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Implications of Attitude Change Theories for Numerical Anchoring: Anchor Plausibility and the Limits of Anchor Effectiveness

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Effects of extreme versus moderate numerical anchors are investigated. Similar to past results in attitude change, three separate data collections show that extreme anchors can have less influence on judgments than more moderate anchors. Though difficult to account for using traditional "anchor-and-adjust" and recent "selective accessibility" views, the findings are consistent with theories of attitude change. Implications of an attitude-change view of numerical anchoring are discussed. © 2001 Academic Press

Numerical judgments are often influenced by previously considering an unrelated number (e.g., Tversky & Kahneman, 1974). The most widely cited explanation for such "anchoring effects" has been an "anchor-and-adjust" process, where people begin with the anchor value and then adjust their answer toward a more plausible value (see Jacowitz & Kahneman, 1995; Quattrone, Lawrence, Finkel, & Andrus, 1984). According to Quattrone et al. (1984), people have a range of plausible answers for any given question. When an anchor lies outside that range, people adjust their estimates until they reach the nearest boundary of that plausible range.

This anchor-and-adjust view suggests that there should be little need for "adjustment" when the anchor is within the range of plausible values. Therefore, within this range, more extreme anchors should bring about larger anchoring effects. Because the boundary of plausible values is always more extreme than values within the range, this view also predicts that anchors outside the range should lead to larger anchoring effects than anchors inside the range (i.e., implausibly extreme anchors lead to larger effects than plausible anchors). As extremity increases beyond the range of plausible values, however, increases in extremity should

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have no effect, because people adjust their estimates until they reach the same boundary no matter how extreme the anchor might be.

These same predictions can also be generated using a hypothesis-testing conceptualization (e.g., Strack & Mussweiler, 1997). That is, when a person considers a plausible anchor, he or she tests the hypothesis that the judgment is equal to the anchor. In doing this, the person looks for ways in which the real answer might be similar to the anchoring value. Because of this "confirmatory search" (cf. Chapman & Johnson, 1994), aspects of the target that are similar to the anchor become accessible and tend to be emphasized in judgments. When implausibly extreme anchors are encountered, however, a different hypothesis is tested—that the boundary of the range of plausible values is the correct answer. No matter how extreme the anchor might be, the hypothesis tested is the same—that the real answer equals the nearest boundary of the range of plausible values (Mussweiler & Strack, 1999).

Although the "anchor-and-adjust" and "selective accessibility" mechanisms are different, the extremity prediction is the same. Implausibly extreme anchors should lead to larger anchoring effects than plausible anchors, and increases in anchor extremity beyond the range of plausible values should not influence the size of the anchoring effect. Consistent with this view, Strack and Mussweiler (1997, Experiment 3; Mussweiler & Strack, 1999; Experiment 3) manipulated anchor extremity and found larger anchoring effects with more extreme anchors (see also Chapman & Johnson, 1994; Northcraft & Neale, 1987).

Some studies have found the same anchoring effects with moderate and extreme anchors (e.g., Quattrone et al., 1984; Chapman & Johnson, 1994, Experiment 1, high-anchor condition). This might be taken as support for the hypothesized "asymptote" for extreme anchors outside the range of plausible values. However, even in some of these cases, little evidence exists for anchoring asymptote. For example, the two most extreme levels of high anchors in Experiment 1 of Chapman and Johnson (1994) produced equal final judgments. However, the difference between high- and low-anchor conditions showed larger effects for extreme than moderate anchors (because extreme low anchors led to lower estimates than moderate low anchors). Moreover, in Experiment 2, high anchors that were even more extreme than in Experiment 1 produced further increases in anchoring. Therefore, evidence in support of "asymptoting" effects of anchors is quite weak.

In the current article, we offer a new perspective on anchoring by relating numerical anchoring to processes of attitude change. An "attitude change" perspective leads to hypotheses that differ somewhat from the anchor-and-adjust and selective accessibility views, especially in regard to extreme anchors. That is, theory and data in attitude change suggest that increasing levels of extremity could lead to *decreases* in anchoring effects rather than increases or asymptoting effects.

