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Perspective Taking as Egocentric Anchoring and Adjustment

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The authors propose that people adopt others' perspectives by serially adjusting from their own. As predicted, estimates of others' perceptions were consistent with one's own but differed in a manner consistent with serial adjustment (Study 1). Participants were slower to indicate that another's perception would be different from—rather than similar to—their own (Study 2). Egocentric biases increased under time pressure (Study 2) and decreased with accuracy incentives (Study 3). Egocentric biases also increased when participants were more inclined to accept plausible values encountered early in the adjustment process than when inclined to reject them (Study 4). Finally, adjustments tend to be insufficient, in part, because people stop adjusting once a plausible estimate is reached (Study 5).

> We have endeavored to show . . . that thought in the child is egocentric, i.e., that the child thinks for himself without troubling to make himself understood nor to place himself at the other person's point of view. . . . If this be the case, we must expect childish reasoning to differ very considerably from ours, to be deductive and above all less rigorous. (Piaget, 1959, p. 1)

Children view their perceptions of the world as accurate reflections of its actual properties and only with experience come to learn otherwise. People's perceptions of the world are constructions rather than veridical reflections and thus are not only occasionally wrong but also occasionally differ from the perceptions of others. Childhood thinking is less rigorous than adults' because it fails to correct for the subtle but significant fact that our perceptions are perspective bound.

Adults certainly know better. Parents, for instance, often excuse themselves from formally evaluating their own children because they know their assessments are positively biased (Wegener & Petty, 1995). People sometimes recognize that their first impressions have been influenced by idiosyncratic associations, expectancies, or stereotypes (Gilbert & Malone, 1995). People also generally expect those on the opposing side of an argument to interpret an ambiguous action differently than they have themselves (Robinson, Keltner, Ward, & Ross, 1995). People recognize that their assessments can be influenced by their expectations, that behavior is not always what it seems, and that motivation can influence judgment, making one's own perspective on the world potentially unique.

As Piaget recognized, adults come to view the world less egocentrically than children, although they do not outgrow their childhood tendencies altogether. Many social judgments, even among adults, are still egocentrically biased. People tend to believe, for example, that their internal states and intentions are more transparent to others than they actually are (Gilovich, Savitsky, & Medvec, 1998); they overestimate the extent to which others attend to those states (Gilovich, Medvec, & Savitsky, 2000) and exaggerate the extent to which others will share their thoughts and feelings (Keysar, 1994; Nickerson, 1999; Ross & Ward, 1996; Van Boven, Dunning, & Loewenstein, 2000). It is clear that even adults can have a difficult time setting aside their own perspective when considering the perceptions of others. Our goal is to better understand why these egocentric biases arise by examining the psychological processes that guide perspective taking.

Like other theorists, we contend that people do not set aside their own perspective when adopting another's but instead use it as a starting point, or judgmental anchor (e.g., Davis, Hoch, & Ragsdale, 1986; Nickerson, 1999). Because people generally have eyes, ears, and other sensory organs that operate more or less the same, it is reasonable for people to assume that others will "see" or experience the world similarly. However, because adults also recognize that people have motivations, beliefs, and backgrounds that can lead to different perceptions or interpretations of the same stimulus, they understand that this egocentric anchor sometimes needs adjustment to accommodate differences between themselves and others.

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Specifically, we suggest that people adopt others' perspectives by initially anchoring on their own perspective and only subsequently, serially, and effortfully accounting for differences between themselves and others until a plausible estimate is reached, using what Tversky & Kahneman (1974) described as the "anchoring and adjustment heuristic." We argue that this adjustment is comprised of a series of discrete miniadjustments coupled with hypothesis tests: People "jump" some amount from their original egocentric anchor and evaluate whether this new perspective plausibly captures the other's perception (Epley & Gilovich, 2001). If so, adjustment stops. If not, another jump is made to a perspective more discrepant from their own, and so on, until a plausible assessment is reached—one that accommodates the difference between one's own and another's perspective.

Like other judgmental heuristics, anchoring and adjustment simplifies the complicated assessment of another's perspective by substituting one's own perception and adjusting as needed. This model of perspective taking is therefore most likely to be engaged when one's own perspective is readily accessible but another's perspective must be inferred. It may apply less frequently to predictions of family or close friends whose perspectives are already well known and need not be inferred or for members of radically different outgroups for whom one's own perspective may seem irrelevant. Anchoring and adjustment may also apply less frequently to predictions of outgroups for which one's own perspective may seem irrelevant or for which one has highly accessible stereotypes (Ames, in press).

Although the anchoring and adjustment heuristic is clearly useful, the adjustments made from one's own perspective should tend to be insufficient—and give rise to egocentric biases—because they terminate once a plausible estimate is reached (Quattrone, 1982). This "satisficing" produces responses biased toward the egocentric side of the distribution of plausible estimates. This model differs from a simpler model of egocentric projection (Krueger & Clement, 1994) because of the effortful, deliberate, and serial adjustment process that moderates a more extreme egocentric perception. It also differs from more general correction models of human judgment that may work through a process of integration or substitution (e.g., Gilbert, 1989, 2002; Trope & Gaunt, 2000; Wegener & Petty, 1995) in that the present model clearly specifies the exact nature of the serial adjustment process and articulates a stop rule that can explain why adjustments tend to be insufficient. This model therefore builds on previous research by treating anchoring and (serial) adjustment as a literal description of perspective taking and not simply as a metaphorical description of a behavioral outcome (e.g., Krueger & Clement, 1995; Nickerson, 1999).

Although the anchoring and adjustment heuristic has been invoked to explain egocentric biases in perspective taking (Gilovich et al., 1998, 2000; Keysar & Barr, 2002; Nickerson, 1999), no direct evidence for this mechanism has been reported. The five experiments in this article were designed to provide such evidence by testing a set of predictions derived directly from this model. In particular, if perspective taking entails effortful serial adjustment from an egocentric anchor, then factors that inhibit or facilitate this process should increase or decrease egocentric biases. For example, diminishing the time allowed to render a judgment or taxing one's cognitive resources should lower the threshold for accepting an estimate as plausible and may therefore shorten the process of adjustment. In addition, if adjustment proceeds by testing a series of hypotheses increasingly discrepant from an egocentric anchor, then egocentric judgment should be influenced by factors that raise or lower individuals' threshold for accepting hypotheses.

This anchoring and adjustment model of adult perspective taking fits at least three empirical findings. First, manipulations that hinder people's ability to expend cognitive resources also diminish their ability to correct for biases in their immediate sensory experience. Individuals whose heads are tilted, for example, will judge straight lines as tilted if they are simultaneously distracted but will recognize the biasing influence of their tilted head and identify the line as straight if they are not distracted (Rock & Nijhawan, 1989). Similarly, people are more likely to use their chronic mood state as a guide for evaluating ambiguous stimuli when forced to respond quickly—an extraneous influence that diminishes when people respond at their leisure and are better able to correct for their mood's influence (Gilbert & Gill, 2000). Although this research was not directly concerned with perspective taking, we suspect that the psychological process of correcting one's perception to accommodate biasing sensory experiences may involve a process of adjustment very similar to that in our proposed model of perspective taking.

Second, measurements of people's eye gaze during perspective taking tasks reveal an egocentric anchor: People frequently fixate on locations that only an egocentric analysis would suggest. In one experiment, for example, participants followed another's instructions to move objects around a rectangular array of boxes (Keysar, Barr, Balin, & Brauner, 2000). Although most of the objects were visible to both participants, some were occluded from the "director's" view but easily seen by the "addressee." Most addressees initially interpreted the director's instructions egocentrically, looking at and occasionally reaching for objects that were visible only from their own perspective and only later looking at the mutually visible target.

Third, participants' self-reports of their perspective-taking efforts are consistent with an egocentric anchoring and adjustment account. In the only study we know of that presents such self-report data, participants were asked to don an embarrassing T-shirt (emblazoned with the image of John Tesh or Vanilla Ice) and asked to estimate the percentage of their peers seated in the room who would correctly identify the person pictured on their shirt (Study 3, Gilovich et al., 2000). Participants were obviously well aware of the person pictured on their shirt and, as a result, tended to overestimate the number of peers who would notice it as well—a phenomenon dubbed the Spotlight Effect. More important for our present purposes, 73% of participants reported considering another number before making their estimate, and of these, 72% reported considering a number higher than their final estimate. Because serial adjustments are deliberate and effortful, they should frequently be available to conscious awareness and thus appear in self-report data (Epley & Gilovich, 2001).

