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Response Category Width as a Psychophysical Manifestation of Construal Level and Distance

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Abstract

The present research suggests that people adjust their mental response scales to an object's distance and construal level. People make use of wider response categories when they judge distant and abstract as compared with close and concrete stimuli. Across five experiments, participants worked on visual and verbal estimation problems (e.g., length or quantity judgments). Answers were provided in interval format, and differences between minimal and maximal estimates served as a measure of response category width. When target objects were framed as spatially distant rather than close (Studies 1 and 3), as unlikely rather than likely (Study 2), and as abstract rather than concrete (Study 4), category widths increased. Similarly, priming a high-level rather than a low-level mindset yielded wider interval estimates (Study 5). The general discussion highlights the usefulness of category width as a basic measure of construal level and as a theoretical link between various branches of construal-level theory.

Keywords

construal level, psychological distance, response category width, categorization

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The Twofold Role of Categorization

The basic process of categorization is ubiquitous. Whether we recognize a face, read a letter, or interpret a dangerous situation, we categorize a new stimulus as belonging to an older semantic category that already exists as part of our world knowledge in long-term memory. Although the same face will never produce exactly the same projection on our retina, we nevertheless recognize the invariance of the person behind the face. Thousands of different manifestations of the letter *a*, involving different sizes, angles, colors, font types, inclinations, and so on, are all encoded as instances of the same semantic category.

As a new stimulus is recognized as belonging to an existing category, the resulting stimulus representation is enriched with attributes that have not been perceived but can be inferred from general category knowledge (Bruner, 1957). At the same time, actually observed stimulus attributes that are irrelevant for the category may be discarded. Thus, *semantic categories* are conceived as stimulus classes represented as essential knowledge about their defining and characteristic features in long-term memory. When textbooks and journal articles in social psychology refer to categories as carriers of stereotypes, self-concepts, and attitudes, they are usually referring to this kind of socially shared knowledge structures.

In the present research, however, we are referring to *response categories* in a different sense. Whereas semantic categories' main function is to represent firm knowledge about different attributes of stimulus classes in long-term memory, response categories are pragmatic tools to communicate quantitative information within specific attribute dimensions. Thus, whereas the semantic category "a glass of wine" includes socially shared knowledge about physical (glass), social (gregarious settings), cultural (weddings), and content-related attributes (alcohol), response categories serve to communicate quantitative constraints in specific attribute dimensions, such as a reasonable price for a glass of wine, its volume, or its temperature. Thus, like successive categories of a rating scale (cf. Parducci, 1965; Thurstone, 1927a; Torgerson, 1958; Upshaw, 1969b), we use the term "response category" more broadly to denote the boundaries of quantitative expressions. Note that response categories are much more flexible and more dependent on context and

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communicators' perspectives than stable and socially shared semantic categories. A reasonable price for a glass of wine can be negotiated in many different ways and it may differ greatly between persons and situations.

Despite the central role of response categories in scaling and psychometric measurement (Likert, 1932; Parducci, 1965; Thurstone, 1927a; Torgerson, 1958; Upshaw, 1969a), they have been rarely the focus of social-psychological research. When we categorize a behavior as inacceptable, a deal as fair, or a painting as beautiful, we are setting aspiration levels and negotiating tolerance limits. Changes in response categories can thus be used strategically to influence, for instance, selling and buying prices and to redefine attitudes and goals.

The tolerance limits (in specific dimensions) of a glass of wine can be set in many different ways, depending on the communication partners' judgment motive, negotiation strategy, aspiration level, and problem context. Accordingly, response categories can also be used to deal with uncertainty: When interacting with strangers in a foreign country and when insecure about cultural norms, typical habits, and etiquettes, a wider range of behaviors may be considered acceptable (like slurping at the dinner table, taking off one's shoes before entering someone's place, etc.) as compared with one's hometown when being around well-known friends. Moreover, the mapping of preferences, aspiration levels and communication goals onto quantitative response categories is not only subject to deliberate strategies but also to various sources of fluctuation (cognitive, perceptual, environmental; cf. Thurstone, 1927a, 1927b; Torgerson, 1958).

As a consequence, rather than a single fixed value, response categories encompass a distribution of variable responses to a stimulus object—there is no sole, single reasonable price for a glass of wine, but a range encompassing all nuances of prices that are considered reasonable in a given moment. The difference between the upper and lower boundary of such a distribution—indicated by maximal and minimal category value—provides an index for the response category's width. In practice, this view on response categories implies that high and low widths reflect wide and narrow distributions of psychological responses to a stimulus object, respectively. Thus, while a connoisseur may have a very narrow range of what prices he or she deems reasonable for a certain wine, a person less familiar with wine may form wider tolerance limits to quantify the same stimulus attribute.

The central aim of the present research is to shed light on one particularly important determinant of the category formation process. Namely, we investigate the impact of psychological distance and construal level (Trope & Liberman, 2003, 2010) on the width of response categories used for quantitative judgments. Based on five experiments, we propose that response category width—operationalized as the difference between a minimal and maximal estimate of a stimulus attribute—affords a natural approach to measuring and understanding the psychophysical underpinnings of construal levels.

Numerous studies have established an intriguingly wide range of findings from various research areas with regard to distance and construal level, including perception (Förster, Friedman, & Liberman, 2004), preference formation (Trope & Liberman, 2000), action identification (Liberman & Trope, 1998), personal values (Eyal, Sagristano, Trope, Liberman, & Chaiken, 2009), and self-control (Fujita, Trope, Liberman, & Levin-Sagi, 2006). However, less attention has been devoted to examining how construal level itself can be traced back to elementary cognitive processes. By proposing response category width as a psychophysical manifestation of construal level and distance, the present research aims to fill this void in the literature.

Basic Assumptions of Construal-Level Theory (CLT)

CLT can be conceived as a comprehensive theory linking psychological distance and construal levels. Depending on whether a judgment object or decision problem is far away (in time, space, probability, or social distance) or close to our own here-and-now position, we can either focus on few global and essential aspects of a schematic, abstract reality or form a more local picture that includes many details and complicating features that often deviate from the idealized and simplified schemes. This zooming ability is presumably of great adaptive value. It allows us to either abstract from local and subsidiary details and context conditions to keep track of distal goals or to increase the resolution level so that more contextualized details become visible and finer distinctions possible, whenever a more contextualized short-distance view is needed.

