

# Metamotivational Knowledge of the Role of High-Level and Low-Level Construal in Goal-Relevant Task Performance

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Metamotivation research suggests that people may be able to modulate their motivational states strategically to secure desired outcomes (Scholer & Miele, 2016). To regulate one's motivational states effectively, one must at minimum understand (a) which states are more or less beneficial for a given task and (b) how to instantiate these states. In the current article, we examine to what extent people understand the self-regulatory benefits of high-level versus low-level construal (i.e., motivational orientations toward abstract and essential vs. concrete and idiosyncratic features). Seven experiments revealed that participants can distinguish tasks that entail high-level versus low-level construal. Further, participants recognized the usefulness of preparatory exercises with which to instantiate high-level versus low-level construal for task performance, and this knowledge predicted behavioral choices. This research highlights novel insights that the metamotivational approach offers to research on construal level theory and, more broadly, to the study of self-regulation.

*Keywords:* metamotivation, construal level theory, task-motivation fit, self-regulation, construal level

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Self-regulation—the monitoring and modulation of psychological and behavioral responses to achieve desired outcomes and goals—is a critical skill that predicts important life outcomes, including academic achievement and financial, physical, and mental health (e.g., Duckworth & Seligman, 2005; Mischel, Shoda, & Rodriguez, 1989; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004). Given self-regulation's importance for positive outcomes, a major research goal is to understand when and why some succeed, and others do not, at achieving desired ends (e.g., Carver & Scheier, 1982, 1990; Gollwitzer, 1990; Kruglanski et al., 2002; Mann, de Ridder, & Fujita, 2013). Doing so not only provides

insights into the mechanisms that promote self-regulation but may also facilitate the development of interventions that can help those who struggle with goal pursuit.

To this end, self-regulation research has typically focused on ways that people control their thoughts, feelings, and behaviors. For example, research suggests that inhibiting food-related thoughts can help people reduce consumption of unhealthy foods (e.g., Houben & Jansen, 2011; Papiés, Stroebe, & Aarts, 2008), regulating emotions can help people strategically prepare for upcoming challenges (e.g., increasing anger in preparation for a negotiation; Tamir, 2016; Tamir, Ford, & Ryan, 2013), and regu-

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lating actions through precommitment strategies (e.g., ordering meals in advance) can help people circumvent the allure of unhealthy options in favor of healthier choices (Vanepps, Downs, & Loewenstein, 2016). What has been less frequently examined, however, is how people might directly regulate their underlying motivations to secure desired ends. Given that motivation drives and directs cognition, affect, and behavior, understanding how people monitor and change their motivations may provide a fruitful new perspective on how people self-regulate.

In the present article, we examine the regulation of motivation in the context of construal level theory (e.g., Liberman & Trope, 2008; Trope & Liberman, 2010). We hope not only to advance the idea that motivation can be the target of regulation, but also to explore novel hypotheses with which to extend construal level theory. Specifically, drawing from previous research documenting the benefits of construal level for performance on a variety of regulatory tasks, we examine whether people have the requisite knowledge to use construal level adaptively to increase the likelihood of securing desired outcomes.

### Metamotivation

The present work is inspired by a new but growing area of research on metamotivation—people’s knowledge of how motivation functions and their goal-directed regulation of their motivational orientations to promote desired outcomes (Fujita, Scholer, Miele, & Nguyen, 2019; Miele & Scholer, 2018; Scholer & Miele, 2016; Scholer, Miele, Murayama, & Fujita, 2018). Metamotivation research highlights that people not only regulate motivational quantity (i.e., increase or decrease the amount of motivation) but may also regulate motivational quality (i.e., experience the right *type* of motivation). The latter is critical because tasks differ in the extent to which performance benefits from different motivational orientations. For example, performance on tasks that demand an eager and enthusiastic mode of processing (e.g., brainstorming task) benefits from a motivational orientation toward ideals and gains (i.e., promotion focus; e.g., Friedman & Förster, 2001; Seibt & Förster, 2004). By contrast, performance on tasks that demand a vigilant and careful mode of processing (e.g., proofreading task) benefits from a motivational orientation toward security and losses (i.e., prevention focus). Indeed, past work has demonstrated that matching the “right” motivational orientation to the right type of task (i.e., creating *task-motivation fit*; Scholer & Miele, 2016) promotes better outcomes (Avnet & Higgins, 2003; Freitas & Higgins, 2002; Lee & Aaker, 2004; Woolley & Fishbach, 2015). However, research has primarily highlighted a type of matching whereby experimental manipulation produces the fit (vs. nonfit) between the task and an individual’s motivational orientation. In contrast, metamotivational research examines whether people can create task-motivation fit on their own (i.e., in the absence of guidance from experimental manipulation).

To do so, people must recognize what type of motivational orientation best addresses the current task demands, assess whether they are experiencing this orientation, and—if necessary—identify and implement the means to increase or sustain it. Drawing from the metacognition literature (Flavell, 1979; Pintrich, 2002), Scholer and Miele (2016; Miele & Scholer, 2018) have suggested that engaging in these processes requires at least two types of knowledge. First, people must be able to recognize the motivational

orientation demanded by a particular task (i.e., task knowledge). Second, they must be able to identify how to instantiate the orientation (i.e., strategy knowledge). This knowledge may be relatively tacit or implicit (Reber, 1989; Wagner, 1987; Wagner & Sternberg, 1985) such that people may know how to regulate motivation without necessarily being able to articulate spontaneously and explicitly how to do so (see also Nisbett & Wilson, 1977)—in other words, it may just “feel right” or “fit.”

Initial work on metamotivation assessed whether people understand how to create task-motivation fit within the context of regulatory focus theory (Higgins, 1997; Scholer & Miele, 2016). Specifically, Scholer and Miele (2016) assessed participants’ preferences for preparatory exercises (e.g., recall activities) that instantiate promotion versus prevention focus in anticipation of tasks that require eagerness versus vigilance. Findings suggested that people have metamotivational knowledge of how to create fit between these motivational orientations and task demands (i.e., task-motivation fit). Specifically, participants expected that promotion preparatory exercises would enhance performance on tasks requiring eagerness (vs. vigilance), and prevention preparatory exercises would enhance performance on tasks requiring vigilance (vs. eagerness).

The current research embraces this approach to explore novel research questions within construal level theory (CLT; Trope & Liberman, 2010). We examine whether people can appreciate the potential task performance benefits of both high-level and low-level construal. CLT provides a particularly interesting domain in which to assess metamotivational knowledge, as numerous studies have experimentally manipulated construal level to document its effects on various goal-related outcomes (e.g., Belding, Naufel, & Fujita, 2015; Freitas, Langsam, Clark, & Moeller, 2008; Fujita & Han, 2009; Fujita, Trope, Liberman, & Levin-Sagi, 2006; McCreary, Liberman, Trope, & Sherman, 2008; Packer, Fujita, & Chasteen, 2014; Schmeichel, Vohs, & Duke, 2011; Stillman, Medvedev, & Ferguson, 2017; Sweeney & Freitas, 2014; Sweeney & Freitas, 2018). Although researchers have demonstrated that construal level can promote performance on a variety of regulatory tasks, what has been largely overlooked is whether laypeople recognize this (i.e., whether they possess task knowledge about construal level; cf., MacGregor, Carnevale, Dusthimer, & Fujita, 2017). In addition, prior work on CLT highlights many varied strategies by which high-level and low-level construal can be induced—providing an opportunity to examine whether people can recognize the diversity of strategies that could be used to instantiate a desired construal level (i.e., whether they possess strategy knowledge about construal level and whether this knowledge encompasses a narrow or broad repertoire of regulatory strategies). Exploring the extent to which people have knowledge of construal level, thus, provides a critical opportunity to examine people’s understanding of how to create task-motivation fit. Further, it raises important new questions that have yet to be addressed by the existing literatures on construal level theory (specifically) and metamotivation (more generally).

