Causes and consequences of mind perception

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Perceiving others' minds is a crucial component of social life. People do not, however, always ascribe minds to other people, and sometimes ascribe minds to non-people (e.g. God, gadgets). This article reviews when mind perception occurs, when it does not, and why mind perception is important. Causes of mind perception stem both from the perceiver and perceived, and include the need for social connection (perceiver) and a similarity to oneself (perceived). Mind perception also has profound consequences for both the perceiver and perceived. Ascribing mind confers an entity moral rights and also makes its actions meaningful. Understanding the causes and consequences of mind perception can explain when this most social of cognitive skills will be used, and why it matters.

Mind perception in context

Whether or not something has a mind is sometimes settled by vote. Five US Supreme Court Justices decided that corporations have minds that can be expressed, and therefore deserve the right of free speech. The remaining four justices disagreed, saying that "corporations have no consciences, no beliefs, no feelings, no thoughts, no desires" [1]. Considering non-human animals, the majority of the Spanish parliament believed that evidence for the presence of mind in captive chimpanzees was strong enough to grant them limited human rights [2]. Even the presence of mind in other people can be contentious, such as in the case of Standing Bear, a Native American who sued the U.S. Government to be recognized as a person. In the seminal 1879 court case, Standing Bear had to describe the reality of his own mind to the court, saying, "My hand is not the color of yours, but if I pierce it, I shall feel pain" [3]. Whether people think that a particular entity has a mind – be it a group or a technological gadget, a God or a dead person, an unborn fetus or one's next-door neighbor – can be both crucially important and highly controversial [4]. In this article we present an expanding body of research on 'mind perception' [5,6] that investigates how people define minds, when people perceive minds in others, and why mind perception matters in everyday life.

Understanding how people think about minds has long been a fundamental interest in the cognitive sciences. The inferences people make about minds comprise three basic research questions. First, do people think a particular entity has a mind? Second, what state is that other mind in? Third, what are the behavioral consequences of perceiving a mind in another entity? Most research has focused on the second question – the perception of mental states – that has come to be known as 'theory of mind' or 'mentalizing' [7,8]. Researchers are now expanding their attention to the first and third questions – about the causes and consequences of mind perception, respectively – a shift that represents an important emerging trend worthy of attention.

Recent research demonstrates that people intuitively think about other minds in terms of two distinct dimensions: experience (the capacity to sense and feel) and agency (the capacity to plan and act) [9]. A similar two-dimensional representation has emerged independently in several different research programs, including intuitive representations of personhood that distinguish between human nature (the capacity for emotional responsiveness) and human uniqueness (the capacity for civility, rationality, and morality) [10,11], and also the two fundamental dimensions of social evaluation that distinguish between warmth (corresponding to experience) and competence (corresponding to agency) [12]. When people attribute minds to others, it is in terms of their capacity to 'feel', to 'do', or both.

Attributing a mind to another agent is complex because two different minds are involved, the mind of the person perceiving and the mind of the entity being perceived. This creates two distinct sets of causes – those that stem from the mind of the person perceiving, and those that stem from the behavior of the entity being perceived. This also creates two different sets of consequences of mind perception – those for the person perceiving and those for the entity being perceived. This 2×2 structure serves as the outline for this article (Figure 1).

Causes of mind perception
Perceiver

The capacity to reason about minds is an impressive tool that nearly all humans possess. People use tools when they serve immediate goals, and thinking about another's mind is useful for achieving two basic goals in everyday life: understanding, predicting, or controlling another's behavior, and developing a social connection with another agent [13]. Factors that trigger these two should therefore increase the tendency to perceive minds in others.

Causal uncertainly is one of the basic triggers of the goal for prediction and control. When a car behaves in a

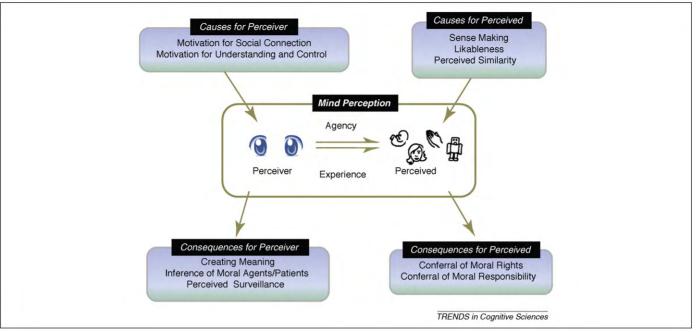Corresponding author: Waytz, A. (waytz@wjh.harvard.edu).