Our goals in this research were to go beyond previous work by directly testing whether people adopt others' perspectives by serially adjusting from their own and to explain why such adjustments tend to be insufficient. We conducted five experiments, each with a unique methodology, to provide converging evidence for our anchoring and serial adjustment account of adult perspective taking. These experiments go beyond previous work by precisely articulating the nature of the adjustment involved, by directly

documenting its existence, and by providing a mechanism to explain residual egocentric biases in adult perspective taking.

Study 1: Sarcastic Messages

Communication is often ambiguous. The same expression may be interpreted as either an insult or a compliment, as helpful or hurtful, as serious or sarcastic. Although listeners seem adept at decoding the underlying meaning of a speaker's ambiguous message (Keysar, 1994; Keysar & Barr, 2002), they may not be as adept as speakers think. Because speakers are aware of their own intentions, they may initially assume that their intentions are obvious and only subsequently adjust in a serial fashion to accommodate possible ambiguities.

This anchoring and adjustment account makes two predictions. First, individuals who have privileged information that clarifies the meaning of an ambiguous message should be aware of their need to adjust and therefore expect the communication's meaning to be less clear to people who do not have clarifying information. Second, because such serial adjustments are likely to terminate as soon as a plausible estimate is reached, egocentric biases should emerge. As a result, individuals with clarifying information should still overestimate the clarity of those messages to listeners without clarifying information.

We tested these predictions by presenting participants with messages ostensibly left on someone's answering machine. The messages were intentionally ambiguous and could be interpreted as either sincere or sarcastic. The ambiguity was resolved for participants by giving them clarifying information about the events leading up to the message, making it either clearly sincere or clearly sarcastic. Participants in the intention condition then indicated the speaker's intended meaning; participants in the interpretation condition anticipated how a person who lacked clarifying information would interpret the messages. We predicted that participants would recognize that the message would sound more ambiguous to listeners without the clarifying information and that responses in the interpretation condition would therefore be more moderate than in the intention condition. However, because adjustments tend to be insufficient, we expected egocentric biases to remain and predicted that participants would expect the speaker's intention to be clearest to uninformed listeners when it was clearest to them.

Method

Participants. Seventy-two undergraduates at the University of Chicago participated either for pay or partial fulfillment of a course requirement. Two participants were not native English speakers and were therefore excluded, leaving 70 in the following analyses.

Procedure. Twelve different scenarios described events in the life of "Tom Reton." Each scenario appeared in one of two versions, one describing a negative event and the other describing a positive event. For instance, one scenario described a recommendation that Tom received from his friend Steve about a comedy show:

> The other day, Tom was having dinner with two of his friends, Gina and Steve. Gina urged them to go see a new comedian whose show just opened in the area. "You've got to see him. I heard he's just hilarious."

Each scenario appeared in one of two versions, one describing a negative event and the other describing a positive event. For example, the positive event version of the comedian scenario ended with: "Tom thought it was a great show. He loved the comedian—in fact, he laughed so hard his stomach hurt." The negative event version ended with: "Tom followed her advice but hated the comedian. He thought the guy was arrogant and tedious."

After reading each scenario, participants listened to a tape-recorded message that Tom had ostensibly left on an answering machine. For both positive and negative event versions of the comedian scenarios, for example, participants heard Tom leave the following message:

> Steve, this is Tom. How are things going? By the way, remember that comedian Gina mentioned at dinner? I just saw him yesterday. All I can say is that you have to see him yourself to believe how hilarious he really is. Well, call me back when you get a chance and we'll make plans for the weekend.

We assumed that participants who read the negative event version (that Tom hated the comedian) would interpret the message as sarcastic but participants who read the positive event version (that Tom loved the comedian) would interpret it as sincere. In all of the scenarios, the negative event information implied that the proper interpretation of the message was that it was sarcastic.

The speaker's tone for all messages was relatively monotonous. The scenarios were carefully constructed to make it clear that the listener (e.g., Steve) would not have access to the clarifying information. The scenarios were presented in booklets, two per page. Each booklet contained all 12 scenarios, half with the positive event information and half with the negative event information. To avoid confounding the valence of the event information with the specific scenarios, we created two versions of the booklets—one with one random order of positive and negative event information and a second with its mirror image. These two versions therefore allowed positive and negative event information to be manipulated between participants for each of the 12 items. The order of the scenarios was determined by a coin flip, with the provision that no more than 3 scenarios of the same valence appear consecutively.

After reading each scenario and listening to its corresponding answering machine message, participants randomly assigned to the intention condition ($n = 30$) judged whether Tom intended the message to be sarcastic. Participants in the interpretation condition predicted whether the listener would interpret the message as sarcastic. Specifically, participants indicated whether the message was intended to be, or would be interpreted as, sarcastic by circling "YES," "MAYBE," or "NO."

Results and Discussion

We predicted that the event information participants read would influence their interpretation of the message left on the answering machine, leading participants who read a negative version of the event to perceive a more sarcastic message than participants who read a positive version. We also predicted that participants in the interpretation condition would recognize that the message would be less clear to uninformed listeners and so would use their own interpretation as an anchor and adjust away from it to account for the listeners' lack of information.

To test this prediction, we first coded *YES* responses (indicating the message was sarcastic) as 1, *MAYBE* as 0, and *NO* (indicating the message was not sarcastic) as –1. Then, for each participant, we averaged these scores across the six negative event scenarios and the six positive event scenarios, and submitted them to a 2 (condition: intention or interpretation) × 2 (event information: positive or negative) mixed model analysis of variance (ANOVA) with repeated measures on the last factor. This analysis yielded a significant main effect for event information, $F(1, 68) = 172.65$,

$p < .01$, qualified by the predicted interaction, $F(1, 68) = 15.86$, $p < .01$. Participants in the intention condition who read a negative scenario rated the message as more sarcastic ($M = .61$) than did those who read a positive scenario ($M = –.52$), $t(68) = 11.33$, $p < .01$. This difference remained, but was significantly smaller, among participants in the interpretation condition (Ms = .34 and –.27, respectively, $t(68) = 6.99$, $p < .1$). The adjustments for both information conditions were also significant. The mean sarcasm score was significantly lower in the interpretation condition than in the intention condition for negative information, $t(68) = 3.19$, $p < .01$, and it was significantly higher for the positive information condition, $t(68) = -2.84$, $p < .01$. These findings suggest that participants used their own interpretation of the ambiguous message as an anchor from which they adjusted to account for the uninformed listeners' lack of information.

We also predicted that participants would perceive the speakers' intention to be clearer to an uninformed listener (i.e., Steve) to the extent that the intention was clear to them. We tested this prediction by first subtracting, separately for each condition, the mean sarcasm score of the negative event version of each scenario from the mean sarcasm score for the positive event version. We then correlated, across scenarios, the magnitude of these difference scores in the intention and interpretation conditions. As expected, this analysis yielded a strong positive correlation between the difference scores in the intention and interpretation conditions, $r(10) = .70$, $p < .05$, indicating that scenarios that created a large difference between the perceived intention of the speaker in the positive and negative event versions also created large differences in the interpretation condition. In other words, participants thought the speaker's intention would be clear to uninformed listeners to the extent that the scenario made the speaker's intention clear to participants themselves.

These results are consistent with our claim that people adopt others' perspectives by adjusting from their own. Participants' interpretations of ambiguous messages, as measured by their judgments of the speaker's intention, were influenced by the background information they received. Participants realized that the speakers' intention would be less clear to listeners who did not have access to the same background information and therefore adjusted from their interpretational anchor to accommodate this informational difference.

Note that these results also indicate that participants' adjustments were insufficient: Participants in the interpretation condition who read negative scenarios thought that uninformed listeners would interpret the messages as somewhat more sarcastic than participants who read positive scenarios. Such insufficiency is a common, albeit not inevitable, result of serial adjustment (Epley & Gilovich, 2004a, 2004b; Tversky & Kahneman, 1974). As we directly address in Study 5, such insufficient adjustment can explain why perspective taking tends to be egocentrically biased.

Study 2: Under Pressure

We sought more direct evidence for adjustment in Study 2 by both measuring and manipulating the amount of time involved in perspective taking. Adjustment takes time because it involves evaluating hypotheses ever further from an original anchor or starting point (Epley & Gilovich, 2001). Responses made under time pressure should therefore be closer to the egocentric anchor than leisurely responses. In addition, participants should respond more quickly when rendering a judgment that is consistent with their own perspective (because it requires little or no adjustment) than when rendering one that is inconsistent (because it requires more adjustment). We tested these hypotheses in Study 2.

