Leslie, 1987; Saxe & Kanwisher, 2003). Because mental states cannot be observed directly, most human beings are merely presuming that behaviors are guided by unobserved mental states, hence developing a "theory" of how others' minds work. By adulthood, most people define others' minds in terms of two fundamental abilities (Gray, Gray, & Wegner, 2007; Haslam & Loughnan, 2014): the ability to think (including reasoning, planning, and exercising) and to feel (including experiencing pain, pleasure, and complicated emotions like regret and joy). Developing a theory of mind and then applying it to our understanding of both our own and others' actions makes mind perception possible. It is also one of the features that make human beings unique on the planet. We are mind readers.

Here we cover the basic psychological processes that comprise what may be the human brain's most impressive capacity. Engaging with the mind of another person requires this capacity to be activated, and the factors that govern activation can explain both anthropomorphism and dehumanization. Once activated, at least three basic processes guide the inferences people make about others' mental states and capabilities: egocentrism, stereotyping,

and behavioral inference. These processes can work both in isolation and in coordination with each other, based on the information people have available to them at the time of judgment. Each process provides some accuracy but also some systematic error. Understanding these processes enables insight into both the remarkable insight that people can have into the minds of others, and also the potentially painful mistakes people make that can create misunderstanding and conflict.

Processes of Mind Perception: Activation and Application

Having a capacity and using it effectively are two very different things. Most psychological research on human capacities attempts to understand how psychological processes get used in everyday life. Two questions are primary. First, what activates a given capacity, such as the capacity to think about another's mind? A person might walk down a busy city sidewalk without ever thinking about the thoughts or intentions of a single passerby. As William James correctly noted over a century ago, "My thinking […] is for doing," (1890/1990, p. 669), and hence our Theory of Mind should be activated only if it is motivationally relevant for some potential action. Second, once thinking about the mind of another person, what guides the application of this capacity in daily life? What processes enable people to get outside of their own minds and make inferences about invisible mental states in the minds of others ranging from family to friends to complete strangers?

Ultimately these questions matter because our inferences about other people can guide our behavior towards them. You act differently towards a person you trust than a person you don't. You blame a person whom you believe harmed another on purpose more intensely than a person who harmed another by accident (Malle & Bennett, 2002). And you'll engage a stranger in conversation if the person seems interested in talking, but avoid it if the person seems

uninterested. Because these mental state inferences guide behavior, the accuracy of mind perception is also critical for identifying potential mistakes that people might make that have important consequences for social interaction. This chapter will cover what psychologists currently know about the activation and application of mind perception, ending with implications for interpersonal understanding *and* misunderstanding.

Activating Mind Perception

The human brain contains a wide array of capacities that get activated only when they are useful. Vision is useful for perceiving the physical world, and people activate their visual system by opening their eyes when navigating the physical world. Mind perception is useful for perceiving the social world, and is therefore activated by goals to explain, understand, or predict others' actions (Koster-Hale & Saxe, 2013). These goals typically arise in situations where there is interdependence between one person and another. Situations that increase the interdependence between the self and others should therefore increase the tendency to consider another person's mental states, whereas situations that decrease interdependence should decrease the tendency.

Sometimes cues to interdependence can come from subtleties in behavior. You might not give any thought to a passerby on the sidewalk until he looks directly at you, at which point you might wonder why he is interested in you. People tend to look at the things they are thinking about and think of the things they are looking at, so attending to another person's eye gaze is a good cue for what they might be thinking of. Direct eye gaze also signals interpersonal connection and engagement that can activate approach-oriented neural systems (Hietanen et al., 2008). Being looked at directly can therefore trigger mind perception processes. In one experiment, for instance, participants saw an experimenter drop a heavy TV onto his hand in a staged accident (Bavelas, et al., 1986). In one condition, the experimenter looked directly at the

participant while showing a pained expression. In another condition, the experimenter looked slightly away, showing the same pained expression. Videotaped recordings indicated that the participants showed more concern for the accident when they were looked at directly, suggesting more sensitivity to another's mind when engaged by a direct eye gaze. In another experiment (Khalid, Deska, & Hugenberg, 2016), participants evaluated another person's mental capacities based only on a photograph, presented either with a direct gaze or an averted gaze. These pictured targets were perceived to be less mindful—less capable of thinking and feeling—when presented with averted gaze than with direct gaze. It is often said that "eyes are the window to the soul," but these results suggest that eyes are also a trigger for our tendency to think about, and therefore recognize, another mind standing right before our eyes.

More blatant signals of interdependence also show similar tendencies to activate mind perception processes. If, for instance, you're about to meet a new roommate, then you probably want to know something about this person's beliefs, attitudes, and preferences. Consistent with this, people who are expecting to interact with another person in the future are more likely to seek information about another person's mental states—their preferences, interests, attitudes, or desires—than when they are not expecting to interact again (Douglas, 1984, 1990). Similarly, the need to understand and attend to another person's mental states is stronger when you are in a real interaction with another person compared to just imagining being in an interaction. Consistent with this, participants in one experiment believed they were more likely to reject unsuitable romantic partners in a hypothetical situation than they actually were when in the midst of a real interaction with the unsuitable partner (Joel, Teper, & MacDonald, 2014). This occurred at least partly because participants were more sensitive to the pain of hurting another person's feelings in a real interaction than in a hypothetical interaction. Others' feelings might

be top of mind when you're interacting with them, but out of mind when you're only imagining an interaction.

