Attitudinal Effects on Numerical Anchoring: A Mere Exposure Approach

Honors Research Thesis

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by
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Abstract

Recent research suggests that an attitude change perspective on anchoring offers important supplementation to existing theories of anchoring. Past data has shown that people are more influenced by anchors when they are directionally consistent with their attitudes. This could be a result of individuals seeking information that is consistent with their attitude. This effect could also arise from differences in knowledge about the anchor. The present research aims to distinguish between these two possibilities by manipulating attitude without changing knowledge about the anchoring target. Experiment 1 established subliminal mere exposure of fictional brand names as a successful means of manipulating participants' attitudes toward generic objects. Experiment 2 revealed that participants assigned higher price evaluations to objects with previously exposed brand names. Experiments 3a and 3b aimed to investigate the relationship between anchoring patterns and anchor-attitude consistency. Data analysis for Experiments 3a and 3b only showed a main effect for anchoring. Thus, a paradigm adjustment may be needed to document simultaneous effects of both mere exposure and numeric anchors in the future.

Attitudinal Effects on Numeric Anchoring:

A Mere Exposure Approach

The phenomenon of numerical anchoring pertains to the unwarranted influence of a given starting point on subsequent judgments. Early research pertaining to numerical anchoring explained the influence of random initial numbers on judgments through use of an anchor-and-adjust heuristic. Though people adjust responses to overtly under/overestimated anchors in the right direction, these responses are not sufficiently adjusted (Tversky & Kahneman, 1974). Quattrone, Lawrence, Warren, Souza-Silva, Finkel and Andrus (1984) extrapolated on this heuristic, suggesting that people form boundary values pertaining to specific target objects. People are expected to adjust away from extreme anchoring values until this boundary of plausibility is reached. Thus, no matter how extreme an anchor might be, when it lies outside of plausibility boundaries, adjustments should take judgments back to the nearest boundary of the plausibility range.

While the aforementioned numerical anchoring heuristics are still widely discussed, more complex anchoring theories have emerged. For example, Klayman and Ha (1987) ascertained that people perform hypothesis testing when presented with a novel piece of information. This "confirmatory search" process is accomplished by recalling information pertaining to or comparative to the proposed fact or statistic. Chapman and Johnson (1994) then related this theory of hypothesis testing processes to anchoring. When a "confirmatory search" process is performed in response to an anchor, the individual tests how an answer to the question might be similar to the given anchor. Similarities between the target object and the anchor, thus, become more salient and accessible. This mechanism for anchoring is known as the selective accessibility approach (Strack & Mussweiler 1997). Some research has integrated the selective

accessibility and anchor and adjust models, showing that people effortfully adjust away from anchors in conditions of directional certainty (Simmons, LeBoeuf, & Nelson, 2010).

Besides the classic anchor-and-adjust and selective accessibility approaches, new theories of anchoring have evolved that take into consideration the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986). In this recent perspective on anchoring, anchor values sometimes serve as simple cues that influence judgments rather directly, but at other times they serve to bias more effortful thinking about a judgment (Petty & Wegener, 1998, 1999). Thus, consistent with the ELM, anchoring, like attitude change, should have more lasting effects when thoughtful elaboration processes are carried out. Consistent with this idea, anchoring effects last longer and are more resistant to attempts at later social influence of responses when initial anchoring effects occur in relatively thoughtful rather than nonthoughtful settings (Blankenship, Wegener, Petty, Detweiler-Bedell, & Macy, 2008).

Because the implications of attitude change theories of numerical anchoring present evidence that is not addressed in well-established and classical theories, research involving attitude change and anchoring seemed highly worthwhile. In Dr. Wegener's lab at Ohio State University, previously collected data examines relations between people's existing attitudes and the effects of anchors that are directionally consistent or inconsistent with the anchor. When an anchor was consistent with the person's attitude (e.g., a person opposing the war in Iraq receiving an anchor suggesting a large number of civilian casualties), the anchor had greater influence on people's judgments than when the anchor was inconsistent with the person's attitude (e.g., a person supporting the war in Iraq receiving an anchor suggesting a large number of civilian casualties). This type of effect is reasonable, but can be interpreted in different ways. It could be that people would prefer to seek out information consistent with anchors that fit rather

than conflict with their existing attitudes, and this motivation slants the type of confirmatory testing in which people engage. For example, Blankenship et al. (2008) found that when participants were able to think about their judgments, anchor-consistent background knowledge enhanced the anchoring effect. Alternatively, such an effect may stem from difference in attitudes simply reflecting differences in judgment-related knowledge, such that people can find more anchor-consistent information in memory when the anchor is consistent with their attitudes. In order to distinguish between these possibilities, it seemed necessary to conduct a study in which the attitudes are changed *without* changing the content of knowledge people have about the object or objects. One way to do that is to attempt to change attitudes through repeated exposure of the attitude object (Bornstein, 1989).

