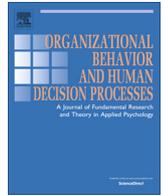


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## Effort denial in self-deception

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### ABSTRACT

We propose a mixed belief model of self-deception. According to the theory, people distribute belief over two possible causal paths to an action, one where the action is freely chosen and one where it is due to factors outside of conscious control. Self-deceivers take advantage of uncertainty about the influence of each path on their behavior, and shift weight between them in a self-serving way. This allows them to change their behavior to provide positive evidence and deny doing so, enabling diagnostic inference to a desired trait. In Experiment 1, women changed their pain tolerance to provide positive evidence about the future quality of their skin, but judgments of effort claimed the opposite. This “effort denial” suggests that participants’ mental representation of their behavior was dissociated from their actual behavior, facilitating self-deception. Experiment 2 replicated the pattern in a hidden picture task where search performance was purportedly linked to self-control.

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### Introduction

In a classic demonstration of self-deception participants were told that pain tolerance was indicative of the quality of their hearts and then were asked to endure a painful stimulus. In one condition, high tolerance was purportedly indicative of a good heart whereas in another condition, the opposite was true. Those told that high tolerance indicated a good heart endured the pain longer on average than those told the opposite, suggesting that some participants modulated their tolerance to create positive evidence. Moreover, participants denied any influence of the cover story on their behavior. They may even have become more confident about the quality of their hearts after enduring the pain (Quattrone & Tversky, 1984; for similar demonstrations see Chance, Norton, Gino, & Ariely, 2011, and Sloman, Fernbach, & Hagmayer, 2010).

We refer to such behavior as diagnostic self-deception because it involves drawing an invalid diagnostic inference in favor of a desirable trait. This phenomenon violates the logic of causality in that an action expressly taken to support belief in a desirable attribute provides no such evidence. In causal terms, changing one’s behavior is an intervention that invalidates the diagnostic relation between behavior and its normal causes (Hagmayer & Sloman, 2009; Meek & Glymour, 1994; Pearl, 2000; Sloman & Hagmayer,

2006). Heart type cannot be responsible for pain tolerance to the degree a participant has manipulated his or her tolerance in response to a cover story.

Diagnostic self-deception is a puzzle for theories of cognition. To draw the self-serving inference, one must remain unaware that one is acting to generate desirable evidence. Yet, in order to generate the evidence, one must perform a causal analysis to determine the desired outcome before executing the behavior. How can one engage in such planning and action and yet remain unaware of doing so when subsequently drawing the beneficial inference?

We propose a solution to this puzzle that builds upon ideas proposed by Quattrone and Tversky (1984) and Sloman et al. (2010). Both of these papers argue that self-deception entails a contradiction between an action and the agent’s mental representation of that action. For instance Quattrone and Tversky write that “people select actions to infer a [...] cause, then, to accept the inference as valid, they often render themselves unaware of their having selected the action just to infer the cause (p. 239)”. They describe this as a substitution of a diagnostic for a causal contingency. According to this account, the true contingency is causal (participants in their study chose their pain tolerance based on the cover story) but people treat it as diagnostic (participants attributed their tolerance to their heart type).

Sloman et al. (2010) unpacked this idea and gave it a more precise meaning in terms of causal models. According to their interpretation, there are two paradigmatic ways to represent a choice

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or action that map onto the two types of evidential relations in Causal Model Theory (Pearl, 2000). These models are depicted in Fig. 1. In the *observational model*, some outside factor that is not under willful control, like a personal trait, skill, physical feature, or preference is the cause of a behavior. This causal relation is represented by the arrow from the underlying causes to the choice/action in Fig. 1. In this model the decision-making process is bypassed and, in that sense, the agent is an observer of his or her own action, just as she might be an observer of someone else's (cf. Bem, 1972). Thus the observation of behavior supports diagnostic inference to the underlying causes.

Conversely, in the *interventional model*, the agent represents behavior as due to agency, presumably mediated by a deliberative decision-making process. This model entails that the behavior can be willfully manipulated, and it also entails that the behavior is rendered independent and therefore non-diagnostic of other underlying causes. Hence the interventional model negates the diagnostic relationship between the behavior and these other causes. This is depicted in the figure by the absence of an arrow from the causes not under willful control to the choice/action. Slovic et al. (2010) argued that diagnostic self-deception occurs when people exert some control over their behavior and thus should believe in the interventional model but instead adopt the observational one.

These ideas suggest that self-deception is enabled by adopting the wrong causal model of one's behavior but they do not explain why people would do so. People are generally good causal reasoners and draw reasonable inferences from interventions and observations (Hagmayer, Slovic, Lagnado, & Waldmann, 2007). Moreover, how can people adopt an incorrect causal model of their behavior without becoming aware of the discrepancies between their beliefs and the observable evidence?

