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SOMEWHERE OVER THE RAINBOW: VERTICAL POSITION IS ASSOCIATED WITH CONSTRUAL LEVEL AND PSYCHOLOGICAL DISTANCE

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Recent findings suggest that stimulus construal level (high vs. low) is mentally associated with its vertical position (up vs. down). We delve deeper into this association and its meanings, and examine, for the first time, its complementary association, that of stimulus psychological distance (distant vs. close) and its vertical position (up vs. down). In Study 1 and 2 goals of activities were positioned higher than the means of performing them and were perceived as more compatible with a spatially higher viewpoint. In Study 3, self-perceptions were more invariant when items were presented at the top (vs. the bottom) of a visual display. In Study 4, participants positioned imagination-related concepts above reality-related concepts. In Study 5, participants provided more distant time estimates for scenarios presented at the top (vs. the bottom) of a display. Theoretical and practical implications are discussed.

Keywords: vertical position; construal level; psychological distance

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All data, codes and research materials associated with this manuscript are openly available in a public repository (https://osf.io/4pjrq/).

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The song "Over the Rainbow," sends listeners to a highly hypothetical, imaginary, physically and temporally distant land. This dreamlike fantasy land, so remote from the here and now, is also placed on the vertical axis in space: "over" and "up high." We contend that the choice of this location is not random, but reflects a mental association between psychological distance and "up," and between psychological proximity and "down."

Objects and events in our world vary with respect to how close or distant they are from our direct experience—that is, from "the self in the here and now" (Trope & Liberman, 2010, p. 440). Construal level theory (CLT; Liberman & Trope, 2008; 2014; Trope & Liberman, 2010) proposes that people engage with the world that lies beyond the here and now by using abstraction, that is, mental representations, which include predictions, memories, speculations, and imagined events. CLT proposes, furthermore, that objects that are more distal in space, time, and social perspective, and that are less realistic (i.e., more distal on the hypotheticality dimension), are construed more abstractly, that is, on a higher level of construal. The present research adds to the well-established link between construal level and psychological distance by showing that both also have predictable associations with the vertical dimension.

Construal level refers to the way objects are represented in our mind, and more specifically to the actual process of representing objects as more or less abstract or superordinate, such that more concrete representations (e.g., "playing ball") are at a lower construal level, whereas more abstract representations ("exercising" or "having fun") are at a higher construal level. Psychological distance is the subjective experience of the extent to which objects are removed from the "point of direct experience," which is one's own self in the here and now. They can be removed in space (things can be far away or close by); time (events can be separated from the present by a long or a short time gap); the social dimension (objects and events can pertain to the self or to a person who is similar to us versus to a stranger or a person who is dissimilar to us); and hypotheticality (objects and events may be real and likely or hypothetical and unlikely).

Much research supports the relationship between construal level and psychological distance (see below). But the associations between both of those constructs and the vertical dimension of space have received less attention. In the present work, we examined these relationships in five studies. The first three studies deal with the association between construal level and the vertical dimension of space. In the last two studies we examined, for the first time, the association between psychological distance and the vertical dimension.

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PSYCHOLOGICAL DISTANCE AND CONSTRUAL LEVEL

Whether something is real or only hypothetical, as well as its distance from us in space, time, and social perspective, are of utmost importance for functioning and survival. These attributes can determine whether and to what extent we can benefit from an object, whether it poses a risk to us, whether and how we should prepare to act on it, how much information we have about it, and much more. In line with this observation, research has found that the psychological distance of stimuli is accessed automatically, even when extracting such information is not one of a person's explicit current goals (Bar-Anan, Liberman, Trope, & Algom, 2007).

According to CLT, the dimensions of psychological distance are interrelated. Thinking about distant places (spatial distance) brings to mind the distant rather than the near future (temporal distance), other people rather than oneself (social distance), and unlikely rather than likely events (hypotheticality) (Liberman & Trope, 2008; Trope & Liberman, 2010). Bar-Anan et al. (2007) found that participants reacted more quickly to words denoting psychological proximity (e.g., "tomorrow," "we," "sure") when these were presented at a proximal point in an image of a landscape compared with a distal point, whereas the reverse was true for words denoting psychological distance (e.g., "year," "others," "maybe"). Thus, processing information that is distant (near) on the physical dimension of psychological distance facilitated the processing of information that is distant (near) on the other dimensions. Similarly, participants assumed that a communicator who used polite (rather than colloquial) language, which is considered to signify larger social distance, was spatially and temporally distant (Stephan, Liberman, & Trope, 2010). Wakslak and Trope (2009) found that people expected more unlikely (i.e., hypothetical) events to occur in situations that were relatively more distant in space, time, and social distance. Finally, Fiedler, Jung, Wänke, and Alexopoulus (2014) showed that people provided correlated estimates on all four dimensions with respect to both future and recalled episodes, and inferred the distance of an imagined episode on any two dimensions of psychological distance from its given distance on the other two.

Another premise of CLT, one demonstrated by ample evidence, is that psychological distance and construal level are related, such that the manner in which people construe stimuli (e.g., objects, people, or events) depends on their psychological distance. Psychologically distant stimuli are construed using more abstract, coherent, and superordinate representations—that is, high-level construals. Psychologically close stimuli are construed using more concrete, less coherent, and subordinate representations—low-level construals (Bar-Anan, Liberman, & Trope, 2006; Liberman & Trope, 1998, 2008; Trope & Liberman, 2010).

VERTICAL POSITION, PHYSICAL DISTANCE, PSYCHOLOGICAL DISTANCE, AND CONSTRUAL LEVEL

Thus far, we have seen that (a) psychological distance carries meaning through the spatial, temporal, social, and hypotheticality dimensions; (b) psychological

distance is accessed automatically; (c) processing information that is distant (near) on one dimension brings to mind information that is distant (near) on others; and (d) psychological distance is associated with construal level, such that what is psychologically distant (near) is represented using a higher (lower) construal level.

It so happens that in natural environments, spatial distance is correlated with the vertical dimension of space. This is because within a person's field of view, distant objects are more prevalent in the upper part of the visual field, while nearby objects are more prevalent in the lower part. Indeed, objects that lie physically within our reach are usually located below eye level (Previc, 1990). Similarly, the ground seems to rise upward from near (the spot where one's feet rest) to far (the horizon; Ooi, Wu, & He, 2001). This association between spatial distance and location in the visual field prevails for indoor and outdoor environments alike (Bruno & Cutting, 1988; Cutting & Vishton, 1995; Previc, 1998; Previc, Declerck, & Brabander, 2005; Yonas, Elieff, & Arterberry, 2002).

