Research Article

The Anchoring-and-Adjustment Heuristic

Why the Adjustments Are Insufficient

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ABSTRACT—*One way to make judgments under uncertainty is to anchor on information that comes to mind and adjust until a plausible estimate is reached. This anchoring-and-adjustment heuristic is assumed to underlie many intuitive judgments, and insufficient adjustment is commonly invoked to explain judgmental biases. However, despite extensive research on anchoring effects, evidence for adjustment-based anchoring biases has only recently been provided, and the causes of insufficient adjustment remain unclear. This research was designed to identify the origins of insufficient adjustment. The results of two sets of experiments indicate that adjustments from self-generated anchor values tend to be insufficient because they terminate once a plausible value is reached (Studies 1a and 1b) unless one is able and willing to search for a more accurate estimate (Studies 2a–2c).*

One strategy for estimating unknown quantities is to start with information one does know and then adjust until an acceptable value is reached, using what Tversky and Kahneman (1974) called the anchoring-and-adjustment heuristic. Research on this heuristic, however, has had an unusual history that has left a large gap in psychologists' understanding of this common source of inaccuracy in everyday judgment. The present research was designed to fill that gap.

In the original formulation, the starting information, or anchor, tends to exert drag on the subsequent adjustment process, leaving final estimates too close to the original anchor. In the paradigm pioneered to examine this heuristic, participants are asked first to make a comparative assessment (e.g., "Is the population of Chicago more or less than 200,000?") and then to provide an absolute estimate (e.g., "What is the actual population of Chicago?"). Countless experiments using this paradigm have demonstrated that people's absolute estimates are biased by the value considered in the comparative assessment. People think Chicago is more sparsely populated, for example, after considering whether its population is more or less than 200,000 than after considering whether its population is more or less than 5 million (Jacowitz & Kahneman, 1995). Thus, "anchoring and adjustment" in this literature describes both a phenomenon (final estimates assimilated toward an anchor) and a process (adjusting from an initial value).

Research on anchoring as a phenomenon commenced immediately after Tversky and Kahneman's (1974) seminal work and has yet to let up. Anchoring effects are elicited easily in the laboratory (Jacowitz & Kahneman, 1995), the field (Mussweiler & Strack, 2004), and the classroom (Plous, 1989)—a robustness that helps explain why anchoring has been used to explain such diverse phenomena as preference reversals, the hindsight bias, subadditivity in likelihood judgment, social comparison, and egocentric biases, among others (Chapman & Johnson, 2002; Epley, 2004). In each case, anchoring is used to explain why judgments tend to be excessively influenced by an initial impression, perspective, or value.

Research on anchoring and adjustment as a process, in contrast, has been more uncertain and uneven. Efforts to identify the mechanism of adjustment through process-tracing procedures have yielded no evidence of adjustment in the standard anchoring paradigm (Chapman & Johnson, 2002; Schkade & Johnson, 1989). And manipulations that ought to influence the amount of effortful adjustment, such as forewarnings and financial incentives, have likewise had little or no effect on responses in that paradigm (Chapman & Johnson, 2002; Tversky & Kahneman, 1974; Wilson, Houston, Etling, & Brekke, 1996; Wright & Anderson, 1989). Outside the standard anchoring paradigm, in contrast, cognitive-load manipulations have been shown to influence judgments in a manner consistent with a

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process of "correction," or adjustment, from an initial assessment (e.g., Gilbert, 2002; Gilbert & Gill, 2000; Kruger, 1999; Pelham, Sumarta, & Myaskovsky, 1994).

The reason for these uneven effects has only recently been clarified by two related research programs. First, extensive work by Mussweiler and Strack (1999a, 1999b, 2000, 2001b; Strack & Mussweiler, 1997) has demonstrated that anchoring effects in the standard anchoring paradigm are produced not by insufficient adjustment, but rather by enhanced accessibility of anchor-consistent information. The attempt to answer the comparative assessment in this paradigm leads people to evaluate whether the anchor value might equal the correct answer. Because people evaluate hypotheses by trying to confirm them (Klayman & Ha, 1987), the comparative assessment generates information disproportionately consistent with the anchor value, thereby biasing the subsequent judgment.

