

# Temporal distance moderates description dependence of subjective probability

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## Abstract

Probability judgment is *description-dependent*; different descriptions of the same event can elicit different judged probabilities. We propose that the temporal proximity of an event moderates the degree of description dependence in probability judgment. According to construal level theory, near future events are represented more concretely than distant future events. These more concrete representations are predicted to be more stable, and therefore less susceptible to description dependence effects. Consistent with this prediction, changing an event's description by unpacking it into constituent parts influenced its judged probability more when the event took place in the distant rather than the near future. Specifically, greater description dependence was found for distant events regardless of whether the unpacking manipulation increased (Experiment 1) or decreased (Experiment 2) judged probability.  
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Alternative descriptions of the same event lead to different judgments of probability, a pattern referred to as description dependence in probability judgment (Tversky & Koehler, 1994). Description dependence of judgments violates the principle of description invariance, which requires that hypotheses referring to the same event be assigned the same probability. Numerous studies, however, have illustrated description dependence in probability judgment. For example, Fischhoff, Slovic, and Lichtenstein (1978) showed that both car mechanics and laypeople assigned higher probability to a residual hypothesis of why a car would fail to start (something other than the battery, the fuel system, or the engine) when this hypothesis was broken down into more specific causes (e.g., the starting system, the ignition system). Tversky and Koehler (1994) incorporated description

dependence into support theory, a formal model of subjective probability.

A key implication of description dependence is that people generally accept judgment and decision problems in the form presented to them, and do not spontaneously transform a given problem to some consistent representation (Slovic, 1972; Tversky & Kahneman, 1986). For example, in a study of framing in decision making, McNeil, Pauker, and Tversky (1988) asked respondents to choose between two alternative treatments for lung cancer, surgery and radiation therapy, whose outcomes were described in terms of either survival or mortality rates. These two logically equivalent but descriptively different frames led to substantial differences in experienced physicians' choice of the two treatments. If decision makers spontaneously transformed problems and represented them in a consistent way (e.g., always in terms of survival rates), then such framing effects would disappear. Formal decision tools are useful precisely because they impose a consistent framework on how decision problems are represented.

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## Construal level and description dependence

Short of using formal decision tools, one potential way to reduce description dependence in intuitive judgment is to identify those conditions that best encourage the formation of *stable* and *consistent* representations of judgment and decision problems, despite the varied ways in which the problems may present themselves. In this paper, building on construal level theory (Trope & Liberman, 2000, 2003), we investigate whether an event's temporal proximity may influence people's propensity to generate a stable, consistent representation of it, and thereby moderate the extent to which alternative descriptions of the same event influence probability judgments.

Construal level theory (CLT) proposes that the temporal distance of an event systematically influences people's construal of that event (Trope & Liberman, 2000, 2003). According to CLT, distant future events tend to be represented more schematically in terms of a few abstract features (high-level construals), while near future events tend to be represented in terms of their more concrete details (low-level construals). These different construals have been found to influence judgment and behavior in numerous ways. Liberman and Trope (1998), for example, show that individuals use more superordinate terms ("why" aspects of an event) to describe distant future activities and more subordinate terms ("how" aspects of an event) to describe near future activities. For example, the activity "ordering seafood for a party" would be construed in terms of its overall purpose or goal when the party is six months from now (e.g., offering a diverse and healthy menu) whereas the same activity would be construed in terms of the concrete means for achieving this goal when the party is tomorrow (e.g., visiting the seafood section of a supermarket).

In an extension of CLT to object categorization, Liberman, Sagristano, and Trope (2002) showed that people used narrower, more specific categories to classify objects related to an event (e.g., camping trip) when it took place in the near rather than the distant future. This finding implies less flexibility in categorization for an event taking place in the near future. Along similar lines, Forster, Friedman, and Liberman (2004) found that abstract construals resulted in more creative problem-solving, whereas concrete construals led to greater single-mindedness in problem-solving.

Cumulatively, these findings suggest a general conjecture: that distant future construals may be more flexible and malleable whereas near future construals may be more concrete and stable. In line with this interpretation, Trope and Liberman (2003) observe that

"a defining characteristic of high-construal features is that changes in these features produce major changes in the meaning of the event. . . Changes in [low-construal] features produce relatively minor changes in the meaning of the event."

This characterization of high- and low-construal features prompts a parallel conjecture about the differential effects of description changes for probability judgment of temporally distant vs. proximal events. Description changes that alter high-construal features of a distant event will tend to have substantial effects on the judge's representation of the event's core meaning or "essence", and consequently may lead to large changes in judged probability. In contrast, description changes that affect low-construal features of a proximal event will have relatively small effects on the judge's representation of the event's core meaning, and consequently result in small changes in judged probability.

We propose, then, that because proximal events are more likely to be represented relatively stably in terms of low-construal features, likelihood judgments of these events will tend to be rather *insensitive* to description changes. Likelihood judgments of more abstractly represented distant events, in contrast, will be more susceptible to manipulations of event description, because those description changes may more readily change the perceived core essence of the event in question. This hypothesis, while by no means following directly from CLT, is prompted by CLT's characterization of proximal events as concretely represented and distant events as more abstractly represented.

## Packed and unpacked descriptions

We focus specifically on unpacking, a particular type of description manipulation in which an aggregate event  $A$  is redescribed as a disjunction of several mutually exclusive subcomponents ( $A_1$  or  $A_2$  or  $A_3$ ). Numerous studies have found the judged probability of an unpacked description (such as "dying from heart disease, cancer, or some other natural cause") to be greater than the judged probability of its packed counterpart ("dying from a natural cause") (Fischhoff et al., 1978; Fox & Tversky, 1998; Koehler, Brenner, & Tversky, 1997; Rottenstreich & Tversky, 1997; Tversky & Koehler, 1994). Support theory (Tversky & Koehler, 1994) suggests that unpacking an event may remind the judge of possibilities that would not spontaneously be considered and/or increase the salience of the listed possibilities. More recent research (e.g., Sloman, Rottenstreich, Wisniewski, Hadjichristidis, & Fox, 2004) indicates that unpacking an event into components may sometimes *decrease* judged probability, depending on the nature of the unpacked components. This diversity of unpacking effects allows for examining how generally temporal perspective may moderate description dependence.

Our analysis predicts larger unpacking effects for abstractly represented distant events, and smaller unpacking effects for concretely represented proximal events. This prediction holds regardless of the direction of change driven by the unpacking manipulation. When unpacking a hypothesis tends to increase its judged probability, it should do so more strongly when the event is distant rather

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