The procedure in Study 2 was similar to that in the interpretation condition in Study 1. Participants read 12 scenarios—half describing a negative event and half describing a positive event—and estimated whether an uninformed listener would interpret the message as sincere or sarcastic. Some participants made these judgments at their leisure, as in Study 1; others made them under time pressure. If perspective taking involves serial adjustment from the anchor of one's own perspective, then limiting the time allowed for adjustment should result in judgments closer to one's own perspective. We therefore expected hurried participants to be more egocentric than unhurried participants.

We also measured the speed with which participants rendered their judgments. If people engage in an effortful, time-consuming process of serial adjustment, then they should take longer to conclude that others will see the world differently than to indicate that others will see it similarly. We therefore predicted that hurried participants would take less time to indicate that uninformed listeners would share their interpretation than to indicate that they would have a different interpretation.[1]

Method

Participants. Ninety-six undergraduates at the University of Chicago participated either for pay or for partial fulfillment of course credit. All were native English speakers.

Procedure. Study 2 used the same 12 scenarios and messages as Study 1, each accompanied by either negative or positive event information. All participants evaluated whether an uninformed listener would perceive a message as sarcastic (yes or no).

The procedure was similar to Study 1 except that the scenarios were presented on a computer screen rather than in booklets. After reading each scenario, participants pressed a key that removed the scenario from the screen and played the answering machine message over headphones. Because response latency was an important variable in this experiment, each message was divided into two parts to more carefully isolate the key components. The first part of the message included the potentially sarcastic phrase (e.g., "you have to see him yourself to believe how hilarious he really is") and was immediately followed by a beep intended to prompt the participant's judgment. Participants indicated whether the message would be interpreted as sarcastic by pressing keys labeled either "yes" or "no."[2] After responding, participants heard the second part of the message that included the concluding remarks (e.g., "well, call me back when you get a chance, and we'll make plans for the weekend").

Before starting the computer program, the experimenter encouraged all participants to take their time reading each scenario. Participants randomly assigned to the leisurely condition ($n = 48$) were then instructed—in

[1] Response times in the leisurely condition are not analyzed because they are less diagnostic of the actual judgment process than response times in the hurried condition. Long response times in the leisurely condition include not only the time spent to arrive at a judgment but also subsequent deliberations and other extraneous noise that is absent in the hurried condition.

[2] Because we were interested in the speed with which participants provided expectancy-consistent versus expectancy-inconsistent responses, Study 2 did not include the "maybe" response option from Study 1.

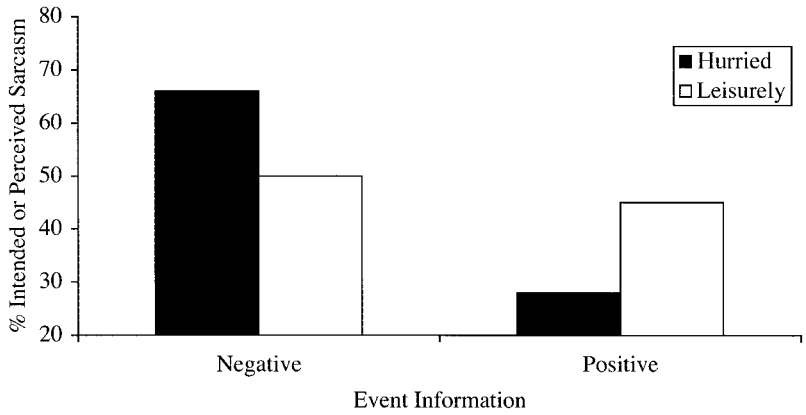

Figure 1. Percentage of hurried and leisurely participants who expect a sarcastic interpretation after receiving positive or negative event information (Study 2).

standardized fashion on the computer—to consider their judgments carefully and respond at their leisure. Participants in the hurried condition were instructed to make their judgments as soon as they could following the beep and were told that they had 3 seconds in which to answer. If they failed to respond within the time limit, a second beep sounded and the next scenario appeared.[3]

Results and Discussion

Fewer than 1% of the data points were missing because of keyboard errors, and none of the participants under time pressure failed to respond within the 3-second deadline.

Our key prediction was that participants under time pressure would be more egocentric than those who responded at their leisure. To examine this prediction, we created two sarcasm scores for each participant by averaging their predictions ("yes" coded as 1, "no" coded as 0) for the six positive scenarios and the six negative scenarios. These scores indicated the percentage of communications in each condition that participants expected would be perceived as sarcastic. We then submitted these scores to a 2 (time pressure: hurried or leisurely) $\times$ 2 (scenario: positive or negative) mixed model ANOVA. This analysis yielded a significant main effect for scenario, $F(1, 94) = 39.6$, $p < .01$, indicating that those who received negative event information believed that others were more likely to detect sarcasm than those who received positive event information (see Figure 1).

More important, there was also a significant interaction, $F(1, 94) = 23.75$, $p < .01$, indicating that hurried participants were more egocentric than unhurried participants. Participants who read about negative events thought listeners were more likely to interpret the messages as sarcastic when they were under time pressure ($M = 66\%$) than when they were not ($M = 50\%$), $t(94) = 2.97$, $p < .01$. In contrast, participants who read about positive events thought listeners were less likely to interpret the messages as sarcastic when they were under time pressure ($M = 28\%$) than when they were not ($M = 45\%$), $t(94) = 3.80$, $p < .01$.

Additional evidence of adjustment comes from hurried participants' response times. Recall that we predicted longer response latencies for perspective-inconsistent responses than for perspective-consistent responses because an inconsistent response requires more adjustment (and hence more time) than a consistent response. As expected, perspective-inconsistent responses (responding "no" after receiving negative event information or "yes" after receiving positive event information) were made more slowly ($M = 1{,}013$ ms) than perspective-consistent responses ($M = 820$ ms), $t(11) = 3.61$, $p < .01$.[4]

One additional finding—or, rather, lack of a finding—warrants discussion. In contrast to Study 1 and past research using similar stimulus materials (Baldwin & Keysar, 1998; Keysar, 1994, 1998; Weingartner & Klin, 2001), participants in the leisurely condition (the white bars in Figure 1) did not exhibit a significant egocentric bias, $t(47) = 1.03$, $p = .31$. Although the findings of this experiment are consistent with serial adjustment from an egocentric anchor, this particular finding might seem inconsistent with a general tendency for *insufficient* adjustment. We suspect this occurred because participants in the leisurely condition were explicitly instructed to take their time rather than having received no instructions regarding pace, as in previous experiments. Because adjustment takes time, instructions to respond leisurely should increase adjustment because it diminishes the need to accept quickly a response as a plausible estimate for another's perception. Indeed, the amount of time involved in perspective taking is one of several moderators of egocentric biases that we address in the General Discussion.

The results of this study further support our contention that adult perspective taking follows a process of anchoring and serial adjustment. Because adjustment from one's own perspective takes time, hurried participants adjusted less and were consequently more egocentric than those who responded at their leisure. In addition, hurried participants responded more quickly when indicating that others would share their interpretation than when indi-

[3] Participants received several memory quizzes during the experiment to ensure that they attended carefully to the scenarios. Participants knew that they would occasionally be tested about the details of the scenarios but did not know when. All participants performed well on the quizzes (each above 80% accuracy).

[4] Not all participants provided a response in each of these four cells. As a consequence, this analysis is done at the level of the item across the 12 scenarios.

cating that others would have a different interpretation, presumably because the former involves less adjustment than the latter.

If, as these results indicate, hindering people's ability to expend attentional resources systematically shortens adjustment, then motivating people to expend *additional* resources should increase adjustment and produce less egocentric judgments. We examined this possibility in Study 3 by offering people a monetary incentive for accurate assessments. Although it is well known that incentives for accuracy do not influence many of the most well-known anchoring effects (e.g., Tversky & Kahneman, 1974; Wilson, Houston, Etling, & Brekke, 1996; Wright & Anderson, 1989), this is because most anchoring effects involving anchors provided by an experimenter or some other external source do not bias judgment through a process of insufficient adjustment but rather through a process of biased hypothesis testing and the selective recruitment of anchor-consistent information (for reviews see Chapman & Johnson, 2002; Epley, 2004). We have shown elsewhere that true adjustment from "self-generated" anchors known to be close to the right answer but wrong *is*, in fact, increased when participants are provided incentives for accuracy (Epley & Gilovich, 2004b). We thus expected participants in Study 3 to be less egocentric, and therefore more accurate, in adopting another's perspective when they were given financial incentives to do so.

