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Journal of Experimental Social Psychology 42 (2006) 380–387
Journal of Experimental Social Psychology
www.elsevier.com/locate/jesp

Subliminal anchoring: The effects of subliminally presented numbers on probability estimates ☆

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Received 13 August 2004; revised 28 April 2005
Available online 20 July 2005

Abstract

Previous research demonstrated that if attention is paid to a supraliminally presented number, a subsequent quantitative estimate assimilates towards this number (the anchor effect). One explanation states that this effect is merely caused by the heightened accessibility level of the anchor value itself. Based on this numeric priming account and generalizing from subliminal priming studies, we expected a short-lived subliminal anchor effect. We presented participants subliminally with a low or high anchor value (10 or 90) and next they had to estimate the probability of an epidemic. Half of them were pressed to do this quickly. Only under time pressure, a significant anchor effect emerged.

Keywords: Anchoring; Subliminal; Numeric priming

Numerical anchoring is the assimilation of a quantitative estimate towards a previously presented number. In one of the first research demonstrations of this effect, Tversky and Kahneman (1974) asked people to estimate the percentage of African countries in the United Nations. In one condition they were first asked whether this percentage was higher or lower than 10%. In another condition 10% was replaced by 65%. The estimate of the percentage of African countries assimilated towards the percentage in the first question: in the first condition the median estimate was 25%, in the latter condition it was 45%.

This anchor effect has often been demonstrated in a broad range of quantitative judgments such as general knowledge (Chapman & Johnson, 1999; Jacowitz & Kahneman, 1995; Tversky & Kahneman, 1974; Wilson, Houston, Etling, & Brekke, 1996), probability estimates (Plous, 1989), legal judgment (e.g., Chapman & Bornstein, 1996), pricing decisions (Northcraft & Neale, 1987), and negotiation (Ritov, 1996) (for a recent review, see Mussweiler & Strack, 1999). Anchoring is a strong and robust effect. Not only laymen are susceptible to anchor effects but also experts when they give judgments in their field of expertise, e.g., accountants (Smith & Kida, 1991), real estate agents (Northcraft & Neale, 1987), and judges (Englich & Mussweiler, 2001). Furthermore, the anchor effect is difficult to avoid, even when people are forewarned (Wilson et al., 1996).

In most demonstrations of the anchor effect, the anchoring process is initiated by explicitly asking people to compare a supraliminally presented anchor value to a target. They have, for example, to judge whether the chances of recurrence of an epidemic of pestilence of the lungs in India within a year are lower or higher than 10%. After this comparative judgment, they have to make an absolute judgment in which these chances must be estimated exactly (Daamen, de Vries, & Kesnich, 1996). The

☆ We thank Ap Dijksterhuis for valuable advice, and Henk Aarts and Sander Koole for helpful comments on an earlier draft of this article.
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0022-1031/$ - see front matter © 2005 Elsevier Inc. All rights reserved.
doi:10.1016/j.jesp.2005.05.001

sequence of a comparative and an absolute judgment has become the dominant paradigm (or as termed by Strack & Mussweiler, 1997, the "standard paradigm") of anchor research. As a consequence, most of the explanations of the anchor effect have focused on the role of the comparative judgment in the anchor process in that paradigm. Other ways to introduce the anchor value, which differ from the standard paradigm, have received relatively little attention. The question is whether this standard paradigm is the only way to obtain an anchor effect.

The standard paradigm consists of a number of elements: an anchor value, which can be perceived as either relevant or irrelevant, a comparative judgment in which the anchor value is presented supraliminally, an absolute judgment and in both judgments a target, which can either be the same or different in both judgments. Maybe not all these elements are needed to obtain an anchor effect.

There are many research examples of strong anchor effects given a relevant anchor value (e.g., Northcraft & Neale, 1987). However, there is still an anchor effect if the anchor value is clearly irrelevant, for example, if the anchor value is obviously random, for example, when the anchor value resulted from the spin of a 'wheel of fortune' (Tversky & Kahneman, 1974; see also Russo and Shoemaker, 1989, as cited in Chapman & Johnson, 1999) or highly implausible (Mussweiler & Strack, 2001a). Taken together, it appears that both relevant and irrelevant anchor values produce anchor effects.

To account for these anchor effects, the Selective Accessibility Model (e.g., Strack & Mussweiler, 1997; Mussweiler & Strack, 1999) has been proposed. A fundamental assumption in this model is that one compares the target of the absolute judgment to the anchor value by applying a hypothesis-consistent strategy. As a result the accessibility of anchor-consistent information in memory is heightened. This activation of semantically related information is a crucial part of the Selective Accessibility Model. For example, when it is asked whether the chances for recurrence of the epidemic of pestilence of the lungs are lower or higher than 90%, participants will search for anchor-consistent information in memory. They might think that the chances will be so high, because sanitary facilities and health care are poor in India, so epidemics are likely. If they have to say whether the probability of that epidemic is lower or higher than 10%, different thoughts will come to mind more easily, e.g., 'well, they recently overcame an outbreak, so they will be immune and recurrence of this pestilence is unlikely.' The recency of the anchor-consistent thoughts renders them to be more accessible than other thoughts that are relevant for the absolute judgment. To generate this absolute judgment, judges rely primarily on these easily accessible thoughts (Higgins, 1996) and according to the Selective Accessibility Model, they will use these thoughts—if applicable and representative—for the absolute judgment. As a consequence, this judgment is influenced by the anchor-consistent knowledge generated before.

However, Wilson et al. (1996) demonstrated that there is still an anchor effect when the thoughts, generated during the comparative judgment, are not applicable or representative for the absolute judgment. In their first experiment, they asked some participants to compare an anchor value to the number of countries in the United Nations and other participants to compare this anchor value to the number of physicians in the Yellow Pages of the local phone book. Next, they all had to estimate the number of local physicians. So, for some participants the target in the comparative and in the absolute judgment was the same, for others the target was different for both judgments. In both conditions, a significant anchor effect emerged, although the effect size was smaller in the latter condition. Ergo, to obtain an anchor effect it is not necessary that the target in both judgments is the same (see also Wong & Kwong (2000), for similar findings).

If the targets in both judgments do not have to be identical, one may question whether a comparative judgment is a necessity for an anchor effect to occur. Wilson et al. (1996) demonstrated that a comparative judgment is not necessary. In Experiment 2, they skipped the comparative judgment and introduced the anchor value in a completely different way. Participants received an identification number of which they had, depending on condition, to check different properties. For example, they had to note whether their number was written in red or blue ink. Subsequent estimates assimilated towards these identification numbers (i.e., the anchor values). In Experiment 3 in the same series, Wilson et al. (1996) used still another way to introduce the anchor value. Participants had to copy down a series of anchor values within a certain range (around 4500). After completing this task, they had to make a quantitative estimate (e.g., the number of current students who will get cancer in the near future). Participants who copied down 35 numbers anchored on these numbers, participants who copied down seven numbers did not. A few repetitions was not sufficient, but more worked out. Based on these studies, Wilson et al. (1996) concluded that 'basic anchoring effects' exist and that the only prerequisite for an anchor effect is a minimal amount of attention paid to the anchor value.

The numeric priming account of anchoring fits the results by Wilson et al. (1996) and Wong and Kwong (2000). In the numeric priming account (e.g., Jacowitz & Kahneman, 1995), it is assumed that the estimation of a quantity or a chance is an automatic process resulting in some weighted combination of all activated numbers. Jacowitz and Kahneman (1995, p. 1162) put it like this: