Special Session Summary    Advances in the Investigation and Application of the Anchoring and Adjustment Heuristic

Leif D. Nelson, New York University

[to cite]:

[url]:
http://www.acrwebsite.org/volumes/9052/volumes/v32/NA-32

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SESSION OVERVIEW

Sometimes the easiest way to evaluate an uncertain prospect is to think of a more certain version, and make some adjustments. This process, the anchoring and adjustment heuristic, was originally identified in the estimation of quantitative estimates (Tversky & Kahneman, 1974), but has been subsequently applied to a variety of complex inferential processes as disparate as egocentrism (Gilovich, Medvec, & Savitsky, 2000) and predictions of consumer opinions (Hoch, 1987). Meanwhile, the theory has been systematically updated to incorporate subtleties in the underlying process (Chapman & Johnson, 2002; Epley & Gilovich, 2001; Strack & Mussweiler, 1997), leaving the field with a multitude of findings claiming a process that has subsequently been reconsidered. What is the state of the field and how should we consider anchoring and adjustment in contemporary consumer research?

In this session, we contribute to the literature by examining the theoretical foundation of the phenomenon, clarifying the processes that underlie it, and offering new theoretical extensions and potential applications. Epley and Gilovich begin by isolating the phenomenological aspects of anchoring and adjustment from the processes guiding them. In a series of studies as diverse in manipulation as alcohol intoxication and financial incentive, they demonstrate that for self-generated anchors, effortful mental adjustments are in fact used in the computation of final estimates. None of these manipulations seem to impact experimenter generated primes. This is the strongest empirical evidence to date demonstrating this critical theoretical distinction. LeBoeuf and Shafir provide striking evidence for the foundation of the process, replicating biases in the new domain of time estimation consistent with existing theory. Their findings have obvious relevance to consumer planning, as they make systematic predictions about how a calendar versus unit focus can lead to dramatically different patterns in buying behavior. The final paper by Nelson and Simmons, starts with an anchoring and adjustment account of the prominence effect and ends by offering a fundamental reconsideration of insufficient adjustment. They argue that insufficient adjustments are the product of high confidence anchors, and that in a more typical consumer situation, adjustments may be sufficient.

Taken together, these papers make two obvious contributions to consumer research. First, by redefining our understanding of the underlying processes, researchers can reexamine some of the classic biases previously considered in terms of anchoring and adjustment. If we have a new understanding of the process shouldn’t we therefore develop a new understanding of the effects it produces? Second, in redefining the core process we can make new predictions about consumer behavior. Since Tversky and Kahneman introduced the anchoring and adjustment heuristic it has been implicated in hundreds of behavioral findings. If we are now rethinking anchoring and adjustment, shouldn’t we be able to make novel predictions about human behavior as well?

“Tales of Thinking While Nodding and Drinking: Resurrecting the Anchoring and Adjustment Heuristic”
Nicholas Epley, Harvard University
Thomas Gilovich, Cornell University

One potentially effective strategy for estimating unknown quantities is to start with information one does know and then serially 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, one that has left a large gap in psychologists’ understanding of this common source of inaccuracy in everyday judgment.

In Tversky and Kahneman’s original formulation, the starting information, or anchor, tends to exert some drag on the subsequent process of adjustment, such that adjustments tend to be insufficient and final estimates are too close to the original anchor. In the paradigm Tversky and Kahneman pioneered to examine anchoring and adjustment, participants are first asked to make a comparative assessment (e.g., Is the population of Chicago more or less than 200,000?) followed by 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, even when the anchor value is randomly selected and clearly irrelevant to the absolute judgment. Anchoring and adjustment thus described both a process (adjusting from an incorrect value to a better estimate) and a phenomenon (final estimates assimilated toward the original anchor).

Research on anchoring as a phenomenon took off immediately and has yet to let up. Anchoring effects resulting from a consideration of irrelevant information have been demonstrated in many different contexts and domains (Chapman & Johnson, 2002). Research on anchoring and adjustment as a process, in contrast, has been more uncertain and uneven. Efforts to lay bare the process of adjustment through process tracing procedures yielded no evidence of adjustment in the standard anchoring paradigm. And manipulations such as forewarnings and financial incentives that ought to influence the amount of effortful adjustment have likewise had little or no effect on responses in that paradigm (Chapman & Johnson, 2002). Outside the standard anchoring paradigm, in contrast, various cognitive load manipulations have been shown to influence judgments in a manner consistent with an underlying process of effortful adjustment or “correction” from an initial assessment (e.g., Gilbert, 2002).