Second, studies conducted in our own lab have provided evidence of true insufficient adjustment outside the standard anchoring paradigm (Epley, 2004; Epley & Gilovich, 2001). In particular, this research suggests that people adjust from values they generate themselves as starting points known to be incorrect but close to the target value. The use of such a self-generated anchor serves as a judgmental heuristic by simplifying an otherwise complicated judgment, substituting a value that can quickly be adjusted in place of a more effortful assessment. Most Americans, for example, do not know when George Washington was elected president of the United States, but can quickly generate an estimate by adjusting from the date of the Declaration of Independence in 1776—a date known to be close to the correct answer. A self-generated anchor of this sort does not need to be evaluated as a potential answer—unlike the anchors in the standard anchoring paradigm—and thus does not initially activate mechanisms of selective accessibility.

Evidence consistent with these two different types of anchoring effects comes from verbal protocols in which participants articulate a process of anchoring and adjustment when answering self-generated anchoring items, but not when answering items in the standard anchoring paradigm (Epley & Gilovich, 2001), and from studies that manipulate participants' willingness to accept values encountered early in the adjustment process. In one experiment (Epley & Gilovich, 2001), participants provided estimates closer to self-generated anchors (i.e., they adjusted less) when they were simultaneously nodding their heads up and down (consistent with acceptance—Wells & Petty, 1980) than when they were shaking their heads from side to side (consistent with rejection)—a manipulation that did not influence responses in the standard anchoring paradigm (see also Epley & Gilovich, 2004, 2005).

People's divergent responses to experimenter-provided and self-generated anchors suggest that earlier attempts to trace the process of adjustment were unsuccessful because investigators were searching for adjustment where it does not occur—in the standard anchoring paradigm—rather than in the contexts that actually elicit the anchoring-and-adjustment heuristic. These failures to document serial adjustment, furthermore, hindered efforts to explain why adjustments tend to be insufficient. Kahneman and Tversky offered no explanation, and the explanations offered by other researchers either were never examined or fared poorly in empirical tests. Quattrone, for example, argued that adjustments tend to be insufficient because people stop adjusting as soon as they reach the nearest edge of some implicit range of plausible values (Mussweiler & Strack, 2001a; Quattrone, 1982; Quattrone, Lawrence, Finkel, & Andrus, 1981). Because the actual values only rarely correspond to these outer boundaries, such a "satisficing" procedure yields insufficient adjustment. Although intriguing and intuitively plausible, this model has not been tested directly. Other accounts have focused on the ability or motivation to engage in effortful cognitive processing, but these accounts predict that forewarnings about bias and incentives for accuracy ought to reduce anchoring effects, which the studies cited earlier failed to uncover.

Beyond anchoring and adjustment per se, research on closely related correction models of human inference is often taken as providing evidence of the effortful nature of adjustment (Gilbert, 2002; Gilbert & Gill, 2000; Wegener & Petty, 1995). In particular, it is considered telling that people under cognitive load are less able than those who are not to modify their initial dispositional inferences in light of subsequently considered situational constraints. Such findings, however, are also consistent with accounts that do not require any serial adjustment process (Chun, Spiegel, & Kruglanski, 2002; Trope & Gaunt, 2000), and so it is unclear whether the corrections involved in these contexts are informative about the anchoring-and-adjustment heuristic, or why adjustments tend to be insufficient. What *is* clear from research on these more coarsely defined correction models is that some mental operation happens quickly and automatically, and another happens slowly and effortfully (Gilbert, 2002). However, the nature of these two mental operations, and the relation between them, is not clearly specified (as it is in the anchoring-and-adjustment heuristic).