Gibson observed that the cognitive system is tuned to this regularity of our environment. He noted (1950, p. 180) that "'upness' is . . . a fairly reliable cue to the distance of an object in the visual field. . . . Of two objects in a perfectly blank frame, the upper will appear to be farther away." Supporting his observation, empirical data suggests that the positioning of a stimulus along the vertical dimension affects its perceived spatial distance from the observer (Li & Guo, 1995; Ooi et al., 2001). Even upward versus downward head and eye movements result in increased versus decreased estimates of spatial distance (Van Kerckhove, Geuens, & Vermier, 2014).

Spatial distance comprises one dimension of psychological distance. Given that the other dimensions of psychological distance are associated with and activated by spatial distance (Bar-Anan et al., 2007), and given that spatial distance is repeatedly coupled in our experience with vertical positioning, it should follow that psychological distance more generally is coupled with vertical positioning. In line with the cognitive ecological approach (Brunswick, 1955; Fiedler, 2014; Gigerenzer, Fiedler, & Olsson, 2012), we thus hypothesize an association between the vertical positioning of a stimulus and its psychological distance (on at least three of the four dimensions of psychological distance; see below), such that what is psychologically distant (e.g., far, later, imaginary) is "up," whereas what is psychologically close (e.g., near, now, real) is "down."

If psychological distance is mentally associated with vertical position, we might expect construal level to be associated with vertical position in the same manner. Recent findings suggest this is indeed the case. Van Kerckhove et al. (2014; see also Roose, Vermier, Geuens, & Van Kerckhove, 2018) found that participants who made upward head or eye movements preferred more abstract descriptions of an activity; assigned products to broader, more inclusive categories; preferred desirable over feasible products; and demonstrated less preference-decision consistency than participants whose heads or eyes were directed forward, in a neutral position. The reverse pattern was obtained for participants who made downward head or eye movements. Most notably, Nussinson, Elias, Mentser, Bar-Anan, and Gronau (2019) showed that people mentally associated a high construal level (abstract, broad,

universal, general) with "up" and a low construal level (concrete, narrow, particular, specific) with "down." Their participants intuitively located abstract concepts (e.g., *custom*) above concrete concepts (e.g., *hut*), and categories (e.g., *furniture*) above exemplars (e.g., *wooden chair*). Finally, they construed activity descriptions (e.g., *typing a document*) on a higher level, in terms of their goals (e.g., *expressing thoughts*) rather than their means (e.g., *pressing down keys*), to a greater extent when these were presented at the top versus the bottom of a display (Study 4).

THE CURRENT RESEARCH

THE VERTICAL POSITION–CONSTRUAL LEVEL ASSOCIATION

The first aim of the current research was to elucidate additional implications of the association between vertical position and construal level. We took what is to us the most intriguing finding of Nussinson et al. (2019), namely the effect of vertical position on the construal level of behaviors (their Study 4), as our departure point. We first examined whether the reverse pattern—that is, an effect of behavior construal level on vertical position—could be demonstrated. Specifically, we tested whether people preferred to position a description representing the goal of an action (high construal) above a description representing the means to perform it (low construal) (Study 1). Next, we realized that the demonstrated effect of vertical position on the construal of behaviors (Nussinson et al., Study 4) may derive, at least in part, from norms relating to written documents (e.g., reports and proposals), whereby the goals of a plan or project tend to be presented early in the document (spatially, relatively near the top), and the means to achieve them are presented later (spatially, closer to the bottom). Although this norm may itself reflect the hypothesized association between construal level and vertical position, we nonetheless sought to rule out the possibility that the effect observed in that study merely reflected this normative structuring of documents. Hence, in Study 2 we tested whether the same pattern would emerge even in a context for which such a norm was not likely to exist. Finally, in Study 3, we explored whether the effect of vertical position on construal level extended to other stimuli, and specifically to the extremely rich, highly accessible, intimately known, and extensively studied stimulus of the self. We examined whether positioning personality questionnaire items at the top versus the bottom of a display affected participants' tendency to construe their selves in terms of abstract traits.

THE VERTICAL POSITION–PSYCHOLOGICAL DISTANCE ASSOCIATION

Another central aim of the current research was to examine, for the first time, the existence of a mental association between the vertical position of a stimulus and its psychological distance. Such an association may result in two kinds of effects (see Cian, Krishna, & Schwarz, 2015; Nussinson et al., 2019): an effect of stimulus psychological distance on where it is vertically positioned by an observer, and an inverse effect of stimulus vertical position on its perceived psychological distance.

We examined these possible effects in Studies 4 and 5, focusing on the hypotheticality and temporal dimensions of psychological distance.[1] In Study 4 we examined the effect of hypotheticality on vertical positioning, testing whether people preferred to position concepts associated with the imagination (psychological distance) above concepts associated with reality (psychological proximity). In Study 5 we examined the opposite effect, testing whether positioning events at the top or bottom of a vertically oriented screen affected their perceived temporal distance.

STUDY 1: WHY IS UP AND HOW IS DOWN

A behavior may be construed in terms of the abstract goal(s) toward which it is directed (*why* we perform it) or in terms of the concrete means by which it is accomplished (*how* we perform it). For example, *eating* may be construed in terms of its abstract goals (e.g., satisfying hunger) or its concrete means (e.g., chewing and swallowing). These are high- and low-level construals of the same behavior, respectively (Vallacher & Wegner, 1987, 1989).

In this study, we examined the effect of a behavior's construal level on its vertical positioning. We presented participants with two descriptions of a behavior, one reflecting the behavior's goal and the other reflecting its means, and asked them to position the descriptions in boxes located at the top and bottom of a vertically oriented rectangle, following their "gut feeling" (Figure 1). We hypothesized that participants would position the goal-related description at the top of the rectangle and the means-related description at the bottom with a probability greater than chance.

METHOD

This study was preregistered at AsPredicted.Org, https://aspredicted.org/blind.php?x=d6mw8m. There were no deviations from the preregistration.

Power Analysis. Sample sizes in all studies were determined a priori based on a power analysis conducted in G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). Assuming a small-to-medium effect (d = 0.35) in a two-tailed test, the analysis suggested that we should recruit 88 participants to achieve 90% power in a within-subjects design and 173 participants to achieve the same power in a between-subjects design. Accordingly, we recruited 90 or 91 participants for those studies employing a within-subjects design (except for Study 2, where we expected a smaller effect of d = 0.25 and therefor recruited a larger sample), and 157–159 participants for the studies employing a between-subjects design.

Exclusion Rule. In all studies conducted online we first excluded all participants who took over an hour to complete the study and then additionally excluded

1. We chose not to examine the social dimension of psychological distance because the poles of this dimension (e.g., "they vs. we" or "enemy vs. friend") are affectively laden, and affect is known to be associated with the vertical dimension (positive is up and negative is down; Meier & Robinson, 2004).