The reason for these uneven effects was only recently made clear by two related research programs. First, a comprehensive series of studies by Mussweiler and Strack has compellingly demonstrated that anchoring effects in the standard anchoring paradigm using “externally-provided anchors” are not the result of insufficient adjustment, but of the enhanced accessibility of anchor-consistent information (e.g., Strack & Mussweiler, 1997). The attempt to answer the comparative assessment within this paradigm leads people to evaluate whether the anchor value could be equal to the correct answer. Because people evaluate hypotheses by trying to confirm them, the comparative assessment generates information disproportionately consistent with the anchor value, thereby biasing the subsequent absolute judgment.

Second, studies conducted in our own lab, in contrast, have provided evidence of true insufficient adjustment outside the standard anchoring paradigm (Epley & Gilovich, 2001). In particular, this research suggests that people adjust from values they generate themselves as starting points or ballpark figures known to be incorrect but close to the target value—that is, from “self-generated” anchors. People estimate the date that Washington was elected President of the United States, for example, by serially
adjusting from 1776, the date the U.S. declared its independence. Or they estimate the freezing point of Vodka by adjusting (down) from 32°F (0°C), the freezing point of water.

Experimental Research

The experiments in this presentation are intended to provide further support for the distinction between experimenter-provided and self-generated anchors, demonstrate that these anchor values respond differently to situational manipulations, and that the anchoring biases produced by these two types of anchor values require different debiasing strategies for amelioration. In particular, because the process of serial adjustment from self-generated anchors requires attentional resources, adjustment should be diminished when participants are under some form of cognitive load. However, because the biased selection of anchor-consistent information is a paradigmatic example of an automatic psychological process, anchoring effects in response to experimenter-provided anchors should not be influenced by forms of attentional load. Three separate experiments found support for these predictions. Participants adjusted less from self-generated anchors when they were less able to expend attentional resources—either because they were under cognitive load, intoxicated by alcohol, or low in the Need for cognition—when they were not. Responses to experimenter-provided anchors, in contrast, were not influenced by these manipulations in any way.

Notice this difference between self-generated and experimenter-provided anchors also suggests very different strategies for reducing the pernicious anchoring biases produced types of anchors. In particular, if serial adjustments from self-generated anchors require attentional resources, then anchoring effects resulting from self-generated anchors should be reduced by manipulations that increase the tendency to expend those resources. Indeed, two additional experiments we will discuss demonstrated that providing financial incentives for accuracy and forewarning about potential anchoring biases increased adjustment from self-generated anchors. Neither of these manipulations, however, influences responses to experimenter-provided anchors within the standard anchoring paradigm.

Conclusion

Anchoring effects are ubiquitous in human judgment. The surface similarities among the many empirical demonstrations of these effects can create the illusion that they are the product of a single psychological process (Epley, in press). The results of the present experiments indicate otherwise, demonstrating that anchoring effects are produced by at least two mechanisms. Those generated by participants themselves as values known to be incorrect but close to the right answer (i.e., “self-generated” anchors) activate a process of serial adjustment, whereas novel anchors provided by an experimenter do not. Much of the uneven progress in understanding the biases that result from anchoring effects can be attributed to the failure to recognize that not all anchoring effects are alike, and to an insistent search for a single explanatory mechanism. Only by recognizing the different mechanisms that underlie these anchoring effects can researchers and practitioners hope to predict the size and magnitude of different anchoring effects in everyday life.

“Anchoring on the Here and Now: Insufficient Adjustment in Time and Distance Estimates”
Robyn A. LeBoeuf, University of Florida
Eldar Shafir, Princeton University

Consumers often must estimate uncertain quantities. Years of research have shown that such judgments and estimates are often systematically and predictably biased. Some biases arise naturally because of shortcuts or heuristics that consumers employ to simplify the estimation task; other biases can be induced by manipulations of the decision situation, choice description, or elicitation procedure (for a review, see Gilovich, Griffin, & Kahneman, 2002). This paper explores a particular type of bias that is especially likely to affect estimates of uncertain time and distance intervals. Notably, such estimates are called for when consumers plan the times and places of their purchases, and a better understanding of bias in such contexts may foster better prediction of consumer choices.

