Predicting Behavior from the World: Naïve Behaviorism in Lay Decision Theory

Samuel G. B. Johnson (samuel.johnson@yale.edu)
Department of Psychology, Yale University
2 Hillhouse Ave., New Haven, CT 06520 USA

Lance J. Rips (rips@northwestern.edu)
Department of Psychology, Northwestern University
2029 Sheridan Road, Evanston, IL 60208 USA

Abstract

Life in our social world depends on predicting and interpreting other people's behavior. Do such inferences always require us to explicitly represent people's mental states, or do we sometimes bypass such mentalistic inferences and rely instead on cues from the environment? We provide evidence for such *behaviorist* thinking by testing judgments about agents' decision-making under uncertainty, comparing agents who were knowledgeable about the quality of each decision option to agents who were ignorant. Participants believed that even ignorant agents were most likely to choose optimally, both in explaining (Experiment 1) and in predicting behavior (Experiment 2), and assigned them greater responsibility when acting in an objectively optimal way (Experiment 3).

Keywords: Theory of mind; lay decision theory; explanation; prediction; rationality.

Introduction

Sunny turned on his Honda's right blinker as he drove down Dixwell Avenue. The Mercury to his right slowed down, and Sunny changed lanes. In changing lanes, Sunny wagered with his life—gambling that the driver of the Mercury would leave enough space for his Honda to enter the right lane—and he won. Indeed, his track record with such wagers is remarkable. How is Sunny able to make such successful predictions about others' behavior?

One strategy that Sunny may have followed in this case was to infer the driver's behavior based on his or her inferred *mental-states*. That is, Sunny may have reasoned that the Mercury's slowing down was a signal of the driver's intention to let him change lanes, based on the driver's assumed beliefs about road behavior and folk physics, and the driver's assumed goals of being a good road citizen and avoiding a collision. Using this *mentalistic* system requires inferring and representing the agent's mental states, then predicting and interpreting actions on the basis of those inferred mental states. This seems to accord with how we typically experience the process of making behavior inferences in day-to-day life.

But Sunny could have reached the same conclusion using a different strategy, inferring the Mercury's behavior based on observable *states of the world*. Sunny may have inferred from the Mercury's change in speed (an action), combined with the geometry of driving (a situational constraint), that the Mercury would leave sufficient space for his Honda (an end-state). Using this non-mentalistic, *behaviorist* system only requires seeking out and representing information about the world—and no inferences about the mental states of the Mercury's driver.

Infants can use world-based cues such as efficiency constraints to reason about behavior before achieving a representational theory of mind (Gergely & Csibra, 2003), suggesting that a primitive, behaviorist system is present in infancy. The behaviorist system therefore seems to precede the mentalistic system in development (see also Povinelli & Vonk, 2004 on chimpanzee theory of mind). However, it is unclear whether the behaviorist system used by infants is *replaced* by the mentalistic system that we use as adults, or whether instead these systems coexist in adulthood. If these systems coexist, many of our everyday inferences about behavior may bypass mental-state inferences altogether, relying instead on directly observable information about the world, coupled with more general assumptions such as the efficiency of actions in achieving optimal end-states.

Here, we test the possibility of a behaviorist system by studying judgments about agents making decisions under uncertainty, contrasting inferences about *knowledgeable* agents—those who know the efficacies of each option under consideration—and inferences about *ignorant* agents—those who do not know the efficacies of the options. For example, consider Jill, who wants her hair to smell like apples and is deciding which of three brands of shampoo to purchase: one with a high probability of leading to her goal ("Best"), one with a medium probability ("Middle"), and one with a low probability ("Worst"). Which option will Jill choose?

Two principles could potentially be used for predicting Jill's choice. First, people might use the *Efficiency Principle* (Dennett, 1987), which would lead Jill to choose Best—the optimal action relative to her goals. This principle alone would not lead Jill to be any more likely to choose Middle than to choose Worst, since both are inefficient relative to Best. Second, people might use a *Preference Principle*, which would lead Jill to form preferences for the options in proportion to their quality, and be more likely to choose more preferred options—that is, to be most likely to choose Best, less likely to choose Middle, and least likely to choose Worst.