### Construal Level Theory

Construal refers to a person’s subjective interpretation and experience of events, and encompasses their cognitive, affective, motivational, and behavioral orientations to these events (Griffin

& Ross, 1991; Mischel & Shoda, 1995). CLT suggests that people's construals of objects and events depend on psychological distance—the extent to which an object or event is removed from one's direct experience (Trope & Liberman, 2010). With increasing psychological distance, detailed information may be less available and reliable, making it challenging to orient toward an event that is temporally, spatially, socially, or hypothetically distant. CLT proposes that people respond to this lack of reliable, detailed information by engaging in high-level construal—an orientation toward abstract, essential features of objects or events. For example, a marathon to be run a year from now is likely to be construed as a supreme test of one's physical endurance. Focusing on essential invariances allows people to plan and make decisions based on the information available. By contrast, as specific information becomes available with psychological proximity, CLT proposes that people respond by engaging in low-level construal—an orientation toward concrete, idiosyncratic features of objects or events. For example, the same marathon to be run tomorrow is likely to be construed as running *this* race on *this* day in *these* conditions. This allows people to tailor their responses to the unique features of the event. Thus, CLT suggests that high-level and low-level construal are psychological means with which people orient toward psychologically distant and proximal events.

### Construal Level and Self-Regulation

Extensive empirical work suggests that people indeed engage in high-level versus low-level construal to orient to psychologically distant versus near events (e.g., Liberman & Trope, 2008; Soderberg, Callahan, Kochersberger, Amit, & Ledgerwood, 2015; Stillman, Lee, et al., 2017; Trope & Liberman, 2010). More germane to the current work, research suggests that people can engage in high-level versus low-level construal independently of any changes in psychological distance (e.g., Freitas, Gollwitzer, & Trope, 2004; Fujita et al., 2006), and that these shifts in construal level impact performance on a variety of regulatory tasks. Reflecting the understanding that self-regulation entails a series of distinct challenges that are best addressed by different strategies (e.g., Fujita, 2011; Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987; Higgins, 2000; Kashdan & Rottenberg, 2010; Mann et al., 2013; Miele & Scholer, 2018; Scholer & Miele, 2016), research indicates that performance on some tasks benefits from high-level construal, whereas performance on others benefits from low-level construal.

One regulatory task in which performance benefits from high-level rather than low-level construal is self-control. Self-control is a self-regulation challenge that requires prioritizing global motivational concerns over local motivational concerns when the two conflict (Fujita, 2011; Rachlin, 2000). A prototypical self-control conflict is one in which people must choose larger-delayed outcomes over smaller-immediate outcomes (e.g., Ainslie, 1975; Mischel et al., 1989). Research suggests that high-level versus low-level construal promotes self-control success (e.g., Fujita, 2008; Fujita & Carnevale, 2012). For example, experimentally inducing people to engage in high-level versus low-level construal reduces temporal discounting—the tendency to devalue larger-delayed relative to smaller-immediate rewards (Fujita et al., 2006; Malkoc, Zauberman, & Bettman, 2010; Rudzinska-Wojciechowska, 2017; Smith, Monterosso, Wakslak, Bechara, & Read, 2018; Stillman, Medvedev, et al., 2017;

Yi, Stuppy-Sullivan, Pickover, & Landes, 2017). Similarly, people concerned with weight loss were more likely to choose an apple versus a candy bar when induced to engage in high-level versus low-level construal (Fujita & Han, 2009). Thus, high-level relative to low-level construal appears to promote the successful resolution of self-control conflicts.

Other research suggests that low-level rather than high-level construal promotes performance on some regulatory tasks, particularly those that require precision in behavioral execution (e.g., Freund & Hennecke, 2015; Gollwitzer, 1999; Locke & Latham, 2006; Pham & Taylor, 1997; Schmeichel et al., 2011; Taylor, Pham, Rivkin, & Armor, 1998; Zimmerman & Kitsantas, 1996, 1997). Research has found, for example, that people attain better goal outcomes in these types of tasks when they focus on the concrete processes necessary to execute goal-directed action rather than on abstract outcomes (Freund & Hennecke, 2015; Pham & Taylor, 1997; Taylor et al., 1998). For instance, participants who were instructed to focus on the concrete means rather than abstract ends of a dart-throwing task exhibited superior task performance (Zimmerman & Kitsantas, 1996, 1997). Other work demonstrated that people who engaged in low-level versus high-level construal performed better on a stop-signal task—a cognitive control task that requires vigilant attention to contextual cues and modulation of specific motor responses (Schmeichel et al., 2011). Collectively, this work suggests that low-level relative to high-level construal promotes performance on tasks that require behavioral precision.

### The Present Research

The metamotivational approach suggests that people may strategically engage in high-level versus low-level construal as motivational orientations to promote goal-directed task performance. In this article, our primary goal is to test two necessary conditions for this possibility to occur. First, we examine whether people can recognize that performance on various tasks might be enhanced by high-level versus low-level construal (metamotivational task knowledge). Second, we examine whether they can identify effective strategies with which to create task-motivation fit (metamotivational strategy knowledge). Across a series of experiments, we present people with a variety of strategies with which to instantiate high-level versus low-level construal. In doing so, we are able to explore the breadth of people's strategy repertoire. Critically, deficiencies in either or both of these necessary conditions (task and strategy knowledge) would preclude the strategic regulation of motivation via changes in construal.

We also explore the extent to which people's metamotivational knowledge predicts the actual decisions they make when deciding how to prepare for a task. How one prepares for a task can have important downstream consequences for one's subsequent experiences with the task. To the extent that people have metamotivational knowledge of the role of construal level in goal-directed behavior, we might expect that those with greater versus lesser metamotivational knowledge would be more likely to make motivationally adaptive decisions. By adopting an individual differences approach, we can begin to explore whether metamotivational knowledge is predictive of important self-regulatory behaviors.

We examine these questions in seven experiments (in addition to an eighth experiment reported in the [online supplement](#)). Experiments 1–6 all examine task knowledge—whether people can

recognize when performance on a regulatory task would benefit from high-level versus low-level construal. Experiments 2–4 and 6 also examine strategy knowledge—whether people can identify the strategic means with which to instantiate high-level versus low-level construal. Specifically, we investigate the extent to which people can recognize that high-level versus low-level preparatory exercises—such as thinking about why versus how one engages in an action (Experiments 2a and 2b), engaging in global versus local visual processing (Experiments 3 and 6), and engaging in category versus example generation (Experiment 4)—represent strategic means to evoke high-level versus low-level construal, respectively.

Experiment 5 assesses metamotivational knowledge under more stringent and realistic conditions. Specifically, mimicking real-world conditions that typically afford a variety of ways with which to prepare for a performance task, Experiment 5 presents people with multiple motivational orientations: high-level construal, low-level construal, and two distractors unrelated to construal level. The critical question in Experiment 5 is whether people can still recognize the benefits of high-level and low-level construal in more complex contexts with multiple options (see [supplemental Experiment 1](#) for a similar test of this question).

Experiment 6 extends these findings beyond ratings in response to hypothetical scenarios to examine whether people can create task-motivation fit in a context in which behavioral choice is consequential. Moreover, Experiment 6 explores individual differences in metamotivational knowledge of construal level, and whether this individual-level variance can predict these consequential choices.