Understanding another's mind enables the ability to cooperate, coordinate, connect, and share reality with that person. This means that being motivated to understand another's behavior, or to connect with another person, should also trigger people to think about the minds of others. Research indicates that those who are interested in connecting with others are more likely to attend to others' emotions (Pickett, Gardner, & Knowles, 2004), adopt another person's psychological perspective (Knowles, 2014), and attribute a mind to nonhuman animals or gadgets (Epley, Akalis et al., 2008; Epley, Waytz et al., 2008). Diminishing the motivation to connect with others, such as by being reminded of friends, can diminish the degree to which people attribute mental capacities of thinking and feeling to out-group members (Waytz & Epley, 2012) and to nonhuman animals (Bartz, Tchalova, & Fenerci, 2016).

Needing to explain another's behavior can likewise trigger people to think about others' minds. When a person acts exactly as you'd expect, you shrug your shoulders and move on. However, when a person behaves unexpectedly, then additional thinking is prompted to try to understand the behavior. Often this additional thinking shifts attention to another's mind. What was he *thinking*? Why did she *want* to do that? Unpredictable and unexpected behavior triggers people to think about the minds of others, increasing attention to mental states and even increasing the tendency to attribute humanlike mental capacities to animals or objects (Waytz et al., 2010). In one experiment on gift giving (Zhang & Epley, 2012), the amount of thought a gift giver was presumed to have put into a gift affected the recipient's evaluation only when it was a gift that really needed to be explained—specifically, when the recipient received a bad gift (versus good gift) from a friend (versus a stranger).

Once interacting with another person, the motivation to connect can also activate mind perception processes. One example involves power and social status. Having power enables the ability to act independently, without constraints imposed by others. Lacking power, in contrast, requires operating under constraints, and hence requires coordination with others in order to achieve one's goals. Several experiments demonstrate how this can affect the activation of mind perception. Those in positions of high power, for instance, tend to be less accurate inferring others' interests and attitudes (Keltner & Robinson, 1997), less likely to adopt another's psychological perspective (Galinsky et al., 2006; Gordon & Chen, 2013; but see Schmid Mast, Jonas, & Hall, 2009), and less likely to experience empathy for another's misfortune (Van Kleef et al., 2008). High status similarly creates a sense of disconnection and independence from others, and the effects of status appear similar to the effects of power on mind perception. Feeling like you are of high status, for instance, can increase attention to your own goals, interests, and desires while decreasing attention to those same mental states in others, creating what one group of researchers described as "solipsistic social cognitive tendencies" (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012).

These tendencies may vary, however, depending on more precise details of a person's status that might heighten motivation to attend to very specific mental states. If a person's status or power is perceived as illegitimate, then others' anger may be especially relevant to a high-power person who is concerned about losing his or her position, whereas a leader's fear may be especially relevant to a low-power person in this same situation. Several experiments support this possibility, demonstrating that those in illegitimate high-power positions detect anger more quickly (and more accurately) than those in legitimate high-power positions, whereas those in illegitimate low-power positions detect fear more accurately (Stamkou, van Kleef, Fischer, &

Kret, 2016). Social contexts that require coordination with others trigger attention to others' mental states, and sometimes to very specific mental states, whereas contexts that reduce the need for coordination can lead people to overlook the minds of others.

That mind perception processes are triggered by personal motivation makes it clear that thinking about others' mental states requires at least some deliberate attention and effort in order to be utilized. Over time, as with any effortful process, repeated practice can create a less effortful habit. As people age, the ability to consider another's thoughts in the midst of an interaction becomes easier and more automatic (Epley, Morewedge, & Keysar, 2004). Cultures in which interdependence is especially prominent, such as those with a history of highly interdependent agrarian practices (Talhelm et al., 2014), may also consider others' perspectives more readily than do people from independent cultures (Leung & Cohen, 2007; Wu & Keysar, 2007). As Markus and Kitayama (1991) note about interdependent cultures, "The requirement is to 'read' the other's mind and thus to know what the other is thinking or feeling." Even growing up in a family with siblings, which may generally increase the need for coordination and attention to others, seems to increase the likelihood of attending to other minds in social interactions compared to growing up in a family without siblings (Jenkins & Astington, 1996; Lewis, Freeman, Kyriakidou, Maridaki- Kassotaki, & Berridge, 1996; McAlister & Peterson, 2007; Perner, Ruffman, & Leekam, 1994).

Mind perception enables effective coordination with others, comprehension and understanding of others' behavior, and also prediction of how others are likely to behave. Mind perception processes are therefore activated by the interdependent demands of the context a person is in, by the goals of a person within that context, and by the person's behavioral history. Understanding how mind perception is activated enables an understanding of when people are likely to be sensitive to others' thoughts, beliefs, and attitudes, and when they likely to overlook others' minds almost completely.