Consumers can think about a future event in terms of its date of occurrence or in terms of the amount of time until that event. These different viewpoints may prompt different senses of event proximity. At the end of February, for example, “March” may seem distant until one realizes that it is just 48 hours away. In the studies described below, we find that time estimates are indeed influenced by whether they are unit-based (e.g., number of days) or based on boundaries (e.g., final date). We then document a similar discrepancy with estimates of distance.

We first asked participants about multiple past and future events, which were divided into “private” and “calendar” events. Private events, like getting a haircut or buying one’s books for the semester, have no publicly known date; their occurrences are determined by the participant. In contrast, calendar events, like Christmas, have a publicly available date. Some participants were asked to estimate the number of days remaining until (or that had passed since) the events; others estimated the date of occurrence of the same events. (For purposes of analysis, we converted date estimates to the corresponding number of days.)

For future-private events (e.g., doing laundry, getting a haircut), the average day-format estimate was 66.6% of the corresponding date-format estimate, reliably lower than the 100% expected if question format had no effect, \( p < .001 \). Thus, estimating the number of days until future-private events yielded relative underestimation compared to directly estimating the corresponding dates. This effect was limited, however, to future-private events. Day-format estimates did not differ from date-format estimates for future-calendar, past-calendar, or past-private events (day-format was 99.2%, 96.4%, and 95.8% respectively, of date-format). Thus, consumers are affected by response-format manipulations only when the date of the event is not yet decided. When the date has been determined, consumers are quite accurate in converting from the known date to provide the number of days (when requested to do so). In contrast, when estimating the days until an uncertain future event, people seem not to first generate a date and then convert to the requested units. Instead, we suggest, people appear to anchor on the present and to adjust by the suggested units (e.g., “more than one day, more than two, more than three...”), but that adjustment is typically insufficient, yielding relative underestimation.

If insufficient unit-by-unit adjustment underlies the low day-format estimates, increasing response-unit size should increase overall adjustment. Indeed, for future-private events, day-format estimates averaged only 46.1% of estimates obtained when participants were asked to respond by giving the weeks and months remaining until the events. This supports the hypothesis that an increase in unit size generates greater overall adjustment from the anchor, which in these cases is presumed to be “the present.”

We replicated these effects with distances; some participants estimated various familiar campus distances in conventional units (e.g., miles), whereas others were asked to answer using unconventional units (e.g., number of footsteps). Unconventional-unit estimates were, on average, 62.5% of conventional-unit estimates and 61.9% of the actual distances (both ratios less than 100%, \( p < .01 \)). These effects of unit type were not found for commonly known distances, such as the length of a football field; for such distances,
participants presumably converted from the known length to the specified units.

For both time and distance, using particular units to estimate uncertain intervals seems to prompt different processes from when estimates are made in terms of calendar dates or natural distance units. In the latter cases, respondents may have readily available scripts or may use memory or spatial cues to inform them about interval size. In contrast, when small, simple units such as days or footsteps are required, consumers appear to anchor on “here” or “now” and to adjust, unit-by-unit, generating an answer that is often insufficiently distant. This work has implications for certain lines of memory research (Huttenlocher, Hedges, & Bradburn, 1990) as well as for research on the planning fallacy (Buehler, Griffin, & MacDonald, 1997). Furthermore, the findings are relevant to consumer planning more generally: Ranging from predictions about how long supplies will last to the scheduling of services and maintenance, consumers’ estimates are likely to differ depending on whether they think of time in terms of successive units, such as days, as opposed to eventual calendar dates. Similarly, estimates of distance appear highly malleable, suggesting that the perceived proximity of relevant locations will vary significantly, depending on how distance estimates are elicited. These findings add to the large body of research illustrating the impact of elicitation methods on estimation procedures.

References:

“Favored Favorites: Inequalities in Equivalent Outcomes”
Leif D. Nelson, New York University
Joseph P. Simmons, Princeton University

How do consumers make decisions between explicitly equivalent alternatives? Despite a normative account predicting that people will choose each of two equal alternatives approximately half the time, research has demonstrated a systematic selection bias (Tversky, Sattath, & Slovic, 1988). The question remains though, what process leads to systematic selections where random selections would be expected?