To see how this task can give evidence for a behaviorist system, first consider what a normative response pattern would be if people correctly use mental-state inferences. If Jill knows the probabilities of all three options (i.e., if she is a *knowledgeable* agent), then either the Efficiency or the Preference Principle potentially apply, and we would certainly expect her to be more likely to choose a higher-quality option. On the other hand, if Jill does not know the efficacies of the options (i.e., she is an *ignorant* agent), then we should normatively conclude that she is equally likely to choose any of the three options, because she does not have any relevant beliefs. Thus, if people rate Jill's likelihood of choosing the three options differently *even when she is ignorant*, this inference could not be produced by veridical mental-state reasoning. Instead, people might *overgeneralize* these principles to ignorant agents for whom they do not apply—using *behaviorist* reasoning that bypasses reasoning about the agents' beliefs. It is particularly plausible that behaviorist reasoning could lead to overgeneralization of the Efficiency Principle, since young infants can use efficiency to constrain behavior predictions in a presumably non-mentalistic manner (Gergely & Csibra, 2003).

We compare inferences about knowledgeable and ignorant agents, using judgments about explanation (Experiment 1), prediction (Experiment 2), and responsibility (Experiment 3). We also test whether people conceptualize suboptimal actions and omissions differently (Experiment 2), and whether people reinterpret mental states to rationalize otherwise suboptimal behavior (Experiment 3), for knowledgeable and ignorant agents. Throughout these experiments, we gather evidence for a non-mentalistic, behaviorist system with distinct signatures from the representational theory of mind that we are accustomed to using in everyday experience.

Experiment 1

In our first study, we used participants' ratings of the need for an explanation to measure expectations about behavior. Since anomalous events act as triggers for explanation (e.g., Hilton & Slugoski, 1986), participants should indicate a higher need for explanation to the degree that agents' choices violate their expectations, just as infants look longer at suboptimal than at optimal actions (e.g., Gergely & Csibra, 2003). If people use only normative mentalistic reasoning, one would expect them to rate optimal decisions less surprising than suboptimal decisions for agents who are aware of the relative quality of the choices. But if people supplement mental-state inferences with behaviorist thinking, then they may also predict optimal choices even for ignorant agents.

Method

We recruited 100 participants from Amazon Mechanical Turk in exchange for a small payment. These participants also participated in another experiment, with the order of the experiments counterbalanced. Sixteen participants were excluded from data analysis because they incorrectly answered more than 33% of a series of check questions designed to ensure that participants had attended to the details of the vignettes (including whether the agent was knowledgeable or ignorant). However, including all participants does not qualitatively alter these results.

Participants read three vignettes. The agent's choice (Best, Middle, Worst) varied within-subjects across three cover stories using a Latin square, and the agent's knowledge about the options (knowledgeable or ignorant) varied between-subjects. In the knowledgeable condition, the agent knew the efficacies of each option. For example:

Jill is shopping for a new shampoo, and wants her hair to smell like apples. She is considering three brands of shampoo to use.

She knows that if she uses Variety JLR, there is a 70% chance that her hair will smell like apples; that if she uses Variety WYQ, there is a 50% chance that her hair will smell like apples; and that if she uses Variety HPN, there is a 30% chance that her hair will smell like apples.

Jill chooses Variety [JLR/WYQ/HPN], and her hair smells like apples.

In the ignorant condition, the agent was said to believe (incorrectly) that all three formulas had a 70% efficacy, but the actual probabilities were listed for the participant. The Best, Middle, and Worst versions of each problem differed only in Jill's actual choice (JLR, WYQ, or HPN).

Participants then completed the need for explanation measure ("To what extent do you feel that an explanation is necessary for Jill's behavior?") on a 0-to-10 scale (0: "explanation definitely not necessary"; 5: "neither necessary nor unnecessary"; 10: "explanation definitely necessary"). Vignettes were presented in a random order.

Results and Discussion

Participants took both the efficacy of the agent's choice and the agent's knowledge into account in determining whether an explanation was necessary. As Figure 1 shows, in both conditions, participants rated Best choices as least in need of explanation, but the effect of choice differed between the knowledgeable and ignorant conditions. There was no main effect of knowledge, $F(1,82) = 1.82$, $p = .18$, $\eta_p^2 = .02$, but both the main effect of choice, $F(2,164) = 46.35$, $p < .001$, $\eta_p^2 = .36$, and the interaction between knowledge and choice, $F(2,164) = 5.90$, $p = .003$, $\eta_p^2 = .07$, were significant. Knowledgeable agents' decisions were rated more in need of explanation for Middle than for Best, $t(45) = 5.22$, $p < .001$, $d = 0.77$, and more for Worst than for Middle, $t(45) = 4.23$, $p < .001$, $d = 0.62$. In contrast, although ignorant agents' decisions were rated more in need of explanation for Middle than for Best, $t(37) = 3.21$, $p = .003$, $d = 0.52$, the difference between Worst and Middle only reached marginal significance, $t(37) = 1.72$, $p = .095$, $d = 0.28$.

