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The Multiple Inference Model of Social Perception: Two Conceptual Problems and Some Thoughts on How to Resolve Them

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Philosophers of science have noticed repeatedly that scientists have a preference for simple over complex theories (e.g., Harman, 1965). Unfortunately, simple theories sometimes turn out to be oversimplifying, which in turn limits their generality (Quine & Ullian, 1978). As Reeder points out in his target article, the history of attribution research experienced a similar fate, in that the emphasis on intentions and motives in early theories of social inference (e.g., Heider, 1958; Jones & Davis, 1965) disappeared in favor of simpler models that focused exclusively on inferred traits (e.g., Gilbert, Pelham, & Krull, 1988) or broadly defined causal factors that are internal or external to the agent (e.g., Kelley, 1973). Reeder's multiple inference model (MIM) comes as a refreshing alternative to these simpler models, providing a more comprehensive view on the type of inferences perceivers make about other people. As such, the MIM not only integrates many findings from more than 50 years of attribution research; it also implies several novel predictions, many of which have already gained empirical support (e.g., Reeder, Hesson-McInnis, Krohse, & Scialabba, 2001; Reeder, Kumar, Hesson-McInnis, & Trafimow, 2002; Reeder, Monroe, & Pryor, 2008; Reeder, Vonk, Ronk, Ham, & Lawrence, 2004).

Despite the superiority of a multiple inference approach over single inference models, the MIM outlined by Reeder in this issue has a few conceptual problems that should ideally be resolved to further strengthen the power of the model. Specifically, there are two parts where the assumptions of the model seem circular, which limits its capability of providing a fully convincing account of social inference. In the following sections, I first outline the two conceptual problems that I see with the MIM. In an attempt to provide constructive criticism, this discussion is followed by some theoretical thoughts on how these shortcomings could possibly be resolved by means of a simple yet significant revision of the model.

Intentionality and Motive Inferences

A central assumption of the MIM is that intentional behavior is explained in terms of mental states such as aims and motives, whereas unintentional behavior is explained in terms of causal antecedents that may be internal or external to the person (see also Malle, 1999). The aims and motives inferred for intentional behaviors are further assumed to provide the basis for corresponding trait inferences. In other words, people do not directly infer traits from intentional behavior, but they first infer aims and motives, which then provide the basis for subsequent inferences about stable traits and dispositions.

A major question implied by the distinction between intentional and unintentional behavior is how people know that a given behavior is intentional or unintentional. The answer provided by the MIM is that a behavior will be judged as intentional if the agent (a) desired the outcome, (b) believed that the action would bring about the outcome, (c) planned the action, (d) had the skill to accomplish the action, and (e) was aware of accomplishing the outcome.

As may already be evident from the juxtaposition of the last two paragraphs, this conceptualization implies the risk of circularity, as inferences of intentionality provide a precondition for inferences about aims and motives, but at the same time inferences of intentionality depend on perceivers' inferences about aims and motives. Perceivers need to infer the agent's motives to identify whether the agent's behavior was intentional or unintentional, but they first need to know whether the observed behavior was intentional or unintentional to determine whether motives account for the agent's behavior. In other words, inferences of intentionality represent both an antecedent as well as a consequence of inferences about motives. This not only poses an inferential problem to the perceiver, it also represents a conceptual problem in the MIM, in that it implies the risk of circularity.

Soft Versus Hard Constraints

A second, rather similar conceptual problem concerns the distinction between soft versus hard constraints. According to the MIM, soft constraints favor motive inferences. In contrast, hard constraints favor inferences about causal antecedents, similar to the inferences proposed for unintentional behavior. Soft constraints are defined as situational factors that leave the

agent with a choice of whether or not to engage in the observed behavior; hard constraints are defined as situational factors that do not allow any choice. This distinction can be rephrased more concretely such that soft constraints imply that the agent could have done otherwise, whereas hard constraints do not provide the opportunity of alternative behaviors.