Relations between Anchoring and Attitude Change

Though one could point to a variety of differences between anchoring and attitude change paradigms, the core of each setting is quite similar—people are presented with a view (explicitly or implicitly) that diverges somewhat from their current view. The prototypic setting for attitude change would accompany this alternative view with "arguments" for why that new view should be adopted. However, attitude change certainly occurs in other settings. For example, attitudes can change in response to repeated exposure of the attitude object (e.g., Bornstein, 1989) or to conditioning procedures in which no message is presented (e.g., Cacioppo, Marshall-Goodell, Tassinary, & Petty, 1992; see Petty, Priester, & Wegener, 1994; Petty & Wegener, 1998, for reviews). One type of process that has figured prominently in the attitude change literature is the generation of cognitive responses (Greenwald, 1968). For example, Brock (1967) presented students with a proposed tuition increase, but with no message justifying the increase. As the position diverged from recipients' views to a greater extent (i.e., as the proposed tuition increase rose), participants generated a greater number of counterarguments to that position, and this number of counterarguments predicted later views of the tuition topic. Considering an anchor value might often elicit cognitive responses that are more consistent with the anchor than would otherwise be the case. It is also possible, however, that people would generate "counterarguments" to the anchor (i.e., thoughts about why the real value couldn't be as high or low as the anchor suggests). Importantly, attitude change theory and results would make predictions about when this should occur.

Over the years, studies of attitude change have often found an inverted-U pattern of attitude change across levels of position discrepancy. For example, Bochner and Insko (1966) presented a message advocating that people get 8, 7, 6, 5, 4, 3, 2, 1, or 0 h of sleep per night. As the advocated number of hours of sleep decreased, participants' beliefs changed in a direction consistent with the message. However, instead of asymptoting when the advocacy became quite extreme (e.g., advocating one or 0 h of sleep), participants were *less* persuaded by these extreme advocacies than they were by less extreme (but presumably more plausible advocacies, e.g., get 3 h of sleep; see also Aronson, Turner, & Carlsmith, 1963; Insko, Murashima, & Saiyadain, 1966). Differing attitude change theories have been applied to message extremity studies (e.g., cognitive response theory, Brock, 1967; social judgment theory, Sherif, Sherif, & Nebergall, 1965), but the predictions have been similar—an inverted-U pattern in which attitude change first increases and then decreases as communication extremity increases.[1]

When advocacies are too extreme, people might generate counterarguments or might ignore the advocacy completely (both of which would lead to less attitude change). In the anchoring domain, this suggests that implausibly extreme anchors should result in less of an anchoring effect (i.e., less difference between high- and low-anchor conditions). Of course, this prediction is the opposite of the anchor-and-adjust and selective accessibility perspectives (for a similar extremity prediction, see Kahneman, 1992, p. 310). In this context, our attitude change perspective would translate into consideration of the perceived plausibility of the *anchor*. If the anchor is viewed as relatively plausible, recipients might be more likely to generate cognitive responses suggesting that the real answer is closer to the anchor than would normally be the case. In contrast, anchors perceived as implausible would be relatively ignored or counterargued. If found, this would be the first demonstration of more extreme anchors leading to smaller anchoring effects than less extreme anchors. This would suggest that the currently dominant anchor-and-adjust and selective accessibility views do not fully capture the effects of numerical anchors. The studies in this article present an initial test of these ideas.

Before describing our specific studies, it is important to note that these ideas are only one small portion of a complete "attitude change" approach. Although we focus here on predictions for anchor extremity, a multiprocess attitude change approach could address many additional questions. Applying the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) to anchoring would suggest that an anchor could have an impact for different reasons depending on the level of thought given to the judgment target. For example, the anchor could act as a simple cue when motivation or ability to think is relatively low, but could influence the thoughts that come to mind when motivation and ability are relatively high. We return to these multiprocess issues under Discussion.