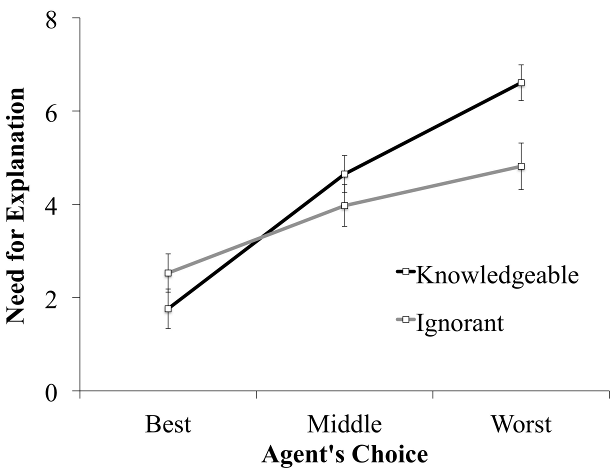

Figure 1: Results of Experiment 1. Bars represent ±1 SE.

For knowledgeable agents, people rely on the Preference Principle, finding knowledgeable agents' decisions to be increasingly surprising in proportion to their poorness. More surprisingly, however, people also take the quality of the options into account in evaluating the decisions of *ignorant* agents. Although correct mentalizing would lead people to predict the agent's three possible decisions as equally likely, and hence equally surprising, they nonetheless found the optimal choice less surprising than the middle or worst choice. Further, they did not robustly distinguish between the Middle and Worst options, suggesting that these inferences about ignorant agents were made using the Efficiency Principle. Since both the Middle and Worst options were suboptimal or inefficient relative to the Best option, the Efficiency Principle alone would not distinguish between these two inefficient actions.

We take these results as evidence of behaviorist thinking in behavior predictions—that is, relying directly on information about the world rather than on the agents' mental states. Could these results instead be explained by participants' incorrectly attributing knowledge of the probabilities to the agents, either through inattentiveness to the vignettes or through a perspective-taking error (Birch & Bloom, 2007)? Inattentiveness is an unlikely explanation because participants who failed check questions (including questions about the agents' knowledge) were removed from the analysis. In addition, these explanations would not account for the qualitative interaction, in which participants used the Preference Principle for knowledgeable agents (distinguishing between all three options) but the Efficiency Principle for ignorant agents (distinguishing between optimal and suboptimal options, but not among different suboptimal options). In contrast, use of the Efficiency principle is a signature of infants' non-mentalistic behavior predictions (Gergely & Csibra, 2003) and is therefore quite consistent with our behaviorist account. We nonetheless sought converging evidence in Experiments 2 and 3.

Experiment 2

Our primary goal in Experiment 2 was to replicate these findings using a different dependent measure—explicit behavior predictions. In addition, we manipulated whether the Worst option was framed as an action or as an omission (e.g., Ritov & Baron, 1992). In contrast to Experiment 1, where suboptimal choices were seen as equally surprising for ignorant agents, behaviorist thinking could potentially lead people to distinguish between suboptimal actions and suboptimal omissions, since an option's being an action or an omission is a salient feature of the world.

Method

We recruited 100 participants from Amazon Mechanical Turk in exchange for a small payment. These participants additionally participated in another experiment that is not reported here, with the order of the experiments counterbalanced. Three participants were excluded from analysis because they incorrectly answered more than 33% of the check questions.

Participants read two vignettes, with worst-option framing (action or omission) varied within-subjects across two different cover stories, and knowledge of the probabilities (knowledgeable or ignorant) varied between-subjects. In the knowledgeable condition, the agent was said to know the probabilities of each option leading to their goal. For example (differences between the action and omission conditions in brackets):

Angie has a shrub, and wants the shrub's flowers to turn red. She is thinking about applying a fertilizer, and has three options: applying [Formula LPN / nothing], applying Formula PTY, or applying Formula NRW.

