The Malleability of Anchoring Effects

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Abstract. Anchoring effects – the assimilation of a numeric estimate to a previously considered standard – are typically described as very robust and persistent. Based on the assumption that judgmental anchoring involves a hypothesis-testing process in which judges actively seek and generate judgment-relevant target knowledge, it was assumed that anchoring effects might at the same time be fairly malleable. Specifically, subtle influences that change the nature of the tested hypothesis are likely to affect the magnitude of anchoring. Using a procedural priming task, judges were induced to focus on similarities versus differences during a series of anchoring tasks. The results demonstrate that the magnitude of the obtained effect critically depended on this manipulation. In particular, a more pronounced anchoring assimilation effect resulted for judges with a similarity rather than a difference focus. Implications of these findings for models of anchoring as well as for the nature of the anchoring phenomenon are discussed.

Key words: anchoring, judgemental heuristics, selective accessibilty

Human judgment is often influenced by salient norms and standards. One striking case in point is the so-called anchoring effect – the assimilation of a numeric estimate towards a previously considered standard. Abundant research (for a review, see Mussweiler & Strack, 1999a) attests that judgments in a variety of domains such as general knowledge (Chapman & Johnson, 1999; Jacowitz & Kahneman, 1995; Mussweiler & Strack, 1999a, 2000a, 2000b; Strack & Mussweiler, 1997; Tversky & Kahenman, 1974; Wilson, Houston, Etling, & Brekke, 1996), probability estimates (Plous, 1989; Switzer & Sniezek, 1991; Tversky & Kahneman, 1974), legal judgment (Chapman & Bornstein, 1996; Englich & Mussweiler, 2001), pricing decisions (Northcraft & Neale, 1987; Mussweiler, Strack, & Pfeiffer, 2000), and negotiation (Galinsky & Mussweiler, 2001; Neale & Bazerman, 1991; Ritov, 1996) are reliably influenced by judgmental anchors. In fact, this influence even persists if the anchors are clearly uninformative for the critical judgment (Tversky & Kahneman, 1974; Cervone & Peake, 1986; Mussweiler & Strack, 2000b; Mussweiler, Förster, & Strack, 1997), if they are considered one week before the critical estimate is given (Mussweiler 2001a), if participants are highly motivated to remain uninfluenced (Wilson, Houston, Etling, & Brekke, 1996), and if participants are experts in the judgment domain (Joyce & Biddle, 1981; Englich & Mussweiler, 2001; Mussweiler et al., 2000; Northcraft & Neale, 1987; Wright & Anderson, 1989). Anchoring thus appears to be a remarkably robust judgmental phenomenon. How can this robustness be explained? What are the psychological mechanisms that lead to anchoring, and why do these mechanisms produce such a strikingly robust and persistent effect?

The Selective Accessibility Model of Anchoring

To answer these questions, we have recently proposed a Selective Accessibility (SA) model (Mussweiler, 1997; Mussweiler & Strack, 1999a, 1999b, 2000a, 2000b; Strack & Mussweiler, 1997) which conceptualizes the anchoring phenomenon in terms of two fundamental principles of social cognition research: hypothesis-consistent testing and knowledge accessibility. To see how the interplay of both mech-

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anisms produces anchoring effects, consider what is often seen as *the* classic anchoring study. In this study, which also introduced the paradigm that, to date, is typically used to study anchoring effects, Tversky and Kahneman (1974) asked their research participants two consecutive questions about the percentage of African nations in the United Nations (UN): a comparative and an absolute one. In the comparative anchoring question, participants indicated whether the percentage of African nations in the UN is higher or lower than an arbitrary number (the anchor) that had ostensibly been determined by spinning a wheel of fortune (e.g., 65% or 10%). Subsequently, participants received an absolute anchoring question which asked them to give their best estimate of this percentage. Absolute judgments were assimilated to the provided anchor value, so that the mean estimate of participants who received the high anchor was 45%, compared to 25% for participants who received the low anchor.