Experiments 1 and 2 established subliminal mere exposure as an effective means to influence attitudes. Experiment 3a and 3b aimed to investigate the relationship between attitude-anchor consistency and anchored judgment magnitude. More specifically, it was predicted that numerical changes in participants' anchored judgments would be enhanced when the direction of the anchor was consistent rather than inconsistent with the evaluation of the object.

Experiment 1

Experiment 1 assessed whether subliminal exposure of brand names affected subsequent preferences of branded objects. It has been shown that exposure to initially neutral words increases raters' liking of the words (Bornstein, 1989; Zajonc, 1968). Overall, the mere exposure effect is shown to be particularly strong under subliminal conditions (e.g., Bornstein & D'Agostino, 1992; Bornstein, Leone, & Galley, 1987; Janiszewski, 1988, 1993; Kunst-Wilson &

Zajonc, 1980). Thus, subliminal exposure of hypothetical brand names seemed to be a logical method to manipulate attitudes toward branded objects.

Methods

Participants

Seventy-four undergraduate approached in the main library of The Ohio State University volunteered to participate in this study.

Design

Participants were randomly assigned to one of two conditions in a between-subjects design. Two sets of neutral fictional brand names ("A" and "B" brand sets) were created for the research project. Participants were subliminally exposed to either the A set of brands or the B set of brands. Effects of this exposure were documented through choices in a forced-choice task comparing one object with a previously exposed brand name with a similar object with a novel brand name.

Materials

A laptop computer was used to collect all data for Experiment 1. The experiment was run using DirectRT software (Jarvis, 2008).

Procedure

After opting to participate in the study, participants were told that they would be judging a series of novel stimuli. The introduction screen also stated that the stimuli may be impossible to perceive, but it was important to keep looking at the screen. In the mere exposure segment of the study, subjects were subliminally exposed to one of two possible sets of brand names (i.e., the A set or the B set; see Figure 1). The four brands were presented ten times each at 17ms

exposures for a total of forty subliminal exposures. Previous research shows that presentations of words at 17ms are not consciously perceptible to participants (e.g., Fishbach, Friedman, & Kruglanski, 2003; Shah & Kruglanski, 2002). A mask of Xs created a focus point for participants and ensured subliminal exposure by compensating for after effects. The mask appeared for 500ms between each subliminal brand presentation.

"A" Brands	"B" Brands
PROXID BRIMERT DOWMAN HOFFLE	LANVER PELHOUS WERTON SIDENT

Fig. 1. A and B brands

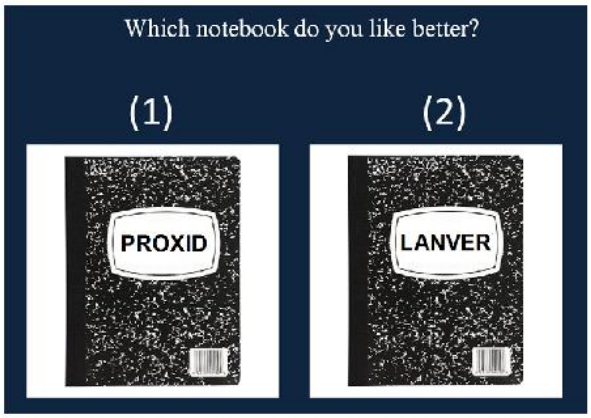

Fig. 2. Forced choice paradigm for branded objects

Upon completion of the exposure segment of the study, participants were presented with two notebooks in a forced choice paradigm. One notebook was labeled with an A brand, while the second notebook was labeled with a B brand (see Figure 2). No other features besides the brand names on the notebooks differed.

Results

Participants expressed their preference between two branded notebooks four times during Experiment 1. Data analysis focused on the proportion of A brand notebooks chosen by participants as a function of previous exposure to A versus B brands. As predicted, individuals subliminally exposed to A brands chose a higher proportion of A brands ($M = .61$, $SD = .25$, $N = 34$) than individuals subliminally exposed to B brands ($M = .48$, $SD = .24$, $N = 40$), $t(72) = 2.16$, $p = .034$, two-tailed.

Experiment 2

The results of Experiment 1 replicated findings of many previous studies, showing that object liking and preference are influenced by subliminal mere exposure (Bornstein, 1989). Thus, manipulating attitude formations toward a specific set of objects could be accomplished through the branding paradigm of Experiment 1 (cf. Hansen & Wanke, 2009). Because subsequent studies would involve numerical anchoring tasks, it seemed necessary to relate attitudinal evaluations of the branded objects to numerical values. It was predicted that a more favorable attitude toward a branded object would correspond to a higher price evaluation of the object. In Experiment 2, it was hypothesized that participants would assign higher price valuations to generic objects when the item's brand name had been subliminally exposed in the preceding mere exposure segment.

Methods

Participants

Sixty-nine introductory psychology students from The Ohio State University participated in the study. The enrollees in Experiment 2 received credit for an undergraduate class's research experience requirement.

Design

Experiment 2 was a repeated measures design. The independent variable was subliminal exposure to either A or B brands. Participants' price evaluations of branded objects were measured. For each participant, price estimates were measured for both A brand objects and B brand objects.

Materials

The data for Experiment 2 were collected on desktop computers in a laboratory setting. The experiment was run using DirectRT software (Jarvis, 2008).

Procedure

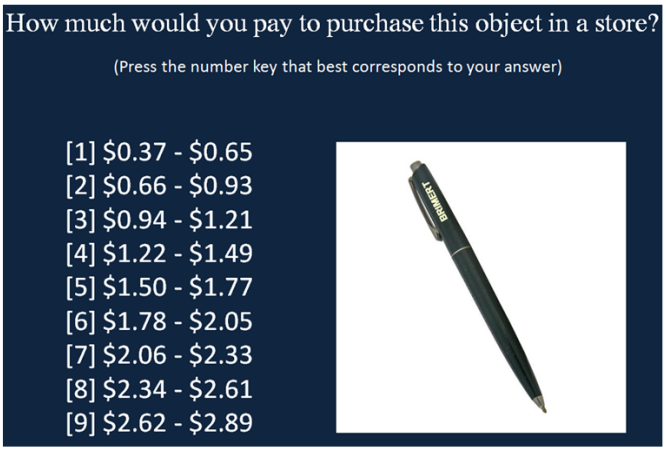

Fig. 3. Price evaluation task for a branded item

After agreeing to participate in the study, participants were informed that they would be judging a series of novel stimuli. Like Experiment 1, the introduction screen stated that the stimuli may be impossible to perceive, but it was important to keep looking at the screen. Affectively neutral stimuli were presented for one second intervals during the mere exposure segment in order to increase participant's attention to the computer monitor (Lang, Bradley, & Cuthbert, 2008). These pictures were unrelated to the stimuli used during the judgment phase of the study (when the objects were accompanied by the brand names). During the mere exposure segment, participants were subliminally exposed ten times to either the four A brand names or the four B brand names from Experiment 1. In all, each participant experienced forty subliminal (17ms) exposures to brand names from either the A set or B set. After the exposures, individuals were asked to estimate branded objects' costs. Participants chose one of nine listed prices arrayed along a continuum (from 1 to 9 based on ranges of values that pretest participants identified as plausible for each object; see Figure 3). In Experiment 2, the branded objects included scissors, pens, screwdrivers, and rulers. Subjects' price evaluations were given for both A brand objects and B brand objects. In other words, within a large set of ratings, participants encountered and rated four pairs of objects consisting of two items that varied only

in brand and orientation during the study. Orientation varied by a rotation of ninety degrees between the objects. Because of the repeated measures nature of the study, participants also estimated the cost of twenty filler items (ten pairs of filler items). The filler items were a series of generic objects such as dice, calculators, notebooks, lighters, and toothbrushes. The order of items presented in this phase was randomized for each participant.

Results

Mean price estimates were calculated for objects branded with previously exposed brand names and objects branded with brand names that were not subliminally exposed. Data analysis focused on a comparison of mean price estimates between the exposure and no exposure branded objects. As predicted, results from a repeated measures t-test showed that individuals were willing to pay more for objects when they had been subliminally exposed to their brand names ($M = 4.15$, $SD = 1.35$, $N = 69$) as compared to objects with no exposure to brand names ($M = 3.97$, $SD = 1.15$, $N = 69$), $t(68) = 2.01$, $p = .048$, two-tailed. Additional data analysis showed no main effect for brand exposed (A or B), and there was no significant interaction between brand exposed (A or B) and exposure level (exposure and no exposure).