Applying Mind Perception: Processes of Egocentrism, Stereotyping, and Behavioral Inference

The ability to go beyond observable characteristics to make inferences about another's invisible mental states is among our brain's greatest strengths. Once activated, what are the processes that people use in order to make inferences about others' minds? Like many great abilities, mind perception is not enabled by a single process but is instead composed of several different processes that are used in varying degrees depending on the information we have about another person, and on our own processing capacity and motivation. Three distinct processes have received the most empirical attention by psychological scientists: egocentric simulation, stereotyping, and behavioral inference.

Egocentric simulation. "The only true voyage of discovery," Proust (1923/1993) wrote, "would be not to visit strange lands but to possess other eyes, to behold the universe through the eyes of another." No person will ever be able to actually take Proust's voyage into the mind of another person, but many have noted that you don't need to travel very far to find a good source of inspiration. You can simply use your own mental experience as a guide to another's. If a meal tastes disgusting to you, then it is reasonable to presume that others will find it to be disgusting, too (Dawes & Mulford, 1996). In one of the earliest papers introducing the concept of a theory of mind, Nicholas Humphrey (1983) described this as the bedrock process guiding mind perception: "We could imagine what it's like to be [others] because we know what it's like to be ourselves [and] make sense of [others'] behavior by projecting what I know about my mind into them." Humphrey was not exactly describing a new idea. Decades before, Bertrand Russell (1948) hypothesized that people use themselves as analogy to explain others' actions. Centuries before that, Immanuel Kant (1781/1953) simply took this process for granted as common sense: "It's

obvious that if anyone x wants to represent a thinking being y to himself he has to put himself in y's place, as it were substituting his own subject for y's."

Less obvious are the numerous ways in which using oneself as guide for others manifests itself in everyday judgment. For instance, people tend to overestimate the extent to which their own emotions are visible to others, mainly because people's own emotions are so clear to themselves (Gilovich, Savitsky, & Medvec, 1998). In conversation, listeners likewise tend to interpret another's message in a way that's consistent with their own egocentric perspective on the situation (Keysar, Barr, Balin, & Brauner, 2000; Kruger, Epley, Parker, & Ng, 2005). Speakers may do the same, assuming their intentions are clearer to listeners than they actually are, an egocentric bias that can become problematic in social interaction if one's "obviously" sarcastic joke is interpreted as sincere (Keysar & Barr, 2002), or if one's intentionally harmless teasing is mistaken as a malicious insult (Kruger, Gordon, & Kuban, 2006). People also use their own behavior as a guide to others' likely behavior, such that people tend to assume that others will act in a way that is relatively similar to the way they would personally act (Ross, Greene, & House, 1977). Those who cheat on a test, for instance, assume that others are more likely to cheat than those who do not cheat on the same test (Katz, Allport, & Jenness, 1931). People may also project their own experience onto others, assuming that others will feel something relatively similar to their own experience after hearing a joke, seeing a movie, or experiencing an event. In one experiment, for instance, participants predicted how willing they would be, and how much they would need to be paid, to dance in front of their large class to Rick James' iconic funk song, *Superfreak* (Van Boven, Loewenstein, Welch, & Dunning, 2012). These participants facing a purely hypothetical choice overestimated how willing they would be to dance compared to a group that actually faced this choice in front of a real classroom full of students, and also

underestimated how much they would need to be paid in order to dance. As a result, people also overestimated how willing other people would be to dance when facing an actual choice, and also underestimated how much people would need to be paid to do it (Van Boven, Loewenstein, & Dunning, 2005).

Of course, adult human beings are not entirely egocentric. As people age, they quickly and sometimes painfully learn that their own perspective might be unique and that others do not see the world exactly as they do. Whereas young children make relatively egregious perspective-taking errors, often failing to attribute false beliefs to others (Baillargeon, Scott, & He, 2010), adults make perspective-taking errors that seem relatively less severe. This is not because adults outgrow their tendency to start with an egocentric default in judgment, but rather because adults become more adept at correcting their egocentric default when they are aware that another person's perspective might differ from their own (Epley, Morewedge, & Keysar, 2004; Epley, Keysar, Van Boven, & Gilovich, 2004; Tamir & Mitchell, 2013). This egocentric correction process documented across age may also characterize the cross-cultural differences that emerge in mind perception, with those from interdependent cultures being more likely to correct an egocentric default rather than failing to rely on it at all (Wu & Keysar, 2007).

Cognitive processes like egocentric projection can also be moderated by a person's motivational state. The motive to connect to another person, or to distance yourself, seems to explain why people project their own personality traits—and presumably mental states as well—onto other people (Machunsky, Toma, Yzerbyt, & Corneille, 2014). Some research also suggests that basic motives of self-protection and mate search may also lead to more sophisticated patterns of egocentric projection (Maner et al., 2005). Feeling threat may make people hyper-vigilant for signs of danger from threatening others, increasing the likelihood of seeing anger in

out-group faces. Likewise, men who are actively seeking women for a romantic relationship may be more vigilant to signs of reciprocating interest, increasing the likelihood of perceiving sexual arousal in women's faces compared to men who are not seeking women. A person's goals can guide the information he or she attends to, in at least some cases affecting the processes used to understand the minds of others.