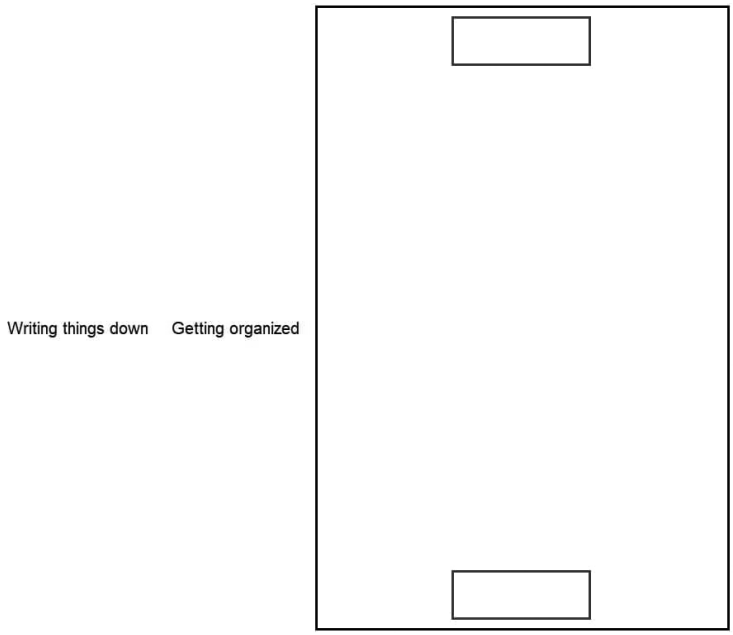

FIGURE 1. A sample trial used in Study 1.

participants whose completion time was more than 3 standard deviations longer than the mean completion time.

Participants. Ninety Hebrew-speaking Israeli students (53 females, M_{age} = 27.03, *SD* = 3.81) completed the study online in return for a small payment. The study was conducted in Hebrew.

Materials and Procedure. Participants were told that the task would involve intuitive processing of spatial information. They were first instructed to adjust the size of the display so that they could view all four sides of the rectangle without having to scroll down. They were then given specific instructions for the task—namely, dragging and dropping a series of two action descriptions into boxes located at the top and bottom of a vertical card (the rectangle mentioned above). Participants were instructed to position the descriptions so that the organization "felt right" to them (see Figure 1 for a sample trial). They were ensured that there were no right or wrong answers in this task and were encouraged to follow their gut feelings.

Participants were presented with 22 pairs of action descriptions (adopted from the Behavior Identification Form of Vallacher & Wegner, 1989, and translated into Hebrew). The pairs of descriptions were presented alone, without their respective

target behavior. In each pair, one of the descriptions was at a high construal level, focusing on the end for which a certain action is performed (the *why*—e.g., organizing thoughts), and the other was at a low construal level, focusing on the means by which it is performed (the *how*—e.g., writing things down). The two descriptions were presented side by side to the right of the rectangular card, midway up.[2] The order of the two descriptions was counterbalanced across two versions of the experiment.

RESULTS AND DISCUSSION

Nine participants who took an excessively long time to complete the study (see the exclusion rule above) were excluded from the analysis, resulting in a final sample of 81.[3] Experimental version did not affect or interact with the dependent variable (both Fs < 1). Therefore, we report the results for both versions together.

In our sample, the proportion of description pairs placed in congruence with the hypothesis was .581 (SD = .261), which was significantly different from chance, $t(80) = 2.782$, $p = .007$, $d = 0.31$, 95% CI for the difference = [0.023, 0.139]. Thus, the results of Study 1 support the hypothesis that high and low construal levels are indeed congruent with up and down, respectively.

STUDY 2: UP IS WHY AND DOWN IS HOW (EVEN WITH RESPECT TO A MOUNTAIN)

As noted, Nussinson et al. (2019, Study 4) demonstrated the effect of vertical position on the construal level of behaviors, but did so with a display that might be reminiscent of a written document. The effect may thus have been driven, at least in part, by norms associated with the structuring of documents. In Study 2 we tested whether vertical position would still affect the construal level of behaviors even in a context for which such norms were not likely to exist.

We presented participants with one of two cartoon-like drawings. Both drawings featured an image of a mountain reaching into the clouds, along with the figure of a man and, next to him, an empty box for the participant's answer. The drawings differed only in the location of the man and the box: in one image the man was pictured standing at the top of the mountain, and in the other he was pictured standing on the ground. Participants were given pairs of descriptions, as in Study 1, and were asked to choose how the figure in the image would describe a target behavior (see Figure 2 for a sample trial).

2. All the experiments reported in this study were conducted in Hebrew, which is written from right to left. The figures present sample trials or screens translated into English. The texts in Figures 1–4 were positioned to the right of the card or image in the original experiment (in Hebrew). Thus, the texts in this task are presented such that the eye naturally moves from the text to the card. They are shown to the left in these examples because English is written from left to right.

3. Including all 90 participants in the analyses yielded similar results.

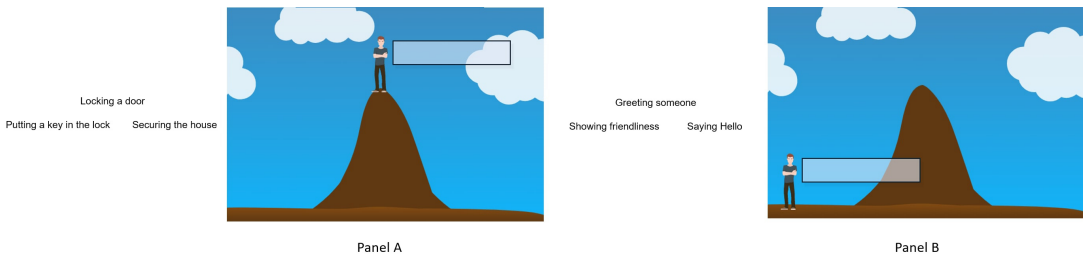

FIGURE 2. Sample trials in Study 2, with the figure at the top of the mountain (Panel A) and at the foot of the mountain (Panel B).

METHOD

Participants. One hundred sixty-seven Hebrew-speaking Israeli students (127 females, M_{age} = 26.29, SD = 3.99) participated in the study online for a small payment. The study was conducted in Hebrew.

Materials and Procedure. In this study, participants were told only that the task involved intuitive processing of information. As in Study 1, participants were first instructed to adjust the size of the display on their screens so that they could view the full image without having to scroll down. As in Study 1 they were encouraged to follow their gut feelings.

The experiment involved the same 22 pairs of behavioral descriptions used in Study 1, but this time they were presented together with their target behaviors. The target behavior (e.g., *typing a document*) appeared above the two descriptions, one representing the behavior's goal (*expressing thoughts*, high construal level) and the other representing the means to achieve it (*pressing down keys*, low construal level). The stimuli appeared to the right of the cartoon. In half the trials (11 trials) the man was pictured standing at the top of the mountain, and in the other half he was pictured standing on the ground. Participants were told that the figure in the image wanted to describe the target behavior, and that their task was to drag and drop into the box the description that they intuitively felt the figure would choose.