Overview of Studies

Anchor extremity is manipulated and anchoring effects are expected to be smaller when implausibly extreme (rather than less extreme, but more plausible) anchors are used. The basic design is the same as past studies that found either equal or increasing impact of extreme anchors, so a reader might wonder why we would predict the opposite. In addition to theory and results from attitude change, another reason relates to the anchors used in past research. If one considers the generic inverted-U pattern of anchoring that we propose, the pattern of effects for any two-level study depends on the particular levels chosen. In the Strack and Mussweiler studies, the plausible anchoring values were chosen to be one standard deviation above and below the mean of a set of unanchored responses. This seems reasonable, but it means that 16% of the people receive an anchor that is misclassified regarding its "high" or "low" status relative to the respondent's initial perception (i.e., 16% of people receiving a "high" anchor, for instance, would have spontaneously thought that the real answer was even higher).[2]

Perhaps it should not be surprising, then, that there was room for extreme anchors (where everyone viewed "high" anchors as high and "low" anchors as low) to produce larger anchoring effects than low-extremity anchors (Mussweiler & Strack, 1999; Strack & Mussweiler, 1997). In our studies, we attempted to use "moderate" anchors—extreme enough that everyone would view high anchors as high and low anchors as low, but not so extreme as to become implausible. We believed that such moderate anchors would be likely to produce substantial anchoring effects. This could provide a setting conducive to finding an absolute decrease in anchoring with extreme anchors if, in fact, the hypothesized inverted-U pattern exists. This finding would be difficult to understand using the anchor-and-adjust or selective accessibility views.

EXPERIMENTS 1A AND 1B

Methods

Participants and procedure. Participants were 296 undergraduates enrolled in introductory psychology classes at Ohio State University. In groups ranging in size from 25 to 50, participants were asked to make eight estimates, such as "The record high (hottest) temperature for a day in Seattle, Washington," and "How old George Washington was when he died" (see the Appendix for the judgments and anchors). Before providing estimates for each question, respondents were asked to indicate whether they thought the true answer to the question was higher or lower than a given "random" number (cf. Tversky & Kahneman, 1974). Specifically, participants were given the following instructions:

> For each of the following questions, we have generated a random number. For each question, your task is to simply indicate whether the real answer to the question is *higher* or *lower* than this random number. Note that this number is random and is in no way associated with the real answer to the question. Second, for each question, please indicate what you believe is the true answer. The closeness of your answer to the real answer is your accuracy score. Please be sure to respond to all questions, no matter how uncertain you are.

The judgments appeared in the same order for all participants, but counterbalanced across questions the "random"

[1] Though there has been little support for the social judgment prediction that latitudes of acceptance and rejection are responsible for the inverted-U pattern of attitude change (e.g., see Eagly & Telaak, 1972), the plausibility approach we use for predicting anchoring effects might prove more useful. People might often consider positions with which they disagree as plausible, even defensible, positions. Thus, it might actually be that "latitudes of plausibility"or "reasonableness" are better than "latitudes of rejection" at predicting the level of extremity where downturn in attitude change occurs.

[2] Assuming a normal distribution of unanchored responses.

(anchor) values were either relatively high or low and were either moderate or extreme. Therefore, the cells of a within-participant 2(Anchor: high vs low) × 2 (Extremity: moderate vs extreme) were distributed across the eight judgments in one of four orders based on a revised Latin square (with four yoked pairs of questions—each pair constituting one cell of the within-participant design). The only difference between Experiment 1A ($n = 151$) and Experiment 1B ($n = 145$) was that the extreme anchors from Experiment 1A were replaced with even more extreme anchors in Experiment 1B. The same moderate anchors were used in each sample (see Appendix). Therefore, in the first sample, extreme anchors were clearly unrealistic (e.g., a record high in Seattle of 285°F), but in the replication sample, extreme anchors were more clearly impossible (e.g., a record high in Seattle of 8905°F).

Standardization and aggregation. Because the metrics varied to a large extent across questions (e.g., the average starting salary of American undergraduates versus how much Julius Caesar weighed), responses were standardized separately for each of the eight questions. Standardization was performed across all 296 participants. After standardization, each of the participants' two responses for each condition were averaged to provide a single standardized response for that condition. These composite scores were then analyzed using a 2 (Anchor: high vs low) × 2 (Extremity: moderate vs extreme) within-participants analysis of variance (ANOVA) for each sample.[3]

Results

For Experiment 1A, a main effect of Anchor was obtained such that high anchors led to higher estimates than low anchors [Ms = +.43 vs −.44 respectively, $F(1, 150) = 287.55$, $p < .001$]. This main effect was qualified, however, by the predicted Anchor X Extremity interaction [$F(1, 150) = 7.11$, $p < .01$]. That is, anchoring was *less* evident when extreme anchors were used (Ms for high and low extreme anchors = +.37 and −.36 respectively) than when moderate anchors were used (Ms for high and low moderate anchors = +.50 and −.52 respectively).