Empirical Evidence for CLT

Corroborating evidence for the functional importance of this kind of distance regulation stems from numerous experiments showing that from a distal perspective judgments and decisions rely more on abstract, idealized, low-dimensionality models of reality (Liberman, Sagristano, & Trope, 2002) and give more weight to superordinate attributes and causal origins (Rim, Hansen, & Trope, 2013) and lesser weight to subordinate attributes and incidental consequences (Nussbaum, Liberman, & Trope, 2006) than from a proximal perspective. As a consequence, manipulations of construal level or cognitive distance have been shown to trigger a number of judgment biases, decision anomalies, and preference reversals (see, for example, Sagristano, Trope, & Liberman, 2002; Trope & Liberman, 2000; Zhao & Xie, 2011).

Given the central assumption of a bi-directional relationship between psychological distance and construal level, empirical research relies heavily on appropriate methods to measure construal level. Although in the published literature, linguistic abstractness is certainly the most commonly cited measure of construal level (Fujita, Henderson, Eng, Trope, & Liberman, 2006), some studies have resorted to other measures, such as the number and inclusiveness of semantic categories in a sorting task (Liberman et al., 2002), the spontaneous reference to large or small measurement units (Maglio & Trope, 2011), the restrictive or creative span of associations (Förster et al., 2004; Jia, Hirt, & Karpen, 2009), or the sensitivity for local versus global features in perception (Förster et al., 2004; Liberman & Förster, 2009). However, hardly any prior research has investigated what might be considered one of the most natural and straightforward measures of construal level in the context of quantitative judgment tasks, namely, the direct estimation of category width conceived as the difference between separate estimates of a stimulus attributes' upper and lower boundary.

Construal Level and Category Width

To understand why psychological distance and construal level would affect such quantitative judgment tasks, it is necessary to first analyze the relativity of judgments in the context of psychological scaling (Thurstone, 1927a) and personal reference scales (Upshaw, 1969a). Intriguingly, judgments of the same person's life satisfaction (Parducci, 1984), the same consumer products (Mellers & Cooke, 1996), and invariant decision prospects (Stewart, Chater, Stott, & Reimers, 2003) depend heavily on the comparison level and the tolerance limits of the reference scale that is applied to the decision at hand. Consider, for example, again the judgment category "reasonable prices." Can US$10 for a coffee be categorized a reasonable price? Most people would probably deny and refrain from buying such a drink. However, priming people with luxury-related images or even more inflated prices of luxury products, or telling them that other people have already bought such a $10-coffee, may cause an upward shift in people's internal reference scale. As a consequence, a price of $10 may become acceptable on such an elevated reference scale. Note that no invariant answer exists to the question of whether $10 per se is an acceptable price or not. "Acceptable prices" is a malleable response category that is formed ad hoc in a given situation for the purpose of making, for instance, a buying decision about one particular coffee. Moreover, reference scale effects in price judgments do not depend on changes in the semantic memory representation of the target object (i.e., the coffee for $10). Even when knowledge about the coffee remains identical, shifts in the reference scale can lead to different judgments.

Now consider the impact of distance on the formation of the response category "reasonable prices." In the same way as comparison objects or priming can cause shifts in the midpoint, we expect distance to affect the width of the category. Hardly anybody would buy a $10 coffee in his or her hometown. However, in a foreign country, with a different culture, currency, and culinary norms, one may loosen the category limits and consider a very high price acceptable or an extremely low price still possible. We may be sure that $10 is inacceptable for ourselves, but when making the same judgment for a (socially distant) co-worker, we may be less sure and, from his perspective, $10 may well be a reasonable price.

More generally, we assume that people adjust their reference scales to the construal and distance of a stimulus object. Response categories do not stay invariant, when an object is mentally represented as concrete versus abstract or close versus distant. Instead, people increase their tolerance limits and thus their response category width with increasing distance and construal level, because distance and construal level are necessarily related to the amount of specific knowledge and certainty. The proximal end of the distance continuum is defined by direct experience (Trope & Liberman, 2010). People have a lot of specific knowledge about proximate objects because they encountered them repeatedly. In contrast, most distal objects have never been directly experienced and, therefore, judgments about these involve ambiguity and uncertainty. In fact, our visual perceptive system in and of itself is built for the regulation of informational density and uncertainty as a function of (spatial) distance: The further an object is removed from an observer, the blurrier the visual input gets and the higher the ambiguity about it. The link between distance and knowledge recently received support from studies demonstrating conceptual associations between construal level, psychological distance, and the amount of information available (darkness vs. brightness; Steidle, Werth, & Hanke, 2011). People engage in broad, global processing when they encounter remote or unfamiliar objects that have not been experienced before (Förster, Marguc, & Gillebaart, 2010).

In a similar vein, we expect construal level to be linked to category width. Naturally, people can be less precise about estimating the duration of a *sports event* in comparison with a *basketball game*, or when judging the aggressiveness of an *act of hostility* in comparison with an *insult*. Just like for distant objects, people are less knowledgeable about the concrete attributes of high-level construals—which by definition omit precise information. As a result, people take a wider range of possibilities into account when judging the attributes of an abstract target, which is composed of many specific instances, as compared with a concrete one.

Research on Parducci's (1965) range-frequency model supports our reasoning about knowledge and category width. According to this model, people split up crude categories into more fine-grained ones (i.e., they reduce category width), when they encounter increasingly more instances of that category (i.e., when a category's frequency increases). As more specific knowledge is available for close and low-level targets, we similarly expect people to narrow down the category width of those targets. In a classical study, Hovland and Sherif (1952) provide evidence for this idea by demonstrating that people are more restrictive in accepting statements that are close to their own opinion than in rejecting statements that are not. The distribution of response categories is skewed: People use narrow categories for judging stimuli at the psychologically close end (i.e., close to their own opinion) and crude categories at the psychologically distant end of the attitude dimension.

Overview of the Present Studies

In five experiments, we investigate the influence of psychological distance (Studies 1-3) and construal level (Studies 4 and 5) on category width. In particular, participants are presented with stimulus objects and estimate the upper and lower boundary of a quantitative attribute of each object as a measure of category width. We manipulate the object's spatial distance (Studies 1 and 3), likelihood (Study 2), and construal level (Study 4) or participants' mindset construal level before they approach the estimation task (Study 5). If differences in category width are indeed a fundamental characteristic of distant versus close objects and high- versus low-level construals, we expect participants' interval estimates to increase with increasing distance and construal level.