Study 3: Cola Wars

We conducted a taste test to examine our hypotheses. Participants tasted two unmarked drinks, one containing Coca-Cola (Coke; Coca-Cola Company, Atlanta, GA) and the other Pepsi-Cola (Pepsi; PepsiCo, Purchase, NY). Before tasting the drinks, participants were told the identity of the beverages. As with the clarifying information in Study 2, we assumed that informing participants of the drinks' identities ahead of time would lead them to taste a difference between them—a difference that would not be apparent to those uninformed of the identities. Indeed, in a pilot test of this assumption, 85% of students in the condition informed of the drinks' identities ($N = 27$) believed they could have correctly distinguished between the drinks even if they had not been informed—a figure that differed substantially from the 50% accuracy rate actually obtained from a sample of uninformed participants ($N = 32$), $\chi^2(1, N = 59) = 8.09$, $p = .004$.

Participants in this experiment were asked to estimate the percentage of their peers who, uninformed of the drinks' identities, would be able to distinguish between Coke and Pepsi. On the basis of the results of Study 1, we assumed that participants would recognize that uninformed peers would have a harder time identifying the difference than they would themselves and that they would thus need to adjust from an initially high percentage ("it's obvious—everyone will taste the difference") to a more moderate estimate.

We manipulated participants' motivation to engage in adjustment by offering half of them a financial incentive for accuracy. Because serial adjustment requires effortful thought, we predicted that those offered a financial incentive would exert more effort, and therefore be less egocentric, than those who were not offered an incentive. In particular, we predicted that participants offered an incentive would expect a lower percentage of uninformed peers to identify the drinks correctly.

Method

Sixty-one University of British Columbia (Vancouver, British Columbia, Canada) students were approached as they exited a university dining hall and asked if they would be willing to take part in a brief taste test in exchange for a chocolate bar. Participants were told that they would taste two colas—one Coke and one Pepsi—from two different cups labeled "A" and "B." After learning the identities of the two colas and tasting each of them, participants were told that some participants in this experiment would remain uninformed about the identities of the drinks before tasting them.[5] Participants then estimated the percentage of these uninformed participants who would correctly identify the two drinks. Before making these estimates, participants randomly assigned to the incentive condition ($n = 31$) were told that the participant who made the most accurate estimate would receive a $50 gift certificate to the University of British Columbia bookstore—with a tie being resolved by a random drawing. Participants in the no incentive condition were not offered this incentive. Finally, participants indicated whether they themselves could taste the difference between the two colas.

Results and Discussion

Most participants in the control condition (79%, 95% confidence interval = 61%–92%) and in the incentive condition (84%, 95% confidence interval = 66%–95%) believed they could taste the difference between the two drinks—substantially more than the 50% of uninformed participants in the pretest who could distinguish the two drinks.

Our key prediction concerned participants' beliefs about the ability of uninformed participants to correctly identify the two drinks. As predicted, participants offered an incentive for accuracy estimated that uninformed tasters would be less likely to identify the two drinks correctly ($M = 54.4\%$) than did participants not offered an incentive ($M = 64.8\%$), $t(59) = 2.60$, $p < .01$. The estimates made by those offered a financial incentive were not only more conservative, but their proximity to the 50% accuracy rate obtained in the pretest indicates they were more accurate as well. Participants not offered an incentive overestimated the likelihood that uninformed tasters—represented by the 50% accuracy in the pretest—would be able to taste the difference, $t(29) = 4.55$, $p < .01$, whereas participants who were offered an incentive did not, $t < 1$. These results offer further evidence that people adopt others' perspectives by initially anchoring on their own perception and then effortfully adjusting for differences between themselves and others.

Study 4: Backmasked Messages

Our account specifies that people adjust from their own perspective to adopt another's by evaluating a series of hypotheses ever further from their own perspective until they reach a value that plausibly captures the other person's point of view. If so, then influencing individuals' willingness to accept these tentative hypotheses ought to influence the magnitude of egocentric biases that emerge when people adopt another person's perspective.

[5] The order in which participants were informed about the identities of the colas as well as the order in which they drank them were counterbalanced. Neither order manipulation influenced any of the results in this experiment, however, and so we collapsed across these conditions.

To influence this willingness, we asked participants in Study 4 to nod or shake their heads while trying to adopt another person's perspective. Nodding one's head while evaluating a proposition makes one more likely to accept the proposition, whereas shaking one's head makes one less likely to accept it (Forster & Strack, 1996, 1997; Wells & Petty, 1980). These head movements have this effect because they serve to validate one's thoughts in a manner consistent with the everyday implications of these head movements (Brinol & Petty, 2003). Individuals assessing whether a persuasive message is true, for instance, are more likely to confirm this assessment when nodding their heads up and down (subtly suggesting that, yes, it is true) than when shaking their heads from side to side. When adopting another's perspective, we predicted that participants' head movements would serve to validate plausible estimates that come to mind early in the process of adjustment.

Indeed, head nodding and shaking was used in previous research to confirm the operation of serial adjustment in numerical anchoring tasks (Epley & Gilovich, 2001). For example, most people do not know when George Washington was first elected President of the United States, but they readily estimate the year by anchoring on 1776 and adjusting to a later date. In one experiment, participants thought Washington was elected President earlier when they made their estimate while nodding their heads up and down than while shaking them from side to side. Similarly, we predicted in this experiment that participants engaged in head nodding would accept hypotheses earlier in the adjustment process, and thus be more egocentric, than participants engaged in head shaking.

Participants in this experiment listened to a short segment, in reverse, from the Queen (1980/1991) song, "Another One Bites the Dust" (interested readers are encouraged—*before* reading further—to listen to this clip at http://gsbwww.uchicago.edu/fac/nicholas.epley/research/clip.html). The chorus of this song has long been used to support the claim that rock and roll bands "backmask" illicit or immoral statements into their music in an attempt to influence listeners (Vokey & Read, 1985). Proponents of this view report being able to hear the phrase "It's fun to smoke marijuana" when the chorus from "Another One Bites the Dust" is played backward. This prodrug message, however, is not produced by the subversive actions of the artists but by the creative interpretations of listeners, specifically by the human tendency to create order out of randomness. Knowing what to listen for further facilitates this tendency.

Accordingly, before listening to the critical selection, approximately half of our participants were told to listen for the phrase "It's fun to smoke marijuana." The other half were told nothing. The selection played for participants is sufficiently unclear to ensure that very few (if any) of those who were not told about the critical phrase would hear it on their own, but virtually everyone told about the phrase in advance would have no difficulty detecting it. After listening to the selection, participants estimated the percentage of their peers who, told nothing about the selection, would be able to hear the critical phrase. Approximately half estimated while nodding their heads and half while shaking their heads.

We made three predictions. First, participants informed about the critical phrase would hear the backmasked message more clearly than those who were uninformed. Second, participants would be egocentric: Informed participants would expect a higher percentage of their (uninformed) peers to hear the phrase than would uninformed participants. Third, and most important, participants' head movements would moderate their egocentrism: Participants nodding their heads would be more egocentric than participants shaking their heads. We expected informed participants to start with a high egocentric anchor (e.g., "everyone will hear it") and adjust downward to account for their private information (e.g., "but they weren't told about the hidden message beforehand"). Because head nodding leads people to accept values earlier in the process of adjustment than head shaking (Epley & Gilovich, 2001), we expected informed participants who were nodding their heads to provide higher estimates than those shaking their heads. In contrast, we expected uninformed participants to start with a low anchor ("nobody will hear it") and adjust upwards because the experimenter explicitly told them that at least "some" people report hearing the phrase. Stopping the adjustment process early in this context would lead to lower estimates, and thus we expected uninformed participants who were nodding their heads to provide lower estimates than those shaking their heads.

Method

Fifty-three Cornell University undergraduates participated in exchange for extra credit in their psychology or human development courses. On arrival at the laboratory, the experimenter informed all participants that this was a study of product evaluations being conducted in conjunction with the Marketing Department at Cornell University (Ithaca, NY). The experimenter explained that participants would evaluate a pair of headphones and would be asked, at some point in the experiment, to simulate common head movements one might make while wearing these headphones—either nodding one's head up and down or shaking it from side to side.

Participants listened to the Queen song as well as the critical dependent measures over the headphones. To justify this procedure and eliminate any apparent connections between the head movements and critical questions, the experimenter explained that he wished to examine "implicit evaluations [that people] form without conscious intention or effort." He thus needed to busy participants with another task while they were evaluating the headphones, in this case listening to the music and questions on the tape.