She does not know anything about the differences between these options, except that she knows that if she applies [Formula LPN / nothing] there is a 10% chance that the flowers will turn red, that if she applies Formula PTY there is a 50% chance that the flowers will turn red, and that if she applies Formula NRW there is a 70% chance that the flowers will turn red.

In the ignorant condition, the second paragraph instead stated that the agent did *not* know the probabilities. In contrast to Experiment 1 (where this was described as a false belief), the agent was described as having no relevant beliefs, to test the generality of our effects.

After reading each vignette, participants were asked to "Please rate below how likely you think it is that she will choose each option." Participants then rated each decision alternative on a 0-to-10 scale (0: "Very unlikely"; 5: "Neither likely nor unlikely"; 10: "Very likely"). The assignment of action or omission framing to the Worst option was counterbalanced across the two cover stories, and items were presented in a random order.

Results and Discussion

As shown in Figure 2-A, the results for the action framing condition were similar to the results in Experiment 1. Under this framing, the Worst option was the choice of a particular product (e.g., Formula LPN). Here, knowledgeable agents were thought more likely to choose Best than Middle, $t(49) = 14.56$, $p < .001$, $d = 2.06$, and more likely to choose Middle than Worst, $t(49) = 8.49$, $p < .001$, $d = 1.20$. However, ignorant agents were thought more likely to choose Best than Middle, $t(46) = 2.94$, $p = .005$, $d = 0.43$, but equally likely to choose Middle and Worst, $t(46) = 0.95$, $p = .35$, $d = 0.14$. This difference led to a significant interaction between choice and knowledge in the action condition, $F(2,190) = 87.30$, $p < .001$, $\eta_p^2 = .48$. Mental-state inferences would lead to the prediction that an ignorant agent is equally likely to choose any of the options; nonetheless, even ignorant agents were judged more likely to choose the optimal option—a further demonstration of behaviorist thinking. Mirroring Experiment 1, however, people thought Middle more likely than Worst only for the knowledgeable agents.

However, Figure 2-B shows that the omission framing produced a quite different pattern of results. Considering just the omission condition, in which the Worst option was described as doing nothing, the interaction between choice and knowledge is again significant, $F(2,190) = 43.21$, $p < .001$, $\eta_p^2 = .31$. But this time, the interaction occurred because participants made more conservative predictions about the ignorant agent, rather than because they failed to differentiate among some of the options. Participants thought the knowledgeable agents more likely to choose Best than Middle, $t(49) = 12.94$, $p < .001$, $d = 1.83$, and more likely to choose Middle than Worst, $t(49) = 8.91$, $p < .001$, $d = 1.26$. Likewise, ignorant agents were judged more likely to choose Best than Middle, $t(46) = 3.12$, $p = .003$, $d = 0.46$, and more likely to choose Middle than Worst, $t(46) = 6.09$, $p < .001$, $d = 0.89$. That is, when a suboptimal option is framed as an omission, people think even ignorant agents are less likely to choose it. This result too is consistent with behaviorist thinking, because actions and omissions are qualitatively different choices not only in the agent's mind, but in the world, with actions and omissions tacitly thought to have distinct affordances (Ritov & Baron, 1992).

As in Experiment 1, it is unlikely that participants were incorrectly attributing knowledge of the probabilities to the ignorant agents, because inattentive participants were removed from the analysis and because such attributions would lead participants to predict Middle as more likely than Worst. Furthermore, such explanations could not straightforwardly account for the difference between the action and omission conditions, whereas this difference is a natural consequence of behaviorist thinking.