Similarly, Experiment 1B showed a strong main effect for the Anchor factor such that high anchors led to higher estimates than low anchors [Ms = +.33 vs −.33 respectively, $F(1, 144) = 114.01$, $p < .001$]. Again, this main effect was qualified by the expected Anchor X Extremity interaction [$F(1, 144) = 25.68$, $p < .001$] such that anchoring was *less* evident when very extreme anchors were used (Ms for high and low very extreme anchors = +.15 and −.25 respectively) than when moderate anchors were used (Ms for high and low moderate anchors = +.52 and −.41 respectively).[4]

Though not crucial to our analysis (because we found the hypothesized downturn in each sample), we also compared the effect size of this interaction between samples. As might be expected given the more extreme anchors used, the effect size for Experiment 1B ($r = .39$) was somewhat larger than for Experiment 1A ($r = .21$), $Z = 1.69$, $p = .045$, one-tailed.

EXPERIMENT 2

In a third data collection, we measured peoples' perceptions of anchor plausibility in order to show that these perceptions predict the amount of anchoring. If the instructions about random generation of anchors were effective, then research participants in Experiment 1 should not have identified the anchoring task as an advocacy per se (as in much attitude change work). If work on attitude change serves as a useful model for understanding effects of anchors, however, then similar effects might occur when the "random number" aspect of the traditional anchoring paradigm is removed. Therefore, in the following study, we removed this aspect of the procedure.

One might argue that this would make it more likely for a "communicative norm" of informativeness to influence the results (cf. Schwarz, 1994). That is, participants might assume that the experimenter would not provide information unless it is informative and thus might be likely to use information they otherwise would not. Such a process might account for previously found increasing effects of extreme anchors (if participants do not believe typical anchoring rationale for "random generation" of anchors). Importantly,

[3] To minimize the impact of outliers on the standardized judgments, we used an outlier procedure recommended by Tukey (1977). The interquartile range is multiplied by 1.5 and this value is subtracted from the 25th percentile and added to the 75th percentile. This produces what Tukey referred to as the "inner fence" of a normal distribution. Values falling outside the inner fence could be expected to occur with a 1 in 300 probability and could thus be considered outliers. Rather than discarding the outlying values, scores falling outside the "inner fence" (less than 4% of responses for each of our three data collections) were recoded as falling *at* the inner fence. For example, the 25th and 75th percentiles for George Washington's age when he died were 48 and 68. The inner fences were therefore 18 and 98 (i.e., 48-[20 × 1.5], 68 + [20 × 1.5]). If a participant responded with an answer greater than 98, that answer was recoded as 98. Similarly, if a response fell below 18, it was recoded as 18. This procedure is functionally similar to the recoding of overly fast reaction times to be some minimum reasonable value (e.g., 300 ms) along with overly slow reaction times being recoded to equal some reasonable maximum value (e.g., 3000 ms; see Greenwald, McGhee, & Schwartz, 1998). The standardized scores reported are based on standardization of responses after this recoding procedure was completed.

[4] The median responses show the same pattern in each sample. For Experiment 1A, the medians for the moderate high and low anchors are 0.53 and −0.60, but the medians for the extreme high and low anchors are 0.36 and −0.44, respectively. For Experiment 1B, the medians for the moderate high and low anchors are 0.49 and −0.42, but the medians for the very extreme high and low anchors are 0.13 and −0.24, respectively. Clearly, the results represent the mass of the data rather than a few divergent responses.

however, this norm would work against our hypotheses because "informativeness" would encourage participants to use extreme anchors to a greater extent than usual.

Methods

Participants and procedure. Eighty introductory psychology students from Yale University ($n = 28$) and Purdue University ($n = 52$) participated. The items were the same as in Experiment 1B, but the instructions said nothing about the anchors being randomly generated. Before making each estimate, participants were asked to rate the extent to which they perceived the anchor as a plausible answer using a 9-point scale with 1 = *Completely Implausible* and 9 = *Completely Plausible.* Prior to analysis, outliers were identified and the estimates were standardized using the same procedures as for Experiment 1.