A conceptual problem with these assumptions is that they imply the same risk of circularity discussed for intentionality. As just outlined, a central assumption of the MIM is that inferences about motives provide the basis for subsequent inferences about traits. Thus, if soft and hard constraints determine whether perceivers will make inferences about motives versus causal antecedents, they first need to determine whether the agent could have done otherwise to identify the soft or hard status of the present constraints. However, such inferences presuppose knowledge about the agent's abilities, and therefore inferences about the agent's traits. This creates the paradoxical situation that trait inferences require inferences about motives, inferences about motives require inferences about soft versus hard constraints, but inferences about soft versus hard constraints presuppose inferences about traits. As with the aforementioned case of intentionality, this poses not only an inferential problem to the perceiver but also a conceptual problem in the MIM, such that inferences about traits presuppose inferences about traits.

Possible Solutions

Even though conceptual circularity is a major problem for any scientific theory, it is important to note that it could be resolved rather easily in the case of the MIM by revising a relatively simple yet significant assumption of the model. Specifically, the MIM seems to propose a sequential process of social inference, such that certain types of inferences provide the basis for other inferences (e.g., inferences about motives provide the basis for inferences about traits underlying intentional behaviors). This assumption represents a major source of the aforementioned circularity, such that a given inference (e.g., about traits or motives) cannot presuppose itself. However, this paradox can be resolved by assuming a *parallel* process that simultaneously integrates multiple pieces of information (e.g., motives, beliefs, intentions, traits, situational constraints), instead of proposing a *sequential* process in which one type of inference logically builds on other types of inferences. One example of such parallel information integration is the notion of constraint satisfaction (e.g., Read & Marcus-Newhall, 1993; Thagard, 1989), according to which inferences about motives, intentions, traits, and other characteristics can be regarded as emergent properties of a constrained network that tries to accommodate the whole set of momentarily available inputs

(e.g., behavioral information, situational information). Another example of parallel information integration is implied by the notion of propositional validation processes, as proposed by recent models of evaluative information processing (e.g., Gawronski & Bodenhausen, 2006). In the reminder of this comment, I outline how the latter type of information integration may look like and what implications this account has for inferences about motives and traits, as conceptualized by the MIM.

Activation Versus Validation

In their Associative-Propositional Evaluation model, Gawronski and Bodenhausen (2006) distinguished between two distinct kinds of mental processes: associative and propositional processes (see also Strack & Deutsch, 2004). Associative processes are defined as the mere *activation* of associations in memory independent of subjective truth or falsity. In contrast, propositional processes are defined as the *validation* of the information implied by activated associations (see also Gawronski, LeBel, & Peters, 2007). The validation of activated information is further assumed to be driven by the principles of logical consistency, such that inconsistency within a given set of beliefs serves as a marker of inaccuracy (Gawronski, Peters, & Strack, 2008). Specifically, it is assumed that people, by default, consider activated information as valid. However, if the overall set of momentarily activated information is inconsistent in the sense that some components imply the opposite of another component (see Festinger, 1957), this inconsistency signals a potential inaccuracy in one's belief system. As a result, inconsistency needs to be resolved by identifying which of the involved belief components is inaccurate (i.e., subtracting a cognition in Festinger's terms) or by searching for additional information that resolves the inconsistency (i.e., adding a cognition in Festinger's terms). The central premise underlying these assumptions is that inconsistent belief systems cannot be valid, which makes inconsistency an important marker of inaccuracy.

Another important validity principle in the context of causal inferences is Kelley's (1972) discounting principle. Even though the discounting principle has typically been applied to the discounting effects of causes that are internal versus external to the agent (see Heider, 1958), its applicability is much broader. Similar to the notion of alternative explanations in scientific research, the discounting principle states that any factor that accounts for a given outcome should be discounted if there is another factor that can equally account for the same outcome (Kelley, 1972). For instance, in the context of ulterior motivation (Fein, 1996), helpful behavior can be due to a person's motivation to help other

people or to the motivation of gaining a personal benefit from one's behavior (e.g., Reeder et al., 2004). Thus, to the degree that perceivers have reason to assume the presence of an ulterior motivation of gaining personal benefits, a presumed motivation to help others will be discounted as a potential explanation for the observed behavior. In other words, the perceived validity of one explanation is questioned if there is another explanation that equally accounts for the same behavior.