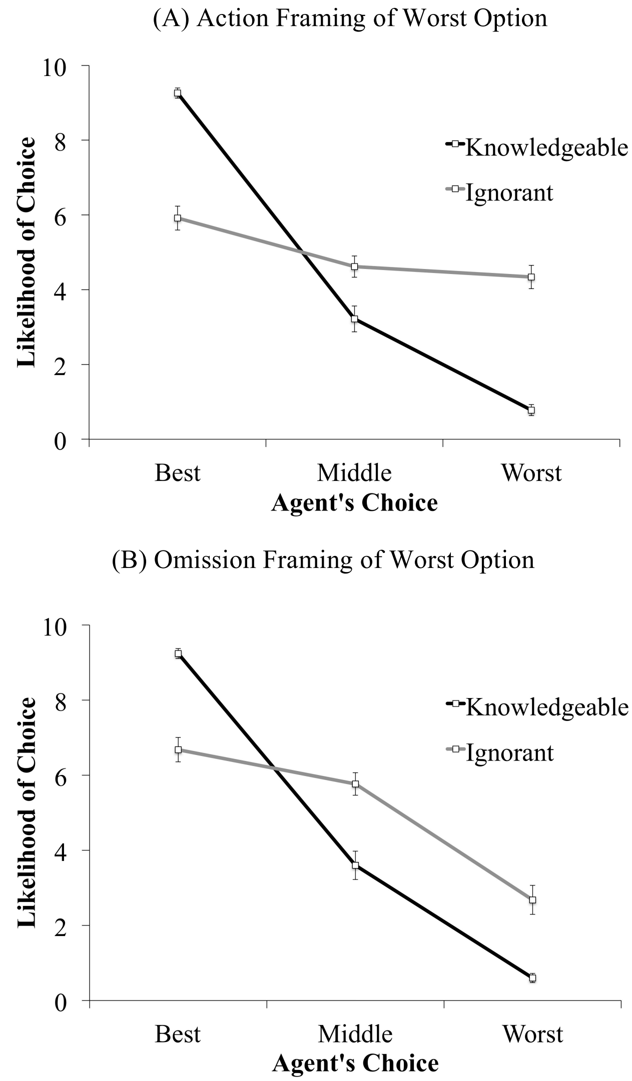

Figure 2: Results of Experiment 2. Bars represent ±1 SE.

Experiment 3

When an agent makes an objectively suboptimal choice, we can use the Efficiency Principle to infer that the agent may have been acting under a different set of beliefs or goals—a process we can call *rationalizing* an action (Baker, Tenenbaum, & Saxe, 2009; Buchsbaum, Gopnik, Griffiths, & Shafto, 2011). For example, consider Jill's shampoo-purchasing decision. The Efficiency Principle predicts that Jill should prefer a shampoo with a higher probability of resulting in a luscious apple smell. This inference, however, relies on the assumption that Jill's only goal is making her hair smell like apples, and that she had accurate information. If Jill chooses an objectively suboptimal action (from the point of view of making her hair smell like apples), we can rationalize Jill's action by denying either of these assumptions. One might infer, for example, that Jill had changed her goal or that Jill did not realize that Variety JLR was superior.

In Experiment 3, we used this idea to provide further evidence that the inferences about ignorant agents in previous experiments were due to behaviorist thinking. We used responsibility judgments as the dependent measure because previous studies show that people assign greater responsibility to decision-makers who behave optimally than to those who behave suboptimally (Johnson & Rips, 2013). In all cases, the agent was deciding between options with higher and lower probabilities of the outcome, and always chose the higher probability option. To vary the optimality of an action, we manipulated the agent's attitude toward that outcome (desires the outcome, indifferent toward the outcome, or desires that the outcome not occur). We also varied whether the agent knew or did not know the efficacies of the options, as in Experiments 1 and 2. The vignettes in the knowledgeable condition were of the format:

Jill is shopping for a new shampoo, and is deciding whether to purchase Variety JLR or Variety WYQ.

[She wants her hair to smell like apples. / It does not matter to her whether her hair smells like apples. / She wants her hair not to smell like apples.]

She does not know anything about the differences between Variety JLR and Variety WYQ, except that she knows that if she uses Variety JLR, there is a 50% chance that her hair will smell like apples, and if she uses Variety WYQ, there is a 30% chance that her hair will smell like apples.

Jill chooses Variety JLR, and her hair smells like apples.

In the ignorant condition, the third paragraph instead stated that the agent did *not* know the probabilities.