Stereotyping. Mental state inferences are complicated, composed of multiple processes that interact in order to render a judgment about another person's inner life. Other minds can sometimes be blank slates onto which we project our own, using the process of egocentric simulation just discussed. But we often know considerably more than nothing about the people we are trying to understand. Others can be police officers or parolees, teachers or students, conservatives or liberals. These categories activate beliefs about groups that can then provide information about another individual's attitudes, beliefs, or other mental states. Learning that someone is a member of a conservative political party, for instance, gives you some information about his or her likely attitudes on social and economic issues. These stereotypes—defined simply as beliefs about categories of people—comprise a second process by which people infer others' mental states.

It is reasonable to use oneself as a guide to others who are relatively similar to us, but less reasonable when others clearly differ from us. The perceived similarity of another person to the self therefore moderates the use of an egocentric default in social judgment, which is corrected or even replaced by using stereotypes or other individuating information in its place. In one experiment, university students tended to use their own attitudes as a guide to the attitudes of students from their own university, but relied on stereotypes as a guide to the attitudes of students from a dissimilar university (Ames, 2004a; 2004b). Specifically, students from

Columbia University predicted what percentage of fellow Columbia students and UC Berkeley students would agree to a series of statements, along with indicating their own agreement with each statement. UC Berkeley students are perceived as being politically liberal with a long history of social activism. The statements were either consistent with the liberal stereotype of Berkeley students ("Do you engage in political protests at least once a year?") or inconsistent with the stereotype ("Do you think capital punishment is ever an acceptable policy?"). Results indicated that participants' own views were highly correlated with the views they expected of their fellow Columbia University students. In contrast, participants' own views were not correlated with predictions of the dissimilar out-group's views—that is, of UC Berkeley students. Instead, participants presumed that Berkeley students held views relatively consistent with the common stereotype of these students. By measuring participants' own beliefs as well as group stereotypes, this researcher was able to confirm that participants relied on egocentrism when understanding the mind of a similar other but relied on a group-based stereotype when understanding the mind of a dissimilar other.

Perceived similarity on one dimension can even moderate the use of an egocentric default on what could be seen as a completely unrelated dimension. If you are feeling cold because you have been standing in cold weather for a long time, then it's easy to presume that concerns about the cold are top of mind for other people as well. One series of experiments, however, found, that this projection occurred when people were making inferences about someone from the same political party, but not when reasoning about someone from an opposing political party (O'Brien & Ellsworth, 2012). Kant's "obvious" mechanism for understanding the minds of others seems not to be employed in cases where another person's mind seems obviously different from one's

own. In these cases, the stereotypes that allow people to identify the differences between themselves and others also guide their inferences about the minds of dissimilar others.

Behavioral inference. Both egocentrism and stereotyping are relatively indirect sources of information about the mind of another person. A person may gain somewhat more direct insight by watching another's behavior and then working backwards to a corresponding inference about a person's underlying mental states and experience (Jones, 1979). When a manager yells at an employee, then it is easy to infer that the manager felt angry and was intending to change the employee's behavior. When a person votes for a candidate, it is easy to presume the voter likes the chosen candidate. When someone is crying, then his or her suffering is obvious.

A person's behavior can provide such a strong cue to mental experience that egocentrism and stereotyping are quickly supplanted by behavioral inference when someone else can be observed directly. In one experiment, for instance, participants who watched a white or black person being interviewed for fifteen seconds showed strong evidence of using ethnic stereotypes to think about the person's characteristics. After twelve minutes of an interview, however, no evidence of stereotypic thinking could be detected (Kunda, Davies, Adams, & Spencer, 2002).

Recognizing the value of another person's behavior as a guide to their mental experience may be somewhat obvious, but the attributional process that people go through to understand the meaning of behavior is a nuanced, multi-step causal analysis that moves from perceptions of others' mental states to inferences about others' stable traits and dispositions (Gilbert & Malone, 1995; Heider, 1958; Van Overwalle, Duynslaeger, Coomans, & Timmermans, 2012). Most behavior, after all, is somewhat ambiguous. Was the question asked during an interview hostile or earnest? Is a coworker giving the boss honest praise or insincere flattery? In order to

understand what a behavior might mean for underlying mental states, its nature first has to be interpreted and characterized by a perceiver so as to remove inherent ambiguity (Trope, 1986). This characterization can then lead to an automatic inference of a corresponding mental state consistent with one's characterization of the action. If a coworker's praise is perceived as unjustified, then the coworker is presumed to be insincere and engaging in attempted flattery. If a person votes for a political candidate, then the voter is generally presumed to like the chosen candidate (even if the perceiver personally dislikes the candidate; Miller & Nelson, 2002).