Activation in Social Inference

Applied to the MIM, the distinction between activation and validation has a number of implications for processes of social inference. With regard to the notion of activation, one can assume that inference-relevant cues will activate corresponding concepts in memory and, via processes of spreading activation (Collins & Loftus, 1975), whatever concepts that are linked with these concepts in associative memory. For instance, watching a person hastily drinking a glass of beer will activate not only the corresponding concept of *drinking beer* but other concepts that may be associated with *drinking beer*, such as *thirsty* or *refreshing* (e.g., Ham & Vonk, 2003; for a review, see Uleman, Saribay, & Gonzalez, 2008). In this context, it is important to note that these spontaneously activated concepts may refer to features of the behavior, the situation, or the agent (Trope, 1986). Moreover, agent-related concepts may be further divided into associations that involve motives, beliefs, intentions, traits, or other person-related characteristics.

A second important implication is that the activation of mental associations should depend on the momentary salience of the relevant cues (Higgins, 1996). If a given cue is low in salience, this cue will be less likely to activate corresponding concepts than when this cue is high in salience. For instance, to the degree that situational constraints are often lower in salience than the agent's behavior (Jones, 1991), activation of situation-related associations may often be lower compared to the activation of behavior-related associations. Note, however, that it is not the type of information per se (e.g., behavioral vs. situational) that determines the activation of corresponding concepts, but its relative salience (see also Trope & Gaunt, 2000).

Finally, a third implication is that perceivers' inferential goals can direct attention to particular features of the behavior, the situation, or the agent, thereby influencing their relative salience (see Krull, 1993; Quattrone, 1982). Hence, which associations get activated in response to observing a given behavior depends to a significant extent on the perceiver's inferential goal, such that goals may direct the perceiver's attention to particular cues, thereby increasing the salience of some cues and decreasing the salience of others. Note,

however, that cues may be sufficient to activate corresponding concepts regardless of perceivers' goals if the salience of these cues is high to begin with, which is typically the case in research on spontaneous inferences (see Uleman et al., 2008).

Validation in Social Inference

The defining characteristic of the proposed validation process is that it assesses the validity of the activated information. As previously outlined, two important criteria in the context of social inference are (a) the inconsistency of momentarily activated information and (b) the potential discounting of a given explanation in the presence of an alternative explanation. Whereas inconsistency tends to trigger higher levels of cognitive elaboration (Roese & Sherman, 2007), enhanced elaboration seems to be a precondition for both inconsistency resolution (Gawronski & Strack, 2004; Wilson, Lindsey, & Schooler, 2000) as well as causal discounting (Krull, 1993; Krull & Erickson, 1995), at least when the activation level of concepts representing alternative causal factors is low (Trope & Gaunt, 2000).

A useful example to illustrate the roles of inconsistency resolution is a study on attitude attribution (Jones & Harris, 1967) by Gawronski (2003). Drawing on Reeder and Brewer's (1979) notion of implicational schemata, Gawronski (2003) argued that attitude attributions under conditions of low choice (e.g., essay direction was assigned by an experimenter) are based on a trait-behavior theory similar to the ability schema, such that perceivers assume that only people with a corresponding attitude are able to write a persuasive essay in favor of an assigned position. However, for free choice essays, the author's decision to endorse a particular position in his or her essay provides sufficiently diagnostic information for inferring a corresponding attitude. In line with these assumptions, Gawronski (2003) found that free choice essays led to strong correspondent inferences irrespective of their persuasiveness. However, under low choice conditions, participants attributed a corresponding attitude to the author only when the essay was highly persuasive, but not when the essay was weak.