For two reasons, we believe that such a study makes a valuable contribution beyond previous research. First, at the theoretical level, we are convinced that demonstrating the impact of construal level on category width does not merely add another item to an already long list of manifestations of distance and abstractness. Rather, direct interval estimates on quantitative judgment scales afford a natural means of establishing one of the central psychophysical underpinnings of construal level and distance that may foster understanding of a wide variety of related findings. Indeed, assuming that response categories become wider with increasing construal level offers a straightforward explanation why high-level (low-level) processing is associated with a focus on (dis-)similarities (Förster, 2009), why priming global (local) perception styles fosters assimilation (contrast; Förster, Liberman, & Kuschel, 2008), why people include more (less) instances in a semantic category that is distant (close; Liberman et al., 2002), why broader (narrower) associations are formed in distant (close) tasks (Förster et al., 2004), and why stereotyping is more (less) pronounced in high-level (low-level) mindsets (McCrea, Wieber, & Myers, 2012).

Second, the interval judgment paradigm in and of itself is of practical importance, and has face validity for a number of real-life settings. In marketing and consumer behavior, interval estimates (e.g., of minimally and maximally acceptable prices) determine the acceptance of various brands and markets (Dost & Wilken, 2012). In social psychology, the width of the categories used to identify elderly, handicapped, or criminal people reflects tolerance and moderates the impact of stereotypes and discriminatory behavior (Dovidio & Gaertner, 1999). Or, in decision research, interval construction tasks have been shown to produce particularly strong overconfidence effects (Juslin, Winman, & Hansson, 2007). Extending construal-level research to interval-estimation therefore raises new implications for applied fields such as marketing, stereotyping, and overconfidence. Moreover, for future research, interval judgments afford a practical and natural quantitative assessment of construal levels, going beyond linguistic measures of abstract versus concrete language, or general preferences for global versus local, or desirable versus feasible stimulus aspects.

Study 1

Study 1 was designed to investigate whether the width of a response category is adjusted to the geographical distance of a target item. Participants were provided with a series of visual stimuli (bridges) and their task was to provide upper and lower boundary estimates about a quantitative stimulus attribute (length) as a measure of category width. We expected response categories to be wider, hence interval judgments to be larger, when the objects were located in a spatially distant (France) rather than close location (the United States). By applying (and sometimes overgeneralizing) the rule that wider categories are required to judge distal rather than proximal objects, participants should broaden their mental unit size and apply larger categories when providing responses for distal as compared with proximate targets.

Method

Participants. Forty-four U.S.-American participants were recruited via Amazon's Mechanical Turk online platform (MTurk; 22 women, age M = 33.62 years, SD = 9.24[1]) and paid US$0.50 for their participation (see Buhrmester, Kwang, & Gosling, 2011, for information regarding MTurk). Participants were randomly assigned by the computer program to either the United States (low spatial distance) or the France (high spatial distance) condition.

Materials and procedure. At the beginning of the online study participants were informed that their task in the present study was to estimate the length of several bridges. Each participant was instructed to provide interval estimates, that is, a minimal and a maximal estimate for each bridge's length and worked on a sample item. Next, participants read the following sentence as a manipulation of the target objects' spatial distance: "All the bridges you will be presented with are located in the United States [France] and, from an architectural perspective, represent typical examples of bridges from this region." In addition, participants were asked to write a few words about American (French) architecture to make sure that they took sufficient note of the spatial distance manipulation.

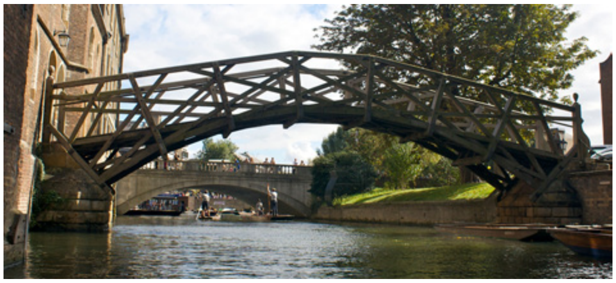

Figure 1. Item used in Study 1.
Note. Participants' task was to provide an interval estimate of the bridge's length. Depending on the condition, this photograph was either presented as "*Tamar Bridge*" (spatially close) or "*Pont au Change*" (spatially distant).

Figure 2. Item used in Study 2.
Note. The images were introduced as digital planning sketches and participants were either told that the bridges actually existed (high likelihood) or not (low likelihood).

The main task consisted of 12 web pages presented in a random order. Each page was composed of a large photo displaying a bridge (see Figure 1) and the dependent measure below. Dependent on condition, the bridges either had English (e.g., *Sunderland Bridge, West Gate Bridge*) or French names (e.g., *Pont Saint-Louis, Pont de l'Archevêché*). Participants had to provide their interval estimates by answering questions of the following format: "The Sunderland Bridge [Pont Saint-Louis] is in between ___ft. and ___ft. long." After answering all 12 items, participants filled out demographics, were thanked for their participation, and received their payment electronically via Mechanical Turk.

Results and Discussion

To assess category width, we first subtracted the lower boundary from the upper-boundary estimate for each of the 12 bridges. As bridges differed greatly in terms of their actual lengths, scores were first *z*-standardized separately for each bridge and then summed up (α = .91). One participant was excluded from data analysis for generating negative intervals (including this participant does not change level of significance in the reported analysis).

As predicted, psychological distance did affect category width. Participants formed larger response categories when the bridges were ostensibly located in France (Z = 3.96) as compared with the United States (Z = −2.34), $t(41)$ = 2.79, p = .008, d = .78. A descriptive analysis reveals that in each of the 12 items, category widths were larger in the high spatial distance condition.

Results indicate a clear pattern confirming our central hypothesis. Wider response categories were formed when the bridges were framed as psychologically distant rather than close. Notably, the stimulus objects themselves—the bridges—did not differ between conditions. Providing information about a bridge's location was sufficient to affect participants' reference scales that they used for generating their numerical estimates. As a consequence, interval widths differed as a function of distance.

Study 2

The central aim of Study 2 was to generalize the findings obtained in the previous study to another dimension of psychological distance: Likelihood. According to CLT, there are four distance dimensions, which are interrelated and share a common underlying meaning (Bar-Anan, Liberman, Trope, & Algom, 2007; Fiedler, Jung, Wänke, & Alexopoulos, 2012; Trope & Liberman, 2010). Therefore, we expected the likelihood of an object to be similarly linked to response category width as spatial distance. To test this prediction, participants saw the same series of bridges that was already used in Study 1. However, this time, we added several optical filters in an image processing program (Paint Shop Pro X, Corel Corporation) to make the original photographs look like computerized planning sketches (see Figure 2) that could either exist in reality (high likelihood condition) or not (low likelihood condition).