We argue that anchoring and adjustment processes (Tversky & Kahneman, 1974) may account for this effect. For example, when considering two competing products, people first identify the higher quality alternative (the anchor) and then adjust for the price difference equating the products. Because adjustment is often insufficient, even when a consumer’s self-generated price difference equates the options, the higher-quality option will still be selected. In the context of a more general dual process (Kahneman, 2003), the quick intuitive inferences of System 1 provides an imperfect anchor, and the more effortful System 2 corrects the initial inference to make it more accurate. Nevertheless, because System 2 often undercorrects, responses tend to be biased towards the intuitive estimate.

Why would a correction system systematically undercorrect? In the context of anchoring and adjustment, we argue that this is due to System 1 outputs that provide two signals. Consistent with other models, the first signal indicates the exact anchor value, but we posit an additional output communicating the felt confidence in System 1 judgments. We argue that people use confidence as an informational cue for System 2 adjustments, so that when confidence is high, smaller adjustments are made. In many purchasing decisions, where prominent dimensions determine quality differences, initial preferences are felt with high confidence, and as a result adjustments for price are comparatively small.

Initially we tested this hypothesis by looking at decisions in a market predicated on notionally equivalent outcomes: sports betting. In football, bookmakers take bets on games by first setting a point spread equating the favorite with the underdog, and offering equal odds (minus a commission) to people who bet on either team. We examined choices made by thousands of people in a national online football pool across the entire 2003 season. In line with our argument, we made two predictions: 1. People anchor on the subjective probability that the favorite will defeat the underdog, and (insufficiently) adjust for the magnitude of the point spread. As a result most people should bet on favorites. 2. An interaction between initial subjective probability and point spread should emerge, suggesting that people adjust more with lower judged probabilities than they do with higher probabilities. We found very strong support for both hypotheses, as in more than 90% of the games the majority chose the favorite against the point spread, but this effect was considerably reduced as people became less certain about which team would win the game.

We then ruled out a number of competing explanations. To show that the effect was not due to a lack of financial incentive, we conducted an experiment in which we gave money to knowledgeable football fans to bet on games, and showed that they chose more favorites, bet more money on those games, and felt more confident in their accuracy as a function of the number of favorites they picked. To rule out systematic disbelief in bookmaker point spreads, borrowing the matching procedure of Tversky et al. (1988) we asked participants to ideographically generate point spreads equating the two teams, and subsequently choose the winner. Across a number of studies we demonstrated that most people bet on favorites with a self-generated spread, did so when the teams were otherwise unknown (i.e., Team A vs. Team B), and with non-sporting probabilistic events (i.e., the presidential election). Perhaps most notably though, we showed that the effect reversed when there was low confidence about who would win the contest to begin with—a demonstration that adjustments could be not only sufficient, but in fact, enthusiastic.

If our model is correct, and System 1 feelings of uncertainty guide the engagement of System 2, then increasing System 1 uncertainty should lead to sufficient adjustments. We partly demonstrated that with the latter studies mentioned above, but we sought a manipulation of uncertainty that was not endogenous to the anchor itself. Borrowing a procedure from Epley and Norfolk (2004), some participants read about an upcoming football game in a difficult to read font. This manipulation reduces fluency, and decreases feelings of certainty about the anchor information. As predicted, reading about the game in a bad font increased betting on underdogs relative to reading in a good font.

Perhaps these findings only extend to probabilistic events? Two additional studies investigated product decisions, and replicated the key findings in that domain as well. In the first of these studies participants were presented with lists of attributes describing two apartments. First people decided which apartment they preferred. This decision was either easy (one dominated the other) or difficult (one had a large space and a bad landlord, and the other had a small space and a good landlord). After choosing between the apartments, participants equated them on price, and then they were required to choose between the two apartments given the
prices they indicated. Participants were much more likely to select their preferred option when the initial decision was easy than when it was difficult. This effect was mediated by how confident they were in their initial decision.

A second study tested the generality of this finding. People made an easy choice between two MP3 players, matched them on price, and choose between their preferred option at the price they indicated or their unpreferred option at a price equal to 5% less than the equated price. Despite the strong consistency pressures here—based on their own prices the unpreferred option dominates—we still observed that the vast majority of people chose their preferred option.

Taken together, these studies offer a fundamental change in thinking about an old paradigm. We argue that “insufficient” adjustments may be epiphenomenal—the accidental byproduct of experimental situations that prompt the generation of high certainty anchors. Contemporary thinking about anchoring and adjustment needs to incorporate these factors when drawing on the anchoring and adjustment model to explain apparent biases in the perceptions, inferences, and preferences of consumers.