Experiment 3a

Experiment 1 established subliminal mere exposure as a means to manipulate attitude. Experiment 2 showed that subliminal exposure to brand names resulted in higher price evaluations of objects branded with the subliminally presented brands. Experiment 3a aimed to examine whether these evaluative differences across objects could influence the extent to which numerical anchors influenced the price estimates. In Experiment 3a, participants underwent the same subliminal mere exposure segment as Experiment 2. However, before giving price

evaluations in the subsequent task, high or low anchors were displayed to the participants. It was predicted that when anchors were consistent with attitudes (e.g., high anchors are consistent with positive evaluations of objects), the anchor would have a greater influence on individuals' anchored judgments.

Methods

Participants

Sixty-four introductory psychology students from The Ohio State University participated in the study. The enrollees in Experiment 3a received credit for an undergraduate class's research experience requirement.

Design

Experiment 3a was a 2x2 mixed design. The between subjects variables were anchor level (high or low) and subliminal exposure to either the A set of brands or the B set of brands. The repeated measures was in evaluating the prices of both objects with previously exposed and with previously unexposed brand names.

Materials

The data for Experiment 3a was collected on desktop computers in a laboratory setting. The experiment was run using DirectRT software (Jarvis, 2008).

Procedure

The mere exposure segment of Experiment 3a was identical to the subliminal mere exposure session in Experiment 2. After subliminal exposure to either A or B brands, subjects performed an anchored price evaluation task. A classical anchoring paradigm was used for Experiment 3a. Participants were first asked a comparative judgment of whether they would pay

more or less than a given price for an object in a store. The high and low anchor prices were set one standard deviation above and below the mean price estimates of a calibration group. Participants were then asked to give an absolute judgment of price (Strack & Mussweiler, 1997). The absolute price estimation task was identical to Experiment 2, and participants chose one of nine listed prices arrayed along a continuum (See Fig. 3.). The order of items encountered within the anchoring task in Experiment 3a was counterbalanced to avoid order effects.

Results

An independent samples t-test showed a main effect for anchoring. The price estimates of individuals exposed to high anchors ($M = 4.91$, $SD = 1.29$, $N = 32$) were significantly higher than the price estimates of participants exposed to low anchors ($M = 3.27$, $SD = 1.19$, $N = 32$), $t(62) = 5.27$, $p < .001$, two-tailed. Participants' average price estimates were calculated for objects labeled with exposed brand names and for objects labeled with brands that were not exposed. To test the main effect of previous exposure of the brand names, a difference score was calculated by subtracting the no exposure object price estimates from the exposure object price estimates. It was predicted that the difference scores would be significantly larger than zero. A one sample t-test showed no main effect for mere exposure ($p = .724$). It was hypothesized that the anchoring effect would be greater when anchor value matched (i.e., high anchor with previously exposed brands and low anchor with previously unexposed brands) rather than mismatched the mere-exposure condition. A mixed factorial ANOVA showed no such trend ($p = .726$). Thus, there was no anchor x match interaction detected. The results of Experiment 3a were not supportive of the prediction that anchors that are numerically consistent with attitudes have a stronger influence on subsequent numerical judgments.

Experiment 3b

Experiment 3a failed to show a main effect for mere exposure alongside the main effect of anchor. This result could possibly mean that the anchoring effect overwhelms the subliminal mere exposure effect. In a meta-analysis of mere exposure studies from 1968-1987, Bornstein (1989) showed that subliminal mere exposure effects were very reliable, but not particularly large. Anchoring effects are quite strong, and experience in Dr. Wegener's lab suggests that anchoring effects are almost always present, even with limited sample sizes. It was speculated that the high and low anchors in Experiment 3a were overwhelming the subliminal mere exposure attitude manipulation. In an attempt to weaken the anchoring effect to possibly allow for mere exposure effects to operate in conjunction with the anchoring effect, in Experiment 3b, the anchors were made less extreme in magnitude.

Methods

Participants

Sixty-six introductory psychology students from The Ohio State University participated in the study. The enrollees in Experiment 2 received credit for an undergraduate class's research experience requirement.

Procedure

The design and materials in Experiment 3b were identical to Experiment 3a. The procedure for Experiment 3b was also very similar to Experiment 3a and differed only in anchor extremity. In Experiment 3a anchor values were set one standard deviation above and below the mean price estimates of a calibration group. In Experiment 3b anchor values were set at one half of a standard deviation above and below the mean price estimates of the same calibration group.