Method

Participants. Eighty U.S.-American participants were recruited via MTurk (32 women, age M = 31.74, SD = 9.07), paid US$0.50 for their participation in this study, and randomly assigned to either the high or the low likelihood condition.

Materials and procedure. The experimental procedure was consistent with the previous study except for the following changes regarding the manipulation of psychological distance. In particular, at the beginning of the experiment, participants either read that "All the bridges in the sketches we will present you have finally been built" or that those bridges "have not been built yet." Participants saw the same 12 bridges as in the previous study, but several optical filters were added to the photographs to be able to convince participants that they were seeing digital planning sketches of bridges, which may or may not exist in reality. Critically, all participants saw the same 12 sketches when they provided their interval estimates. However, half of them thought that the bridges actually exist, whereas the other half thought that they do not exist yet. In the end of the study, participants were probed for suspicion about the images, answered demographics, and received their payment via MTurk.

Results and Discussion

Following Study 1's procedure, category width was computed by subtracting the estimated minimum from the estimated maximum, *z*-standardized, and summed up over all 12 items ($\alpha = .93$). Two participants were excluded from the analyses for providing negative interval scores, and two participants reported to not believe our cover story about the sketches (including these participants does not affect the level of significance).

Using a likelihood rather than a spatial distance manipulation, results from Study 1 could be replicated. Participants provided wider response categories, when the bridges were presented as unlikely ($Z = 2.83$) rather than likely ($Z = -2.76$), $t(74) = 2.81$, $p = .006$, $d = .65$.

Studies 1 and 2 provide convergent evidence for the idea that people attune their internal reference scale to the psychological distance of an object to be judged. An increase in the distance of a target object leads to an increase in the coarseness of the reference scale that is used for providing a judgment about it. Thus, response categories are wider for distal than for proximate targets. Note that such reasoning is not concerned with the underlying mental representation of the target object in the first place. Although we do not want to preclude the possibility that different semantic categories can be chosen to represent a bridge (e.g., overpass, footbridge), we believe that the obtained results can more reasonably be explained in terms of response categories. The items to be judged were permanently visible to the participants and all information was directly accessible in the photographs. Thus, above all, the estimation task was about the scaling of a numerical estimate.

Study 3

Study 3 extended the results obtained so far, by investigating the distance-width association in a different judgment domain. In particular, participants' task was to provide quantity estimates about the number of individual items in a food bowl. Based on our theoretical reasoning, we expected participants to provide wider response categories when the foods were framed as spatially distant rather than close. Moreover, after judging all items we asked participants to rate their general confidence about the estimates they had just given. When people indeed use category width to compensate for differences in certainty about distal versus proximate targets, subsequent confidence judgments should be equally high, because certainty differences are already communicated by respective interval widths (cf. Klayman, Soll, Juslin, & Winman, 2006; Yaniv & Foster, 1995). Thus, we expected differences for category width but not for subsequent confidence judgments.

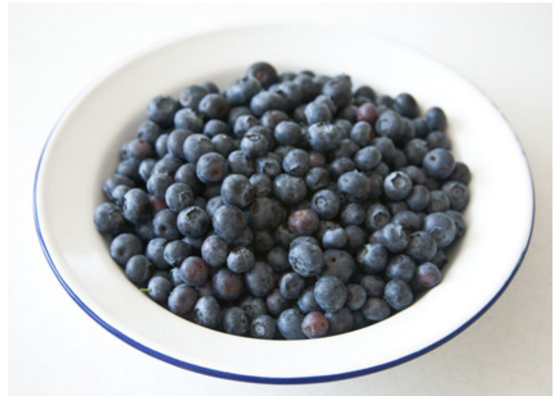

Figure 3. Item used in Studies 3 and 4.
Note. Participants' task was to provide an interval estimate of the quantity of blueberries in the bowl. In Study 3, the photograph was either presented as "blueberries" (spatially close) or "brimbelles (blueberries)" (spatially distant). In Study 4, the photograph was presented as "blueberries" (exemplar) or "fruits" (category).

Method

Participants. Sixty-five U.S.-American participants were recruited using MTurk (27 women, age $M = 36.89$ years, $SD = 11.4$). Participants received US$0.50 for their participation and were randomly assigned to either the United States (low spatial distance) or France (high spatial distance) experimental condition.

Materials and procedure. After reading the instructions and seeing a sample item, participants were asked to write a few words about the American or French cuisine to ensure they paid sufficient attention to the spatial distance manipulation. The subsequent estimation task consisted of 10 web pages that were presented in random order and displayed photographs of bowls and boxes filled with different kinds of fruits, nuts, or vegetables (see Figure 3). Dependent on experimental condition, the food items were either labeled in English (*cherries, hazelnuts, blueberries*) or French (*cerises, noisettes, brimbelles*) with the English translations following in parentheses. Below each photograph, participants filled out the main dependent measure: "There are in between ___ and___ cherries [cerises (cherries)] in the box." After providing interval estimates for all 10 foods, participants indicated their overall confidence about the judgments they had given on a 9-point Likert-type scale ranging from *very unconfident* to *very confident*. Upon answering the confidence item, they filled out demographics, were thanked for their participation, and received their payment via Mechanical Turk.

Results and Discussion

A sum score of category width based on the 10 individual items was computed following Study 1's procedure (α = .95). As predicted, the spatial distance manipulation affected category widths. When the foods were presented as spatially distant (Z = 1.63) higher interval estimates were provided than when the same items were presented as spatially close (Z = −1.58), $t(63)$ = 2.06, p = .044, d = .54. A descriptive analysis revealed the robustness of the experimental effect: The same ordinal pattern was found in each of the 10 items used in the experiment.

Next, we analyzed participants' final confidence ratings about their judgments. Not surprisingly, confidence was negatively correlated with category width, thus validating the measure, $r(65)$ = −.40, p = .001. The negative sign of the correlation implied that participants generated larger intervals when they felt less confident about their estimates. Most importantly, however, confidence and psychological distance (coded 0 = *United States*, 1 = *France*) were unrelated, $r(65)$ = −.01, ns. Thus, participants from both experimental conditions rated their confidence equally high, though their interval estimates differed in width. Apparently, any certainty differences related to a target object's distance had already been expressed through appropriate adjustments of category width.