For each set of stimuli, the order of the two descriptions and the position of the figure (on top of the mountain or at its foot) were counterbalanced across four experimental versions.

RESULTS AND DISCUSSION

Two participants who took an excessively long time to complete the study were excluded from the analysis.[4] Experimental version did not affect or interact with

4. [4] Including all 167 participants in the analysis made the focal effect significant only in a one-tailed test, p = .031.

the dependent variable (both Fs < 1). Hence, we report the results for all versions together.

As hypothesized, participants were more likely to choose the goal-oriented description when the figure in the display was positioned at the top of the mountain (M = 6.77 out of 11 trials, SD = 2.56) rather than at its foot (M = 6.21 out of 11 trials, SD = 2.67), $t(164) = 2.091$, $p = .038$, $d = .162$, 95% CI for the difference = [0.031, 0.110]. This result demonstrates an effect of vertical position on construal level, this time (at least to our knowledge) in the absence of a hypothesis-consistent norm.

STUDY 3: VERTICAL POSITION AND ABSTRACT CONSTRUAL OF THE SELF

Previous research suggests that a temporally distant perspective promotes a high-level, abstract construal of the self, in which the self is structured around invariant, decontextualized, essential self-attributes, and is conceived as relatively stable. In contrast, a temporally proximal perspective promotes a low-level, more concrete construal of the self, in which the self consists of more specific, contextualized, and unrelated features, and is seen to vary more from one situation to another (Wakslak, Nussbaum, Liberman, & Trope, 2008; see also Nussbaum, Trope, & Liberman, 2003, Study 4; Pronin & Ross, 2006). In the present study we set out to determine whether vertical position would have a similar effect on construal of the self.

If indeed vertical position affects people's self-construal, then one implication is that when asked to rate themselves on various scales, people may be more likely to self-identify in terms of invariable traits when questionnaire items are presented at the top of a display, and in terms of contextualized, variable, more concrete traits when questionnaire items are presented at the bottom of a display. To examine this hypothesis, we presented participants with personality scales containing three possible answers for each item: an abstract trait term (e.g., *reserved*), its polar opposite (e.g., *emotionally expressive*), or the phrase *changes/depends on the situation*. For half the participants the scales were presented at the top of a vertically oriented screen (Up condition), and for the other half the scales were presented at the bottom of the screen (Down condition). We expected participants presented with the scales at the top of the screen to adopt a more abstract self-construal, and hence choose fixed traits, compared to participants presented with the scales at the bottom (see Figure 3).

METHOD

Participants. A total of 157 Hebrew-speaking Israeli students (102 females, M_{age} = 25.28, SD = 3.48) were recruited to participate in a lab study in return for a symbolic payment (NIS 10, about $2.50). The study was conducted in Hebrew.

Materials and Procedure. Participants were asked to describe themselves using a series of 12 items developed by Nisbett, Caputo, Legant, and Marecek (1973). Each item comprised two opposing character traits (*reserved–emotionally expressive,*

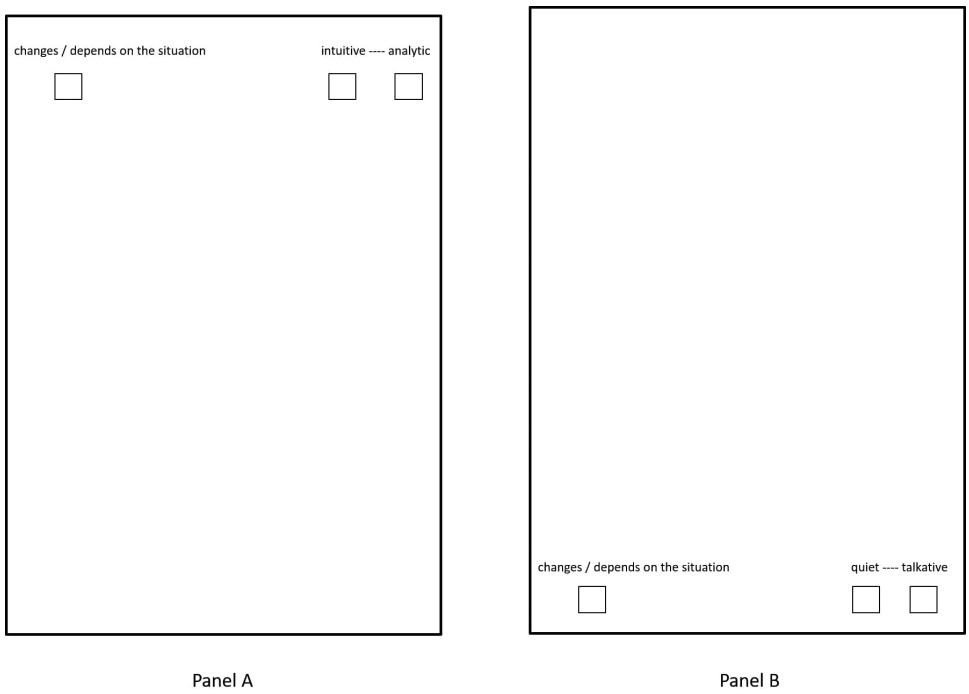

FIGURE 3. Sample trials in Study 3, with the scale at the top (Panel A) and bottom (Panel B) of a vertically oriented screen.

dignified–casual, *future-oriented–present-oriented*, *intuitive–analytic*, *energetic–relaxed*, *unassuming–self-asserting*, *lenient–firm*, *intense–calm*, *quiet–talkative*, *steady–flexible*, *cautious–bold*, *cooperative–competitive*) plus a third option, *changes/depends on the situation*, which indicates reluctance to ascribe to oneself a stable personal attribute. Participants were instructed to click the box that best described them for each item. They were informed that the first three items would serve as practice trials and the rest as test trials, resulting in nine critical trials. The items were presented 220 mm above or below the center of a vertically oriented screen (532mm × 300mm) for the Up and Down conditions, respectively (see Figure 3). Participants sat at a distance of 65 cm from the screen, with the center of the screen at eye level, requiring them to tilt their gaze about 19 degrees up or down to view the stimuli. To ensure that participants began each trial with their eyes at the center of the screen, a fixation cross (i.e., a plus sign) was displayed for one second at the center of the screen before each new trial.

The vertical positioning of the stimuli was manipulated between participants. To control for possible affective differences between conditions (see Meier & Robinson, 2004), at the end of the study participants were asked to indicate their current mood by making a vertical mark on a 100 mm horizontal scale with its extremes labeled *very bad* and *very good*. Participants were also asked to indicate the degree

of difficulty they had experienced in completing the task on a Likert scale from 1 (*not at all difficult*) to 7 (*very difficult*).