The SA model proposes that such anchoring effects are mediated by a selective increase in the accessibility of anchor-consistent knowledge about the target. More specifically, we assume that to answer a comparative anchoring question, judges engage in an active hypothesis-testing process in which they consider the possibility that the actual target value may be similar to the anchor. In the example of Tversky and Kahneman's (1974) study, judges who are asked whether the percentage of African nations in the UN is higher or lower than 65%, would thus test the hypothesis that this percentage is indeed 65%. Because hypotheses are typically tested in a consistent manner (Snyder & Swann, 1978; Trope & Lieberman, 1996), judges test this hypothesis by actively seeking evidence that is consistent with it. That is, they may actively search for evidence which indicates that the percentage of African Nations in the UN may indeed be fairly high. Doing so renders this anchor-consistent target knowledge easily accessible in memory. When generating the subsequent absolute estimate, this easily accessible anchor-consistent knowledge comes to mind first. As a consequence, judges base their absolute estimate on the knowledge they previously generated during the hypothesis-testing process, so that the absolute estimate is consistent with this knowledge. In our example, the absolute estimate of the percentage of African Nations in the UN would thus be based on knowledge indicating that this percentage is fairly high. As a consequence, the final estimate is assimilated towards the high anchor value. Abundant research suggests that this selective accessibility mechanism is indeed responsible for the anchoring effect (Mussweiler, 1997; 2001a; Mussweiler et al., 1997, 2000; Mussweiler & Strack, 1999a, 1999b, 2000a, 2000b, in press).

From this selective accessibility perspective, it is the hypothesis-testing stage of the assumed anchoring process that is responsible for the striking robustness and persistence of anchoring effects. In particular, the anchor-consistent target knowledge that is activated during this process may yield such robust effects because it is generated by the judges themselves. Self-generated information (Slamecka & Graf, 1978) has been demonstrated to yield more persistent effects than externally provided information in domains such as belief perseverance (Davies, 1997) and judgmental priming (Mussweiler & Neumann, 2000). In much the same way, it may be a self-generation effect that is driving the robustness of anchoring. Consistent with this assumption, a recent study (Mussweiler & Strack, 1999b) demonstrated that anchoring effects are more persistent if the anchor-consistent target knowledge is generated by judges themselves rather than provided by another judge. Thus, the active hypothesis-testing process appears to be the driving force behind the robustness of anchoring.

Malleability of Anchoring Effects

The very same process that is responsible for the robustness of anchoring, however, also implies a high degree of malleability. Because the critical target-knowledge that produces anchoring is actively sought and generated in the hypothesis-testing process, any factor that influences the nature of this process is also ultimately likely to have an effect on the final absolute estimate. If, for example, the nature of the initially tested hypothesis is influenced by contextual factors, this should become apparent in the absolute estimate. In fact, even subtle influences that change the nature of the hypothesis-testing process may lead to different absolute estimates. Thus, the hypothesis-testing mechanism, while able to explain the striking robustness and persistence of anchoring, also allows for considerable malleability of the effect.

Notably, this implication is not shared by alternative models that attribute anchoring to more passive activation mechanisms. For example, it has been suggested that anchoring effects are produced by a passive numeric priming mechanism (Jacowitz & Kahneman, 1995; Wilson et al., 1996; Wong & Kwong, 2000). In particular, solving a comparative anchoring task may simply render the anchor value itself more accessible rather than a specific subset of self-generated target knowledge, so that this value is likely to influence the subsequent absolute judgment. From this numeric perspective on anchoring, the sole determinant of anchoring effects is the anchor value itself, regardless of its context and the mental opera-

tions in which it is involved. Clearly, such a passive account of anchoring implies that for identical anchor values, identical absolute estimates should be produced. From a numeric priming perspective, anchoring thus constitutes a rather static phenomenon.

The present research was designed to examine the malleability of anchoring effects and to investigate whether this strikingly robust phenomenon may at the same time be open to subtle influences.

The Present Research

To do so, an attempt was made to influence the nature of the hypothesis that – from a selective accessibility perspective – is initially tested in the anchoring process through a procedural priming manipulation. The SA model holds that the nature of the initially tested hypothesis critically determines the absolute estimate. In particular, assimilation typically results because judges test the hypothesis that the target value is similar to the anchor. This initial test of a similarity hypothesis may well stem from a basic human propensity to focus on similarities whenever two entities are compared (Gentner & Markman, 1997). In fact, this tendency appears to be so strong that judges first consider similarities even if their explicit task is to name differences between two targets (Markman & Gentner, 1996). Although a general focus on similarities is likely to be operating in most situations, the extent to which judges seek information that suggests similarities may depend on contextual factors. If this is indeed the case, then the typical anchoring assimilation effect should be more pronounced under conditions that promote testing the similarity hypothesis than under conditions which impede this test.

To establish such conditions, a procedural priming manipulation was used. Prior to a classic anchoring task, participants worked on an unrelated task in which they compared sketches of two scenes. About half of the participants were asked to list all the similarities between the two scenes they could find. The other half, however, was asked to list all the differences they could find. In both cases, the respective focus on similarities or differences should become proceduralized (Smith, 1994) and influence the nature of the hypothesis that is tested in the subsequent anchoring task. In particular, searching for similarities between the two scenes should facilitate similarity testing whereas searching for differences should impede it. Consistent with this assumption, some of my previous research has demonstrated that this procedure of listing similarities versus differences does indeed induce judges to focus on the respective kinds of information in subsequent tasks (Mussweiler, 2001b). In the context of judgmental anchoring, these foci should induce judges to generate more anchor-consistent target knowledge if they had listed similarities rather than differences. Ultimately, this should be apparent in a more pronounced assimilation effect after similarity priming. Would such a subtle priming manipulation indeed influence the robust anchoring effect?

Method

Participants

Male and female students (35 in total) at Northwestern University were recruited as participants and randomly assigned to one of two experimental conditions.

Materials

The procedural priming task consisted of sketches of two scenes that were taken from Markman and Gentner (1996). The first sketch depicted a woman leaning over a table while holding a cup of coffee, a Christmas tree with a few presents underneath, and a fireplace. The second sketch depicted a man standing in front of a table and reaching for a bowl placed in the middle of the table, a bottle and a few glasses that were also placed on the table, as well as a fireplace.

The anchoring task consisted of four pairs of comparative and absolute anchoring questions, which were taken from Jacowitz and Kahneman (1995). The individual questions along with the anchor values are reported in Table 1. The high and low anchor values we used were those provided by Jacowitz and Kahneman (1995). Thus, the high anchor represented the 85th percentile of the distribution of estimates given by a group of calibration participants who answered absolute questions only. The low anchor values corresponded to the 15th percentile. For about half of the participants, the first and third comparative question included a high anchor value, whereas the second and fourth included a low anchor. For the other half, this assignment was reversed. The order of the anchoring questions was kept constant for all participants.

Procedure

Participants were recruited while working in individual cubicles in the university library. They were asked to participate in a series of two ostensible pretests of experimental materials. Upon agreement to

Table 1. Targets and Anchor Values

Target	High anchor	Low anchor
Length of Mississippi River (in miles)	2 000	70
Height of Mount Everest (in feet)	45 000	2 000
Year telephone was invented	1 920	1 850
Amount of gas used per month by average American (in gallons)	80	20

participate, they were handed two separate folders and were instructed to work through them in the given order. It was pointed out that both pretests were completely unrelated and were administered together solely for efficiency reasons. This ostensible unrelatedness was further underlined by using different fonts. The first folder included the procedural priming task, which was introduced as a pretest for later studies on event memory. Half of the participants were instructed to list as many similarities between the two critical scenes as they could find. The other half was instructed to list as many differences as they could find. In both cases, instructions emphasized that it was important for participants to inspect the two scenes as thoroughly as possible, to list as many features as they can find, and to allow themselves a few minutes to complete the task.

The second folder included the anchoring task. In the instructions, participants were informed that they were taking part in a pretest for the construction of a general-knowledge questionnaire. The purpose of the pretest was ostensibly to find the best wording for general-knowledge questions. To reduce the prescribed informativeness of the anchors and thus discourage conversational inferences (Grice, 1975), participants were told that the values were randomly selected.[1] Moreover, it was pointed out that because the anchors were randomly selected, they were not informative with respect to the actual values of the targets. Finally, participants were instructed to answer the questions as accurately as possible.

In sum, the study is based on a 2 (Similarity vs. Difference Focus) × 2 (High vs. Low Anchor) × 2 (content of anchoring task) factorial design. The first factor was manipulated between, the second and third factor within participants. The content factor resulted from the fact that participants received a total of four pairs of anchoring questions, two including high anchors and two including low anchors. Thus, the high and low anchor conditions were realized twice for each subject, once using the contents of the first two questions, and once using the contents of the final two questions.