Study 3 corroborates the results obtained in the first two studies. Increasing the psychological distance of a stimulus increases the coarseness of the reference scale that is used for providing a quantitative judgment about it. Importantly, results from the previous studies were replicated in a different judgment domain.

Study 4

So far, we established a consistent relationship between psychological distance and category width. As CLT proposes similar implications for construal level (Trope & Liberman, 2010), Study 4 was designed to investigate how construal level affects category width. In particular, the same estimation task as in Study 3 was used, but this time, the foods were either given an abstract category or a concrete exemplar label as a manipulation construal level (cf. Bar-Anan, Liberman, & Trope, 2006; Fujita, Trope, et al., 2006; Wakslak & Trope, 2009). By their very definition, low-level construals put an emphasis on the specific details of an object, whereas high-level construals highlight its core meaning, function, and goals (Trope & Liberman, 2010). Hence, the former are more suitable for narrowing down quantitative judgments than the latter, which is why we expect participants to use more fine-grained reference scales and to provide more precise judgments when low-level rather than high-level information is activated.

In the end of the study, after finishing the estimation task, participants answered an edited version of the *Behavioral Identification Form* (BIF; Vallacher & Wegner, 1989) as a check on the construal level manipulation. The BIF affords a linguistic measure of a person's current mindset abstractness (Fujita, Henderson, et al., 2006; Liberman & Trope, 1998).

Method

Participants. Sixty-six U.S.-American participants agreed to take part in the study for US$0.50 via MTurk (29 women, age M = 32.36 years, SD = 12.18) and were randomly assigned to either the category or the exemplar condition.

Materials and procedure. Materials and procedures were identical to Study 3 except for the two following changes regarding the experimental manipulation and the manipulation check. First, the construal level of the foods was manipulated by framing the items either in abstract categorical or concrete exemplar terms. Specifically, the photographs were either abstractly labeled as *fruits, nuts*, or *vegetables* (high-level construal) or concretely denoted as *blueberries, pine nuts*, or *beans* (low-level construal). Labels appeared on top of each photo and were included in the question about the item quantity ("What do you estimate the quantity of the blueberries [fruits] to be?").

Second, on finishing the main task, participants answered a four-item questionnaire that evaluated their preferences for abstract versus concrete linguistic expressions. The questionnaire was constructed according to the BIF principles (Vallacher & Wegner, 1989), a widely used tool for assessing a person's construal level. In particular, each item consisted of a behavioral episode that was followed by one ends-related (high-level) and one means-related (low-level) alternative redescription of that behavior. One of the items was taken directly from the original questionnaire (*eating)* and three additional ones were created in accordance with the food-related cover story of the experiment (*sticking to a diet; going to the gym; having a healthy nutrition*; α = .56). For instance, participants had to indicate whether they preferred "being healthy" (high-level, coded as 1) or "eating less" (low-level, coded as 0) as an alternative identifications of "sticking to a diet."

Results and Discussion

Scores were standardized and summed up as in the previous studies (α = .93). We predicted higher category widths when the items were presented in categorical rather than exemplar format. Our expectations were confirmed. When the foods were framed abstractly as fruits or vegetables participants provided higher category widths (Z = 1.81) than when the items were framed on a more concrete level as blueberries or beans (Z = −2.26), $t(64)$ = 2.30, p = .025, d = .57. Again, the same ordinal pattern was obtained in each of the 10 items.

Moreover, we expected the preceding construal level manipulation to carry over to the subsequent BIF questionnaire (cf. Fujita & Roberts, 2010). Indeed, participants in the category condition indicated relatively stronger preferences for the high-level action identifications (M = 2.56) than participants in the exemplar condition (M = 1.85), $t(64) = 2.30$, $p = .025$, d = .57. Thus, the abstract versus concrete labeling of the foods did affect participants' construal level at which they represented the items. Taken together, Study 4 provides convincing evidence that response category width varies as a function of both, psychological distance and construal level.

Study 5

Thus far, our studies have demonstrated that manipulating the psychological distance and the construal level of a target object affects interval estimates about its attributes. Study 5 was designed to go beyond these results by manipulating participants' general mindset construal level independent of the target object itself. Previous research demonstrated repeatedly that construal level mindsets can be activated experimentally, affecting at what construal level objects are processed subsequently (see, for example, Freitas, Gollwitzer, & Trope, 2004; Fujita, Trope, et al., 2006; Liberman, Trope, McCrea, & Sherman, 2007). One of the advantages of such task-unrelated mindset manipulations is that a-priori differences regarding the target (i.e., any differences independent of the experimental manipulation) can be ruled out as an explanation for later effects. Accordingly, in Study 5, participants first answered several how- or why-questions about maintaining physical health as a mindset manipulation of construal level (cf. Freitas et al., 2004) and then provided category width estimates of 10 estimation problems.

Method

Participants. One hundred seventy U.S.-American participants (86 women, age M = 35.60 years, SD = 12.01) agreed to participate in the present study via MTurk for US$0.50 and were randomly assigned to either the how- (low-level construal) or the why-condition (high-level construal).

Materials and procedure. At the beginning of the experiment, participants read that their task was to work on two ostensibly unrelated questionnaire studies, which in fact were the experimental manipulation and the dependent measure. After reading the instruction, participants worked on the mindset manipulation (adapted from Freitas et al., 2004). In particular, participants in the low-level construal condition were asked to provide four increasingly specific answers to the question "How can you improve and maintain your physical health?" Participants in the high-level condition, in contrast, had to provide four increasingly abstract reasons for "Why should you improve and maintain your physical health?" As the former task is about providing concrete means, whereas the latter task is about generating abstract ends, the tasks prime low- and high-level construal, respectively.