Once the procedure was clear, participants were first played the critical segment from Queen's "Another One Bites the Dust" as it was originally recorded (i.e., forward). Participants randomly assigned to the informed condition were then told that they would be asked to listen to this same selection backward and that some people report being able to hear the words "It's fun to smoke marijuana." These informed participants then listened to the selection three times, each time being reminded to listen carefully for the critical phrase. Participants assigned to the uninformed condition, in contrast, received no information about the reported content of the backward selection and listened to it only once.

After listening to the backward selection, all participants were asked to move their heads either up and down or from side to side (following the experimenter's demonstration) while they listened to a series of questions over their headphones. The first question informed all participants (some for the first time) that some people report hearing the words "It's fun to smoke marijuana" when the chorus from "Another One Bites the Dust" is played backward. Participants then indicated (verbally) whether they heard those words (yes or no) and how clearly they heard them on a scale ranging from 0 (*completely unclear*) to 100 (*completely clear*). All participants were then asked to imagine that "we played the backwards selection to 100 Cornell University psychology students without giving them any information about its source or what might be contained within the selection" and to estimate the percentage who would indicate being able to hear the critical phrase.

Results and Discussion

We expected the backward selection to sound very different to informed and uninformed participants. Indeed, nearly everyone in the informed condition (88%—all but 3) reported being able to hear "It's fun to smoke marijuana," whereas none (0%) in the uninformed condition did so, $\chi^2(1, N = 53) = 42.20$, $p < .01$. Not surprisingly, participants in the informed condition also rated the phrase as more clear ($M = 58.46$) than did those in the uninformed condition ($M = 9.26$), $t(51) = 11.25$, $p < .01$. Participants' head movements did not influence responses to these questions either across or within the informed and uninformed conditions (all ts < 1).

We also expected informed participants to estimate that a higher percentage of their peers would hear the phrase than participants who were uninformed. However, we expected this effect to be qualified by an interaction with participants' head movements. Participants who were nodding their heads should be more egocentric and give more extreme responses than participants who were shaking their heads. As predicted, a 2 (knowledge: informed versus uninformed) $\times$ 2 (head movement: nodding versus shaking) ANOVA yielded a significant main effect for knowledge, $F(1, 49) = 29.34$, $p < .01$, qualified by the predicted significant interaction, $F(1, 49) = 4.10$, $p < .05$. As can be seen in Figure 2, participants in the informed condition expected a higher percentage of peers to hear the phrase when they were nodding their heads ($M = 55\%$) than when they were shaking their heads ($M = 44\%$). As predicted, this difference was reversed among participants in the uninformed condition who expected a smaller percentage of peers to hear the phrase when they were nodding their heads ($M = 16\%$) than when they were shaking their heads ($M = 28\%$). Neither of these simple effects, however, were statistically significant, ts(49) = 1.38 and 1.62, ps = .18 and .12, respectively.

These results provide further evidence that people adopted others' perspectives by serially adjusting from their own. Participants informed about the critical phrase expected a higher percentage of their peers to hear the phrase than participants who were told nothing about the phrase. The effect of the head movement manipulation suggests that those in the informed condition were adjusting downward from a relatively high anchor, whereas those in the uninformed condition were adjusting upward from a low anchor. Head nodding produced higher estimates in the informed condition but lower estimates in the uninformed condition compared with head shaking, consistent with a shortened process of serial adjustment.

Study 5: Satisficing

The preceding four experiments support our claim that people often adopt others' perspectives by serially adjusting from their own. What they do not establish is why such adjustments are often insufficient. One interesting possibility was suggested by Quattrone (1982), who argued that serial adjustment is typically characterized by some degree of "satisficing." That is, given the uncertainty surrounding the true value being estimated, people are likely to have a range of values they would consider to be plausible estimates. In the absence of sufficient motivation for accuracy, people are likely to terminate adjustment once a plausible estimate is reached—arriving at a satisfactory estimate rather than the most accurate estimate. Because adjustments terminate at the boundary of the range of plausible values closest to the original (egocentric) anchor, they tend to be insufficient (see also, Epley & Gilovich, 2004a; Mussweiler & Strack, 2001). This satisficing account of serial adjustment is consistent with the effects of time pressure and incentives observed in Studies 2 and 3, but these studies do not test this account directly. We sought to do so in Study 5.

If this satisficing account provides an accurate description of the stop rule for serial adjustment when people try to adopt another's perspective, then participants' estimates of others' perceptions should be skewed toward the egocentric side of their range of plausible estimates. To test this possibility, we asked participants in Study 5 to estimate whether others would interpret an ambiguous message as sincere or sarcastic, as in Studies 1 and 2. As before, all participants received privileged positive or negative background information that clarified the intended meaning of the message. This time, however, only half of the participants (those in the answers condition) estimated the number of uninformed peers who would interpret the message as sincere versus sarcastic. The other half of the participants (those in the ranges condition) stated the range of values they found to be subjectively plausible by

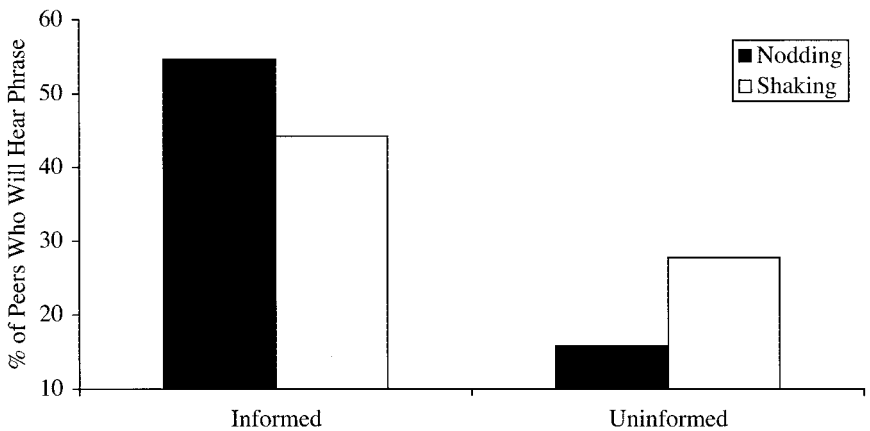

Figure 2. Estimated percentage of peers who would hear the "backmasked" phrase among informed and uninformed participants who were either nodding or shaking their heads (Study 4).

estimating the upper and lower bounds on the number of uninformed peers who would interpret the message as sincere versus sarcastic.[6] We predicted that the point estimates provided by participants in the answers condition would be skewed toward an egocentric response within the range of plausible values provided by participants in the range condition. Not only would such a result illuminate the stop-rule for serial adjustment, but it would also provide additional evidence in support of our serial adjustment account of adult perspective taking.

We also sought to investigate our satisficing account of adjustment more fully by including a time pressure manipulation. Study 2 demonstrated that time pressure shortened the process of adjustment, and we believe it did so (like incentives in Study 3 and head movements in Study 4) by influencing participants' threshold for accepting a value as a plausible estimate during the course of serial adjustment. We tested this possibility in Study 5 by placing half of the participants under time pressure to provide their responses. As in Study 2, we expected this manipulation to produce more extreme responses among those in the answers condition. We made no predictions about the influence of time pressure on participants' ability to generate plausible estimates, as any result would be informative. On the one hand, if time pressure influences point estimates but not range estimates, this would suggest that range estimates are made by some process other than serial adjustment. This pattern would suggest that time pressure influences participants' threshold for accepting any particular value as a plausible estimate only while engaging in adjustment. On the other hand, if time pressure influences both point estimates and range estimates, then this suggests that it influences what participants find to be plausible estimates rather than simply the threshold for accepting a value as plausible during the course of adjustment.

Method

Seventy-eight Harvard University (Cambridge, MA) undergraduates participated in exchange for $6 or research credit in one of their psychology courses. The procedure was the same as that in Study 1, with the following exceptions. First, all materials were presented on a computer rather than in booklets. An audio file of the experimenter reading the materials was presented along with the text on the computer screen to ensure that all participants attended to the instructions and scenarios. Second, the ambiguous messages were presented as e-mail messages rather than telephone messages, primarily to simplify the experimental procedure but also to increase the variety of experimental manipulations. Third, 10 scenarios involving ambiguous messages were used instead of 12 to allow 2 of the earlier scenarios from Study 2 to be used as practice items. This was deemed necessary in order to familiarize participants in the ranges condition with their task. Of these 10 items, half included positive event information intended to make the message appear sincere and half included negative event information to make it appear sarcastic. Scenarios were presented in one random order or its mirror image, resulting in two counterbalanced versions. Fourth, half of the participants were placed under time pressure. These participants were asked to respond as quickly as possible and were told that they would be timed out in 3 seconds if they had not yet responded.