RESULTS AND DISCUSSION

Each participant's responses were first converted to a single score corresponding to the number of that participant's stable trait ascriptions. As expected, the number of invariable trait ascriptions was higher when the scales were presented at the top of the screen (M = 6.21 out of nine, SD = 2.00) than when they were presented at the bottom (M = 5.51 out of nine, SD = 1.97), $t(155) = 2.202$, $p = 0.029$, $d = 0.35$, 95% CI for the difference = [0.07, 1.33]. The two conditions did not differ with respect to participants' mood, nor the degree of difficulty participants reported in completing the task (ps > .564). Thus, as hypothesized, the findings suggest that stimulus verticality affects construal of the self.

Studies 1–3 delved deeper into the association between vertical position and construal level established in previous research. In Studies 4 and 5 we asked whether vertical position was also associated with psychological distance.

STUDY 4: IMAGINATION IS UP, REALITY IS DOWN

In Study 4 we sought to examine the effect of psychological distance on vertical positioning. Focusing on the hypotheticality dimension, we asked participants to position two words, one associated with the imagination (representing psychological distance) and the other associated with reality (representing psychological proximity), in separate boxes located at the top and bottom of a vertically oriented rectangle, following their "gut feeling." We hypothesized that a spatial organization that is congruent with the hypothesized association (imagination–up, reality–down) would be intuitively appealing to participants. We hence expected participants to position imagination-related concepts at the top of the rectangle and reality-related concepts at the bottom with a probability greater than chance.

METHOD

Participants. Ninety-one Hebrew-speaking Israeli students (50 females, M_{age} = 27.03, SD = 4.27) participated in the study online for a small payment. The study was conducted in Hebrew.

Materials and Procedure. Participants were asked to first press F11 so as to view the study on a full screen. They were then presented with a vertically oriented rectangle containing two small boxes, one at the top of the rectangle and the other at the bottom. As in Studies 1 and 2, they were asked to adjust the size of the display to ensure they could view all four sides of the rectangle without having to scroll down.

Participants were told that the task would involve intuitive processing of spatial information. They were then told that vertical cards (the vertically oriented

rectangles described above) would be presented on the screen along with a pair of words, and that their task would be to position the words by dragging and dropping them into the boxes at the top and bottom of the card so that the organization of the words felt right to them (see Figure 4). Participants were assured that there were no right or wrong answers in this task, and were encouraged to follow their gut feelings.

Participants were presented with 20 pairs of words. Fifteen of these comprised filler pairs that entailed clear vertical differences between the two words (e.g., sun–earth, treetop–trunk). The five critical pairs each contained an imagination-related word and a reality-related word (illusion–reality, hallucination–fact, imaginary–real, dreamlike–existing, legend–actual). We made sure that the imagination-related and reality-related words were similar in valence, $t(4) = -.415$, $p = .700$, $BF_{01} = 2.344$ (based on norms by Warriner, Kuperman, & Brysbaert, 2013).[5] The two words were presented side by side to the right of the rectangular card, midway up. The order of the two words was counterbalanced across two versions of the study. The two versions differed only in the order in which the words in each pair were presented, not the order of the pairs.

RESULTS AND DISCUSSION

Three participants who took an excessively long time to complete the study were excluded from the analysis.[6] The number of pairs positioned in congruence with the hypothesis (henceforth, "congruent position") served as our dependent measure. It did not differ between the two versions of the study ($t(87) = -0.305$, $p = .761$), and therefore we report the results for both versions together.

If participants positioned the words in each pair randomly, we would expect to find words in congruent positions (imagination–up, reality–down) in 50% of the trials. The average proportion of congruent positions was .843 ($SD = .288$), which was significantly higher than 0.5, $t(87) = 11.163$, $p < .0001$, $d = 1.191$, 95% CI for the mean difference = [0.282, 0.404]. Thus, the results of Study 4 demonstrated an effect of hypotheticality on vertical positioning, showing that hypothetical (psychologically distant) and real (psychologically close) concepts are indeed congruent with up and down, respectively.

STUDY 5: UP IS LATER, DOWN IS SOON

Study 4 lent support to the hypothesis that at least one dimension of psychological distance, namely hypotheticality, is associated with the vertical dimension. In Study 5 we focused on a different dimension, namely temporal distance, while also reversing the direction of the examined effect. That is, whereas in Study 4 we examined the effect of psychological distance on vertical positioning, in Study 5 we examined the effect of vertical position on psychological distance. Modifying

5. We could not find Hebrew norms for valence, and so based these on the English translations of the chosen words.

6. Including all 91 participants in the analyses yielded similar results.

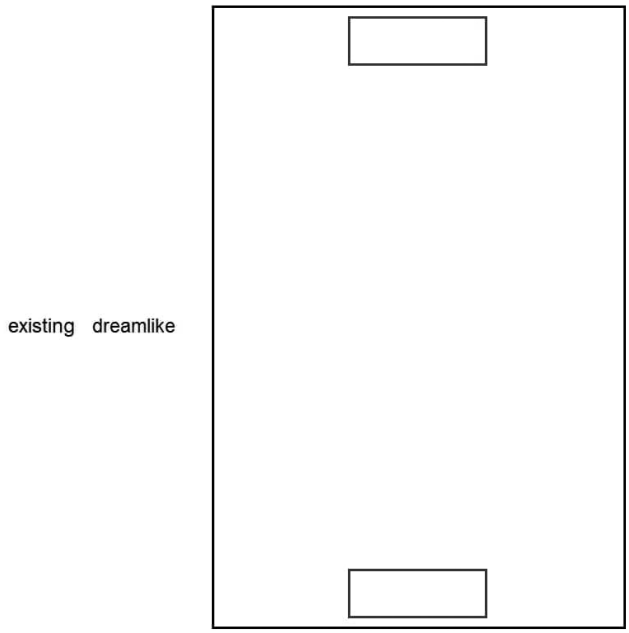

FIGURE 4. A sample trial in Study 4.

the procedure used by Liberman, Trope, McCrea, and Sherman (2007), we presented participants with one-sentence scenarios (e.g., "Ron is considering opening a bank account"), and asked them to estimate when in the future the target would perform the activity. For each participant, all scenarios were presented either at the top or at the bottom of a vertically oriented screen. We hypothesized that those presented with the scenarios at the top would provide more distant time estimates.

METHOD

This study was preregistered at AsPredicted.Org, https://aspredicted.org/blind.php?x=f3a43d. There were no deviations from the preregistration.

Participants. A sample of 159 Hebrew-speaking Israeli students (109 females, M_{age} = 24.66, *SD* = 2.97) took part in the study, for compensation of NIS 20 (about $5). The study was conducted in Hebrew.

Materials and Procedure. In a modified version of the procedure used by Liberman et al. (2007), participants were told they would be taking part in a task on the construction of narratives. The instructions read as follows: "The following task is a pretest for a study on construction of narratives, which examines how people interpret different events they read about and what general impressions

are created by different narratives. In other words, we are interested in how people imagine actions and events they read about. Following is a list of short descriptions of different actions that people might consider doing. Please simply read each description, imagine that the person is actually considering doing the action, and answer the questions that follow." The instructions, and the task items that followed, were all presented on a vertically oriented screen measuring 56 cm × 33 cm.