Next, participants received the dependent measure that consisted of 10 estimation problems. For instance, participants were asked to estimate "How many peanuts make an average 18 oz jar of peanut butter?" "What amount of gasoline does a typical automobile use during its lifetime?" or "How many emails are sent every day (including spam, advertising, etc.)?" For each question, they could indicate their answers by moving two sliders on a scale. One slider was blue-colored and labeled "min.," the other one red-colored and labeled "max." The scale was a 300 pixel long horizontal bar with only the two endpoints being labeled. The endpoints of each item's scale were determined in a pretest of 100 participants who provided a simple mean estimate for each item. From the respective distributions of answers for each question, the 15th and the 85th percentile were rounded and taken as lower and upper endpoints, respectively. Thus, for instance, for the scale of the number of peanuts to make a jar of peanut butter, the pretest determined 100 and 3,000 peanuts as endpoints; for the amount of lifetime gasoline usage, the pretest yielded 4,000 and 50,000 gallons. To make participants familiar with the item format, they first worked on a sample question explicating the instructions in detail. Participants were informed to "Please move both sliders to provide a minimal estimate and a maximal estimate" and to click a next button when they were satisfied with their final slider positions. Then, they worked on the 10 estimation problems. The computer program coded the final slider position on a scale from 1 (*lowest possible value*) to 100 (*highest possible value*). After providing interval estimates for all 10 questions, participants filled out demographics and were thanked for their participation in the study.

Results and Discussion

Category width scores were obtained by subtracting the position of the minimum-slider from the position of the maximum-slider. Thus, scores could potentially range from 0 (*both slider have the identical position*) to 99 (*the minimum- and the maximum-slider positions at the lower and upper end of the scale*, respectively). Negative intervals due to participants mixing up the two sliders were transformed into positive scores (overall, this applied to 4.2% of all answers). Finally, an average interval width over all 10 items was calculated for each participant, $\alpha = .90$.

We expected the generation of concrete means as opposed to abstract ends in the mindset priming task to affect the width of the intervals in the subsequent estimation task. A mean comparison of participants' interval sizes confirmed our expectations, $t(168) = 2.23$, $p = .027$, $d = .34$. Participants provided wider intervals after having worked on the why- (M = 29.64) as compared with the how-version (M = 25.69) of the mindset priming task.

Study 5 substantiates the evidence for an association of construal level and response category width. Manipulating participants' mindset construal level, interval widths in a subsequent estimation task were wider when they were based on high-level as compared with low-level construals. Thus, Study 5 supports the idea that construal level per se is sufficient for affecting response categories, also when it is not related to the target object whatsoever.

General Discussion

People attune their mental scales and response categories to an object's distance and construal level. When an object is moved away from someone's egocentric perspective or when it is construed at a higher level of abstraction, people adjusts their mental space by widening response categories. Coarse units are used to characterize the vagueness of the abstract and distant, and fine-grained units are used to capture the specificity of the concrete and close. In support of this notion, five studies have shown that, first, a wider range of lengths becomes acceptable when estimating bridges in a distant versus close (Study 1) or unlikely versus likely context (Study 2). Second, the number of food items in a bowl is judged with a higher category width from a distant as compared with a close perspective (Study 3). Third, wider intervals are generated when food items are described in high-level terms (Study 4). Finally, high construal level mindsets increase interval widths in a series of subsequent estimation problems (Study 5).

Many scholars have argued and empirically demonstrated that less is known about the distant than the near, because the former is by definition less often part of one's direct experience (Bar-Anan et al., 2006; Bar-Anan et al., 2007; Fiedler, 2007; Hamilton & Thompson, 2007; Steidle et al., 2011; Wakslak, Trope, Liberman, & Alony, 2006). As a consequence, judgments from a distant perspective involve a higher degree of ambiguity and uncertainty. To compensate for such differences, people attune their internal reference scales to the context in which the judgment takes place. Just like an experienced real estate agent can be more precise about judging the value of an apartment than an inexperienced prospective buyer, people are able to scale objects in terms of more fine-grained units when these are close to them rather than distant. Intriguingly, they exhibit this behavior even in situations where the factual amount of information is constant and only specific cues allude to an object's experiential distance, like in the studies presented.

In a similar vein, high-level construals allow for higher latitude than low-level construals, because they disregard an object's specific details for the benefit of emphasizing abstract information such as goals, functions, and meanings. Although concrete low-level information narrows down the perspective and allows for differentiations at a relatively high resolution level, high-level information is less instrumental for precise judgments as it focuses on general aspects that most objects have in common. Everybody has a relatively precise idea of a *coffee cup* and the simple fact that it is used for drinking coffee limits most of its attributes (such as size, content, or value) considerably. The more abstract construal *container*, however, puts an emphasis on the object's basic function, and consequently lacks most of the details, which would be central for narrowing down concrete inferences about it. Containers can have many sizes and can differ greatly in terms of their contents and values. As a result, even if the object is the same, construing it as a coffee cup and not as a container renders its details more accessible and decreases the possible shapes it may assume. As the present research demonstrates, people do justice to this higher specificity by adjusting their internal response scales to the object's construal level.

Implications for CLT

At the theoretical level, the concept of category width is pivotal for gaining insights into the psychophysical underpinnings of construal levels. Much research has been concerned with antecedents and consequences of construal level and distance (for an overview, see, for example, Trope & Liberman, 2010). However, at the "algorithmic level" (Marr, 1982), it is less established how construal level can be conceptualized beyond verbal descriptions. In accordance with the five studies presented, we suggest the width of response categories as one fundamental property of psychological distance and construal levels.

Past CLT research has not made an explicit distinction between semantic categories and response categories. Does the notion of construal level pertain to the abstractness with which a whole semantic category is represented or is it useful to consider the width or grain size of response categories in distinct attribute dimensions? Indeed, some findings demonstrate that high distance or construal level sensitizes people for different attributes (value, primary attributes) than low distance or construal level (probability, secondary attributes). The notion of category width, in contrast, affords a straightforward measure of people's sensitivity to specific quantities. In any case, the reported results suggest that it is worthwhile studying the influence of construal level on the properties of reference scales used for quantitative judgments. Future studies will have to clarify the specific processes through which construal level and distance affect response scales. Our research suggests knowledge-based certainty as one of the critical mediating factors. Future experiments may investigate this relationship more closely and establish additional factors that explain the construal level-width association.

At a more pragmatic level, our studies have profound implications for conducting construal level research. Construal level is often measured by assessing a participant's general mindset abstractness. For instance, in the classical Navon (1977) letter task, participants' reaction times toward global stimuli are compared with their reaction times toward local stimuli; the BIF asks for preferences of means- over ends-related behavioral descriptions (Vallacher & Wegner, 1989); and the Kimchi–Palmer figures test refers similarity judgments about geometrical figures to global or local features (Kimchi & Palmer, 1982). These tasks afford useful tools for assessing a participant's current mindset level of construal. However, with regard to specific stimulus objects, they must be considered rather indirect measures, as they do not directly tap into a person's representation of a particular object in a given context. We suggest category width as an easily applicable measure that is able to fill this void. Asking participants to provide interval estimates about an object's attributes represents a straightforward approach to measuring construal level.