### Sample Size and Exclusionary Criteria

All experiments used within-subjects designs to enhance statistical power. Given the lack of comparable published data with which to estimate effect sizes, we used general rules of thumb to determine sample sizes a priori in all experiments. In Experiments 1–3, Experiment 5, and [supplemental Experiment 1](#), we set a target  $N = 100$ . A sensitivity power analysis in G\*Power revealed that this  $N$  would provide 80% power to detect an effect of  $\eta_p^2 = .019$  and 90% power to detect an effect of  $\eta_p^2 = .026$  for the primary statistical test of our hypotheses—a two-way interaction within a repeated measures analysis of variance (ANOVA). As an initial pilot study suggested that the effect size of Experiment 4 might be smaller than that of the other experiments, we set a target  $N = 200$ , which provided 80% power to detect an effect of  $\eta_p^2 = .008$  and 90% power to detect an effect of  $\eta_p^2 = .010$ . Whenever possible, we conducted multiple statistical methods to examine the same dataset including ANOVAs and linear mixed effects models—the latter of which controls for the random effects of participants, scenarios, and the interaction between participants and scenarios. In all cases, these analyses produced essentially the same results. Given readily available procedures for calculating statistical power and ease of interpretation within the ANOVA context, we only report these analyses in the main text. Some comparative analyses using linear mixed effects models can be found in the [online supplement](#). Lastly, as Experiment 6 involved a statistically less powerful binary outcome measure, we set a target  $N = 200$ , providing 80% power to detect an odds ratio ( $OR$ ) = 1.78 and 90% power to detect an  $OR = 1.95$  for the McNemar test that repre-

sented one of our primary statistical tests. For reference, the estimated median effect size in social psychological research is  $\eta_p^2 = .035$ , or equivalently,  $OR = 1.99$  (Lovakov & Agadullina, 2017). Critically, no data were analyzed until all data were collected for a given experiment.

We applied the same exclusion criteria across all experiments for consistency (with minor exceptions for Experiment 5, as this experiment sampled from a more diverse population). As our materials required sensitivity to subtle differences in language, we excluded participants who indicated they were not paying attention (i.e., reported being “very” or “extremely” distracted, or taking the study “not at all” or “a little” seriously on our attention check measures). Similarly, in all experiments except Experiment 5, we excluded those who identified as non-native English speakers. In Experiment 5, we retained all non-native English speakers (35% of our sample) for the sake of statistical power. Exclusions did not change the interpretation of any results.

After we had conducted and analyzed most of the data reported in this article, reports began to emerge about the possibility of “bots” or “farmers” providing poor quality data in experiments conducted on Amazon’s Mechanical Turk (MTurk) platform (Bai, 2018; TurkPrime, 2018). To address this, we subsequently implemented procedures recommended by Bai (2018) that allowed us to identify and exclude suspicious responses. Specifically, we limited analyses to responses with GPS coordinate data that were located in the United States and were unique (i.e., “nonrepeating”) within the dataset.<sup>1</sup> These are the data that we report in the main text; we report all original analyses conducted before this data-cleaning procedure in the [online supplement](#). Critically, analyses with versus without these data-cleaning procedures did not change the interpretation of the primary findings in any experiment.

### Experiment 1: Knowing When High-Level Versus Low-Level Construal Is Beneficial for Task Performance

Experiment 1 was designed to test whether participants have metamotivational task knowledge (i.e., whether they can recognize when high-level vs. low-level construal might enhance performance on a task). We created scenarios that described regulatory tasks in which performance has been shown to benefit from high-level construal or low-level construal, along with tasks in which construal level a priori was not expected to impact performance (control condition scenarios). We then asked participants to rate the usefulness of high-level and low-level construal for performance in each scenario as an assessment of metamotivational task knowledge.

<sup>1</sup> There is a lack of consensus as to whether implementing these data-cleaning procedures versus not represents the more conservative exclusion criterion. It is not entirely clear how researchers should interpret the duplicate GPS coordinate data that seems to characterize the data quality issues that have been observed on Amazon Mechanical Turk. We used Qualtrics survey software to collect data, which at best provides accurate location data at the level of the city (<https://www.qualtrics.com/support/survey-platform/data-and-analysis-module/data/download-data/understanding-your-dataset/>). Moreover, some participants may mask their actual location using VPN protocols. Although the interpretations of the data with versus without these data points remain unchanged, the data patterns of the former (reported in the [online supplement](#)) were much stronger, presumably because of the enhanced statistical power that is associated with the larger  $N$ .

## Method

**Research ethics statement.** The Ohio State University's Institutional Review Board approved all research reported in this article (Protocol 2016B0116, "Knowledge and Flexible Implementation of Construal Level in Self-Regulation").

**Participants.** Ninety-nine MTurk workers in the United States with a HIT (Human Intelligence Task) approval rate >97% participated in exchange for \$0.60 ( $M_{\text{age}} = 34.97$ ,  $SD_{\text{age}} = 12.34$ , 55 women, 44 men). Because of similar materials in this and subsequent experiments, workers only had access to one experiment to maintain naïveté.

**Materials and procedure.** Participants first read that it is possible to orient to events in different ways and that some orientations can help or hinder goal pursuit (see Appendix A for complete instructions). They were then told that they would be asked to consider two orientations in various scenarios (see Figure 1). Essentially, these orientations described high-level and low-level construal in colloquial terms.

**Metamotivational knowledge assessment.** Participants were presented with scenarios that described various types of regulatory tasks (see Appendix B for all scenarios). Scenarios were based on tasks used in previous research suggesting that high-level construal (e.g., Fujita et al., 2006; Kirby & Maraković, 1996) or low-level construal (e.g., Pham & Taylor, 1997; Zimmerman & Kitsantas, 1997) promotes performance. Specifically, whereas the high-level tasks involved self-control conflicts, the low-level tasks involved contextual sensitivity and precision. An additional set of scenarios served as a control condition and included tasks in which performance did not a priori appear to benefit from either high-level or low-level construal (i.e., did not involve either self-control or contextual sensitivity and precision). However, as previous empirical research has not yet examined whether high-level or low-level construal promotes performance in this set of control scenarios, this condition may also be viewed as exploratory. Six high-level scenarios, six low-level scenarios, and six control condition scenarios were presented in random order to all participants.

For each scenario, participants rated the usefulness of Orientation Set A (e.g., low-level construal; "focusing on the trees, instead of the forest") and the usefulness of Orientation Set B (e.g., high-level construal; "focusing on the forest, instead of the trees") on a 7-point scale (1 = *extremely unhelpful*, 7 = *extremely helpful*; see Table 9 in the online supplement for details about internal consistency). Whether low-level versus high-level construal was labeled as Set A versus Set B was counterbalanced between participants.

<b>Orientation Set A</b>	<b>Orientation Set B</b>
"Narrowing your focus of attention"	"Broadening your focus of attention"
"Zooming in to have a narrow perspective"	"Zooming out to have a broad perspective"
"Focusing on the trees, instead of the forest"	"Focusing on the forest, instead of the trees"

Figure 1. Orientation sets describing low-level (A) versus high-level (B) construal for Experiment 1.

**Demographics and other measures.** Participants reported their demographics and responded to our attention checks. Specifically, participants rated how distracted they were during the study and how seriously they took the study (1 = *not at all*, 2 = *a little*, 3 = *somewhat*, 4 = *very*, 5 = *extremely*). Participants were then debriefed and compensated.

## Results

Using the exclusion criteria described earlier, Experiment 1 had a final  $N = 76$ . To assess participants' metamotivational task knowledge, we submitted usefulness ratings to a 3 (scenario: high-level vs. low-level vs. control)  $\times$  2 (construal: high-level vs. low-level)  $\times$  2 (construal order<sup>2</sup>: high-level first vs. low-level first) mixed ANOVA with repeated measures on the first two factors. Results revealed that although there was no main effect of scenario,  $F(2, 148) = 0.53$ ,  $p = .59$ ,  $\eta_p^2 = .01$ , there was a significant main effect of construal such that participants generally reported that low-level construal ( $M = 4.77$ ,  $SD = 0.63$ ) would be more useful than high-level construal ( $M = 4.35$ ,  $SD = 0.69$ ),  $F(1, 92) = 14.39$ ,  $p < .001$ ,  $\eta_p^2 = .16$ . Critically, as predicted, the main effect of construal was qualified by a significant interaction between scenario and construal,  $F(2, 148) = 104.26$ ,  $p < .001$ ,  $\eta_p^2 = .59$ .