Participants were presented with a series of 17 one-sentence scenarios (e.g., "Dan is considering enrolling in a fitness program," "Rina is considering subscribing to a newspaper," "Dana is considering learning to play the piano," "Sharon is considering buying a computer," "Ami is considering starting a blog"). Each scenario was followed by a "when" question—for example, "Please try to estimate when (i.e., how long from now) Dan will enroll in a fitness program"—and a blank box for participants to write their answer. For each participant, all items were presented either at the bottom of the screen (the center line of the scenario/question combination was 21.5 cm below the center) or at the top (the center line was 21.5 cm above the center; see Figure 5). Participants sat at a distance of 76 cm from the screens, and their seats were adjusted such that participants' eye level was at the center of the screen, requiring them to tilt their gaze upward or downward about 20 degrees to view the stimuli. As in Study 3, a fixation cross (a plus sign) was displayed for one second at the center of the screen before each trial.

Participants were randomly assigned to the experimental conditions (top or bottom). To ensure that participants' affective state was not influenced by the manipulation, at the end of the task participants' current mood was assessed using a slider (21 cm long) ranging from *very bad* to *very good*.

As in Liberman et al. (2007), participants' time estimates were translated into days. For example, "2 weeks" was coded as 14, and "3 hours" was coded as 3/24 or 0.125. Most of the responses (92.6%) were numeric. Near-numeric responses (5.3% of the total) were translated into numeric values using the following conventions: "a few" and "a number of" were coded as 3 (e.g., "a few hours" was coded as 3/24 or 0.125), and ranges were coded as the median value (e.g., "2–4 hours" was coded as 3/24 or 0.125). Responses of "now," "immediately," or "ASAP" (0.7% of the total) were assigned the value of the minimum response within the dataset. The remainder ("never," as well as missing or illegible responses; 1.4% of the total) were treated as missing data. An independent coder was trained on a subset of the data until the coder and the first author reached 100% agreement; at that point, the coder proceeded to code the rest of the responses in the data set.

RESULTS AND DISCUSSION

The time estimates were positively skewed. Hence, they were log-transformed to achieve homogeneity of error variance, normalized, and added to form a single index of temporal distance (see Liberman et al., 2007). An independent samples *t*-test on the temporal distance measure revealed a significant effect of vertical

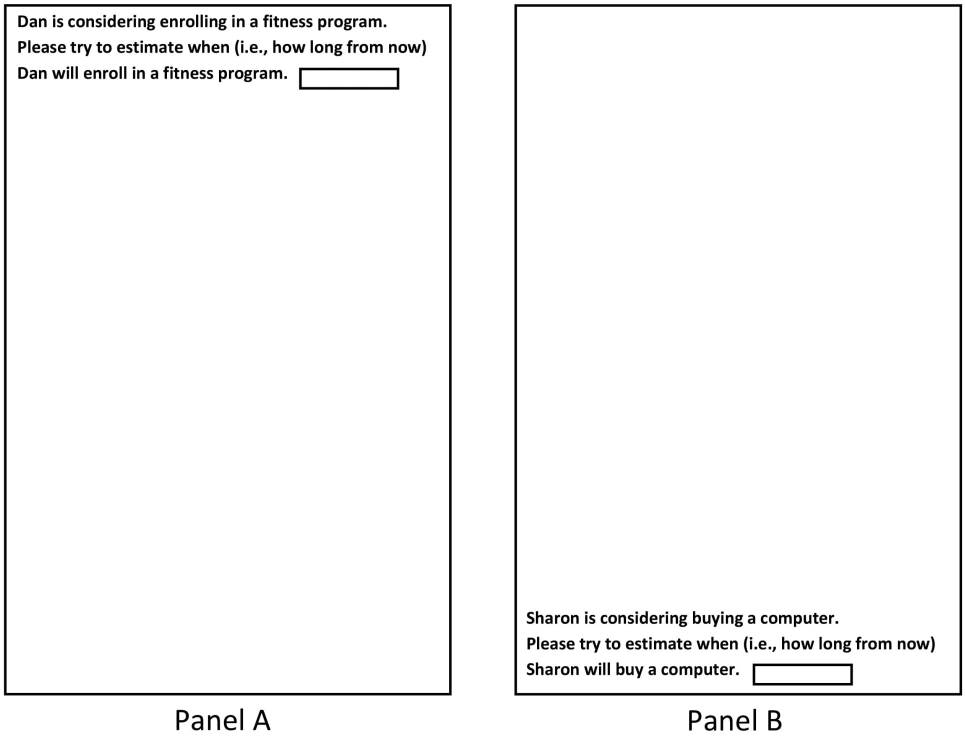

FIGURE 5. Sample trials used in Study 5, with the scenario presented at the top (Panel A) and bottom (Panel B) of a vertically oriented screen.

position, $t(157) = 2.224$, $p = .028$, $d = .355$, 95% CI for the difference = [0.013, 0.223], indicating more distant time estimates (in days) when the scenarios were presented at the top of the screen ($M = 1.775$, $SD = .337$) compared to the bottom ($M = 1.657$, $SD = .333$). Participants' current mood did not differ between conditions, $t < 1$. Thus, the results of Study 5 demonstrated an effect of vertical position on the perceived temporal distance of future scenarios.

GENERAL DISCUSSION

Studies 1–3 probed further into the known association between vertical position and construal level. In Study 1, participants intuitively positioned descriptions characterized by abstract, goal-directed, high-level construals (*why* something is done) at the top of a display, and descriptions characterized by concrete, means-directed, low-level construals (*how* something is done) at the bottom at a rate greater than expected by chance. This result demonstrates an effect of behavior construal level on vertical positioning. In Study 2, goals rather than means were perceived as more compatible with a spatially higher viewpoint. This result exemplifies the reverse effect, whereby vertical position influenced the construal level

of behaviors, with an experimental design that accounted for conventions of written documents such as reports, where the goals of a project tend to be presented above the means for achieving them. In Study 3, we manipulated the vertical position of personality questionnaire items and examined the effects on self-construal. We found that people were more likely to construe the self in terms of invariable traits (high-level construal) when the items were presented at the top of a display, and as variable (low-level construal) when the items were presented at the bottom. These results suggest that stimulus vertical position affects construal level even when it comes to intimately familiar concepts such as the self.

Studies 4 and 5 directly examined, for the first time, the bidirectional vertical position–psychological distance association. As expected, Study 4 showed that people intuitively positioned words denoting psychological distance (i.e., hypotheticality-related concepts) at the top of a display, and words denoting psychological proximity (reality-related concepts) at the bottom at a rate greater than expected by chance. This result suggests an effect of psychological distance on vertical positioning. In Study 5, we manipulated the vertical position of stimuli and examined the effects on temporal distance (another dimension of psychological distance). Participants intuitively attributed longer time frames to scenarios that were presented at the top of a display relative to those presented at the bottom. This result suggests an effect of vertical positioning on psychological distance.