Category Width as an Explanatory Construct

As the present research is concerned with a fundamental manifestation of distance and construal level, the concept of category width may add one more layer of understanding to other prevailing areas of related research. For instance, in a series of experiments, Förster (2009) demonstrated a general link between global (local) processing and a focus on similarities (dissimilarities). Applying the notion of category width in future research may shed light on this intriguing relation: According to the present results, an increase in a person's processing level should lead to larger category widths. As broader, less restrictive categorization reinforces the recognition of similarities (Wallach, 1958) and as objects being categorized together are judged to be more similar (Goldstone, Lippa, & Shiffrin, 2001), the interplay of global (local) processing and similarity (dissimilarity) focus may reflect the usage of wider (narrower) response categories.

A parallel argument can be made for the link between construal level and assimilation versus contrast (see Förster et al., 2008). Schwarz and Bless' (2007) inclusion–exclusion model suggests that assimilation occurs when information is included in a category whereas contrast occurs when it is excluded from it. As including an exemplar into a category essentially requires a broad conceptual scope (Isen & Daubman, 1984; Liberman et al., 2002), category width may assume an important mediational role in construal level's link to assimilation versus contrast. In support of this notion, the importance of category width for assimilation versus contrast has recently been demonstrated in consumer decision making: When a target's range (e.g., the perceived prestige range of a new car) is wide enough to overlap with its context (e.g., the prestige range of other cars), assimilation occurs. However, when it is too narrow to overlap, the object is contrasted away from its context (Chien, Wegener, Hsiao, & Petty, 2010).

Conclusion

The present research suggests response category width as a psychophysical underpinning of construal level and distance. Variation in category width can have important practical consequences on social categorization and discrimination, the perception of normality, and acceptance or tolerance limits in various domains of life. Therefore, the notion of category width is not only theoretically relevant for CLT but also in and of itself a vital component for understanding categorization—one of humans' most fundamental and pervasive cognitive capacities.

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Note

1. Demographic data from two participants is missing due to a technical error. In this and all other studies, only English-speaking, U.S.-American participants who completed the entire survey were accepted as participants, following common guidelines on how to use Mechanical Turk (Goodman, Cryder, & Cheema, 2013).

References

Bar-Anan, Y., Liberman, N., & Trope, Y. (2006). The association between psychological distance and construal level: Evidence from an implicit association test. *Journal of Experimental Psychology: General*, *135*, 609-622.

Bar-Anan, Y., Liberman, N., Trope, Y., & Algom, D. (2007). Automatic processing of psychological distance: Evidence from a Stroop task. *Journal of Experimental Psychology: General*, *136*, 610-622.

Bruner, J. S. (1957). On Perceptual Readiness. *Psychological Review*, *64*(2), 123-154.

Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk. *Perspectives on Psychological Science*, *6*, 3-5. doi:10.1177/1745691610393980

Chien, Y. W., Wegener, D. T., Hsiao, C. C., & Petty, R. E. (2010). Dimensional range overlap and context effects in consumer judgments. *Journal of Consumer Research*, *37*, 530-542.

Dost, F., & Wilken, R. (2012). Measuring willingness to pay as a range, revisited: When should we care? *International Journal of Research in Marketing*, *29*, 148-166. doi:http://dx.doi.org/10.1016/j.ijresmar.2011.09.003

Dovidio, J. F., & Gaertner, S. L. (1999). Reducing prejudice: Combating intergroup biases. *Current Directions in Psychological Science*, *8*, 101-105. doi:10.1111/1467-8721.00024

Eyal, T., Sagristano, M. D., Trope, Y., Liberman, N., & Chaiken, S. (2009). When values matter: Expressing values in behavioral intentions for the near vs. distant future. *Journal of Experimental Social Psychology*, *45*, 35-43.

Fiedler, K. (2007). Construal level theory as an integrative framework for behavioral decision-making research and consumer psychology. *Journal of Consumer Psychology*, *17*, 101-106.

Fiedler, K., Jung, J., Wänke, M., & Alexopoulos, T. (2012). On the relations between distinct aspects of psychological distance: An ecological basis of construal-level theory. *Journal of Experimental Social Psychology*, *48*, 1014-1021. doi:http://dx.doi.org/10.1016/j.jesp.2012.03.013

Förster, J. (2009). Relations between perceptual and conceptual scope: How global versus local processing fits a focus on similarity versus dissimilarity. *Journal of Experimental Psychology: General*, *138*, 88-111. doi:10.1037/a0014484

Förster, J., Friedman, R. S., & Liberman, N. (2004). Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition. *Journal of Personality and Social Psychology*, *87*, 177-189.

Förster, J., Liberman, N., & Kuschel, S. (2008). The effect of global versus local processing styles on assimilation versus contrast in social judgment. *Journal of Personality and Social Psychology*, *94*, 579-599. doi:10.1037/0022-3514.94.4.579

Förster, J., Marguc, J., & Gillebaart, M. (2010). Novelty categorization theory. *Social and Personality Psychology Compass*, *4*, 736-755. doi:10.1111/j.1751-9004.2010.00289.x

Freitas, A. L., Gollwitzer, P., & Trope, Y. (2004). The influence of abstract and concrete mindsets on anticipating and guiding others' self-regulatory efforts. *Journal of Experimental Social Psychology*, *40*, 739-752. doi:10.1016/j.jesp.2004.04.003

Fujita, K., Henderson, M. D., Eng, J., Trope, Y., & Liberman, N. (2006). Spatial distance and mental construal of social events. *Psychological Science*, *17*, 278-282.

Fujita, K., & Roberts, J. C. (2010). Promoting prospective self-control through abstraction. *Journal of Experimental Social Psychology*, *46*, 1049-1054. doi:10.1016/j.jesp.2010.05.013

Fujita, K., Trope, Y., Liberman, N., & Levin-Sagi, M. (2006). Construal levels and self-control. *Journal of Personality and Social Psychology*, *90*, 351-367.

Goldstone, R. L., Lippa, Y., & Shiffrin, R. M. (2001). Altering object representations through category learning. *Cognition*, *78*, 27-43.

Goodman, J. K., Cryder, C. E., & Cheema, A. (2013). Data collection in a flat world: Strengths and weaknesses of Mechanical Turk samples. *Journal of Behavioral Decision Making*, *26*, 213-224.