To interpret this interaction, we first examined the usefulness ratings of high-level versus low-level construal within each scenario type (see Figure 2; see Tables 10–18 in the online supplement for individual scenario statistics for all experiments). As expected, for high-level scenarios, participants rated high-level construal ( $M = 5.38$ ,  $SD = 0.94$ ) as more useful than low-level construal ( $M = 3.79$ ,  $SD = 1.15$ ),  $t(75) = 7.51$ ,  $p < .001$ , 95% CI [1.17, 2.01],  $d = 0.86$ .<sup>3</sup> By contrast, for low-level scenarios, participants rated low-level construal ( $M = 5.87$ ,  $SD = 1.01$ ) as more useful than high-level construal ( $M = 3.20$ ,  $SD = 1.29$ ),  $t(75) = 11.05$ ,  $p < .001$ , 95% CI [2.19, 3.15],  $d = 1.27$ . There were no significant differences in the control condition scenarios between the usefulness ratings of high-level ( $M = 4.47$ ,  $SD = 0.88$ ) and low-level construal ( $M = 4.66$ ,  $SD = 0.91$ ),  $t(75) = 1.10$ ,  $p = .28$ , 95% CI [-0.51, 0.15],  $d = 0.14$ .<sup>4</sup> These results suggest that people are sensitive to the comparative effectiveness of high-level versus low-level construal orientations within a given type of regulatory task.

To explore the interaction further, we also examined the usefulness ratings of high-level and low-level construal across sce-

<sup>2</sup> As results revealed no significant effect of order ( $F(1,74) = 0.05$ ,  $p = .83$ ,  $\eta_p^2 < 0.001$ ) for this and subsequent experiments, we do not discuss this issue further.

<sup>3</sup> Participants reported low-level and high-level construal as similarly useful in the studying scenario. Although we framed this particular scenario as a self-control conflict (i.e., one that should benefit from high-level construal), the act of studying likely involves a variety of subtasks that benefit from both high-level and low-level construal (such as engaging in abstract conceptualizing vs. executing detailed behavioral plans). Nevertheless, the studying scenario generally supported hypotheses in subsequent experiments (with one notable exception: see Experiment 4).

<sup>4</sup> While there was no overall difference in the endorsement of high-level versus low level construal in the control condition, many of these individual scenarios revealed significant differences (see Table 10 in the online supplement). Subsequent experiments revealed, however, that the control condition scenarios—examined individually and collectively across experiments—did not produce reliable and meaningful patterns in the endorsement of high-level versus low-level construal.

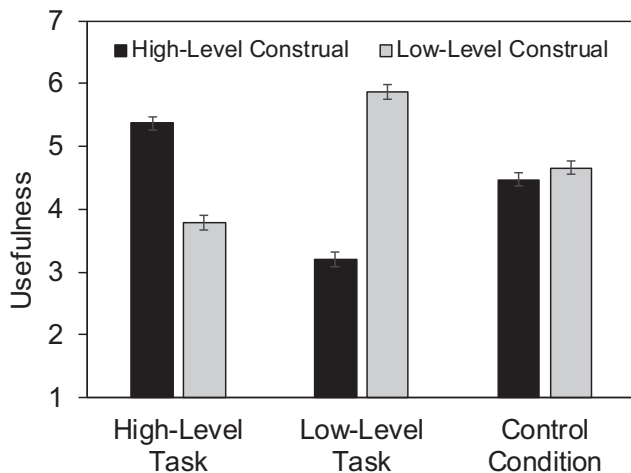


Figure 2. Average endorsement of high-level and low-level construal for tasks that benefit from high-level construal versus low-level construal versus neither (control; Experiment 1).

nario types. As expected, participants rated high-level construal as more useful for high-level scenarios to low-level and control scenarios, *HL versus LL*:  $t(75) = 12.25$ ,  $p < .001$ , 95% CI [1.83, 2.54],  $d = 1.42$ ; *HL versus control*:  $t(75) = 6.70$ ,  $p < .001$ , 95% CI [0.64, 1.18],  $d = 0.77$ . In contrast, participants rated low-level construal as more useful for low-level scenarios relative to high-level and control scenarios, *LL versus HL*:  $t(75) = 11.41$ ,  $p < .001$ , 95% CI [1.71, 2.44],  $d = 1.31$ ; *LL versus control*:  $t(75) = 8.33$ ,  $p < .001$ , 95% CI [0.92, 1.50],  $d = 0.95$ . These results suggest that people's endorsement of a given motivational orientation (i.e., high-level and low-level construal) is sensitive to the regulatory task demands presented to them.

## Discussion

Experiment 1 provides preliminary evidence that people have metamotivational task knowledge—knowledge of the distinct motivational demands of regulatory tasks. That is, people appear to distinguish high-level versus low-level tasks. Further, replicating MacGregor et al. (2017), participants appeared to recognize the usefulness of high-level relative to low-level construal for resolving self-control dilemmas—tasks in which performance benefits from high-level construal. Critically, participants also appeared to recognize the usefulness of low-level relative to high-level construal on tasks that require contextual sensitivity and precision—tasks in which performance benefits from low-level rather than high-level construal. This suggests that people indeed appreciate at some level the role of construal level in addressing task demands.

As Experiment 1 suggested that people have task knowledge (i.e., recognize when high-level and low-level construal benefit performance on a regulation task), we next tested whether they have strategy knowledge (i.e., recognize ways to instantiate high-level and low-level construal). Thus, Experiments 2–4 not only examined whether people can distinguish performance tasks that require high-level versus low-level construal, but they also examined whether they can recognize various construal level manipulations as strategic means to create task-motivation fit.

## Experiments 2–4: Knowing When and How to Induce High-Level Versus Low-Level Construal

Experiments 2–4 asked participants to rate the perceived usefulness of different high-level versus low-level preparatory exercises for task performance, and report their preferences for engaging in these preparatory exercises in anticipation of different tasks. In addition to task knowledge, these experiments tap into strategy knowledge, as the preparatory exercises are means by which people can evoke high-level and low-level construal. Of note, each successive experiment presented strategies that we surmised were increasingly less intuitive, allowing us to explore the level of sophistication that people have in their ability to identify appropriate strategic means with which to create task-motivation fit.

As one operationalization of construal level, Experiments 2a and 2b asked participants to consider the preparatory exercises of thinking about why versus how they engage in a task. Past work has demonstrated that whereas thinking about *why* one performs an action evokes high-level construal (as it promotes consideration of abstract end-states), thinking about *how* one performs an action evokes low-level construal (as it promotes consideration of concrete means; Freitas et al., 2004; Liberman & Trope, 1998). Experiment 2b was a direct replication of Experiment 2a, omitting one word in the instructions (see Appendix A).

In contrast to Experiments 2a and 2b, Experiments 3 and 4 operationalized construal level as mindset inductions that were materially unrelated to the regulatory tasks described in the scenarios. Specifically, participants were asked to consider the preparatory exercises of engaging in global versus local visual processing (Experiment 3) or engaging in category versus exemplar generation (Experiment 4). Past research has demonstrated that high-level versus low-level construal, respectively, can be induced through global versus local processing (Smith, Wigboldus, & Dijksterhuis, 2008; Wakslak & Trope, 2009) and superordinate categorization versus subordinate exemplification (Belding et al., 2015; Fujita & Han, 2009; Fujita et al., 2006; Packer, Fujita, & Herman, 2013).