Figure 1. The causes and consequences of mind perception for perceiver and perceived.

perfectly predictable way in response to your actions, it seems mindless; but when it starts lurching forward while breaking, or stalling while starting, then your car might seem to have a mind of its own. This is because mental states – intentions, desires, and feelings – are the very states that best explain the behavior of independent entities [14]. People consistently use mental states to explain both human and non-human actions, particularly when they are under cognitive load and are therefore unable to generate more elaborate causal explanations [15]. For instance, cognitive load causes adults to explain natural events (e.g. why the sun radiates) in terms of purposeful design (e.g. to nurture life [16]) – a teleological bias also found in young children [17] and Alzheimer's patients [18], both of whom lack well-developed causal reasoning abilities.

Just as causal uncertainty increases mind perception by triggering a motivation for understanding, predictability, and control, so too does lacking personal control. For example, when people ruminate on experiences in which they lacked control or are primed with thoughts of randomness, they become more likely to believe in an agentic, controlling God, capable of planning and intention [19,20]. Similarly, when reminded of existential meaninglessness and powerlessness in the face of death, people become more likely to believe in agentic Gods and other supernatural sources of agency [21]. Supernatural agents can provide power, safety, and the potential for immortality, all of which increase one's sense of personal meaning and control when facing death. In less existentially significant examples, simply being denied control over a set of animate marbles increases attributions of intentionality to those marbles [22], whereas being dispositionally inclined toward control in daily life increases the attribution of complex mental capacities to dogs [23].

Other minds not only create a sense of understanding, they also create a sense of social connection with another entity. Considering another person's mental states by explicitly adopting his or her perspective increases the perceived similarity between the self and the other person [24,25]. A motivation to connect with another entity can likewise trigger thoughts about that entity's mental states. Those with a high need to belong identify emotions from facial and vocal cues more accurately than those with a low need to belong, suggesting an increased attentiveness to mental states [26]. Naturally-occurring or situationally-induced loneliness also causes people to ascribe mental states to pets and machines, and increases belief in the presence of invisible minds such as that of God [23,27,28].

Perceived
Although mind is in the eye of the perceiver, characteristics of the entity being perceived also influence mind perception. For example, entities that act unpredictably evoke the need for control, and therefore seem more mindful than entities that behave predictably [29]. Likewise, entities that produce negative outcomes also seem more intentional than entities that produce positive outcomes [30], such that people attribute more intentionality to others who commit evil deeds than good deeds [31], and express greater belief in an agentic God when attempting to understand suffering rather than salvation [32]. This is likely because negative events elicit an increased search for causal explanations [33].

Non-human entities that resemble humans – the prototypical mind-havers – are also attributed more mind, whether they have a humanlike appearance [34] or simply move at a humanlike speed [35,36] (Box 1). People who are similar to the self are seen as more mindful as well. In one study people judged others with similar political beliefs to be rational, whereas they judged others who held different beliefs to be less capable of 'logical analysis' and holding an 'objective perspective' [37]. Liked others also seem more mindful than disliked others [38]. Conversely, disliked

Box 1. Mind perception in the uncanny valley

Mind perception is not necessarily a cold perceptual process, as it sometimes evokes strong emotional reactions (Figure I). One emotional response to minds under current investigation is the 'uncanny valley' – the tendency for a robot to elicit negative emotional reactions when it closely resembles a human [72]. Robots that are obviously mechanical seldom produce such emotional reactions, and presumably, a robot that fully passed as human would also not prompt an exaggerated emotional response. But a robot with near-human features such as skin, expression, voice, and movement, rather than prompting reactions that might also be near human, often instead provokes feelings of revulsion. This might occur because abnormal features violate evolutionary esthetics [73], or because humanoid features remind people of death [74]. Or, it could be that agency without the capacity for experience adds up to the perception of a mind that is disturbingly incomplete (Gray and Wegner, unpublished).