If mental states are inferred directly from behavioral cues, then the cues most closely related to actual mental experience should also be the most powerful in guiding mind perception. One such cue is a person's voice, through speech. The human voice evolved as a tool to communicate the content of one's own mind to others, and vice versa (Pinker & Bloom, 1990). Beyond the obvious semantic content present in language, speech also contains paralinguistic cues including intonation, pace, and cadence that may all be used as cues to others' mental states. Intonation (variance in pitch) may reflect the process of thinking as it is occurring. A pause in speech may be interpreted as thinking or deliberation. And a rising tone may signal enthusiasm whereas a falling tone signals sadness. The paralinguistic cues appear to be at least somewhat accurate cues, as several experiments demonstrate that people can predict another person's thoughts and emotions more accurately when they can hear another person speak compared to reading the same content in text, or simply observing the person's nonverbal cues (Bond & DePaulo, 2006; Hall & Schmid Mast, 2007; Ickes, 2003; Kruger et al., 2005; Mehrabian & Wiener, 1967; Zaki, Bolger, & Ochsner, 2009).

Beyond conveying the content of one's mind—what a person may be thinking or feeling—a person's voice may also convey the actual presence of a person's mind—that another person is *capable* of thinking or feeling. Just as you might infer the presence of biological life in another person by watching for variance in motion (i.e., movement), so too might you infer the presence of mental life by listening for variance in paralinguistic cues that would suggest a

lively, active, and thoughtful mind. Changes in the tone or pace of one's speech (intonation and cadence, respectively) can reveal the presence of conscious experience as it is occurring. Consistent with this possibility, potential job candidates in one experiment were perceived to be more mindful—more thoughtful, intelligent, and rational—when potential employers heard the candidate's "elevator pitch" compared to when they read a written pitch or read a transcript of the spoken pitch (Schroeder & Epley, 2015). Even a person with an opposing political viewpoint is perceived to be more mindful when you hear the other person explain his or her beliefs compared to reading the same content, or reading a written explanation of the other person's viewpoint (Schroeder, Kardas, & Epley, 2017).

Although nonverbal cues are considerably less diagnostic than verbal cues, people nevertheless rely on them to infer underlying mental states. Some of these cues are quite obvious, such as facial or bodily expressions that communicate emotions or intentions. Other cues, however, are considerably subtler. Eye movements, for instance, are also used to infer emotions and intentions (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Wesselmann, Cardoso, Slater, & Williams, 2012). Around the world, people report that "shifty eyes" are a clear sign that another person is lying (The Global Deception Research Team, 2006), even though empirical evidence suggests that eye movements do not provide accurate signals to honesty. Other facial cues, such as a more feminine appearance, increase perceived trustworthiness even in children as young as 3 years of age (Jessen & Grossmann, 2016; see Todorov, 2017 for a review). These judgments from nonverbal cues tend to be triggered automatically, producing consistent impressions from another's face or body with as little as 39-millisecond exposure to another person's face (Bar, Neta, & Linz, 2006; Willis & Todorov, 2006). Some researchers suggest that rapid mental state inferences are a core component of human social intelligence, producing rapid inferences about others with above-chance accuracy that can be used to make critical split-second judgments (Ambady & Weisbuch, 2010). These

inferences, however, can also produce systematic errors that lead to significant interpersonal misunderstanding and undermine the quality of social relationships (Epley, 2014).

Research on basic processes of egocentrism, stereotyping, and behavioral inference make it clear that mind perception is guided by multiple processes operating in different contexts, sometimes alone or in concert with each other, based on the cues available at the time of judgment. When the implications of another person's behavior are clear, then corresponding inferences from observed behavior are likely to drive judgment. When lacking clear behavioral cues, people may resolve ambiguity by using either stereotypes or egocentric simulations depending on what is known about the target, sometimes correcting an automatic egocentric inference based on additional information that might be known about a target. Given this complexity, the field currently lacks a comprehensive account of mind perception that accommodates all of the varying contexts and conditions in which mental state inferences are made.

Consequences of Mind Perception

Mind perception's primary goal is to provide a causal analysis of the momentary or stable psychological causes of others' behavior in order to be able to interact with it more effectively in the present or to predict others' behavior in the future. This causal analysis is aimed at answering two primary questions about the minds of others (Epley & Waytz, 2010). First, does "it" have a mind? Understanding how people attribute mental states to others helps explain the related processes of anthropomorphism and dehumanization. Anthropomorphism arises when people attribute humanlike minds to nonhuman agents, whereas dehumanization arises when people fail to attribute a humanlike mind to other human beings. Second, what state is another's mind in? The specific attributions people make about others' mental states inherently raise

complicated questions about the degree to which mental state inferences are accurate versus inaccurate. Understanding the processes that enable mind perception allows precise predictions about when mental state inferences will be relatively accurate versus relatively inaccurate. Perhaps of most interest for everyday life, mind perception processes can also create systematic errors that undermine the quality of interpersonal relationships, while also pointing the way to more effective strategies for understanding others.

Anthropomorphism and Dehumanization. Scientists may vigorously debate which capacities make us uniquely human, but almost everyone else has a fairly clear intuition that personhood is defined not by the presence of particular physical features, such as opposable thumbs or bipedalism, but rather by the presence of mental features. Article 1 from the United Nations' Universal Declaration of Human Rights, for instance, states that "All human beings are born free," indicating a capacity for autonomy, and "are endowed with reason and conscience," indicating a sophisticated capacity for thinking. One of the earliest philosophical definitions defined a person as "an individual substance of a rational nature" (Boethius, 6th Century AD), a view reinforced by John Locke who likewise defined a person as "an intelligent being that has reason and reflection" (quoted in Farah & Heberlein, 2007, p. 37). And when psychologists ask people in surveys to identify uniquely human features, they consistently focus on the presence of a humanlike mind capable of thinking and feeling (Gray, Gray, & Wegner, 2007; Haslam, 2006; Demoulin, Leyens, Paladino, Rodriguez-Perez, & Dovidio, 2004). Attributing humanlike mental capacities to other agents is therefore the essence of anthropomorphism (Epley et al., 2007). *Failing* to attribute humanlike mental capacities to other people, thereby conceptualizing them as more similar to a nonhuman animal or object, is the essence of dehumanization (Haslam, 2006).

The processes of mind perception discussed earlier can therefore help to explain both anthropomorphism and dehumanization. For instance, egocentric projection of one's own mental states onto others is moderated by the perceived similarity of others to the self. Research

indicates that people are more likely to anthropomorphize nonhuman agents when they are perceived to be similar to human beings either in physical appearance or in bodily movements (Aggarwal & McGill, 2007; Eddy, Gallup, & Povinelli, 1993; Johnson, Slaughter, & Carey, 1998). In one series of experiments, nonhuman animals, robots, and even plants were perceived to have a more humanlike mind when they moved at a humanlike pace (Morewedge et al., 2007). Hummingbirds, with their fast and erratic motion, seem neurotic and thoughtless. Sloths, perpetually stuck in what seems to us like slow motion, were described by the first naturalist ever to study them as clearly mindless creatures: "Slowness, stupidity, neglect of own body, and even habitual sadness, result from this bizarre and neglected conformation" (quoted in Gould, 1998). Similar findings have emerged in perceptions of other humans. When normal human motion is shown in slow motion or sped up compared to normal speed, the person seems less thoughtful or rational, consistent with dehumanizing another person by attributing diminished mental capacities to them (see also Caruso, Burns, & Converse, 2016).

Anthropomorphism and dehumanization can also be moderated by the motivations that activate mind perception processes, such as the motivations to connect with another agent, or to explain and understand another agent's behavior. Feeling lonely or isolated can increase the likelihood of believing in anthropomorphized religious agents such as a god, or can increase the likelihood of attributing humanlike mental characteristics to pets (Aydin, Fischer, & Frey, 2010; Bartz et al., 2016; Epley, Akalis, Waytz, & Cacioppo, 2008; Epley, Waytz et al., 2008). Inversely, thinking about anthropomorphized pets can also satisfy relational needs, increasing wellbeing and diminishing the psychological pain that can follow social rejection (McConnell, Brown, Shoda, Stayton, & Martin, 2011). When thinking about other human beings, feeling socially connected to members of one's in-group, and hence feeling little motivation to connect to others, can increase the tendency to dehumanize out-group members (Waytz & Epley, 2012).

Similarly, being motivated to explain another agent's behavior, such as because it behaves unpredictably, increases the tendency to anthropomorphize a nonhuman agent. In one experiment, an alarm clock outfitted with wheels that rolls around after pressing its snooze button twice was more likely to be perceived as having "a mind of its own" when its behavior was described as relatively unpredictable compared to when its behavior was described as relatively predictable (Waytz, Morewedge et al., 2010). Similar effects seem to emerge when evaluating other people as well. When people behave in a way that violates social norms, observers are more likely to explain this unusual behavior by appealing to a person's underlying mental states as explanation. When a person just goes with the flow and behaves as the norms dictate, then people are less likely to attribute behavior to a person's mental states (Uttich & Lombrozo, 2010). More research is needed, however, to firmly establish a link between indifference to explaining another's actions and dehumanization.

Finally, cues that reveal the presence of mind, such as paralinguistic cues in voice, have also been linked to anthropomorphism and dehumanization. One experiment demonstrated that a simulated self-driving vehicle seemed more mindful—better able to sense its environment, and more intelligent—when it was able to speak to the driver in a human voice than when it contained no voice (Waytz, Heafner, & Epley, 2014). In another, people were more likely to believe that computer-generated writing was actually created by a person when they heard the content read by a human voice than when they read the exact same content in text (Schroeder & Epley, 2016). When evaluating other people, the presence of voice seems to be humanizing, and its absence is dehumanizing. Job candidates giving an elevator pitch (a brief description of their qualifications for a job) were judged to be more mindful—more thoughtful, rational, and intelligent—when a hypothetical employer heard the candidate's pitch than when they read a

text-only transcript of exactly the same content, or read the candidate's written elevator pitch (Schroeder & Epley, 2015). In another experiment conducted on the weekend before the 2016 U.S. Presidential election, voters who were explaining why they were voting for an *opposing* political candidate seemed less mindful—less thoughtful, rational, and intelligent—when evaluators read the voter's written explanation or read a transcript than when they heard the voter's explanation in his or her own voice (Schroeder et al., 2017). Cues that convey the presence of mind are humanizing, with their presence producing anthropomorphism when evaluating nonhuman agents and their absence producing dehumanization when evaluating other human beings. Perceptions of another's mind matter in these cases because they have the power to award or deny aspects of personhood, along with the rights, responsibilities, and status that come with it.