In summary, Experiments 2–4 asked participants to consider different high-level versus low-level preparatory exercises as means to create task-motivation fit for tasks in which performance is known to benefit from high-level versus low-level construal, respectively. Collectively, these experiments also test the breadth and sophistication of people's knowledge, exploring a progression of strategies that span from those that are more to less intuitive. If people indeed have metamotivational strategy knowledge, they should report that high-level preparatory exercises are more preferable and useful than low-level preparatory exercises for performance on tasks that demand high-level construal. Similarly, they should report that low-level preparatory exercises are more preferable and useful than high-level preparatory exercises for performance on tasks that demand low-level construal. Again, we have no a priori reasons to expect that high-level versus low-level preparatory exercises will be perceived as differentially useful in the control condition tasks.

## Method

**Participants.** MTurk workers in the United States with a HIT approval rate >97% participated in exchange for \$0.60 (Experi-

ment 2a:  $N = 100$ ,  $M_{age} = 36.38$ ,  $SD_{age} = 12.14$ , 53 women, 46 men, 1 transgender; Experiment 2b:  $N = 100$ ,  $M_{age} = 34.26$ ,  $SD_{age} = 9.42$ , 54 women, 46 men; Experiment 3:  $N = 100$ ,  $M_{age} = 36.41$ ,  $SD_{age} = 12.61$ , 57 women, 43 men; Experiment 4:  $N = 205$ ,  $M_{age} = 33.39$ ,  $SD_{age} = 9.28$ , 82 women, 118 men, 2 transgender, 3 unidentified).

**Experiments 2a and 2b: Materials and procedure.** As in Experiment 1, participants in Experiments 2a and 2b first read that it is possible to approach the same task in different ways. Specifically, participants read that every activity can be thought of in terms of the reasons WHY they engage in it or the process of HOW they engage in it, and that these ways of thinking can help or hinder goal pursuit (see Appendix A for complete instructions).

**Metamotivational knowledge assessment.** Participants read nine of the scenarios used in Experiment 1 (see Table 1) and provided ratings for the following variables, described in the order in which they were administered.

**Perceived task-level difficulty and enjoyment.** Tasks can vary not only in the type of strategy required to perform well but also in their perceived difficulty and enjoyment. To account for potential confounding effects that these features might have on responses to the usefulness of thinking about why versus how, we asked participants to indicate how difficult (1 = *extremely easy*, 7 = *extremely difficult*) and enjoyable (1 = *extremely unenjoyable*, 7 = *extremely enjoyable*) they thought the regulatory task in each scenario would be. As statistically adjusting for these variables did not impact our findings (see Table 19 in the online supplement), we do not discuss them further.

**Preferences for high-level versus low-level preparatory exercise.** For each scenario, participants rated the extent to which they preferred thinking about why versus how (1 = *strongly prefer HOW*, 6 = *strongly prefer WHY*).

**Usefulness of high-level and low-level preparatory exercise.** Critically, to assess participants' reasoning for their preferences, we asked participants to rate the usefulness of thinking about why and how (counterbalanced) for each scenario (1 = *extremely unhelpful*, 7 = *extremely helpful*).

**Perceived strategy-level difficulty and enjoyment.** Much like task-level difficulty and enjoyment, strategy-level difficulty and enjoyment may also impact participants' ratings. For example, participants might prefer high-level over low-level construal (or vice versa) because it seems more enjoyable and/or less difficult, holding perceived usefulness constant. To account for this, we asked them to rate the difficulty and enjoyment of thinking about why and how for each scenario as additional potential reasons for their preferences. We counterbalanced whether participants rated the usefulness, difficulty, and enjoyment of thinking about why they would engage in the task before or after making these ratings for thinking about how. Analyses statistically controlling for the difficulty and enjoyment of thinking about why and how did not impact findings (see Figure 9 in the online supplement) and are not discussed further.

**Performance expectancies.** Another variable that might impact one's judgments of the usefulness of and preferences for a given strategy is one's perceived level of skill in performing a regulatory task. Any strategy might be perceived as less useful to the extent one is already highly skilled. To control for this, we asked participants to rate how well they thought they would perform in each scenario (1 = *extremely poorly*, 7 = *extremely well*). As statistically adjusting for this variable did not impact our findings (see Table 19 in the online supplement), we do not discuss it further.

**Experiment 3: Materials and procedure (global vs. local mindsets).** In Experiment 3, participants were introduced to a set of preparatory exercises that involved making similarity judgments about shapes. The preparatory exercises consisted of three compound shapes of large elements composed of smaller elements (Kimchi & Palmer, 1982; Navon, 1977). One represented the "standard," whereas the other two were "comparison shapes" (see Figure 3). In the global (vs. local) mindset exercise, participants identified the option that resembled the standard in terms of its overall shape (vs. individual shapes). Whereas global visual processing is associated with high-level construal, local visual processing is associated with low-level construal (Hansen & Trope, 2013; McCrea, Wieber, & Myers, 2012; Smith et al., 2008; Wakslak & Trope, 2009). Given the novelty of the exercises, participants completed four practice trials of the global and local mindset exercises with corrective feedback to reinforce learning. After rating the difficulty and enjoyment of the global and local mindset exercises, participants were presented with nine scenarios (see Table 1). For each scenario, participants rated task difficulty, task enjoyment, their preferences for the global versus local mindset exercises, usefulness of the global and local mindset exercises (counterbalanced), and performance expectancies.

**Experiment 4: Materials and procedure (category vs. example mindsets).** In Experiment 4, participants were presented with preparatory exercises that involved categorization or exemplification. In the category mindset exercise, participants were asked to identify the overall category to which the target object belonged. In the example mindset exercise, participants were asked to identify a specific example of the target object (see Figure 4). Whereas superordinate categorization induces high-level construal, subordinate exem-

Table 1  
Overview of Scenarios Included in Experiments 1–6 and Supplemental Experiment 1

Scenario	Experiment							
	1	2a	2b	3	4	5	6	S1
<b>Low-level scenarios</b>								
Proofreading	x	x	x		x	x	x	
Basketball	x	x	x		x	x	x	x
Stroop task	x	x	x		x	x	x	x
Vigilance task	x			x	x	x		x
Darts	x			x	x	x	x	x
Mini golf	x			x	x	x	x	x
<b>High-level scenarios</b>								
Recycling	x	x	x		x	x	x	x
Delay discounting	x	x	x		x	x		x
Negative feedback	x	x	x		x	x	x	x
Studying	x			x	x	x		x
Emotion regulation	x			x	x	x	x	x
Getting criticism	x			x	x	x	x	x
<b>Control scenarios</b>								
Daydreaming	x	x	x		x		x	x
Meditation	x	x	x		x		x	x
Movie choices	x	x	x		x		x	x
Free dessert	x			x	x			x
Mailing letters	x			x	x		x	x
Nice evening	x			x	x		x	

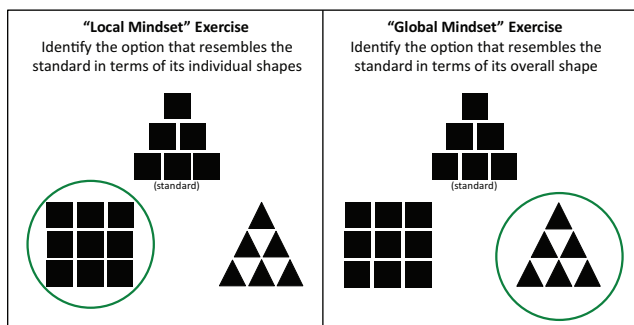


Figure 3. Local and global mindset exercises for Experiment 3. See the online article for the color version of this figure.

plication induces low-level construal (Belding et al., 2015; Fujita & Han, 2009; Fujita et al., 2006; Packer et al., 2013). As in Experiment 3, participants completed practice trials of the exercises and rated the difficulty and enjoyment of the exercises. For each of the 18 scenarios in the knowledge assessment, participants completed measures of task difficulty, task enjoyment, their preferences for the category versus example mindset exercises, usefulness of the category and example mindset exercises (counterbalanced), and performance expectancies.

**Demographics and other measures.** After completing the knowledge assessment, participants in all experiments reported their demographics, responded to our attention checks, and were then debriefed and compensated.

**Results**

Using the exclusion criteria detailed earlier, we had a final  $N = 87$  for Experiment 2a,  $N = 85$  in Experiment 2b,  $N = 87$  for Experiment 3, and  $N = 187$  for Experiment 4.

**Usefulness of high-level versus low-level preparatory exercises.** To examine whether people recognize various preparatory exercises as means to create task-motivation fit, we conducted 3 (scenario: high-level vs. low-level vs. control)  $\times$  2 (construal: high-level vs. low-level)  $\times$  2 (construal order: high-level first vs. low-level first) mixed ANOVAs on the usefulness ratings from each experiment. Statistical main effects and interactions for each experiment are presented in Table 2. In all experiments, there was a main effect of scenario. This effect was statistically significant in three experiments (Experiments 2a, 2b, and 4) and marginally significant in the fourth (Experiment 3). Results also revealed a main effect of construal that was significant in one experiment (Experiment 4) and marginally significant in another (Experiment 3). However, the direction of each of these main effects was inconsistent across the experiments and likely reflects idiosyncratic features of the construal level operationalizations, rather than systematic trends across experiments. Critically, as predicted, these main effects were qualified by a significant interaction between scenario and construal in all four experiments.

To interpret this interaction, we first examined the ratings of comparative usefulness of high-level versus low-level preparatory exercises within each type of scenario (see Figure 5). In an effect that was statistically significant in three experiments (Experiment 2a:  $d = 0.96$ ; Experiment 2b:  $d = 0.79$ ; and Experiment 3:  $d = 0.43$ ), participants reported that high-level construal would be

more useful than low-level construal for high-level scenarios. As predicted, across all four experiments, participants reported that low-level construal would be more useful than high-level construal for low-level scenarios (Experiment 2a:  $d = 1.13$ ; Experiment 2b:  $d = 0.97$ ; Experiment 3:  $d = 0.69$ ; Experiment 4:  $d = 0.45$ ). Moreover, there were no differences in the endorsement of high-level and low-level construal in the control condition scenarios across all four experiments (Experiment 2a:  $d = 0.06$ ; Experiment 2b:  $d = 0.05$ ; Experiment 3:  $d = 0.11$ ; Experiment 4:  $d = 0.11$ ). Collectively, results from these four experiments suggest that given a scenario, people are sensitive to the comparative effectiveness of high-level versus low-level preparatory exercises.

We continued to unpack the interaction between scenario and construal by conducting simple comparisons of the usefulness ratings of high-level and low-level preparatory exercises across scenario types (see Table 3). As expected, participants in all four experiments rated high-level preparatory exercises as significantly more useful for high-level relative to low-level scenarios (Experiment 2a:  $d = 1.26$ ; Experiment 2b:  $d = 1.07$ ; Experiment 3:  $d = 0.56$ ; Experiment 4:  $d = 0.32$ ). Further, participants in all four experiments rated low-level preparatory exercises as more useful for low-level than high-level scenarios (Experiment 2a:  $d = 0.90$ ; Experiment 2b:  $d = 0.78$ ; Experiment 3:  $d = 0.77$ ; Experiment 4:  $d = 0.21$ ). All four experiments also suggested that high-level preparatory exercises would be significantly more useful for high-level relative to control scenarios (Experiment 2a:  $d = 0.69$ ; Experiment 2b:  $d = 0.58$ ; Experiment 3:  $d = 0.20$ ; Experiment 4:  $d = 0.37$ ) and three experiments suggested that that low-level preparatory exercises would be significantly more useful for low-level relative to control scenarios (Experiment 2a:  $d = 0.70$ ; Experiment 2b:  $d = 0.51$ ; Experiment 3:  $d = 0.56$ ). Collectively, the results from these four experiments suggest that people’s endorsement of a given preparatory exercise (i.e., high-level or low-level) is sensitive to the demands of the scenario presented to them.

**Preferences for high-level versus low-level preparatory exercises.** Recall that in addition to ratings of usefulness, Experiments 2–4 also assessed participants’ preferences for high-level versus low-level construal in anticipation of high-level and low-level scenarios. To analyze these data, we conducted repeated measures ANOVAs to test the effect of scenario (high-level vs. low-level vs. control) on preference ratings in each experiment (see Table 4). As predicted, preferences for high-level versus low-level construal differed significantly by scenario in all four experiments. Simple comparisons revealed that participants preferred high-level versus low-level preparatory exercises in anticipation of high-level scenarios, and preferred low-level versus high-level preparatory exercises in anticipation of low-level sce-

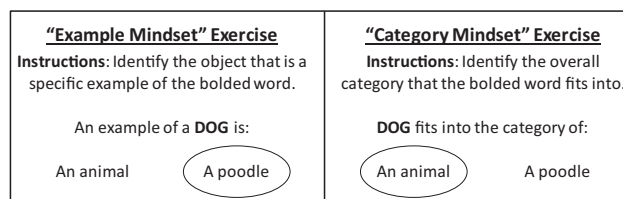


Figure 4. Example and category mindset exercises for Experiment 4.



Table 2

Results of the 3 (Scenario: High-Level vs. Low-Level vs. Control)  $\times$  2 (Construal: High-Level vs. Low-Level)  $\times$  2 (Order: High-Level First vs. Low-Level First) Repeated Measures ANOVA on Usefulness Ratings for Experiments 2–4

Experiment	<i>F</i>	<i>df</i>	<i>p</i>	$\eta_p^2$	High-level	Low-level	Control
					<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )
a) Main effect of scenario							
2a: Why/how	12.72	(2, 168)	<.001	0.13	5.02 (0.60) <sup>a</sup>	4.72 (0.64) <sup>b</sup>	4.92 (0.57) <sup>a</sup>
2b: Why/how	13.1	(2, 166)	<.001	0.14	4.86 (0.65) <sup>a</sup>	4.55 (0.73) <sup>b</sup>	4.77 (0.66) <sup>a</sup>
3: Global/local	2.98	(2, 168)	0.054	0.03	4.51 (0.97) <sup>a</sup>	4.60 (0.88) <sup>a</sup>	4.43 (0.98) <sup>a</sup>
4: Category/example	25.31	(2, 370)	<.001	0.12	4.30 (0.89) <sup>a</sup>	4.26 (0.90) <sup>a</sup>	4.51 (0.91) <sup>b</sup>
b) Main effect of construal level							
2a: Why/how	2.42	(1, 84)	0.124	0.03	4.83 (0.66)	4.94 (0.56)	
2b: Why/how	1.3	(1, 83)	0.257	0.02	4.68 (0.71)	4.77 (0.61)	
3: Global/local	4.44	(1, 84)	0.038	0.05	4.44 (0.94)	4.59 (0.92)	
4: Category/example	14.47	(1, 185)	<.001	0.07	4.26 (0.88)	4.45 (0.94)	
c) Scenario $\times$ construal level							
2a: Why/how	92.31	(2, 168)	<.001	0.52			
2b: Why/how	61.9	(2, 166)	<.001	0.43			
3: Global/local	32.32	(2, 168)	<.001	0.28			
4: Category/example	12.41	(2, 370)	<.001	0.06			

Note. Different superscript letters denote significant differences within rows at  $p < .05$ .

narios (Experiment 2a:  $d = 1.15$ ; Experiment 2b:  $d = 1.03$ ; Experiment 3:  $d = 0.72$ ; Experiment 4:  $d = 0.41$ ). Additionally, preferences for high-level versus low-level preparatory exercises in high-level scenarios were significantly higher than preferences in the control condition in three experiments (Experiment 2a:  $d = 0.68$ ; Experiment 2b:  $d = 0.46$ ; Experiment 3:  $d = 0.39$ ) and directionally consistent in the fourth (Experiment 4:  $d = 0.05$ ). Preferences for low-level versus high-level preparatory exercises in anticipation of low-level scenarios relative to control were significantly lower in all four experiments (Experiment 2a:  $d = 0.77$ ; Experiment 2b:  $d = 0.82$ ; Experiment 3:  $d = 0.49$ ; Experiment 4:  $d = 0.34$ ). Taken together, results from these four experiments suggest that participants prefer preparatory exercises that afford opportunities to create task-motivation fit.

To explore more deeply the reasoning behind participants' preferences, we conducted mediation analyses to test whether participants' usefulness ratings of high-level and low-level preparatory exercises mediate the effect of scenario type on preferences. All mediation analyses were conducted using the MEMORE (MEDiation and MODeration for REpeated measures; Montoya & Hayes, 2017) SPSS macro. One current limitation of MEMORE is that it is only capable of analyzing repeated measures data with two conditions. As such, our analyses focused on comparing responses to high-level versus low-level scenarios. To simplify analyses for each experiment, we computed difference scores whereby we subtracted the usefulness of low-level construal from the usefulness of high-level construal within each high-level and low-level scenario. Next, we averaged these difference scores to compute two indices: strategy knowledge within high-level scenarios and strategy knowledge within low-level scenarios. Lastly, we averaged preference ratings within each scenario type (high-level vs. low-level).<sup>5</sup> In all four experiments, mediation analyses revealed a significant indirect effect of scenario type on preferences for high-level versus low-level preparatory exercises through perceived usefulness of high-level and low-level preparatory exercises (see Figure 6). Collectively, these results suggest that people

preferred engaging in high-level versus low-level preparatory exercises for high-level versus low-level regulatory tasks, respectively, in part because of the perceived usefulness of such preparatory exercises when anticipating these tasks.

## Discussion

Experiments 2–4 all suggested that people not only distinguish tasks in which performance benefits from high-level versus low-level construal (task knowledge), but they also understand the strategic means to induce these motivational states (strategy knowledge) to create task-motivation fit. In all four experiments, participants' ratings of usefulness of high-level versus low-level preparatory exercises were dependent on whether they were anticipating high-level versus low-level regulatory tasks. Generally speaking, analyses within each scenario type suggested that people recognize that high-level (vs. low-level) preparatory exercises are more useful in anticipation of high-level (vs. low-level) regulatory tasks. Moreover, analyses across scenario types suggested that people recognize that high-level preparatory exercises are more useful in anticipation of high-level relative to low-level and control tasks, and that low-level preparatory exercises are more useful in anticipation of low-level relative to high-level and control tasks. Further, all four experiments provided evidence that people prefer high-level versus low-level preparatory exercises in anticipation of high-level versus low-level regulatory tasks, and that these preferences are mediated by their beliefs about the usefulness of these preparatory exercises.

Critically, we replicated these effects across three distinct operationalizations of construal level that varied in the extent to which they were intuitive: thinking about why versus how, global versus local

<sup>5</sup> In Experiments 2a and 2b, we also ran a parallel mediation analysis that included participants' perceived usefulness, difficulty, and enjoyment of why minus how. Consistent with analyses in the main text, only the usefulness of why minus how mediated the effect of scenario on preferences (see Figure 9 in the online supplement).

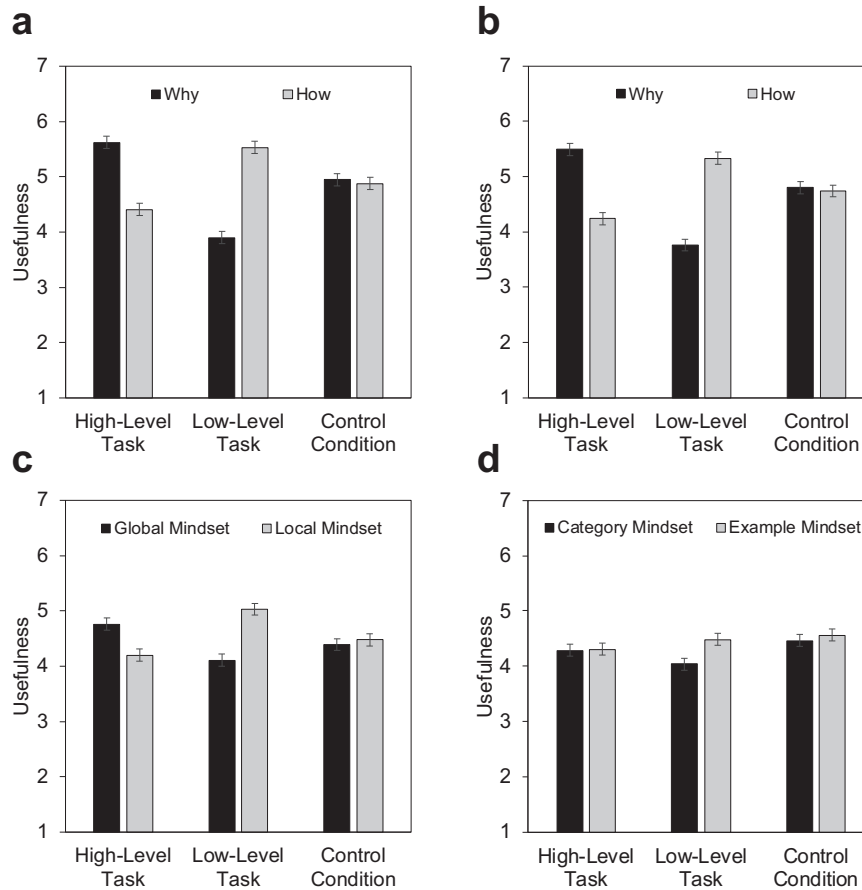


Figure 5. Average endorsement of high-level and low-level construal preparatory exercises for tasks that benefit from high-level construal versus low-level construal versus neither (control; a–Experiment 2a, b–Experiment 2b, c–Experiment 3, and d–Experiment 4).

visual processing, and categorization versus exemplification. For example, when faced with a high-level task such as receiving criticism about one's valued organization, participants were more likely to report that completing a preparatory exercise that required engaging in global visual processing (Experiment 3) would benefit performance. By contrast, when faced with a low-level task such as throwing darts, they were more likely to report that completing a preparatory exercise that required engaging in local visual processing would benefit performance (Experiment 3). Despite how increasingly dissimilar the construal level operationalizations were from the regulatory tasks, people recognized how to create task-motivation fit. For example, participants reported that recycling despite the inconvenience (relative to shooting basketball free throws) would be better served by thinking about superordinate categories. Further, participants reported that performance on a Stroop task (relative to emotion regulation) would be better served by thinking about subordinate exemplars (Experiment 4). Thus, these experiments provide evidence that people not only recognize when task performance demands high-level versus low-level construal (task knowledge), but they can also identify numerous means by which to instantiate these motivational states (strategy knowledge).