Figure I. The model of Repliee Q2, a humanoid robot that is extremely uncanny. Image courtesy of Brad Beattie.

entities and those different from the self seem more mindless. People attribute fewer secondary emotions (e.g. humiliation and nostalgia) and mental-state traits (e.g. imaginative, analytical) to out-group members than in-group members [10,39,40]. Out-group members evoke less activation in the medial prefrontal cortex (MPFC), a region involved in perceiving other minds [41], and are sometimes likened to animals with diminished mental capacities [42,43]. People also dehumanize (or dementalize) specific disliked others, such as another person who rejects them [44]. Finally, when individuals objectify another person by focusing solely on the person's body, attention is diverted from that person's mind, making the target appear less mentally capable [45,46].

Consequences of mind perception
Perceiver
Perceiving mental states in another entity matters to the perceiver for three main reasons. First, perceiving mental states in another entity intensifies the perceiver's psychological experience of events. A seemingly random event might have little importance, but the same event intended by another could seem more significant because it comes with broader implications – intentional events are more

likely to be recurrent, and demand a response. A tree branch that another person drops on you is more noteworthy than one that the wind blows down on you [47]. People therefore experience intentional events more intensely than accidental events. An electric shock, for instance, hurts more when delivered intentionally than accidentally [48], and an insult intentionally directed at the self triggers more cognitive processing and rationalization than does the same insult directed at someone else [49]. Likewise, people judge intentional harms more harshly than accidental ones [50,51].

Second, other minds can have thoughts, and mindful others can therefore have thoughts about the perceiver. Perceivers want to be evaluated positively by others, and the presence of another surveilling mind can therefore increase socially desirable behavior. Gods and spirits, for instance, are presumed by believers to be capable of monitoring one's own behavior at all times and in all places. Priming the presence of a mindful God therefore prompts less cheating [52], and more generous donations in an economic exchange [53]. Simply evoking the external characteristics of a mind (e.g. a pair of eyes) also decreases cheating [54], and the presence of an audience increases people's tendency to uphold a moral code by punishing wrongdoers. Researchers have suggested that belief in such surveilling minds is adaptive because it increases prosocial behaviors that benefit one's in-group [55,56], and reduces anti-social behaviors that could lead to punishment or exile [57]. This does not mean that mind perception is always personally beneficial. Exaggerating the presence of surveilling minds can have negative implications for the perceiver, as in the case of paranoid schizophrenics whose overactive mind perception might make them believe that they are constantly being scrutinized [58].

Finally, perceiving one mind within a moral context can compel people to see a second mind. This is because people's psychological template for moral events involves (at least) two minds, one mind to perpetrate the moral act – a moral agent – and one mind to receive it – a moral patient [59]. For example, a murder requires both a murderer and victim; a charitable donation requires both a donor and a recipient. Thus, when people are wronged or victimized, they might search for a perpetrator to blame, whether it be another person [60], animal [61], or God [32]. Conversely, when people see a perpetrator of wrongdoing, they could infer the presence of such a victim, a mind harmed by the act [32].

Perceivers also tend to characterize agents and patients in terms of their most prominent aspect of mind, ignoring moral agents' experience (in the case of perceiving villains to be insensitive to pain and pleasure) and moral patients' agency (in the case of perceiving victims to be blameless for their circumstances) – a phenomenon called moral typecasting [59]. Moral typecasting can explain people's willingness to harm heroes [59], hesitance to blame victims [62], and how doing moral deeds can increase personal agency [63]. The link between mind perception and morality means that attributing less mind to an entity reduces its moral status as well. People might therefore assuage their guilt after harming another person by perceiving

them to be relatively mindless [64,65]. That mind perception is tied so tightly to morality is no coincidence because moral events – consisting of punishment, condemnation, praise, and reward – are fundamentally social events [66].

Perceived

The perception of mind in an entity could alter how people interact with it because mind perception implies moral status. Entities capable of experience (moral patients) are afforded moral rights, whereas entities capable of agency (moral agents) are afforded moral responsibility [9,67]. Given how readily people anthropomorphize, it is no surprise that people also ascribe moral responsibilities to non-human entities, such as animals [61] and computers [68]. In some cases, the over-attribution of moral responsibility can have harmful consequences, such as when parents ascribe intention to their infants for wrongdoing and abuse them in retribution [69].