One important aspect of Gawronski's (2003) study is that the situational information that the author was assigned to endorse a particular position is ambiguous, in that it does not specify whether the author's assignment was congruent or incongruent with his or her personal attitude. To illustrate this ambiguity, imagine that participants were told that the author was asked to write an essay that is *counter* to his or her personal attitude (Gawronski, 2003, Experiment 5). Based on perceivers' assumption that only people with a corresponding attitude are able to write a persuasive essay,

this information should lead perceivers to expect a relatively weak, unconvincing essay. Hence, if the essay turns out to be highly persuasive, perceivers' system of beliefs will be challenged, in that it implies three inconsistent propositions:

1. "*Only people with a corresponding attitude are able to write a persuasive essay.*"
2. "*The author has been assigned to write a counterattitudinal essay.*"
3. "*The essay is highly persuasive.*"

These three propositions are inconsistent with each other, in that each of them is in contradiction with the logical implication of the other two (see Festinger, 1957). Proposition 1 is inconsistent with the joint implication of Propositions 2 and 3, Proposition 2 is inconsistent with the joint implication Propositions 1 and 2, and Proposition 3 is inconsistent with the joint implication of Propositions 1 and 2 (for a similar example on moral attribution, see Gawronski, 2004). As previously outlined, this inconsistency signals to the perceiver that one of these propositions is likely to be false. As Proposition 3 is based on relatively hard evidence (i.e., the available essay), this proposition may be quite robust against rejection. This leaves the possibility that either Proposition 2 or Proposition 3 needs to be rejected. That is, the author may have refused to write a counterattitudinal essay, or people are indeed able to write highly persuasive essays in favor of a counterattitudinal position. However, as the available evidence seems insufficient to determine which of the two possibilities is the correct one, the perceiver is left with a state of uncertainty that is driven by the inconsistency between the three propositions.

These assumptions were confirmed by Gawronski (2003). In one of the reported studies (Experiment 5), participants were told either that the author was assigned to write a counterattitudinal essay (counterattitudinal condition) or that the author was asked to write an essay in favor of a position that was determined randomly (random condition). In the counterattitudinal condition, participants inferred a strong attitude *counter* to the one endorsed in the essay when the arguments in the essay were weak. If, however, the arguments in the essay were strong, participants in the counterattitudinal condition were reluctant to infer an attitude counter to the one endorsed in the essay, presumably because they became suspicious of whether the author actually followed the request of the experimenter to write a counterattitudinal essay. Further supporting the proposed relation between (in)consistency and perceived (in)validity, participants showed high levels of confidence in inferring a strong attitude counter to the one endorsed in the essay when the essay was weak. However, confidence ratings were relatively low when the essay was strong. These results differed remarkably

from the ones obtained in the random condition, which is conceptually equivalent to the standard low choice condition employed by Jones and Harris (1967). In this condition, participants drew strong correspondent inferences from the endorsed position in the essay when the essay was strong but not when the essay was weak. Moreover, and in contrast to the results in the counterattitudinal condition, confidence ratings were relatively high for correspondent inferences from strong essays but remarkably low for reduced correspondent inferences from weak essays. Taken together, these results indicate that cognitive consistency plays a significant role in determining the validity of different pieces of accessible information, and thereby the usefulness of this information for inferring an agent's personal characteristics.

How Do Motives Fit Into the Picture?

It is important to note that the aforementioned example on attitude attribution does not involve any reference to motives. Nevertheless, inferences about motives may play a significant role when motive-related concepts are activated by the cues that are salient within a given situation (e.g., Fein, 1996). In such cases, motive-related information needs to be brought in line with the other information that is momentarily activated. For instance, if available cues signal that the author of a highly persuasive essay had a strong motive to follow the instructions of the experimenter to write a counterattitudinal essay (see Gawronski, 2003), this additional information will challenge the proposition that only authors with a corresponding attitude are able to write a persuasive essay (i.e., subtraction of a cognition, see Festinger, 1957). As a result, perceivers will likely attribute an attitude to the author that is *counter* to the one endorsed in the essay. If, however, cues signal that the author of a persuasive essay had a motive not to comply with the request to write a counterattitudinal essay, this information will produce a consistent set of beliefs by providing a fourth proposition that resolves the inconsistency between the other three propositions (i.e., addition of a cognition, see Festinger, 1957). In this case, perceivers will likely attribute an attitude to the author that is *in line* with the one endorsed in the essay.