Fifth, and most important, participants were randomly assigned to one of two response conditions. After reading the scenario and e-mail message, those in the answers condition were asked to imagine that "100 people were asked to read Tom's e-mail message" and to estimate the "percentage of these people who would interpret the message as sincere versus sarcastic." Responses were made on an 11-point scale ranging from *100% sarcastic* to *100% sincere,* with the midpoint labeled *50/50.* Participants in the ranges condition were also asked to imagined that 100 people were asked to read Tom's e-mail message but to estimate upper and lower bounds on the percentage of people who "would plausibly interpret the message as sarcastic versus sincere." During the two practice trials, the experimenter told these participants that their ranges could be as wide or as narrow as seemed appropriate for each particular item.

Results and Discussion

This study was designed to investigate two issues: (a) whether participants under normal circumstances stop adjusting once they reach a plausible estimate and (b) whether time pressure influences the threshold for accepting a value as a plausible estimate or shifts the range of estimates that appear plausible while under time pressure. Because these are distinct research questions, we report analyses of the control participants first and present the results of the time pressure manipulation second. To ease interpretation of all analyses, the dependent measures are reported in terms of the percentage of participants who would interpret a message as sincere.

Answers versus ranges. As in the previous studies, participants' assessments in the control condition were egocentrically biased. Participants estimated that a smaller percentage of their peers would interpret a message as sincere when it was preceded by negative event information ($M = 60.78\%$) than when it was preceded by positive event information ($M = 78.11\%$), paired $t(17) = 3.70$, $p < .01$.

Our main prediction, however, was that control participants' point estimates in the answers condition would be skewed toward the egocentric end of the ranges provided by participants in the ranges condition, consistent with a process of adjustment from an egocentric anchor that terminates once a plausible estimate is reached. As can be seen in Table 1, this prediction was strongly confirmed. When considering negative event information, participants' answers were skewed toward a sarcastic response within the ranges provided by participants in the range condition. That is, answers did not differ from the lower boundary closest to the sarcastic end of the scale, $t(35) = 0.29$, $p = .77$, but they were significantly lower than the upper boundary, $t(35) = -2.53$, $p < .05$. The opposite occurred when participants were considering positive event information: Answers did not differ from the upper boundary closest to the sincere end of the scale, $t(35) = -0.05$, $p = .96$, but were significantly higher than the lower boundary, $t(35) = 3.18$, $p < .01$.

These results suggest that people stop adjusting once they reach an estimate that appears plausible. Because this estimate terminates at the egocentric end of the range of plausible values, adjustments tend to be insufficient. Note that the overlap in the ranges provided by participants in our ranges condition is substantial, being shifted over by a mere 5%. This indicates that simply adjusting further into the range of plausible values would yield more accurate estimates and mitigate the pronounced egocentric biases in perspective taking.

[6] This between-participants manipulation of answers versus ranges (rather than within-participants) was used to avoid the possibility that generating an answer would influence the generation of a plausible range, or vice versa.

Table 1
Average Point Estimates and Ranges Provided by Participants in the Control and Time Pressure Conditions (Study 5)

Condition	Answer estimate	Range	
		Low	High
Control			
Negative event information	60.77_a	59.26_a	73.16_b
Positive event information	78.11_a	64.10_b	78.32_a
Time pressure			
Negative event information	44.30_a	58.63_b	73.05_c
Positive event information	83.10_a	64.95_b	78.21_a

Note. Means that do not share the same subscript within rows differ at $p < .05$.

Time pressure. Our secondary goal in this experiment was to study the impact of time pressure on participants' answers and plausible ranges.[7] Because participants in the answers condition provided only one response, whereas those in the ranges condition provided two, responses from these two conditions are analyzed separately and compared with *t* tests wherever appropriate. As can be seen in Table 1, time pressure produced stronger egocentric biases among participants in the answers condition, replicating the results of Study 2. A 2 (time pressure: yes vs. no) × 2 (background information: positive versus negative) ANOVA with repeated measures on the last factor yielded a main effect for background information, $F(1, 38) = 58.84$, $p < .01$, qualified by the predicted interaction, $F(1, 38) = 8.60$, $p < .01$. When considering negative background information, participants under time pressure thought a smaller percentage of participants would interpret the message as sincere than participants not under time pressure (*M*s = 44.30 and 60.77, respectively), $t(38) = -2.46$, $p < .05$. When considering positive background information, in contrast, participants under time pressure thought a larger number of participants would interpret a message as sincere than participants not under time pressure (*M*s = 83.10 and 78.11, respectively), although this latter difference was not significant, $t(38) = 1.44$, $p = .16$.

Interestingly, the impact of time pressure on participants' answers was not matched by an influence on the ranges provided by participants in the range condition (see Table 1). A 2 (time pressure vs. no time pressure) × 2 (background information: positive versus negative) × 2 (boundary estimate: low versus high) ANOVA with repeated measures on the last two factors yielded only two main effects. The first significant main effect was for background information, $F(1, 36) = 9.67$, $p < .01$, indicating that participants' ranges were still somewhat egocentrically biased. The second significant main effect was for boundary estimate, $F(1, 36) = 237.29$, $p < .01$, indicating that the lower boundary of these ranges was—no surprise—lower than the higher boundary. Neither the main effect for time pressure nor any interactions approached significance. The differential impact of time pressure in the answers versus ranges conditions suggests the operation of very different mental processes in these two conditions. Those searching for a single answer appeared to be engaging in serial adjustment whereas those generating a range of plausible values were not.

The differential impact of time pressure on responses in the answers and ranges conditions also resulted in answer participants in the hurried condition providing answers that fell *outside* their counterparts' range of plausible values. This may have occurred because adjustment from an egocentric anchor requires participants to consider the plausibility of highly egocentric responses, whereas generating a range of plausible values does not. Those generating an answer under time pressure may therefore have seized on an egocentric estimate considered early in the course of adjustment that those generating a range of plausible values under time pressure did not even consider because they had approached their task by invoking rather different mental processes. Regardless of the exact cause, these results make it clear that time pressure influences the threshold for accepting a value as a plausible estimate while engaging in serial adjustment, but it does not cause a shift in the range of values considered plausible.

In addition to providing further evidence for our anchoring and adjustment account of adult perspective taking, these results are also at variance with an alternative interpretation of our data based on an inappropriate weighting or integration of information (e.g., Trope & Gaunt, 2000). That is, in each of the preceding studies, people had two pieces of information to think about when adopting others' perspective—their own perception of a stimulus *and* information that others would likely perceive the stimulus differently than they did. Egocentric biases would emerge if participants gave the second piece of information less weight than the first. Notice, however, that such a weighted integration model does not predict the results of this last study. Instead, inappropriate weighting should produce estimates roughly centered within participants' range of plausible values because whatever weighting formula is followed should influence estimates of the upper and lower bounds in the same way it influences the point estimates themselves. The skewed estimates observed in this study, in contrast, are both predicted and readily explained by a process of serial adjustment that stops once a plausible estimate is reached. People tend not to adjust far enough, it appears, because they stop once they reach an estimate that is simply good enough.

General Discussion

Perspective taking is central to social interaction. Teachers, lovers, parents, and nearly everyone involved in social relationships base their actions, at least in part, on their understanding of others' perspective. But an accurate understanding of others' perspective can be hard to achieve. Everyday experience and psychological research demonstrates that people tend to overestimate the extent to which others will perceive the world as they do—that teachers often overestimate the clarity of their lectures, lovers the clarity of their emotions, and parents the clarity of their instructions. In short, perspective taking is often egocentrically biased.

We sought to understand the processes responsible for these egocentric biases in perspective taking. The results of five studies support our contention that people adopt others' perspectives by initially anchoring on their own perspective and subsequently adjusting to account for differences between themselves and others. Consistent with this anchoring and adjustment process, participants' judgments about others' perceptions of an ambiguous

[7] All participants in the time pressure condition responded within the 3-second response window.

stimulus were correlated with, but were more moderate than, their own perceptions (Study 1). Because adjustment requires both time and mental effort, participants became more egocentric when under time pressure (Study 2) and less egocentric when provided incentives for accuracy (Study 3). Participants were also more egocentric when simultaneously performing actions that induce acceptance (nodding their heads) than when performing actions that induce rejection (shaking their heads; Study 4), indicating that head nodding led participants to accept hypotheses encountered early in the adjustment process, whereas head shaking led them to reject those hypotheses and adjust further (see also Epley & Gilovich, 2001; Forster & Strack, 1997; Wells & Petty, 1980). Finally, participants' estimates of others' perceptions fell on the outskirts of the range of plausible perceptions—too close to an egocentric anchor—as implied by our thesis that participants adopt a satisficing strategy when serially adjusting from their own perspective, stopping when they reach a plausible value (Study 5).