Thus, after 30 years of research on the anchoring-and-adjustment heuristic, it remains unclear why adjustments tend to be insufficient. This constitutes a significant shortcoming because one cannot fully understand subadditivity, perspective taking, preference reversals, or any of the other phenomena apparently produced by the anchoring-and-adjustment heuristic without understanding why adjustments tend to be insufficient. The present research was designed to overcome this shortcoming by examining one possible explanation of the insufficiency of adjustment. More specifically, we examined whether adjustments tend to be insufficient because they are effortful and tend to stop once a plausible estimate is reached. We propose that adjustments proceed in a cybernetic, "test-operate-test-exit" fashion (Miller, Galanter, & Pribram, 1960). One adjusts a possibly-sufficient amount from a given anchor and tests whether the adjusted value is plausible. If so, adjustment terminates. If not, an additional adjustment is made, its plausibility is assessed, and so on. By this account, adjustment stops toward the anchor side of a range of plausible values, a stopping rule that yields adjustment-based anchoring effects. Studies 1a and 1b tested this satisficing model directly by assessing whether participants' best estimates tend to fall between the original anchor value and the midpoint of their range of plausible values (Parducci, 1974).

Of course, whether one accepts a value just within one's implicit range of plausible values or searches for a more accurate estimate depends on one's motivation and ability to devote further cognitive resources to the task. Studies 2a through 2c thus explored the effortfulness of adjustment by examining three determinants of the ability or willingness to expend the cognitive resources necessary for adjustment—attentional load, alcohol consumption, and dispositional inclination toward effortful thought.

STUDIES 1A AND 1B

If adjustments from self-generated anchors tend to be insufficient because people stop once they reach a plausible value, then people's estimates ought to be skewed toward the anchor side of their implicit range of plausible values. Study 1a examined this possibility by asking participants to answer a series of questions known to elicit true adjustment and then to provide a range of plausible values for these items. We predicted that participants' estimates would be skewed toward the anchor side of their ranges.

To make clear that anchoring effects result from distinct underlying processes, and that the present account applies only to adjustment-based anchoring effects and not accessibility-based anchoring effects, we also asked participants to provide estimates and plausible ranges for a series of items with experimenter-provided anchors. We predicted that participants' answers to these questions would not be skewed within their plausible ranges because such items do not elicit serial adjustment. Study 1b addressed the same issues using a between-subjects design in which one group of participants provided point estimates and another provided plausible ranges.

Method

Sixty-two Harvard undergraduates participated in Study 1a, and 102 Cornell undergraduates participated in Study 1b.

In Study 1a, participants were asked to complete 6 *self-generated-anchoring questions*, that is, questions for which no anchors were provided, but that were expected to elicit the same self-generated anchor values for the overwhelming majority of participants (see Table 1). They were also asked 6 experimenter-provided-anchoring questions (the 6 questions that produced the largest anchoring effects reported by Jacowitz & Kahneman, 1995). For both sets of questions, half required upward adjustment and half required downward adjustment. After providing their answers, participants read that these questions were designed to be difficult and that many of their estimates were therefore likely to be incorrect. They were then asked to look back at each of the questions and provide a range specifying their highest and lowest plausible estimates. For example, for the item asking when Washington was elected president, participants were asked to indicate the earliest plausible date he could have been elected and the latest plausible date.

Study 1b was a between-subjects replication of Study 1a. Thus, one group of participants ($n = 54$) was asked the 6 self-generated-anchoring questions listed in Table 2, and another group ($n = 58$) was given the same questions but asked to provide a range of plausible estimates. Experimenter-provided-anchoring items were not used in this study.

Finally, participants in both studies completed a follow-up questionnaire asking directly about whether they knew the intended anchor value for each self-generated-anchoring item and whether they thought of that value when generating their estimate. For instance, for the question about the freezing point of vodka, participants were asked if they knew the freezing point of

TABLE 1
Estimated Answer, Plausible Range, and Location of the Estimated Answer Within That Range (Skew) for Self-Generated-Anchoring Items in Study 1a