When Jill is indifferent to the outcome, there is no optimal choice, so this condition acts as a baseline in both the knowledgeable and ignorant conditions. We would expect choices perceived as optimal (either because their action is objectively optimal or because their action is rationalized and made *subjectively* optimal) to be assigned increased responsibility. Since people appear to apply the Efficiency Principle even to ignorant agents, both knowledgeable and ignorant agents should be assigned greater responsibility when they act efficiently (i.e., when Jill desires the outcome that is made likelier by her choice). However, the agent's decision is objectively suboptimal when she desires that the outcome not occur but nonetheless chooses the action that makes that outcome more likely. If this suboptimal action is rationalized, then responsibility judgments should be *higher* when she desires the outcome not occur than in the baseline condition when she is indifferent. This is because people would attribute mental states to the agent (e.g., an additional goal such as choosing a less expensive option) that would make that apparently suboptimal choice rational. If inferences about ignorant agents are made with the behaviorist strategy, one might expect people not to rationalize the actions of ignorant agents, leading to a difference between the baseline and suboptimal conditions for knowledgeable but not for ignorant agents.

Method

We recruited 259 participants from Amazon Mechanical Turk in exchange for a small payment. These participants additionally participated in other experiments that are not reported here, with the order of the experiments counterbalanced. Forty-nine participants were excluded from analysis because they incorrectly answered more than 33% of the check questions.

Participants read three vignettes (similar to that given above) in a random order. The agent's goal (desires outcome, indifferent to outcome, or desires that the outcome not occur) varied within-subjects across three cover stories using a Latin square, and the agent's knowledge about the probabilities (knowledgeable or ignorant) varied between-subjects. After reading each vignette, participants rated their agreement with a responsibility statement ("Jill is responsible for her hair smelling like apples") on a 0-to-10 scale (0: "Disagree"; 5: "Neither Agree nor Disagree"; 10: "Agree").

Results and Discussion

Responsibility ratings varied both with the agent's goal, $F(2,416) = 8.76$, $p < .001$, $\eta_p^2 = .04$, and with the agent's knowledge of the probabilities, $F(1,208) = 38.63$, $p < .001$, $\eta_p^2 = .16$. As Figure 3 illustrates, however, these effects were qualified by a significant interaction, $F(2,416) = 5.56$, $p = .004$, $\eta_p^2 = .03$.

We consider first the differences between the optimal (desires the outcome) and the baseline (indifferent to the outcome) conditions. Knowledgeable agents were rated marginally more responsible in the optimal than in the baseline condition, $t(96) = 1.89$, $p = .062$, $d = 0.19$. This is consistent with previous work showing that agents who behave optimally are assigned greater responsibility than those who do not (Johnson & Rips, 2013). In addition, ignorant agents were assigned greater responsibility in the optimal than in the baseline condition, $t(112) = 3.91$, $p < .001$, $d = 0.37$. This is consistent with Experiments 1 and 2, in that behaviorist thinking leads people to expect efficient behavior for ignorant agents.

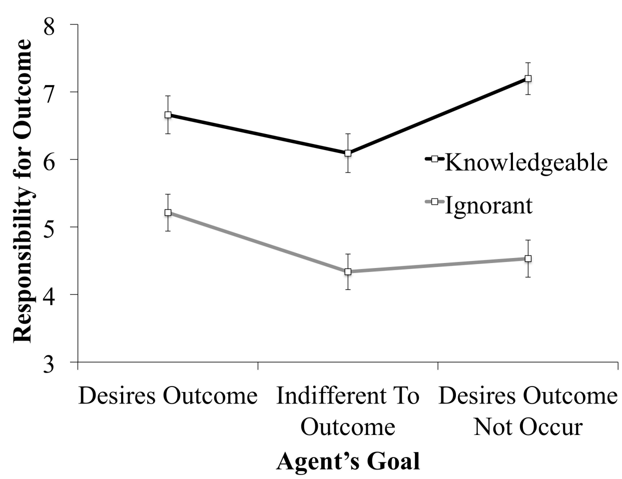

Figure 3: Results of Experiment 3. Bars represent ±1 SE.

Our main interest, however, was in the differences between the suboptimal (desires the outcome *not* occur) and baseline conditions, which would speak to whether participants were rationalizing the actions of suboptimal decision-makers. Knowledgeable agents were rated more responsible in the suboptimal than in the baseline condition, $t(96) = 4.29$, $p < .001$, $d = 0.44$, suggesting that participants rationalized the agent's suboptimal action. However, ignorant agents were rated equally responsible in the suboptimal and in the baseline conditions, $t(112) = 0.78$, $p = .44$, $d = 0.07$, suggesting that suboptimal actions were *not* rationalized for ignorant agents.