Results

An independent samples t-test showed a main effect for anchoring that bordered on significance. The price estimates of individuals exposed to high anchors (M = 4.86, SD = 1.30, N = 33) were higher than the price estimates of participants exposed to low anchors (M = 4.24, SD = 1.46, N = 33), t(64) = 1.84, p = .070, two-tailed. As with Experiment 3a, there was no main effect for mere exposure (p = .252). There was also no significant anchor x match interaction (p = .255).

Discussion

According to attitude change theories, people tend to seek out information that is consistent with their own attitudes (Festinger, 1957). Motivation to seek attitude-consistent information could subsequently bias confirmatory testing. Thus, it is reasonable to predict that attitudinally consistent anchors will often have a larger impact on anchored judgments than attitudinally inconsistent anchors. When such effects are because of differences in knowledge underlying the attitudes, they fit well with previous research on background knowledge and anchoring (e.g., Blankenship et al., 2008; Mussweiler & Strack, 2001). In the current research, however, we hoped to provide evidence that the attitudes themselves might influence the search process to change the resulting effects of attitude-(in)consistent anchors. In order to do so, we sought to manipulate attitudes without providing information about the attitude objects. Subliminal mere exposure was chosen as an attitude manipulator, because evaluations of objects may be improved without recognition of previous exposure to stimuli.

Experiment 1 replicated the findings of many experiments, and showed that subliminal mere exposure to brand names increased the liking of branded objects. Experiment 2 revealed that mere exposure to brand names translated into higher price evaluations. Experiments 3a and

3b produced a main effect for anchoring, but failed to confirm that attitudinally consistent anchors have a greater impact on anchored estimates than attitudinally inconsistent anchors. Thus, it seems in Experiments 3a and 3b that explicit consideration of the anchor values overshadowed any evaluative effects of the mere exposure.

An attitudes and persuasion perspective offers some plausible explanations for the lack of an interaction between anchor and anchor-attitude consistency. An attitudinal approach to anchoring describes the anchor as serving "multiple roles" (Blankenship, Wegener, Petty, Detweiler-Bedell, & Macy, 2008). For example, similar to persuasion factors in the Elaboration Likelihood Model (Petty & Cacioppo, 1986), anchors can promote effortful thinking or serve as non-thoughtful cues. In the classical anchoring paradigm used in Experiments 3a and 3b, effortful thinking most likely occurs, and participants probably generated anchor-consistent knowledge. Mussweiler and Strack (2001) state that a standard anchoring task ''appears to involve a relatively elaborate process of testing the hypothesis that the target quantity may be similar to the comparison standard" (p. 252). If such a highly elaborative process does occur during the anchoring process, it is possible that mere exposure effects would be diminished. The cognitive evaluations that occur during biased processing of the anchor may overwhelm the affective attitude manipulation of subliminal mere exposure. We hoped that the exposure-based attitudes would be sufficient to bias processing of the object in an attitude-consistent direction, but it could be that direct thoughts about the objects and anchors themselves were more salient to participants than any (potentially fleeting) evaluations based on the familiarity of the brand name.

Future research should focus on implementing an anchoring paradigm that does not diminish the mere exposure effect. One possible course of research is to introduce anchors in an

incidental manner. In other words, the initial comparative question of a standard anchoring paradigm would be avoided, and the numerical anchors would be incidentally present in the environment (Critcher & Gilovich, 2008). Incidental anchors have the potential to act as simple magnitude primes, and can have an impact without elaborative thought about the judgment target. In this circumstance, it is conceivable that individuals would rely on their attitudes (in addition to the incidental anchors) formed by mere exposure when judging object values.

Besides changing the anchoring paradigm, future research could also concentrate on developing a more effective attitude manipulation. For example, an implicit attitude formation procedure via classical conditioning could be an alternative manipulation of attitudes that does not increase knowledge about attitude objects. Such a paradigm is described by Olson and Fazio (2001).

Since Tversky and Kahneman's (1974) groundbreaking publication, the anchoring effect has been easy to produce, but difficult to explain. Modern anchoring theories such as confirmatory hypothesis testing (Chapman & Johnson, 1994) and selective accessibility (Strack & Mussweiler 1997) made important strides in elucidating the mechanisms behind anchoring. However, recent research suggests that an attitudes and persuasion perspective of anchoring may offer important insights into the idiosyncrasies of anchoring. Further research from an attitudes and persuasion standpoint appears useful in creating a more comprehensive understanding of the mechanisms underlying anchoring.

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