Results

The within-participant 2(Anchor: high vs low) × 2 (Extremity: moderate vs very extreme) ANOVA on the standardized estimates replicated our previous findings. The main effect of Anchor [with high anchors, $M = +.33$, leading to higher estimates than low anchors, $M = -.33$, $F(1, 79) = 86.90$, $p < .0001$] was again qualified by the expected Anchor × Extremity interaction [$F(1, 79) = 9.02$, $p < .0036$]. For a third time, anchoring was *less* evident when very extreme anchors were used (*M*s for high and low very extreme anchors = +.26 and −.19 respectively) than when moderate anchors were used (*M*s for high and low moderate anchors = +.40 and −.47, respectively).[5]

The same 2 × 2 ANOVA conducted on ratings of anchor plausibility showed that the extremity manipulation strongly influenced the extent to which people viewed the anchors as plausible answers. That is, very extreme anchors ($M = 1.28$) were viewed as markedly less plausible than were more moderate anchors ($M = 4.38$) [$F(1, 79) = 268.27$, $p < .0001$]. Although low anchors ($M = 3.00$) were perceived as slightly more plausible than high anchors ($M = 2.67$) [$F(1, 79) = 6.43$, $p < .02$], the manipulation of extremity had equivalent impact on perceptions for high and low anchors ($p > .2$, for the Extremity × Anchor interaction). When ratings of anchor plausibility were substituted for the manipulation of extremity in the same general linear model (using the Participant × Rated Plausibility × Anchor error term), plausibility ratings moderated the effects of the anchors [$F(1, 79) = 5.55$, $p < .02$], for the Rated Plausibility × Anchor interaction.[6]

We also wanted to investigate whether perceptions of plausibility were responsible for the moderating effects of anchor extremity (i.e., whether the moderating effects of extremity were mediated by perceptions of plausibility—mediated moderation, see Wegener & Fabrigar, 2000). To do so, we conducted separate within-participant mediation analyses for high and low anchor conditions. The collinearity between the extremity manipulation and the plausibility ratings (see earlier analysis) make the current setting less than ideal for mediation analyses (see Kenny, Kashy, & Bolger, 1998). Yet, the results are quite encouraging.

In low-anchor conditions, effects of Extremity [$B = 0.282$, $t(79) = 2.88$, $p < .005$] and of Rated Plausibility [$B = -0.103$, $t(79) = -4.19$, $p < .0001$] were each found when entered independently into the regression equation. Also, the Extremity manipulation strongly influenced ratings of plausibility [$B = -3.269$, $t(79) = -14.94$, $p < .0001$]. When Extremity and Rated Plausibility were simultaneously entered, however, the Extremity effect was diminished and even reversed in direction [$B = -0.204$, $t(79) = -1.12$, $p > .25$], whereas the Rated Plausibility effect was unaffected [$B = -0.149$, $t(79) = -3.11$, $p < .0026$]. The decrease in effect of the manipulation when the mediator was entered was significant ($Z = 3.04$, $p < .0013$; one-tailed; see Baron & Kenny, 1986).

The effects for the high anchor conditions were similar. Although the Extremity manipulation did not have as strong an effect using high anchors [$B = -0.145$, $t(79) = -1.36$, $p < .179$], Rated Plausibility was marginally predictive [$B = 0.05$, $t(79) = 1.74$, $p < .086$] of the estimates provided. Similar to low anchor conditions, the Extremity manipulation strongly influenced ratings of plausibility [$B = -2.925$, $t(79) = -11.87$, $p < .0001$]. When Extremity and Rated Plausibility were simultaneously entered, the Extremity effect was eliminated [$B = 0.008$, $t(79) = 0.05$, $p > .96$] and the magnitude of the Rated Plausibility effect was unaffected [$B = 0.052$, $t(79) = 1.07$, $p < .287$], though the standard error of the estimate was increased. As noted by Baron and Kenny (1986, p. 1177), it is important to note the absolute size of effects in addition to the significance of each, especially because of the collinearity present when both the independent variable and mediator are in the same equation. Though directionally consistent, the test for the decrease in effect of the manipulation when the mediator was entered did not reach significance, ($Z = -1.06$, $p < .145$; one-tailed). This is not surprising given that the initial

[5] The median responses show the same pattern. The medians for the moderate high and low anchors are 0.30 and −0.51, but the medians for the extreme high and low anchors are 0.23 and −0.20, respectively.