These results show that rationalizing inferences (e.g., attributing an additional goal to the agent to make their suboptimal actions seem rational from the agent's point of view) are made when people follow a mentalizing strategy, leading to the counterintuitive finding that knowledgeable agents can be rated more responsible for an outcome when they desire that it *not* occur than when they are indifferent toward it. This finding did not hold for ignorant agents, consistent with our interpretation of Experiments 1 and 2—that people used behaviorist thinking in interpreting the actions of the ignorant agents. If participants had incorrectly attributed knowledge to the ignorant agents (either because of a perspective-taking error or because of inattentiveness), we would not expect this interactive effect.

General Discussion

Every day, we successfully predict what others do, and these successes often seem to be accompanied by inferences about mental states. In three experiments, we provided evidence that these inferences are sometimes made solely on the basis of observable states of the world, using a *behaviorist* system for interpreting actions. Behaviorist thinking manifested in participants' inferences about agents who were ignorant about the efficacy of their decision options, but who were nonetheless expected to choose actions that led to their goals optimally (Experiments 1 and 2). A mentalistic strategy would instead lead participants to predict that ignorant agents are equally likely to choose each option.

Is it possible, however, that people were following a mentalistic strategy, but incorrectly attributed knowledge to the ignorant agents? Inattentiveness is not a likely explanation, since participants failing manipulation checks were excluded from these analyses. However, a more plausible possibility is that participants made a perspective-taking error known as the *curse of knowledge* (e.g., Birch & Bloom, 2007), and were unable to separate their own perspective from that of the agent. This explanation could account for some inferences about the ignorant agents, but could not explain why people only distinguished between Middle and Worst options for knowledgeable agents (Experiments 1 and 2), why actions and omissions were treated in qualitatively different ways (Experiment 2), or why rationalizing inferences were made only for knowledgeable but not for ignorant agents (Experiment 3). These findings all are naturally accounted for by behaviorist thinking that relies on cues such as efficiency and direct information about the world.

These results complement other approaches to theory of mind that involve multiple systems. For example, Apperly and Butterfill (2009) proposed two systems for reasoning about beliefs—a flexible system tracking beliefs and a less flexible system tracking belief-like states such as perceptual registration. Here, we have provided evidence for an additional system that does not make mental-state inferences of any sort but instead makes inferences using environmental cues together with the Efficiency Principle.

We often seem to infer behavior by pondering mental states. But to the extent that behavior can be inferred from efficiency considerations alone (Dennett, 1987), the behaviorist system may often suffice. It is an open question how often we unleash the behaviorist within.

Acknowledgments

This research was partially supported by funds awarded to the first author by the Yale University Department of Psychology. We thank Laurie Santos and an audience at Yale University for helpful discussion.

References

Apperly, I.A., & Butterfill, S.A. (2009). Do humans have two systems to track beliefs and belief-like states? *Psychological Review*, *116*, 953–970.

Baker, C.L., Saxe, R., & Tenenbaum, J.B. (2009). Action understanding as inverse planning. *Cognition*, *113*, 329–349.

Birch, S.A.J., & Bloom, P. (2007). The curse of knowledge in reasoning about false beliefs. *Psychological Science*, *18*, 382–386.

Buchsbaum, D., Gopnik, A., Griffiths, T.L., & Shafto, P. (2011). Children's imitation of causal action sequences is influenced by statistical and pedagogical evidence. *Cognition*, *120*, 331–340.

Dennett, D.C. (1987). *The intentional stance*. Cambridge, MA: MIT Press.

Gergely, G., & Csibra, G. (2003). Teleological reasoning in infancy: The naïve theory of rational action. *Trends in Cognitive Sciences*, *7*, 287–292.

Hilton, D.J., & Slugoski, B.R. (1986). Knowledge-based causal attribution: The abnormal conditions focus model. *Psychological Review*, *93*, 75–88.

Johnson, S.G.B., & Rips, L.J. (2013). Good decisions, good causes: Optimality as a constraint on attribution of causal responsibility. *Proceedings of the 35th Annual Conference of the Cognitive Science Society* (pp. 2662–2667). Austin, TX: Cognitive Science Society.

Povinelli, D.J., & Vonk, J. (2004). We don't need a microscope to explore the chimpanzee's mind. *Mind & Language*, *19*, 1–28.

Ritov, I., & Baron, J. (1992). Status-quo and omission biases. *Journal of Risk and Uncertainty*, *5*, 49–61.