UNDERLYING PROCESSES

We believe that our effects (like those of Nussinson et al., 2019) primarily reflect simple mental associations between vertical position and psychological distance, and between vertical position and construal level. In line with the cognitive ecological approach (Fiedler, 2014, 2020; Pleskac & Hertwig, 2014), these associations would thus be the result of a built-in association in the environment between a stimulus's physical distance and its vertical position in the visual field (Bruno & Cutting, 1988; Cutting & Vishton, 1995; Previc, 1998; Previc et al., 2005; Yonas et al., 2002). Indeed, Nussinson et al. (2019, Study 1) directly documented the existence of both an explicit and an implicit association between vertical position and construal level. Still, it is possible that at least to some degree, some of our findings reflect other factors—in particular, embodiment effects (Barsalou, 2008, 2016) and conceptual metaphor effects (Landau, Meier, & Keefer, 2010).

Embodiment explanations are based on the fact that because objects located in the upper part of our visual field are typically more distant than objects located lower in the visual field (Previc, 1998; Previc et al., 2005), information processing about physically distant objects is repeatedly coupled with the allocation of attention to the upper part of the visual field, and with motor programs aimed at turning the gaze upward (e.g., upward head and eye movements). Likewise, information processing about physically close objects is coupled with the allocation of attention to the lower part of the visual field, and with motor programs aimed at turning the gaze downward. Under these conditions, perceptual experiences associated with the concrete concepts of "physically distant" and "physically close"

are likely to be schematized, such that thinking about physical distance involves perceptual simulation along a vertical spatial dimension. Indeed, work by Van Kerckhove et al. (2014) suggested that upward versus downward head and eye movements resulted in increased versus decreased estimates of physical distance. Since the more abstract dimensions of psychological distance (temporal, social, and hypothetical) are associated in our experience with physical distance and are automatically activated by it (Bar-Anan et al., 2007), it is plausible that thinking about distance along these dimensions involves perceptual simulation along a vertical spatial dimension as well. Furthermore, if the processing of psychological distance (proximity) is coupled with simulations of the upper (lower) visual field, and if what is psychologically distant (close) is represented using high-level (low-level) construals, then it follows that the use of high-level construals is constantly coupled in our daily experience with simulations of the upper visual field, whereas the use of low-level construals is coupled with simulations of the lower visual field. Hence, it may be expected that simulations of the upper (lower) visual field would also facilitate processing stimuli on a high (low) construal level. Indeed, Van Kerckhove et al. (2014) showed that upward versus downward head and eye movements resulted in the use of high- versus low-level construals.

With respect to our findings, it should be noted that any manipulation of the vertical position of a stimulus inevitably involves an indirect manipulation of bodily feedback (i.e., processing the stimulus necessitates turning at least one's eyes upward or downward). Thus, it is possible that the effects we observed in Studies 3 and 5 were a product not only of the relative positioning of our stimuli on a vertically oriented screen, but also of the consequent mild and transient bodily feedback. Note, however, that bodily feedback is not likely to have contributed to the results of Studies 1, 2 and 4, as the stimuli in those studies were presented, and hence processed, at the center of the display.

Conceptual metaphor explanations suggest that people rely on information about the source dimension of vertical position (up vs. down) when they reason about, interpret, or evaluate the abstract target dimensions of psychological distance and construal level in relation to a given stimulus. The basis for this conceptual mapping is presumably the same association between physical distance and vertical position in the visual field that was mentioned above (Previc, 1988). In line with a conceptual metaphor explanation, psychological distance, vertical space, and construal level do seem to repeatedly intersect in the realms of language and culture. Song titles such as "Beyond the Stars" and "Beyond the Sky"[7]—not to mention "Over the Rainbow"— pair a realm of the imagination, one that is geographically and temporally remote, with a position high on the vertical plane. Similarly, someone who is "down-to-earth" is practical, unpretentious, and hence psychologically closer than someone described as "uppish" or "high-handed." We speak of "high" (or highbrow) art as something spiritually elevated, deemed to

7. "Beyond the Stars" is sung by Debbie Reynolds in the 1966 film "The Singing Nun" (https://lyricstranslate.com/en/singing-nun-ost-beyond-stars-lyrics.html). "Beyond the Sky" is the title of a number of different songs by different artists, including Judy Collins (http://www.judycollins.com/lyrics/beyond-the-sky).

be of aesthetic or intellectual value (an abstract concept), while physical humor (e.g., slapstick) and other more concrete, immediate forms of expression are considered "low" (or lowbrow). We can see this sort of linguistic metaphor even in the very notion of construal level that we have been discussing throughout this article: Many languages assume an association between vertical position and construal level, as seen in terms such as *high* construal or *super*ordinate for abstract concepts or categories, and *low* construal or *sub*ordinate for concrete concepts or exemplars (Nussinson et al., 2019). In the realm of religious belief, many religions have a notion of a transcendent, unknowable, psychologically distant God who dwells in the heavens. In many ancient pantheistic religions, the chthonic deities (gods of the underworld and agriculture) oversaw "earthly" matters such as death and fertility (e.g., Hades and Persephone in Greek mythology), while abstract concepts such as justice, wisdom, and love were overseen by gods of the sky (e.g., Zeus, Athena, and Aphrodite in Greek mythology). These latter gods often resided on a sacred mountain that could be scaled only by specially selected mortals, if at all (Mount Olympus in Greek mythology; consider also Moses's ascent of Mount Horeb to encounter God in the Bible).

Indeed, it is highly plausible that at the very least, the large effect obtained in Study 4 ($d = 1.19$) also reflects a conceptual metaphor effect. In that study we asked participants to locate imagination-related and reality-related concepts at the top or at the bottom of a vertically oriented rectangle. As in many languages (including Hebrew), "ideas" and "imagined" things are in one's head, whereas "facts" are "on the ground." This presumably helped boost our observed effect.[8]

RELATIONS TO PREVIOUS FINDINGS

Our findings conceptually replicate and extend those of Nussinson et al. (2019). In that article the concepts *up* and *abstract* and the concepts *down* and *concrete* were shown to be both implicitly and explicitly associated. Furthermore, when asked to position pairs of words one above the other, participants preferred to position abstract concepts above concrete concepts and categories above their exemplars. Finally, participants construed behaviors (e.g., *typing a document*) in terms of their goals (e.g., *expressing thoughts*) rather than their means (e.g., *pressing down keys*) to a greater extent when these were presented at the top (rather than the bottom) of a vertically oriented card.