The notion of information integration in the previous example illustrates that the validity of all information components is assessed simultaneously by means of their mutual consistency. Moreover, to the degree that the available information implies more than one possible explanation for a given behavior (e.g., two different motives accounting for the same behavior), the perceived validity of one explanation will be discounted by the mere presence of the other explanation, unless there is independent evidence that favors one

explanation over the other. This conceptualization implies that inferred motives do not necessarily serve as a *mediator* for subsequent trait inferences. Instead, motives represent one among many pieces of information that need to be brought in line with each other in a simultaneous process of information integration. Moreover, to the degree that the presence of a particular motive challenges the perceived validity of a potential trait attribution, this motive may *moderate* (rather than mediate) the attribution of that trait. That is, the trait attribution may be regarded as valid in the absence of the presumed motive, but its perceived validity will be reduced when the salience of the presumed motive is high.

Not to Forget the Role of Prior Knowledge

The notion of independent evidence in the context of discounting has important implications for the role of information integration. Aside from a few notable exceptions (e.g., Hamilton, 1998; Trope, 1986; Wigboldus, Dijksterhuis, & Van Knippenberg, 2003), research on attribution has largely ignored the role of prior knowledge about agents. Yet, prior knowledge can have important influences on the inferences that are drawn from a particular behavior. Such influences of prior knowledge may occur in at least two different ways (Trope, 1986). First, prior knowledge may influence social inferences *indirectly*, such that ambiguous behavioral cues are interpreted in line with the perceiver's knowledge about the agent (e.g., ambiguously anxious behavior is interpreted as anxious when the agent is known to be an anxious person but as calm when the agent is known to be a relaxed person; see Gawronski et al., 2002). In this case, the likelihood of inconsistencies between prior knowledge and behavioral information will be reduced, as the interpretation of the behavior is already in line with the knowledge about the agent. Second, prior knowledge may influence social inferences *directly*, when this knowledge is used as one piece of evidence in the process of integrating the momentarily accessible information. As long as the knowledge about the agent is consistent with the other accessible information, the inferences drawn about the agent will most likely be in line with that information and the prior knowledge about the agent. If, however, prior knowledge is inconsistent with other accessible information, this inconsistency needs to be resolved before a judgment can be made (Festinger, 1957). As Hamilton (1998) pointed out, behavior that violates a prior expectation about an agent has a particularly strong tendency to be discounted as an "exception-to-rule," for instance, by attributing the behavior to exceptional circumstances (see Kelley, 1972). In the context of the MIM, it is important to note that such exceptional circumstances may not only

include situational circumstances (e.g., the sudden loss of a loved family member when a person known to be strong in math received a low score in a math exam) but also motives and other kinds of mental states (e.g., a motive to make a good impression on a new dating partner when an otherwise sloppy person cleans up his apartment).

Taken together, these considerations suggest that prior knowledge can play an important role in the social inference process by either decreasing the likelihood of inconsistencies (via biased interpretation of behavioral cues) or increasing the likelihood of inconsistencies (via use as independent evidence). As prior knowledge about agents is most likely represented in the form of stable traits (rather than situation-specific motives), direct activation of trait concepts represents an important determinant of inferences about motives, for instance when situation-specific motives are used to account for a behavior that is inconsistent with one's prior trait knowledge about the agent. Again, such cases are characterized by a simultaneous integration of multiple types of information (e.g., motives, beliefs, intentions, traits, situational factors) rather than a sequential priority of motive-related inferences.

Conclusion

Overall, Reeder's MIM provides a significant advance over earlier single inference models. Nevertheless, the assumption of sequential inferences with motives as a starting point seems problematic, given the mutual dependency of motive-related inferences and inferences about intentions, traits, and situational circumstances. Replacing the assumption of a particular sequence of inferences with the notion of simultaneous information integration may not only help to resolve the risk of conceptual circularity but also provide further insights into the particular roles of consistency (Festinger, 1957) and discounting (Kelley, 1972) in the validation of available information, thereby providing an even more comprehensive picture of social inference processes.

Note

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