We suggest that self-deception is enabled by the inherent uncertainty in the causes of behavior. When self-deceiving, people are clearly manipulating their behavior in a self-serving way to some degree, but this does not imply that their behavior is entirely determined by their will. Other factors (e.g. tolerance for pain) must be influencing their actions too. So both pathways are operative to some extent and there is uncertainty about the contribution of each. It is often impossible to identify with confidence the degree to which a given behavior was freely chosen rather than caused by environmental pressures, personal characteristics, unconscious motives, or bodily states. All we know is what action we have taken and our subjective feeling of choosing. These are not sufficient to rule out either hypothesis. Indeed, people sometimes believe their behavior to be chosen freely and under their personal control even when it is not (Wegner, 2002).

As a consequence, we propose that people have a belief distribution over the two paths, representing assumptions about their influence on behavior. This *mixed belief model* is depicted in Fig. 2. The arrows from the two types of causes to behavior/action

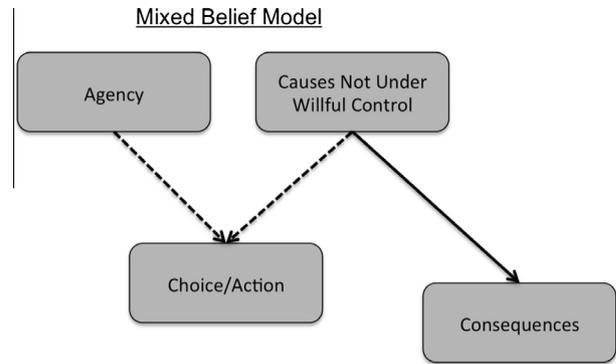


Fig. 2. The mixed belief model of self-deception. Participants distribute belief over the two possible causal paths to action and set the weights on these paths to enable a self-serving inference.

are dashed to indicate that they are malleable and trade off against one another. The implication of this tradeoff is that the diagnosticity of the action for the underlying causes depends on the beliefs about the agency path. Diagnostic self-deception emerges when the underlying causes are associated with good or bad consequences. This creates a motivation to shift beliefs about the two causal paths in a way that increases or decreases the likelihood of consequences depending on whether they are good or bad.

To make this more concrete, consider an example based on the cover story used in Experiment 1. Participants were told that a test provides evidence about how the quality of one's skin will change with age. The test entails enduring a painful stimulus for as long as one can bear. In one condition participants were told that higher pain tolerance indicates lower levels of a chemical in the skin. When present in large quantities this chemical leads to poor skin later in life. In this example, the bad consequences of the chemical induce a motivation to believe that one has low levels of it.

What would bolster such a belief? High tolerance on the test would be necessary but not sufficient to infer low levels of the chemical. The higher the tolerance, the greater the likelihood of low levels of the chemical, but this relation could be explained away by high effort, i.e., by a large contribution of will. Thus in order to draw the diagnostic inference, a self-deceiving participant would have to not only display high tolerance, but also deny exerting great effort to enable the diagnostic inference. Moreover the relation between the belief about the causal contribution of effort and the strength of the diagnostic inference is graded, not all or nothing. The less effort expended to achieve a certain tolerance the stronger the beneficial diagnosis. The mixed belief model therefore predicts that these opposing motivational forces – to display high tolerance by exerting effort and to believe in low effort to enhance the diagnostic inference – will lead to a dissociation between behavior and beliefs about behavior, the hallmark of

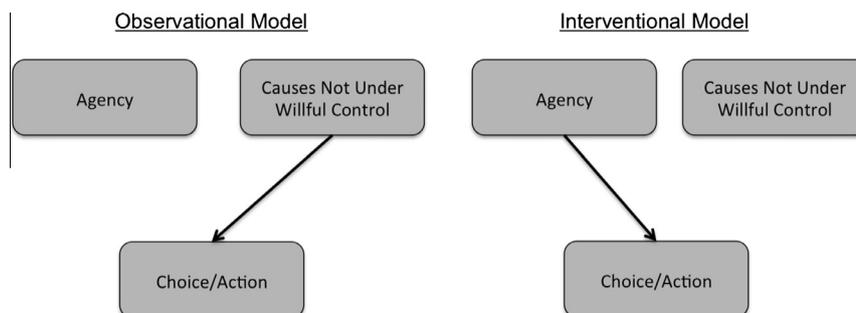


Fig. 1. Two paradigmatic choice models that people can use to construe behavior. In the observational model behavior is treated as due to underlying factors as opposed to agency and thus provides diagnostic evidence. In the interventional model, behavior is non-diagnostic of underlying causes because behavior is represented as freely chosen.

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