More generally, these results suggest that perspective taking operates through a multistage process. Initially, people anchor on their own perspective, presumably because it is often highly accessible. In the absence of clear evidence that another person will see the world differently, perspective taking ends there with people assuming that others will perceive the world as they do (Ross & Ward, 1996). However, when others are known to be in different situations, from different backgrounds, or in possession of different knowledge, such *naive realism* is simply untenable. In these cases, as in the experiments reported in this article, it is clear from the outset that one's own perspective is not shared and adjustment is required. Although this subsequent adjustment process may take several forms, the data we report here and elsewhere suggest that it operates through a series of hypothesis tests ever further from the original anchor value. The original egocentric anchor is rejected, some "jump" is made to a nearby hypothesis, and its plausibility assessed. If the new hypothesis seems too egocentric, another jump is made, another value assessed, and so on until an acceptable hypothesis is reached. The results of each experiment reported in this article are consistent with this model, and Studies 4 and 5 in particular highlight the serial nature of adjustment in perspective taking.

Although such adjustment is helpful—inducing less egocentrism than one would see without it—it is not perfect. We observed egocentrically biased judgments—suggesting insufficient adjustment—in all but two conditions of our five experiments: when participants were encouraged to take their time and respond at their leisure when estimating an uninformed person's interpretation of an ambiguous communication (Study 2) and when participants were offered a financial incentive for accurately estimating the percentage of uninformed people who could taste a difference between Coke and Pepsi (Study 3).

Insufficient adjustments, and resulting egocentric biases, are likely to occur for at least two reasons (Epley & Gilovich, 2004a, 2004b). First, in the absence of a strong motivation for accuracy, many judgments likely terminate as soon as an acceptable response is generated. This satisficing leads people to accept one of the early (and, in this case, egocentric) plausible values they encounter in the course of adjustment. Because adjustments tend to stop as participants reach the edge of their range of plausible values, they tend to be insufficient (Mussweiler & Strack, 2001; Quattrone, 1982). Study 5 tested this hypothesis directly and demonstrated that participants' estimates of others' perceptions are not centered within a range of plausible values but rather skewed toward an egocentric response. Second, serial adjustment requires cognitive resources that are often in short supply, generally leading people to accept hypotheses they might reject under leisurely or unencumbered circumstances. Together, satisficing and limited cognitive resources make insufficient adjustment the rule rather than the exception, causing perspective taking to be egocentrically biased.

One may wonder, however, whether the tendency to adopt another's perspective by adjusting from one's own is limited to the particular kinds of judgments or domains sampled in our experiments. For example, most judgments in these experiments were made along some continuous scale (e.g., the likelihood of a particular interpretation or the percentage of peers who would identify an ambiguous phrase). Perhaps serial adjustment of the kind we have identified only occurs along such ordinal dimensions and does not characterize dichotomous or multicategorical judgments where serial adjustment may be less natural and harder to employ. "Do they understand?" "Do they know how I feel?" "Are they noticing me?" To be sure, it makes little sense to talk about serial adjustment along continuous dimensions that do not exist. However, notice that many of these multicategorical or dichotomous responses are built on underlying continuous assessments (Tversky & Koehler, 1994). How *likely* is it that they understand? How *well* do they understand how I feel? How *many* people are noticing me? Indeed, this is precisely what we contend happened with the dichotomous and multicategorical judgments rendered in Studies 1 and 2. Although the final judgment in these studies may have involved categorical distinctions, we suspect they rest on the same sort of continuous assessments rendered in Studies 3, 4, and 5. The anchoring and adjustment model we are proposing, then, may apply much more broadly than it might initially appear.

This does not mean, of course, that there are no boundary conditions to this model of perspective taking. For example, it is reasonable to assume that people engage in such anchoring and adjustment only when it is clear that one's self is a reasonable starting place in estimating others' perspectives. In situations where one's own perspective is clearly irrelevant, quite different processes may be involved. For example, when loggers assess the perspective of environmentalists, and vice versa, they may not anchor on their own perspective because it is likely to be seen as irrelevant. Instead, each may generate an assessment of the other person's views based on some stored representation (e.g., a prototype) of their ideologies and values (for a similar suggestion, see Ames, in press; Karniol, 2003). Indeed, partisans in disputes tend not to be egocentric in their assessments of the "other side" but to *over*estimate the dissimilarity between themselves and their opponents—more akin to a contrast effect than the assimilation that results from insufficient adjustment (Robinson & Keltner, 1996; Robinson et al., 1995).

On a theoretical level, our results have obvious implications for research on "theory of mind"—humans' ability to attribute mental states such as belief and desire to others. Since Piaget, the exact nature of this "folk psychology" has been hotly debated. One view is that children make sense of other minds by learning and applying a general theory of the way minds work—the so-called "theory-theory" (Gopnik & Wellman, 1992, 1994). A contrasting

view is that children use themselves as a source model, predicting others' thoughts and feelings by imagining themselves in the other person's situation—the "simulation theory" (Goldman, 1992; Gordon, 1992). Our results suggest that by adulthood, individuals' attempts at perspective taking are often something of an integration of theory and simulation. Adults' use of their own perspective as an anchor is similar to using one's self as a source model for predicting others. Additionally, adults' adjustment from that anchor is likely guided by their theories about how different perspectives and psychological states influence judgment and perception. Thus, neither theory may be strictly right or wrong, and both may play a role in different components of a complicated psychological process. Maturity may not cause people to abandon their youthful egocentrism but rather increase the tendency to adjust away from it (Epley, Morewedge, & Keysar, in press).

On a more practical level, the anchoring and adjustment model we have proposed has important implications for understanding (and resolving) social conflict. When people adjust their own perceptions to understand another's, they do so to accommodate discrepancies that would otherwise distort their perception of some target. Sellers, when estimating the interest of potential buyers, adjust for the fact that they own an object that buyers do not (Van Boven et al., 2000). Relationship partners adjust for the fact that their emotions are internal and thus may not be as transparent to others as they are to themselves (Gilovich et al., 1998). Teachers also adjust for the fact that they know the material better than their students when determining the level at which to present an idea. Because people adjust to accommodate apparent external or situational influences on perception and judgment, any residual discrepancy between predicted and actual beliefs is likely to be attributed to a dispositional feature of the target—a buyer's greed, a student's laziness or deficient aptitude, or a partner's insensitivity (Pronin, Gilovich, & Ross, in press). Such inferences are likely to be problematic not only because they are likely to be inaccurate but also because they will be seen as unwarranted and unfair—and thus a source of further conflict—by the target of judgment. Insufficient adjustment when adopting another's perspective may thus contribute to the all-too-frequently observed spiral of conflict and discord. The results of several of our experiments, however, suggest that such conflict may be alleviated by encouraging people to take their time and to think carefully about another's perspective. Indeed, actively instructing people to do so is associated with a variety of desirable effects, from inducing more favorable judgments of others (Epley, Savitsky, & Gilovich, 2002), to increasing altruism and helping (Batson et al., 1991), to reducing stereotyping and prejudice (Galinsky & Moskowitz, 2000).

Of course, that people fail to understand the workings of others' minds perfectly is hardly surprising. The human brain is the most complicated piece of hardware in existence, and people are left to intuit its outputs armed with nothing more than personal experience and a few principles of inference. This intuitive ability is remarkable and appears to be matched by no other species on the planet. The point of the experiments we have reported is not to ridicule a shortcoming in this perspective-taking process but, rather, to point out that this shortcoming is of a systematic variety that provides important clues to how perspective taking works. We hope this understanding, in turn, provides some insight into how to make this impressive human ability even more impressive.

References

Ames, D. R. (in press). Inside the mind-reader's toolkit: Projection and stereotyping in mental state inference. *Journal of Personality and Social Psychology.*

Baldwin, A. K., & Keysar, B. (1998, May). *Perspective taking and attentional resources.* Paper presented at the American Psychological Society, Washington, DC.