Question	Anchor	Answer: Actual	Answer: Estimated	Plausible range: Near	Plausible range: Far	Mean skew
Washington elected president	1776	1788	1781.5	1777.08	1788.45	.32
Boiling point on Mount Everest (°F)	212	167	175.05	194.90	147.75	.44
Freezing point of vodka (°F)	32	−20	11.55	23.31	−6.51	.42
Lowest body temperature (°F)	98.6	57.5	78.94	86.3	70.62	.43
Highest body temperature (°F)	98.6	115.7	110.60	105.79	114.56	.52
Gestation period of elephant[a] (months)	9	22	7.40	3.49	12.60	.43

Note. Skew was calculated by dividing the difference between the estimated answer and the range endpoint nearest the intended anchor by the total range of plausible values. Estimates that were perfectly centered within the range received a score of .50 on the skew index, whereas those closer to the anchor received a score less than .50.
[a]Because participants adjusted in both directions from the intended anchor, the average response to this item is reported as an adjustment score (the absolute difference between the final estimate and the intended anchor).

TABLE 2

Estimated Answer, Plausible Range, and Location of the Estimated Answer Within That Range (Skew) in Study 1b

		Answer		Plausible range		
Question	Anchor	Actual	Estimated	Near	Far	Mean skew
Washington elected president	1776	1788	1779.67	1777.29	1784.57	.33
Boiling point of water in Denver (°F)	212	203	203.00	207.31	187.83	.22
Number of U.S. states in 1880	50	38	39.72	38.45	24.45	−.09
Second European explorer to reach West Indies	1492	1501	1507.25	1496.82	1545.59	.21
Freezing point of vodka (°F)	32	−20	7.35	26.31	−9.08	.54
Duration of Mars' orbit around Sun[a] (days)	365	869	491.67	392.23	1043.00	.15

Note. Skew was calculated by dividing the difference between the estimated answer and the range endpoint nearest the intended anchor by the total range of plausible values. Estimates perfectly centered within the range received a score of .50 on the skew index, whereas those closer to the anchor received a score less than .50.

[a]Because participants adjusted in both directions from the intended anchor, the average response to this item is reported as an adjustment score (the absolute difference between the final estimate and the intended anchor).

water, and whether they thought of that value when generating their estimate.

Results and Discussion

To obtain a valid assessment of adjustment from self-generated anchor values in this study, as well as in Studies 2a through 2c, we had to include in our analyses only those participants who (a) knew the intended anchor value for each item and (b) reported having activated it when making their judgments. Participants who did not meet both criteria were excluded on an item-by-item basis. Including all participants did not change the pattern of results for self-generated-anchoring items in any of the studies reported, but the added variance did reduce some of the findings to nonsignificance. Note that participants were not asked to report on the process that led to their judgments. They were merely asked whether they knew the intended anchor value for each self-generated-anchoring question (e.g., "What is the freezing point of water?"), and whether it had occurred to them while answering the question ("Did you think of this value when answering the question?")—mental contents that can be reported more accurately than mental processes (Nisbett & Wilson, 1977).

As in previous experiments using these same self-generated-anchoring questions (Epley & Gilovich, 2001), not all participants adjusted in the same direction from the intended anchor value on two of the self-generated-anchoring questions (the gestation period for an elephant in Study 1a and the orbit of Mars in Study 1b). Consequently, for each of these items we did not use participants' actual responses in our analyses, but rather calculated an *adjustment score*. This adjustment score was the absolute difference between the stated anchor and the final answer, with a higher number indicating greater adjustment.

In addition, some participants confused degrees Fahrenheit with degrees Celsius. Their responses were converted to degrees Fahrenheit.

To test our hypotheses, we calculated the extent to which participants' estimates were skewed within the range of plausible values—either their own range (Study 1a) or the average range provided by participants asked to supply one (Study 1b). For each item, we divided the difference between each participant's estimate and the plausible value nearest the anchor by the full range of plausible values. Thus, estimates perfectly centered within the range received a score of .50 on this *skew* index, whereas those closer to the anchor received a score less than .50. For example, a person who estimated that George Washington was elected in 1780 but that he could plausibly have been elected as early as 1778 or as late as 1788 would have received a skew value of .20, indicating the answer fell closer to the intended anchor of 1776 than to the center of the range of plausible values, [(1780 − 1778)/(1788 − 1778)].