[6] Six participants rated all of the anchors within either the high or low anchor condition as extremely implausible. Because of this, certain values contributing to higher order interactions involving the participant and rated plausibility factors (e.g., the Participant × Rated Plausibility × Anchor error term) were incalculable for those participants. Rather than discard these participants, we added a very small amount (0.001) to the composite plausibility rating of either moderate or extreme anchors within that anchor condition (which composite was determined randomly). This made the relevant values calculable (so the relevant error terms would have the correct number of degrees of freedom), but did not have any noticeable impact on any of the numerator terms in the model.

effect of Extremity was weaker for high anchors than it was for low anchors (although the same Extremity manipulation had stronger effects for high than for low anchors in Experiment 1B).

DISCUSSION

In three data collections, extreme anchors led to smaller anchoring effects than more moderate anchors. These data are potentially problematic for the existing anchor-and-adjust and selective accessibility views because these views clearly predict *equal or larger* anchoring effects with more extreme anchors. Moreover, in Experiment 2, judgments of anchor plausibility related closely to the manipulation of anchor extremity and the perceptions of plausibility themselves moderated the effects of anchors on target judgments. This could be because perceived plausibility is the key conceptual variable or because plausibility proxies for other variables such as likelihood of generating counterarguments or of ignoring the anchor.

Anchors very close to the mean of unanchored responses would create little or no anchoring, and all relevant theories predict increasing effects of anchors as extremity increases within the range of plausible anchors. Putting this together with the current results strongly suggests the inverted-U pattern predicted by attitude change theory and data. Of course, in order to directly observe such a pattern, future work would need to include more than two levels of anchor extremity.

Our suggestion that the persuasion literature has much to offer work on numerical anchoring should not be taken as implying total rejection of “confirmatory search” (Chapman & Johnson, 1994) or “selective accessibility” (Strack & Mussweiler, 1997) mechanisms for anchoring. To be sure, accessible knowledge plays a role in any cognitive process, and the selective accessibility idea shares a great deal with the cognitive response processes long studied in persuasion. In fact, we would argue that such views have made great progress in explaining numerical anchoring precisely because they capture important aspects of attitude change processes.

“Selective accessibility” and “confirmatory search” views have focused on activation of anchor-consistent knowledge. In contrast, the attitude change view suggests that individuals’ reactions to an anchor can include both acceptance and rejection in varying amounts across conditions. Therefore, although persuasion processes sometimes lead to anchoring effects that look like accessibility- or confirmatory-search-based influences (e.g., when most of the cognitive responses are anchor-consistent), attitude change processes can also lead to very different outcomes (e.g., when most of the cognitive responses counter the possibility of anchor-consistent features). In such cases, the outcomes of persuasion processes might look considerably more like “disconfirmatory search” rather than “confirmatory search.” Such “disconfirmation” might often occur when the social perceiver has some reason to “disagree” with the value suggested by an anchor (cf. Edwards & Smith, 1996).

Consider, for example, a Purdue University basketball fan who is asked whether the Indiana University basketball team will win more or fewer than 25 games during the upcoming season. Because of the fan’s allegiances, he or she would likely look for reasons why the IU team would be considerably less successful than a 25-game winner (i.e., he or she would engage in counterarguing “disconfirmation” of the anchor). The same fan would be quite happy to look for reasons why the IU team would win a small number of games or why the Purdue team would win a large number of games (looking like “confirmatory search”).