Results

To combine absolute estimates for the different content domains, they were *z*-transformed. The resulting values thus represent deviations from the question means in units of the pertinent standard deviations. One estimate deviated from the question mean by more than five standard deviations. It was excluded from the analysis as an outlier.

As Table 2 reveals, the typical anchoring effect was obtained. In particular, participants gave higher estimates if they had previously compared the judgmental target to a high rather than a low anchor. The magnitude of this anchoring effect, however, depended on the nature of the preceding priming task. In particular, the difference between the high and the low anchoring condition was more substantial if participants had been procedurally primed to focus on similarities rather than differences.

Table 2. Absolute Estimates by Anchor and Focus

Anchor	Focus	
	Similarity	Difference
High	.79	.21
Low	−.54	−.41

Note: Z-transformed estimates are reported.

In a 2 (Similarity vs. Difference Focus) × 2 (high vs. Low Anchor) × 2 (Content of Anchoring Question) ANOVA, using the *z*-transformed absolute estimates as dependent variables, this pattern of means produced a significant interaction effect of anchor and focus, $F(1, 33) = 5.1$, $p < .03$, which did not depend on question content, $F < 1$, for the three-way interaction. In this analysis, the main effect of anchor also proved to be significant, $F(1, 33) = 38.27$, $p < .001$.

[1] It has been suggested (e.g., Jacowitz & Kahneman, 1995) that applying implicit rules of natural conversations (Grice, 1975) to standardized situations (e.g. Clark & Schober, 1992; Schwarz, 1994; Strack & Martin, 1987) allows participants to use the anchor value in order to infer the actual range of possible answers. Participants who expect the experimenter to be maximally informative (see Grice's, 1975, *maxim of quantity*) in asking his or her questions, may assume that the anchor value is close to the actual value and consequently position their estimate in its vicinity. This explanation, however, presupposes that the anchor value is deliberately selected by the experimenter. Thus, conversational inferences cannot explain the effects of randomly selected anchor values.

Discussion

Consistent with the hypothesis, these results demonstrate that the magnitude of the anchoring assimilation effect depends on whether judges had been induced to focus on similarities or differences. Within the present framework, listing similarities in the preceding priming task appears to have facilitated the similarity test that – from a selective accessibility perspective – underlies judgmental anchoring. Listing differences, on the other hand, appears to have impeded similarity testing. As a consequence, a more substantial anchoring assimilation effect results in the first case than in the latter case. This finding has a number of notable implications.

For one, the fact that anchoring effects depend on such a subtle priming manipulation suggests that – as we have assumed within the SA model – anchoring effects may indeed be produced by a process in which judges actively seek and generate judgment-relevant knowledge. Such an active search of information is typically achieved through hypothesis-testing (Trope & Lieberman, 1996). In this respect, the current data seem consistent with the assumption that the anchoring process involves an initial hypothesis-testing stage. In combination with a growing body of evidence (for recent overviews, see Mussweiler & Strack, 1999a, in press), these findings thus further suggest that mechanisms of selective accessibility may be at the heart of the anchoring phenomenon.

At the same time, the current results seem more difficult to reconcile with a more passive perspective on anchoring. If, for example, anchoring effects were indeed produced by a passive numeric priming mechanism (Jacowitz & Kahneman, 1995; Wilson et al., 1996; Wong & Kwong, 2000), then the anchor value itself should be the only determinant of the resulting anchoring effect. The current findings clearly demonstrate that this is not the case. Rather, a subtle manipulation that left the anchor value itself unchanged strongly influenced absolute estimates. These findings appear to be inconsistent with a numeric priming account of anchoring (for a detailed discussion of additional problems, see Mussweiler & Strack, in press).

Finally, the present data add to our knowledge about the characteristics of the anchoring phenomenon. Anchoring effects are often described as strikingly robust (Mussweiler et al., 2000; Wilson et al., 1996). In fact, it has proved to be almost impossible to reduce the amount of anchoring (for an exception, see Mussweiler et al., 2000). This robustness is again apparent in the present data. As is typically the case, absolute estimates were assimilated towards the provided anchor value in all conditions. Although robustness is clearly one of the central characteristics of anchoring, the present data demonstrate that the phenomenon is more multifaceted than is often assumed. Specifically, the magnitude of the anchoring effect may depend on rather subtle and unrelated influences. Thus, in addition to and within the boundaries set by their striking robustness, anchoring effects also appear to be quite malleable.

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