Accuracy, Bias, and Confidence. The main goal of trying to infer another person's thoughts, beliefs, attitudes, or other mental states is to understand them better, allowing you to interpret their current behavior appropriately and also to predict their future behavior before they actually do it. How accurately we can understand the minds of others is therefore of primary interest. Actually assessing accuracy, however, turns out to be extremely complicated as many different paradigms are utilized involving predictions of a wide variety of mental states. The standard experimental methods typically involve having one person self-report the mental state being predicted, and then having a perceiver predict that mental state. One spouse, for instance, might be asked to report his or her attitudes on a range of issues while the other spouse predicts these responses. Or, in what is known as the "empathic accuracy paradigm" (Ickes, 2001), two people could have a conversation, after which one person goes back through the video and notes what he or she was thinking or feeling at specific points in time while the other person predicts

those thoughts or feelings at the same points in time. Accuracy may also be assessed across a range of different targets, where accuracy is then indexed either by averaging the targets' ratings together and comparing it against a perceiver's predicted average (known as generalized accuracy), or by correlating a perceiver's predictions for each target with the actual evaluations made by each target (known as dyadic accuracy).

Despite this complexity, several broad conclusions can be drawn. First, accuracy tends to be better than chance but far from perfect. For instance, one study meta-analyzed experiments in which people were asked to predict how much others in a group liked them (Kenny & DePaulo, 1993). These groups ranged from close acquaintances who had worked together over time to participants who had just met in a short get-to-know-you session. The average correlation between predicted and actual liking was .18, significantly greater than zero but also dramatically lower than a perfect correlation of 1. In summarizing this literature, David Kenny (1994, p. 159) writes, "People seem to have just a tiny glimmer of insight into how they are uniquely viewed by particular other people." In the empathic accuracy procedure described in the preceding paragraph, accuracy is calculated as the percentage of others' thoughts predicted correctly, which can range from 0%-100%. Accuracy rates here are typically around 20%, again higher than chance but also far from perfection. Accuracy tends to be a little higher when predicting friends or romantic partners, but not markedly so, averaging around 30% (as reported by Ickes & Hodges, 2013). These results along with many others make it clear that people are not clueless when it comes to understanding the minds of others, but they are also not psychic savants. Other people are complicated creatures to understand, with mental states that have to be inferred rather than directly observed. Understanding the minds of others is therefore an extremely challenging task. Accuracy rates reflect this challenge.

Second, accuracy rates vary systematically based on the mind perception process utilized by perceivers. The processes of egocentrism, stereotyping, and behavioral inference described earlier all provide some systematic understanding of others but also create predictable biases in judgment that can lead to systematic misunderstanding. Consider egocentrism. Assuming that others' minds match one's own can lead to systematic egocentric biases in judgment. People tend to assume, for instance, that others' attitudes, knowledge, beliefs, and emotional experience is at least somewhat similar to one's own (Krueger, 1998; Krueger & Clement, 1994; Ross, Greene, & House, 1977). This can create systematic accuracy when others' mental states are indeed similar to one's own, such as when predicting the attitudes of a spouse (Hoch, 1987), but can lead to systematic error when another's perspective is quite different from one's own (Epley & Caruso, 2008). In general, people have difficulty recognizing when their own perspective is truly unique, meaning that it is difficult for most people to correct an egocentric bias when it is appropriate to do so (e.g., Kruger et al., 2005).

Stereotyping likewise yields both a predictable mix of accuracy, bias, and error (see Jussim, 2012, for a comprehensive review). Knowledge about groups of others—that is, stereotypes—is often based on either direct or indirect observations of behavior and therefore contains at least some degree of accuracy about members of these groups. People have some sense of how attitudes might differ between old and young people, conservatives and liberals, or mothers and fathers because they have interacted with people from these groups, observed them indirectly, or have heard from others about members of these groups. Accuracy is considerably lower when predicting the mental states of individual members of these groups, but higher when predicting the average ratings of members from these groups (Jussim, 2012). To the extent that stereotypic knowledge contains some genuine accuracy, then relying on stereotypes even when

judging individuals should increase accuracy compared to avoiding stereotype knowledge. Stereotypes lead perceivers astray, not surprisingly, when judging someone who has relatively counter-stereotypical views (Lewis, Hodges, Laurent, Srivastava, & Biancarosa, 2012). However, because groups are defined by the attributes that make them differ from each other rather than based on the attributes that make them similar to each other, the attributes that come most readily to mind when thinking about groups will tend to exaggerate the actual differences between them simply due to regression to the mean. In one experiment, for instance, men and women predicted how accurately members of each group would be in a variety of mind reading tasks that require interpersonal sensitivity, a highly accessible component of gender stereotypes (Eyal & Epley, 2017). Although women tended to perform slightly better than men on some of these tests, people predicted that these differences would be dramatically larger than they actually were.