Responses to the self-generated-anchoring questions are shown in Tables 1 and 2. Participants' responses to 10 of the 12 comparisons yielded the predicted pattern. The mean skew index was significantly less than .50—the appropriate null value if participants did not terminate adjustment toward the anchor side of their range of plausible values—in both Study 1a, $M = .43$, $t(61) = 4.39$, $p < .001$, $p_{rep} > .99$, $d = 1.12$, and Study 1b, $M = .22$, $t(5) = 3.26$, $p < .05$, $p_{rep} = .92$, $d = 2.91$. Note that these analyses were conducted across participants in Study 1a and across items in Study 1b, because of the within-subjects and between-subjects designs used in Studies 1a and 1b, respectively. The reason for the larger skew in Study 1b is likely that the within-subjects format in Study 1a encouraged some participants to construct relatively symmetrical ranges around their original estimates.

Results for the experimenter-provided-anchoring questions in Study 1a are consistent with previous research indicating that anchoring effects in the standard anchoring paradigm are not the result of insufficient adjustment: Participants' estimates for these questions were almost perfectly centered within the range of plausible values ($M = .49$), $t(61) < 1$, n.s.

The results from these two studies suggest that serial adjustment entails a search for a plausible estimate and that adjustment is terminated once a plausible estimate is reached. This process does not guarantee that adjustments will be insufficient, but does make insufficient adjustment likely.

STUDIES 2A, 2B, AND 2C

Having established that adjustment tends to be insufficient because people often stop adjusting once they arrive at a minimally satisfactory estimate, we investigated the impact of several variables—an individual difference, a potent cognitive modifier common to everyday life, and a standard laboratory procedure—that should influence whether people are likely to accept the first value that lies within their range of plausible values or to be inclined to think harder and arrive at a more accurate estimate. In particular, we examined the extent to which estimates were influenced by need for cognition (NFC; Study 2a), alcohol consumption (Study 2b), and cognitive load (Study 2c). In each case, we expected participants who were less inclined or able to engage in effortful thought (i.e., those who were low in NFC, had consumed alcohol, or were under cognitive load) to adjust less from self-generated anchors (i.e., to provide estimates closer to self-generated anchors) than those who were more inclined or able to engage in effortful thought. We also predicted, in light of previous studies (Chapman & Johnson, 2002), that these manipulations would not influence participants' responses to experimenter-provided anchors.

Method

Participants

Cornell University students participated in all three studies—81 in Study 2a, 140 in Study 2b, and 94 in Study 2c.

Study 2a Procedure

As part of a screening session, 297 Cornell University undergraduates completed the short form of the Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984). Individuals who score high on this scale are more inclined to mull over and reflect upon ideas than those who score low, and are more likely to excel at tasks that involve effortful thought (Cacioppo, Petty, Feinstein, & Jarvis, 1996).

Students who scored in the top (NFC score ≥ 29) and bottom (NFC score ≤ 6) quintiles of the initial sample were sent an e-mail invitation to participate in the experiment. Forty-two people from the top quintile and 39 from the bottom quintile participated, completing a questionnaire containing the four self-generated-anchoring items listed in Table 3 and four experimenter-provided-anchoring questions taken from Jacowitz and Kahneman (1995).

Study 2b Procedure

To obtain respondents who varied in their level of alcohol consumption, we recruited participants from Cornell's annual Slope Day festivities. Every year on the last day of the spring semester, most students and even the occasional faculty member skip classes to gather on a hill to celebrate the end of the academic year. Like many student celebrations, these festivities are accompanied by alcohol consumption. Although many revelers abstain from drinking, most do not.

Students at the Slope Day festivities were asked to complete a short questionnaire in exchange for candy. Approximately half of the participants ($n = 66$) answered two self-generated-anchoring questions (see Table 4), and the rest ($n = 74$) answered two experimenter-provided-anchoring questions taken from Jacowitz and Kahneman (1995). Participants were also asked whether they had consumed any alcohol within the last 12 hr.