The results of the current research replicate and extend Nussinson et al.'s findings in three ways. First, like Nussinson et al., we showed that the link between construal level and vertical position holds for the construal of behaviors in terms of their goals versus their means (Studies 1 and 2); and we did so (Study 2) using a display that was not reminiscent of a document, and hence was not characterized by context-specific norms. Second, the results of our Study 3 went beyond those of Nussinson et al. (2019, Study 4) in suggesting that the relative vertical position of information affects people's preference for construing it at a high versus low level,

8. We are grateful to an anonymous reviewer for highlighting the possible contribution of conceptual metaphors to the effect.

even with respect to a highly complex, highly accessible, and intimately familiar stimulus such as the self.

Third, and most notably, Nussinson et al. (2019) attributed the association between vertical position and construal level mainly to the association between the vertical position of a stimulus and its spatial distance from the observer. In contrast, the current research implies that the association between vertical position and construal level may be produced, at least in part, from the association between vertical position and psychological distance more broadly. Specifically, we conjecture that at earlier stages of an individual's cognitive development, a mental association is formed between the vertical positioning of stimuli and their physical distance, an association that reflects the ecology of our environment (Bruno & Cutting, 1988; Cutting & Vishton, 1995; Previc, 1998; Previc et al., 2005; Yonas et al., 2002). Later on, because the processing of physical distance is continuously coupled both with the activation of the other dimensions of psychological distance and with the activation of high and low construal levels (Trope & Liberman, 2010), associations are also formed between the vertical position of a stimulus and its perceived psychological distance, and between the vertical position of a stimulus and its construal level. It is likely that all three associations (vertical positioning–physical distance, vertical positioning–psychological distance, and vertical positioning–construal level) coactivate and strengthen each other.

Beyond replicating and extending the findings of Nussinson et al. (2019), our findings resonate with recent work attesting to a possible association between *vertical positioning of the self* and construal level. It has been shown that when experiencing themselves in a higher position (e.g., scanning the view from a mountaintop; imagining themselves on a higher floor; looking down from the top of a descending staircase) participants used a higher construal level than those who experienced themselves in a lower position (e.g., looking at a building from below; imagining themselves in a cellar; looking up from the bottom of an ascending staircase; Aggrawal & Zhao, 2015; Slepian, Masicampo, & Ambady, 2015). Thus, both perceptions of an external stimulus and perceptions of one's own perspective as being higher (compared to lower) trigger use of a higher construal level.

Finally, an important possible implication of our findings is that both the association between psychological distance and construal level and the associations between the different dimensions of psychological distance (Liberman & Trope, 2008) are driven at least in part by their mutual associations with the vertical dimension. Repeatedly throughout each day, stimuli that are located "up" are construed both as psychologically distant (on the different dimensions) and as more abstract, and this feeds into the respective associations and facilitates the emergence of CLT effects. Indeed, the results of Bar-Anan et al. (2007) attesting to the automatic processing of psychological distance, and to the associations between physical distance and the rest of the dimensions of psychological distance, might derive directly from the fact that seemingly physically distant locations on the display were (naturally) positioned higher up than physically close ones. Shorter reaction times when psychologically distant words (e.g., *maybe* and *year*) were presented as physically distant, and when psychologically close words (e.g., *sure* and

tomorrow) were presented as physically near, may hence also reflect the fact that the first were presented higher in the display and the latter lower.

IMPLICATIONS

On a general level, our findings have a range of potential ramifications in both the theoretical and practical spheres. First, our findings have profound implications for the study of other phenomena found by construal level theory to be affected by psychological distance and construal level—for example, the weight of feasibility versus desirability in choice and decision making; the basis of metacognitive judgments; categorization; memory for words versus pictures; or correspondence bias (Halamish, Nussinson, & Ben-Ari, 2013; Trope & Liberman, 2010). If vertical position indeed affects both psychological distance and construal level, as shown in our study, many of these phenomena may also be affected by the vertical positioning of stimuli or information in a display. For example, in studies of decision-making judgments, the same event, plan, option, or idea may be perceived as less likely, more hypothetical, or more distant in the future when presented near the top of a vertical list than when presented near the bottom.

Furthermore, previous research has shown that processing of a stimulus is faster (i.e., easier) when associated dimensions of the stimulus match (Chae & Hoegg, 2013; Cian et al., 2015; Deng & Kahn, 2009; Meier & Robinson, 2004). Studies 4 and 5 attest to an association between the vertical position of a stimulus and its psychological distance. Our findings thus suggest that psychologically distant information (e.g., involving temporally distant events or hypothetical content) may be easier to process when presented higher in a display, and psychologically proximal information (involving temporally close events or real content) when presented lower in a display. If this is true, the potential implications are numerous. For example, previous studies showed that the ease in which a message was processed contributed to its persuasiveness (Amit, Wakslak, & Trope, 2012; Briñol, Tormala, & Petty, 2013; Lee & Aaker, 2004). Our findings thus suggest that messages involving a contrast between hypothetical and real contents, between temporally distant and temporally close events, between physically distant and physically close places, or between abstract and concrete stimuli may be easier to process and hence more convincing when the former are presented higher up in the display and the latter are presented lower down, compared with the other way around.

Finally, the results of Study 3 suggest that the seemingly irrelevant factor of where on the paper or on the display a certain item appears (near the top or near the bottom) affects the level on which the object of interrogation is construed. This finding may have implications for the design of displays, and in particular for the design of personality questionnaires.

LIMITATIONS

One limitation of Studies 1 and 4 is that in each study, each trial involved a built-in contrast between psychological distance and psychological proximity, or between a

high and low construal level paralleled by a built-in contrast between up and down. Future research should examine whether the results of those studies hold even when (for example) participants are presented with only one item (either a reality-related or imagination-related concept; either a goal-related or means-related construal) in each trial. Note that at least to some extent this shortcoming was addressed in Study 2, in which every trial involved either up or down, and in Studies 3 and 5, which each used a between-participants design (thus involving either only an up condition or only a down condition). Those studies, however, examined the reverse causality.

Another limitation is that the design of Studies 3 and 5 did not include a control condition where the scenarios were presented at the center of the vertically oriented screen. Therefore, at this point it is impossible to tell whether our findings were driven mainly by the positioning of the items at the top of the screen, their positioning at the bottom of the screen, or both.

CONCLUSION

We contend that both psychological distance and construal level are associated in people's minds with the vertical dimension, such that psychological distance and a high construal level are associated with up, and psychological proximity and a low construal level are associated with down. Consistent with these hypotheses, we showed both that psychological distance and construal level affected the vertical positioning of stimuli, and that the vertical position of stimuli affected their perceived psychological distance and construal level. These effects were demonstrated in such varied realms as reality, time, behavior, and the self. They contribute to the literature on psychological distance and construal level and hold broad implications for the many psychological phenomena affected by psychological distance and construal level, as well as more local implications for persuasion and the design of displays, printed material, and questionnaires.

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