Hamilton, R. W., & Thompson, D. V. (2007). Is there a substitute for direct experience? Comparing consumers' preferences after direct and indirect product experiences. *Journal of Consumer Research*, *34*, 546-555. doi:10.1086/520073

Hovland, C. I., & Sherif, M. (1952). Judgmental phenomena and scales of attitude measurement: Item displacement in Thurstone scales. *Journal of Abnormal and Social Psychology*, *47*, 822-832.

Isen, A. M., & Daubman, K. A. (1984). The influence of affect on categorization. *Journal of Personality and Social Psychology*, *47*, 1206-1217. doi:10.1037/0022-3514.47.6.1206

Jia, L., Hirt, E. R., & Karpen, S. C. (2009). Lessons from a Faraway land: The effect of spatial distance on creative cognition. *Journal of Experimental Social Psychology*, *45*, 1127-1131. doi:10.1016/j.jesp.2009.05.015

Juslin, P., Winman, A., & Hansson, P. (2007). The naïve intuitive statistician: A naïve sampling model of intuitive confidence intervals. *Psychological Review*, *114*, 678-703.

Kimchi, R., & Palmer, S. E. (1982). Form and texture in hierarchically constructed patterns. *Journal of Experimental Psychology: Human Perception and Performance*, *8*, 521-535. doi:10.1037/0096-1523.8.4.521

Klayman, J., Soll, J. B., Juslin, P., & Winman, A. (2006). Subjective confidence and the sampling of knowledge. In K. Fiedler & P. Juslin (Eds.), *Information sampling and adaptive cognition* (pp. 153-182). Cambridge, UK: Cambridge University Press.

Liberman, N., & Förster, J. (2009). Distancing from experienced self: How global-versus-local perception affects estimation of psychological distance. *Journal of Personality and Social Psychology*, *97*, 203-216.

Liberman, N., Sagristano, M. D., & Trope, Y. (2002). The effect of temporal distance on level of mental construal. *Journal of Experimental Social Psychology*, *38*, 523-534.

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology*, *75*, 5-18.

Liberman, N., Trope, Y., McCrea, S. M., & Sherman, S. J. (2007). The effect of level of construal on the temporal distance of activity enactment. *Journal of Experimental Social Psychology*, *43*, 143-149.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, *22*, 1-55.

Maglio, S. J., & Trope, Y. (2011). Scale and construal: How larger measurement units shrink length estimates and expand mental horizons. *Psychonomic Bulletin & Review*, *18*, 165-170.

Marr, D. (1982). *Vision: A computational investigation into the human representation and processing of visual information*. New York, NY: Henry Holt.

McCrea, S., Wieber, F., & Myers, A. (2012). Construal level mind-sets moderate self-and social stereotyping. *Journal of Personality and Social Psychology*, *102*, 51-68.

Mellers, B. A., & Cooke, A. D. (1996). The role of task and context in preference measurement. *Psychological Science*, *7*, 76-82.

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology*, *9*, 353-383.

Nussbaum, S., Liberman, N., & Trope, Y. (2006). Predicting the near and distant future. *Journal of Experimental Psychology: General*, *135*, 152-161.

Parducci, A. (1965). Category judgment: A range-frequency model. *Psychological Review*, *72*, 407-418.

Parducci, A. (1984). Value judgments: Toward a relational theory of happiness. In J. R. Eiser (Ed.), *Attitudinal judgment* (pp. 3-21). New York, NY: Springer.

Rim, S., Hansen, J., & Trope, Y. (2013). What happens why? Psychological distance and focusing on causes versus consequences of events. *Journal of Personality and Social Psychology*, *104*, 457-472.

Sagristano, M. D., Trope, Y., & Liberman, N. (2002). Time-dependent gambling: Odds now, money later. *Journal of Experimental Psychology-General*, *131*, 364-376.

Schwarz, N., & Bless, H. (2007). Mental construal processes: The inclusion/exclusion model. In D. A. Stapel & J. Suls (Eds.),

Assimilation and contrast in social psychology (pp. 119-141). New York, NY: Psychology Press.
Steidle, A., Werth, L., & Hanke, E.-V. (2011). You can't see much in the dark. *Social Psychology*, *42*, 174-184. doi:10.1027/1864-9335/a000061
Stewart, N., Chater, N., Stott, H. P., & Reimers, S. (2003). Prospect relativity: How choice options influence decision under risk. *Journal of Experimental Psychology: General*, *132*, 23-46.
Thurstone, L. L. (1927a). A law of comparative judgment. *Psychological Review*, *34*, 273-286.
Thurstone, L. L. (1927b). A mental unit of measurement. *Psychological Review*, *34*, 415-423.
Torgerson, W. S. (1958). Thurstone's judgment scaling model. In W. S. Torgerson (Ed.), *Theory and methods of scaling* (pp. 155-158). New York, NY: John Wiley.
Trope, Y., & Liberman, N. (2000). Temporal construal and time-dependent changes in preference. *Journal of Personality and Social Psychology*, *79*, 876-889.
Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*, 403-421.
Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*, 440-463.
Upshaw, H. S. (1969a). The Personal Reference Scale: An approach to social judgment. *Advances in Experimental Social Psychology*, *4*, 315-371.
Upshaw, H. S. (1969b). Stimulus range and the judgmental unit. *Journal of Experimental Social Psychology*, *5*, 1-11. doi:http://dx.doi.org/10.1016/0022-1031(69)90002-X
Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology*, *57*, 660-671.
Wakslak, C. J., & Trope, Y. (2009). The effect of construal level on subjective probability estimates. *Psychological Science*, *20*, 52-58.
Wakslak, C. J., Trope, Y., Liberman, N., & Alony, R. (2006). Seeing the forest when entry is unlikely: Probability and the mental representation of events. *Journal of Experimental Psychology: General*, *135*, 641-653.
Wallach, M. A. (1958). On psychological similarity. *Psychological Review*, *65*, 103-116. doi:10.1037/h0042908
Yaniv, I., & Foster, D. P. (1995). Graininess of judgment under uncertainty: An accuracy-informativeness trade-off. *Journal of Experimental Psychology-General*, *124*, 424-432.
Zhao, M., & Xie, J. (2011). Effects of social and temporal distance on consumers' responses to peer recommendations. *Journal of Marketing Research*, *48*, 486-496. doi:10.1509/jmkr.48.3.486