The more serious ethical problem in everyday life, however, is likely to come from seeing too little mind in others [4]. If another person is seen as relatively mindless, then he or she receives diminished moral standing, and

might be treated like an animal or an object. People can deny mental capacities in two ways that map on to the dimensions of agency and experience – either people are stripped of uniquely human aspects such as competence and civility, or human nature aspects such as warmth and vitality [10,70]. Each of these methods of dehumanization or dementalization has a consequence for its targets. Those denied warmth and experience come to seem be robotic, cold, and cruel [11,12], encouraging active harm toward them when opportunities arise [71]. Those denied competence, civility and agency come to be seen as sub-servient [71], or animalistic [10,11], licensing people to contain them against their will and to rob them of human rights.

Mind matters

The greatest divide in social life is between the direct experience of one's own mind and the apparent experiences of others' minds (Box 2). Nearly all adults have the capacity to bridge this divide and reason about the minds of others, but having the capacity and using it are two different things. The recent advances highlighted here focus on the triggers of mind perception and why mind perception matters, generating a broad array of topics for future research (Box 3). Understanding mind perception can help explain the belief in God and intelligent design, the tendency for people to seek purpose in unexplained events, and how people can simultaneously see non-human animals as mindful and other people as mindless. Mind perception also explains how the perception of intentionality creates meaning, how the presence of a surveilling mind increases cooperation, and how perceiving emotion and intention can lead people to help and harm or to praise and punish others. The capacity to get beyond one's egocentric perspective and into the minds of others is surely one of the human mind's most impressive abilities. Understanding mind perception allows us to know when people will use it.

Box 2. Transcendence

The process of perceiving other minds could be one component of a broader capacity for transcendence – the ability to get beyond one's experience of the here and now [75]. Perceiving other minds involves 'stepping outside' of immediate experience and is conceptually similar to perceiving one's own mind in the future or past, perceiving one's own mind in an alternate physical setting, or perceiving one's own mind in a hypothetical or fictional experience. The same process might also guide religious or spiritual experiences of perceiving larger meaning in natural events [14].

Recent research demonstrates a link between considering the mind of another person and considering one's own mind in the future. For example, emotional intelligence, a construct linked to understanding others' emotions, is correlated with accuracy in forecasting one's own emotional reactions to future events [76]. Other studies demonstrate that people judge their own future preferences similarly to judging others' preferences in the present. In one, participants chose how much of a disgusting liquid they would drink in the present, how much they would choose to drink in the future, or how much another person would consume. Participants' decisions were strikingly similar for their future selves and for others, but differed significantly for their present selves [77]. Another study demonstrated that the amount of money people were willing to forego to give another person $75 decreased as a hyperbolic function of perceived interpersonal closeness with the other person. This function is virtually identical to the function describing people's willingness to forego an immediate reward to receive a greater reward at varying levels of temporal closeness in the future [78]. A recent neuroimaging study also demonstrated that the ventral MPFC was preferentially active when people reasoned about their present preferences compared with their future preferences and that the magnitude of this region's activity when considering the future predicted greater patience in economic decision-making [79]. Moreover, this same region distinguished between considering one's own preferences versus considering another person's preferences, suggesting a similar mechanism for considering others and considering the future self.

The convergence between intrapersonal prospection and interpersonal perspective-taking suggests that the same causes of mind perception toward others might drive mind perception toward one's future self. It also suggests that capacities for various types of transcendence should be correlated, and possibly that improving performance in one domain (e.g. perspective taking) might also improve performance in another (e.g. intertemporal choice).

Box 3. Outstanding questions

- What policy implications does mind perception have for euthanasia, abortion, animal rights and other debates stemming from the ambiguity of mind?
- How effective is mind perception for satisfying the motivation for understanding, predictability, and control? Does perceiving another mind satisfy the need for social connection?
- Is the process of mind perception the same across all perceived targets (e.g. groups versus individuals)?
- In which direction is the link between morality and mind perception stronger? Do we eat cows because we fail to perceive mind, or do we fail to perceive the minds of cows because we eat them?
- Can mind perception – both the tendency to consider the minds of others and the accuracy of doing so – be systematically increased or trained? If so, does it generalize to other tasks that require transcending one's current experience of the here and now?

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