TABLE 3
Mean Responses to Self-Generated-Anchoring Items Among Participants Low and High in Need for Cognition in Study 2a

			Need for cognition	
Question	n	Anchor	Low	High
Washington elected president	55	1776	1779.74	1786.36
Second explorer after Columbus	66	1492	1501.13	1507.37
Boiling point on Mount Everest (°F)	57	212	177.99	171.04
Freezing point of vodka (°F)	68	32	14.31	6.09

Study 2c Procedure

Participants in this experiment reported to the laboratory and completed a questionnaire containing 18 questions, 9 self-generated-anchoring questions (listed in Table 5) and 9 experimenter-provided-anchoring questions (taken from Jacowitz & Kahneman, 1995). For both types of questions, 5 required upward adjustment and 4 required downward adjustment. The order of presentation of the two types of questions was counterbalanced.

Roughly half of the participants ($n = 46$) were made cognitively busy by having to memorize an eight-letter string presented before each question (Gilbert, 2002; Kruger, 1999). Participants in the control condition ($n = 48$) were asked to memorize the same digits, but this task followed each question instead of preceding it.

TABLE 4
Mean Responses to Self-Generated-Anchoring Items Among Participants Who Had Reported Drinking and Those Who Had Not in Study 2b

			Reported drinking?	
Question	n	Anchor	Yes	No
Washington elected president	42	1776	1779.42	1782.82
Second explorer after Columbus	43	1492	1496.13	1501.13

TABLE 5

Mean Responses to Self-Generated-Anchoring Items Among Participants Who Were or Were Not Under Cognitive Load in Study 2c

			Condition	
Question	*n*	Anchor	Busy	Not busy
Washington elected president	68	1776	1782.18	1783.71
Second European explorer to reach West Indies	65	1492	1500.03	1506.06
Highest body temperature (°F)	75	98.6	111.79	112.39
Boiling point on Mt. Everest (°F)	70	212	176.46	145.07
Lowest body temperature (°F)	82	98.6	70.03	60.21
Freezing point of vodka (°F)	76	32	15.75	8.95
Number of U.S. states in 1880	72	50	37.38	34.77
Gestation period of elephant[a] (months)	67	9	5.84	8.20
Duration of Mars' orbit around Sun[a] (days)	76	365	178.14	153.93

[a]Because participants adjusted in both directions from the intended anchor, responses to these items are reported as adjustment scores (the absolute difference between the final estimate and the intended anchor).

Results

Inspection of Tables 3, 4, and 5 reveals that participants who were motivated and able to engage in effortful thought tended to adjust more from self-generated anchor values (i.e., they provided estimates further from self-generated anchors) than participants who were less motivated, had consumed alcohol, or were under cognitive load. To assess the statistical significance of this pattern, we standardized participants' responses in each study and averaged them across questions. In Study 2a, participants who scored high in NFC provided estimates further from their self-generated anchor values (mean z score = 0.14) than participants who scored low (mean z score = −0.18), $t(77) = 2.13$, $p < .05$, $p_{rep} = .90$, $d = 0.49$. In Study 2b, participants who were sober provided estimates further from their self-generated anchor values (mean z score = 0.44) than participants who had been drinking (mean z score = −0.21), $t(50) = 3.01$, $p < .01$, $p_{rep} = .97$, $d = 0.85$. In Study 2c, participants who were not cognitively busy provided estimates further from their self-generated anchor values (mean z score = 0.14) than those who were cognitively encumbered (mean z score = −0.13), $t(92) = 3.18$, $p < .01$, $p_{rep} = .98$, $d = 0.66$.

None of these manipulations influenced participants' responses to the experimenter-provided-anchoring questions taken from the standard anchoring paradigm (all ts ≤ 1). Thus, there was a significant interaction between our manipulations (NFC, alcohol consumption, or busyness) and question type (self-generated or experimenter-provided anchor) in Studies 2a, $F(1, 77) = 4.37$, $p < .05$, $p_{rep} = .98$, $\eta^2 = .05$, and 2b, $F(1, 115) = 4.27$, $p < .05$, $p_{rep} = .89$, $\eta^2 = .04$, and a marginally significant interaction in Study 2c, $F(1, 90) = 3.22$, $p = .08$, $p_{rep} = .84$, $\eta^2 = .03$.