Taking an “attitude change” view of anchoring opens new research questions and also draws parallels between existing anchoring effects and traditional attitude change literatures. For example, attitude-change theory and data suggest that anchoring should especially occur if the anchors are associated with sources that are knowledgeable and trustworthy (e.g., Hovland & Weiss, 1951; Lorge, 1936), when the anchor recipients are low in knowledge (e.g., Lewan & Stotland, 1961; Wood, 1982), and when anchors or anchor-consistent responses are self-generated rather than externally provided (e.g., Janis & King, 1954). Recently, anchoring has been found to depend on expertise of the source of the anchor (Jarvis, Wegener, & Petty, 1995b), knowledge of the anchor recipient (Jarvis, Wegener, & Petty, 1995a; Mussweiler & Strack, 2000; Wegener, Bedell, Petty, & Jarvis, 1997; Wilson, Houston, Etling, & Brekke, 1996), and even whether responses to the anchor are self-generated (Mussweiler & Strack, 1999). These striking parallels have not been acknowledged previously.

As noted briefly in the introduction, a complete development of an attitude change approach to anchoring would bring multiple attitude-change processes to bear. That is, consistent with attitude change theory and research, the same attitude change outcomes can come about for different reasons (see Petty & Wegener, 1998). Within the ELM (Petty & Cacioppo, 1986), a person could become favorable toward an advocacy because the person thinks carefully about the merits of the advocacy. In other circumstances, however, favorable views of the advocacy might be created because of less effortful processes (e.g., taking the word of an expert). Similarly, an anchor could have an impact because the person thinks about reasons the target might be similar to the anchor, or the anchor could have an impact because the person takes the anchor as the best simple cue available as to the real quality of the target. In order to examine these issues, indices of relatively effortful persuasion processes, such as cognitive responses, could be included in future research. One important feature of such a “multiprocess” view is that different processes are postulated to result in different consequences of the resulting views. Therefore, if an anchoring effect is based on relatively high levels of judgment-relevant thought, the resultant perceptions of the target might be more likely to persist over time or be harder to change compared with anchoring effects that result from less effortful thought (e.g., use of the anchor as a "cue," see Petty, Haugtvedt, & Smith, 1995).

Recent work in attitude change has also integrated the multiprocess ELM with work on attempts to avoid unwanted influences (i.e., bias correction, see Petty, Wegener, & White, 1998; Wegener & Petty, in press). Although the traditional anchoring paradigm includes rather explicit consideration of the anchor value, it is likely that perceivers are often not aware of the anchor's influence on target perceptions. When people do come to realize an anchoring influence, attempts at correction might also be difficult if people underestimate the influence of anchors (Wegener & Petty, 1997; Wilson et al., 1996).

Therefore, the current work is but a beginning in acknowledging the relations between numerical anchoring and processes of attitude change. It is our hope that future research will continue to integrate these phenomena that have been studied previously in relative isolation.

APPENDIX

Anchoring Items and Associated Anchors

Item
(Anchors: Very Extremely Low, Extremely Low, Moderately Low, Moderately High, Extremely High, Very Extremely High)

1. The record high (hottest) temperature for a day in Seattle, Washington.
   (4° Fahrenheit; 28° Fahrenheit; 68° Fahrenheit; 128° Fahrenheit; 285° Fahrenheit; 8,905° Fahrenheit)
2. The age of George Washington when he died.
   (2 years old; 13 years old; 41 years old; 91 years old; 167 years old; 167,054 years old)
3. The average starting annual salary of college graduates in the United States.
   ($48 per year; $722 per year; $13,660 per year; $45,890 per year; $450,012 per year; $8,902,340 per year)
4. The age of Amelia Earhart when she disappeared attempting to pilot a plane around the world.
   (3 years old; 8 years old; 19 years old; 68 years old; 144 years old; 14,423 years old)
5. The weight of Roman Emperor Julius Caesar.
   (12 pounds; 70 pounds; 119 pounds; 312 pounds; 712 pounds; 71,200 pounds)
6. The age of Ernest Hemingway when he wrote his first successful novel.
   (2 years old; 5 years old; 16 years old; 68 years old; 158 years old; 158,020 years old)
7. The length of time an average American person spends eating an evening dinner at home.
   (0 minutes; 1 minutes; 7 minutes; 59 minutes; 238 minutes; 7,921 minutes)
8. The age of Neil Armstrong when he walked on the moon.
   (2 years old; 14 years old; 23 years old; 48 years old; 89 years old; 908 years old)

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