Likewise, inferences from behavior can yield predictably accurate inferences to the extent that the available behavioral cues provide valid information to a target's mental states, but can also yield predictable errors when the behavioral cues are misleading. As reviewed earlier, a person's voice gives meaningful cues to the presence of a person's mind, at least compared to text that is inherently more ambiguous. People tend to be better able to infer another's thoughts and feelings when they hear another person speaking compared to when they read the very same content in text alone (Zaki, Bolger, & Ochsner, 2009). Targets who are more "readable"—that is, who more transparently express their thoughts and feelings—also yield higher accuracy rates among perceivers (Ickes & Hodges, 2013). And as anyone who has ever acted in theater knows well, targets who are instructed to exaggerate their emotional expressions yield higher accuracy rates among perceivers than targets who simply show their genuine emotions, who in turn yield

higher accuracy rates than targets asked to suppress their emotional experience (Zhou, Majka, & Epley, 2017). Relying on observed behavior to infer corresponding mental states, however, can lead to predictable mistakes. People may infer that accidental outcomes were actually intended (Kelemen & Rosset, 2009; Rosset, 2008), or assume that a person's attitudes match his or her behavior even when the behavior was coerced by context the person was in (Gilbert & Malone, 1995).

Accurate mind perception through egocentrism, stereotyping, or behavioral inferences stems from the correspondence between the cues derived from these processes and the actual attributes of the target being judged. Although this correspondence can often be known by the scientists conducting these experiments, it is not also so clearly known to the people participating in these experiments, or to people judging others in their everyday lives. Accuracy may vary from one context to another based on the quality of cues available to a perceiver, but the perceiver's confidence in their judgment often seems insensitive to this variability, and also tends to outstrip their actual accuracy (Realo et al., 2003). For instance, participants in one experiment were asked to predict their romantic partner's level of self worth, self-rated abilities, and activity preferences on three separate measures. People predicted their partner's responses perfectly accurately between 30 and 40% of the time, on average, but these same people *estimated* that they had predicted their partner's responses perfectly accurately roughly 80% of the time (Swann & Gill, 1997). This gap between confidence and accuracy actually *increased* the longer these romantic couples had been together. In another experiment, romantic partners (most of them married) predicted how their partner would answer a series of attitude statements (Eyal, Steffel & Epley, 2018). Participants predicted their partners' answers a little better than chance guessing alone, answering an average of 4.9 statements out of 20 exactly correctly when chance

was 2.7. However, these partners *believed* they had estimated 12.6 out of 20 exactly correctly. People do not seem to know how little they know about others.

These results collectively suggest that the key to enabling accurate understanding of another person is to utilize judgment strategies that provide more accurate cues to the other's mental states, but that people themselves may not recognize when they are using an effective strategy and when they are not. Perhaps the most effective way to understand the mind of another person is to get his or her perspective on a situation directly, either by being in exactly the same situation that another person is in and then relying on egocentric simulation as a guide, or by obtaining more accurate behavioral cues by directly asking another person to report what is on his or her mind—strategies we will refer to as "perspective getting." But if people's confidence in judgment is not sensitive to the actual accuracy of their judgment, then people may undervalue these effective strategies.

Emerging research is consistent with this. In one experiment where participants were asked to predict their own mental states, namely how much they would like another person after meeting him or her, participants thought they would be better able to predict their own minds if they learned demographic information about the person they would be meeting with rather than by talking to another person who had just spent time interacting with this same person (Gilbert, Killingsworth, Eyre, & Wilson, 2009). However, participants were actually more accurate when they learned the impression of the person who had just met with the target. In another experiment (Zhou, Majka, & Epley, 2017), people were asked to predict another person's emotional experience while watching a series of 50 photographs. Participants could either choose to "read" the other person's behavior while watching a videotape of the person's facial expressions, or get the person's perspective directly by seeing the photographs the other person

was seeing. Results indicated the highest accuracy when participants actually got the other person's perspective by viewing the pictures the other person was seeing, and yet they tended to assume that watching the other person's facial expressions would systematically increase their accuracy. Finally, in the most straightforward method of increasing accuracy yet tested (that we know of), romantic couples in one condition of the experiment described in the last paragraph (Eyal et al., 2018) were allowed to ask their partner to verbally answer the attitude statements they would later be asked to predict, essentially interviewing their partner about his or her attitudes before predicting those same attitudes. Results indicated that participants in this "perspective getting" condition were dramatically more accurate in predicting their partners' responses than those in the control condition, but participants' beliefs about their accuracy were identical in these two conditions. Perhaps the most reliable way to understand the mind of another person is to either be in their shoes, experiencing the world as they are directly or asking them to reveal their mind to you directly through language. Just don't expect that the people you might be advising to use these strategies will believe you.

Conclusion

Another person's mind is the most sophisticated system you are ever going to reason about. Many aspects of social life would be much easier if others' minds were simpler to understand. Lacking a direct conduit into another person's mental experience, we have reviewed the indirect mechanisms that enable human beings to reason about each other's minds, and the motivational triggers that set these indirect mechanisms in motion. The basic processes that guide the activation and application of mind perception help to explain related phenomena of anthropomorphism and dehumanization, predict both systematic accuracy as well as error in judgments of others, and also identify both ineffective as well as effective strategies for

understanding others better. Understanding these basic processes will not turn others' minds into open books, but we do hope it will help the one super power you might already possess work just a little bit more effectively than it might otherwise.

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