Collectively, these three studies demonstrate that the magnitude of adjustment-based anchoring biases is moderated by the willingness and ability to continue adjusting after reaching the first satisfactory response. Adjustments tend to be insufficient because people tend to stop adjusting soon after reaching a satisfactory value, and adjustment-based anchoring biases are reduced when people are motivated and able to think harder than they might normally.

GENERAL DISCUSSION

This research was first and foremost designed to explain why the use of the anchoring-and-adjustment heuristic yields reliable anchoring effects—that is, why adjustments tend to be insufficient. Testing an idea first advanced by Quattrone et al. (1981), we obtained evidence that people adjust insufficiently from an initial anchor value because they stop adjusting once their adjustments fall within an implicit range of plausible values (see also Epley, Keysar, Van Boven, & Gilovich, 2004). People's estimates therefore tend to lie near the anchor side of this implicit range, but, on average, the true value is likely to lie closer to the middle of the range. We also obtained evidence that adjustment is effortful, and so anything that increases a person's willingness or ability to seek more accurate estimates tends to reduce the magnitude of adjustment-based anchoring biases.

These studies also make it clear that not all anchoring effects result from the same psychological mechanism and help to clarify part of the theoretical landscape of anchoring research. Past research has consistently found that anchoring effects in the standard anchoring paradigm are not influenced by manipulations of people's willingness or ability to devote care or effort to the task—just the opposite of what we observed in the present studies. But the anchoring effects observed in the standard anchoring paradigm, it is now clear, are the result of an enhanced accessibility of anchor-consistent information, not insufficient adjustment (Mussweiler & Strack, 1999a, 1999b, 2000, 2001b; Strack & Mussweiler, 1997). Manipulations that target the magnitude of adjustment have no effect on accessibility-based anchoring effects. Such manipulations are effective only when true adjustment processes are invoked, as they are in response to the self-generated-anchoring questions examined here and in conceptually similar paradigms (Epley et al., 2004; LeBoeuf & Shafir, in press).

Understanding why adjustment tends to be insufficient is important in its own right and is essential for determining how to make the biases associated with the anchoring-and-adjustment heuristic disappear. The effortful nature of adjustment suggests that adjustment-based anchoring effects may be diminished by incentives to engage in effortful thought. Indeed, adjustments from self-generated anchors are increased by incentives for accuracy, but responses to experimenter-provided anchors are not (Epley & Gilovich, 2005). Also, the conscious and deliberate nature of adjustment suggests that warning participants to avoid satisficing will increase adjustment. Indeed, we have found that warning participants about anchoring effects is sufficient to increase adjustment from self-generated anchors, but has no influence on participants' responses within the standard anchoring paradigm (Epley & Gilovich, 2005).

As always, many questions remain. How many of the varied phenomena traditionally explained by the anchoring-and-adjustment heuristic actually involve adjustment? Is the nature of adjustment continuous, like mental rotation, or more discrete, like a saccade? Are there other types of anchors, beyond those identified thus far, that stimulate serial adjustment? Given that it took 30 years to establish the existence of true serial adjustment and to account for its insufficiency, it might seem that answers to these questions will be a long time coming. However, because it is now clear that anchoring is not a unitary phenomenon but the product of at least two different mechanisms, a major impediment to progress has been set aside. We therefore hope the remaining questions will be more speedily resolved.

Acknowledgments—This research was supported by National Science Foundation Grants SES0241544 and SES0241638. We thank Dennis Regan for commenting on this article, and Noah Goldstein, Thalia Goldstein, Adrianna Lucianno, Rebecca Matro, Celene Menschel, Erin Rapien, Kate Russel, Debbi Share, Rachel Smallman, and Beverly Whelan for help conducting these experiments.

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(RECEIVED 3/14/05; REVISION ACCEPTED 8/11/05;
FINAL MATERIALS RECEIVED 8/23/05)