Batson, C. D., Batson, J. G., Slingsby, J. K., Harrell, K. L., Peekna, H. M., & Todd, R. M. (1991). Empathic joy and the empathy–altruism hypothesis. *Journal of Personality and Social Psychology, 61,* 413–426.

Brinol, P., & Petty, R. E. (2003). Overt head movements and persuasion: A self-validation analysis. *Journal of Personality and Social Psychology, 84,* 1123–1139.

Chapman, G. B., & Johnson, E. J. (2002). Incorporating the irrelevant: Anchors in judgments of belief and value. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 120–138). Cambridge, England: Cambridge University Press.

Davis, H. L., Hoch, S. J., & Ragsdale, E. E. (1986). An anchoring and adjustment model of spousal predictions. *Journal of Consumer Research, 13,* 25–37.

Epley, N. (2004). A tale of tuned decks? Anchoring as accessibility and anchoring as adjustment. In D. Koehler & N. Harvey (Eds.), *The Blackwell handbook of judgment and decision making* (pp. 240–257). Malden, MA: Blackwell.

Epley, N., & Gilovich, T. (2001). Putting adjustment back in the anchoring and adjustment heuristic: Differential processing of self-generated and experimenter-provided anchors. *Psychological Science, 12,* 391–396.

Epley, N., & Gilovich, T. (2004a). Are adjustments insufficient? *Personality and Social Psychology Bulletin, 30,* 447–460.

Epley, N., & Gilovich, T. (2004b). *Why adjustments are insufficient and how to fix them.* Manuscript submitted for publication.

Epley, N., Morewedge, C., & Keysar, B. (in press). Perspective taking in children and adults: Equivalent egocentrism but differential correction. *Journal of Experimental Social Psychology.*

Epley, N., Savitsky, K., & Gilovich, T. (2002). Empathy neglect: Reconciling the spotlight effect and the correspondence bias. *Journal of Personality and Social Psychology, 83,* 300–312.

Forster, J., & Strack, F. (1996). Influence of overt head movements on memory for valenced words: A case of conceptual–motor compatibility. *Journal of Personality and Social Psychology, 71,* 421–430.

Forster, J., & Strack, F. (1997). Motor actions in retrieval of valenced information: A motor congruence effect. *Perceptual and Motor Skills, 85,* 1419–1427.

Galinsky, A. D., & Moskowitz, G. B. (2000). Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology, 78,* 708–724.

Gilbert, D. T. (1989). Thinking lightly about others: Automatic components of the social inference process. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 189–211). New York: Guilford Press.

Gilbert, D. T. (2002). Inferential correction. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 167–184). Cambridge, England: Cambridge University Press.

Gilbert, D. T., & Gill, M. J. (2000). The momentary realist. *Psychological Science, 11,* 394–398.

Gilbert, D. T., & Malone, P. S. (1995). The correspondence bias. *Psychological Bulletin, 117,* 21–38.

Gilovich, T., Medvec, V. H., & Savitsky, K. (2000). The spotlight effect in social judgment: An egocentric bias in estimates of the salience of one's own actions and appearance. *Journal of Personality and Social Psychology, 78,* 211–222.

Gilovich, T., Savitsky, K., & Medvec, V. H. (1998). The illusion of

transparency: Biased assessments of others' ability to read our emotional states. *Journal of Personality and Social Psychology, 75,* 332–346.

Goldman, A. I. (1992). In defense of the simulation theory. *Mind & Language, 7,* 104–119.

Gopnik, A., & Wellman, H. M. (1992). Why the child's theory of mind really is a theory. *Mind & Language, 7,* 145–171.

Gopnik, A., & Wellman, H. M. (1994). The theory theory. In L. A. Hirschfeld & S. A. Gelman (Eds.), *Mapping the mind: Domain specificity in cognition and culture* (pp. 257–293). New York: Cambridge University Press.

Gordon, R. M. (1992). The simulation theory: Objections and misconceptions. *Mind and Language, 7,* 11–34.

Karniol, R. (2003). Egocentrism versus protocentrism: The status of self in social prediction. *Psychological Review, 110,* 564–580.

Keysar, B. (1994). The illusory transparency of intention: Linguistic perspective taking in text. *Cognitive Psychology, 23,* 165–208.

Keysar, B. (1998). Language users as problem solvers: Just what ambiguity problem do they solve? In S. R. Fussell & R. J. Kreuz (Eds.), *Social and cognitive psychological approaches to interpersonal communication* (pp. 175–200). Hillsdale, NJ: Erlbaum.

Keysar, B., & Barr, D. J. (2002). Self-anchoring in conversation: Why language users don't do what they "should." In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 150–166). Cambridge, England: Cambridge University Press.

Keysar, B., Barr, D. J., Balin, J. A., & Brauner, J. S. (2000). Taking perspective in conversation: The role of mutual knowledge in comprehension. *Psychological Science, 11,* 32–39.

Krueger, J., & Clement, R. W. (1994). The truly false consensus effect: An ineradicable and egocentric bias in social perception. *Journal of Personality and Social Psychology, 67,* 596–610.

Mussweiler, T., & Strack, F. (2001). "Considering the impossible": Explaining the effects of implausible anchors. *Social Cognition, 19,* 145–160.

Nickerson, R. S. (1999). How we know—and sometimes misjudge—what others know: Imputing one's own knowledge to others. *Psychological Bulletin, 125,* 737–759.

Piaget, J. (1959). *Judgment and reasoning in the child.* Paterson, NJ: Littlefield, Adams, & Co.

Pronin, E., Gilovich, T., & Ross, L. (in press). Objectivity in the eye of the beholder: Divergent perceptions of bias in self versus others. *Psychological Review.*

Quattrone, G. A. (1982). Overattribution and unit formation: When behavior engulfs the person. *Journal of Personality and Social Psychology, 42,* 593–607.

Queen. (1991). Another one bites the dust. On *The Game* [CD]. Hollywood, CA: Hollywood records. (Original release 1980)

Robinson, R. J., & Keltner, D. (1996). Much ado about nothing? Revisionists and traditionalists choose an introductory English syllabus. *Psychological Science, 7,* 18–24.

Robinson, R. J., Keltner, D., Ward, A., & Ross, L. (1995). Actual versus assumed differences in construal: "Naive realism" in intergroup perception and conflict. *Journal of Personality and Social Psychology, 68,* 404–417.

Rock, I., & Nijhawan, R. (1989). Regression to egocentrically determined description of form under conditions of inattention. *Journal of Experimental Psychology: Human Perception and Performance, 15,* 259–272.

Ross, L., & Ward, A. (1996). Naive realism in everyday life: Implications for social conflict and misunderstanding. In T. Brown, E. Reed, & E. Turiel (Eds.), *Values and knowledge* (pp. 103–135). Hillsdale, NJ: Erlbaum.

Trope, Y., & Gaunt, R. (2000). Processing alternative explanations of behavior: Correction or integration? *Journal of Personality and Social Psychology, 79,* 344–354.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185,* 1124–1130.

Tversky, A., & Koehler, D. J. (1994). Support theory: A nonextensional representation of subjective probability. *Psychological Review, 101,* 547–567.

Van Boven, L., Dunning, D., & Loewenstein, G. (2000). Egocentric empathy gaps between owners and buyers: Misperceptions of the endowment effect. *Journal of Personality and Social Psychology, 79,* 66–76.

Vokey, J. R., & Read, J. D. (1985). Subliminal messages: Between the devil and the media. *American Psychologist, 40,* 1231–1239.

Wegener, D. T., & Petty, R. E. (1995). Flexible correction processes in social judgment: The role of naïve theories in corrections for perceived bias. *Journal of Personality and Social Psychology, 68,* 36–51.

Weingartner, K. M., & Klin, C. M. (2001, November). *Readers' use of privileged information in estimating a character's knowledge.* Paper presented at the 41st Annual Meeting of the Psychonomic Society, Orlando, FL.

Wells, G. L., & Petty, R. E. (1980). The effects of overt head movements on persuasion: Compatibility and incompatibility of responses. *Basic and Applied Social Psychology, 1,* 219–230.

Wilson, T. D., Houston, C., Etling, K. M., & Brekke, N. (1996). A new look at anchoring effects: Basic anchoring and its antecedents. *Journal of Experimental Psychology: General, 4,* 387–402.

Wright, W. F., & Anderson, U. (1989). Effects of situation familiarity and incentives on use of the anchoring and adjustment heuristic for probability assessment. *Organizational Behavior and Human Decision Processes, 44,* 68–82.

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