Although these experiments provide initial evidence that people have metamotivational knowledge of the role of construal level, there

are some limitations. First, participants were tasked with considering only two strategies per scenario—a situation that is simplified relative to the real world in which multiple strategies are likely to be simultaneously available. Relatedly, because construal level represents just one of the many motivational orientations people can instantiate to prepare for tasks, a more stringent test of our hypothesis would include more varied options—some that relate to construal level and some that do not. Further, all experiments thus far have relied on the same population (MTurk workers). Generalizing the findings beyond this particular population might help address concerns about external validity. Finally, all previous experiments presented participants with an opportunity to read about and/or practice the high-level versus low-level construal preparatory exercises before completing the metamotivational knowledge assessment. This “psychoeducation” component may strike some as artificial—one not likely to characterize experiences in daily life. Although we intended for these instructions to help participants label and describe particular motivational states, it is always possible that this introduced methodological artifacts that inflated our effect sizes. Experiment 5 addresses each of these concerns and allows us to test if people can exhibit metamotivational knowledge under more complex or realistic conditions.

Table 3  
Simple Comparisons for Usefulness Ratings for High-Level and Low-Level Construal Across Scenario Type for Experiments 2–4

Measure	Low-level	Control	High-level	<i>F</i>	<i>df</i>	<i>p</i>	$\eta_p^2$
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )				
Experiment 2a							
Why	3.90 (1.09) <sup>a</sup>	4.95 (.88) <sup>b</sup>	5.62 (.85) <sup>c</sup>	94.59	(2, 172)	<.001	.52
How	5.53 (.83) <sup>a</sup>	4.88 (.80) <sup>b</sup>	4.41 (.88) <sup>c</sup>	46.73	(2, 170)	<.001	.36
Experiment 2b							
Why	3.76 (1.21) <sup>a</sup>	4.80 (.87) <sup>b</sup>	5.49 (1.04) <sup>c</sup>	70.39	(2, 168)	<.001	.46
How	5.33 (.96) <sup>a</sup>	4.74 (.86) <sup>b</sup>	4.24 (1.00) <sup>c</sup>	32.29	(2, 168)	<.001	.28
Experiment 3							
Global	4.11 (1.08) <sup>a</sup>	4.39 (1.05) <sup>b</sup>	4.76 (1.19) <sup>c</sup>	15.82	(2, 170)	<.001	.16
Local	5.03 (1.08) <sup>a</sup>	4.48 (1.09) <sup>b</sup>	4.20 (1.09) <sup>c</sup>	28.52	(2, 170)	<.001	.25
Experiment 4							
Category	4.04 (.96) <sup>a</sup>	4.46 (1.00) <sup>b</sup>	4.29 (1.03) <sup>c</sup>	26.23	(2, 372)	<.001	.12
Example	4.48 (1.08) <sup>a</sup>	4.56 (1.02) <sup>a</sup>	4.31 (1.06) <sup>b</sup>	9.24	(2, 372)	<.001	.05

Note. Different superscript letters denote significant differences within rows at  $p < .05$ .

### Experiment 5: Recognizing the Role of Construal Level in the Presence of Distractors

#### Method

**Participants.** Workers from Prolific.ac with an approval rate >95% participated in exchange for \$1.20 ( $N = 100$ ;  $M_{\text{age}} = 28.45$ ;  $SD_{\text{age}} = 9.67$ ; 48 women, 50 men, 1 transgender, 1 unidentified; 24% United States, 37% United Kingdom, 39% from 16 other countries).

**Materials and procedure.** Experiment 5 used the same materials as Experiment 1 with four exceptions. First, we did not describe high-level and low-level construal to participants in the instructions before the presentation of scenarios. Instead, participants were simply told, “People often spend time thinking about upcoming events, and they can think about the same event in many different ways. Some ways of thinking can prepare us to help us reach our goals, whereas other ways can prevent us from reaching our goals.” Second, instead of using the set of three colloquial phrases describing high-level and low-level construal, we used only one of the phrases to convey high-level construal (i.e., zoom out to have a broad perspective) and low-level construal (i.e., zoom in to have a narrow perspective). Third, in addition to assessing participants’ usefulness ratings of high-level and low-level construal, we also assessed their usefulness ratings of two distractors

unrelated to construal level (“get psyched and get pumped up” and “take a deep breath and relax”). We manipulated the presentation order of these four motivational orientations using a modified Latin square. The only constraint in the presentation order was that strategy pairs were never presented next to each other. Thus, we created four conditions with the following orders: (a) zoom out, pump up, zoom in, relax; (b) pump up, zoom out, relax, zoom in; (c) zoom in, relax, zoom out, pump up; and (d) relax, zoom in, pump up, zoom out. Participants were randomly assigned to one of these four conditions and saw the same order of strategies for every scenario. Lastly, as these distractors essentially represent a control condition, we presented participants with only six high-level and six low-level scenarios (see Table 1).

At the end of the experiment, participants reported demographics and responded to our attention checks. Further, to ensure that our MTurk and Prolific samples were independent, we asked participants if they had previously completed a survey with similar materials as the current survey. Participants were then debriefed and compensated.

#### Results

Using the exclusion criteria described earlier as well as excluding participants who said they have previously completed a survey using similar materials ( $n = 3$ ), we had a final  $N = 94$ .

Table 4  
Main Effects and Simple Comparisons for Repeated Measures ANOVAs on Preferences Ratings for Experiments 2–4

Experiment	Effect of scenario				Low-level	Control	High-level
	<i>F</i>	<i>df</i>	<i>p</i>	$\eta_p^2$	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )
2a: Why/how	76.27	(2, 172)	<.001	.47	2.72 (1.11) <sup>a</sup>	3.65 (.99) <sup>b</sup>	4.54 (.97) <sup>c</sup>
2b: Why/how	57.64	(2, 162)	<.001	.42	2.70 (1.12) <sup>a</sup>	3.81 (1.06) <sup>b</sup>	4.43 (1.13) <sup>c</sup>
3: Global/local	28.53	(2, 170)	<.001	.25	2.86 (1.12) <sup>a</sup>	3.38 (1.13) <sup>b</sup>	3.83 (1.21) <sup>c</sup>
4: Category/example	18.01	(2, 372)	<.001	.09	3.03 (.89) <sup>a</sup>	3.35 (.89) <sup>b</sup>	3.40 (.91) <sup>b</sup>

Note. ANOVA = analysis of variance. Different superscript letters denote significant differences within rows at  $p < .05$ .

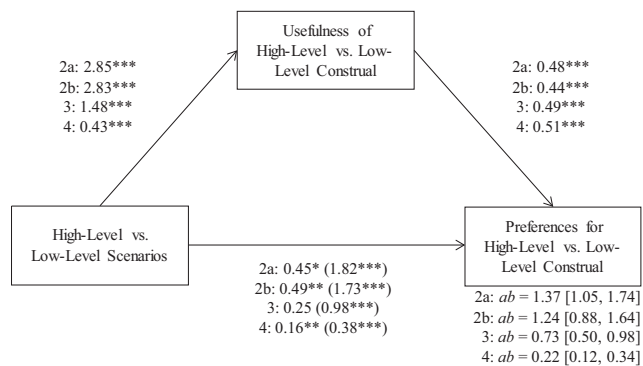


Figure 6. Mediation model for Experiments 2–4 depicting the effect of high-level scenarios versus low-level scenarios on preferences for high-level versus low-level construal, mediated by perceived usefulness of high-level versus low-level construal. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**Usefulness of construal level and distractors.** To examine participants’ endorsement of various motivational orientations, we conducted a 2 (scenario: high-level vs. low-level)  $\times$  4 (orientation: zoom in vs. zoom out vs. pump up vs. relax)  $\times$  4 (orientation order) mixed ANOVA. There was a significant main effect of scenario such that participants generally provided higher ratings for low-level scenarios ( $M = 4.87, SD = 0.48$ ) than for the high-level scenarios ( $M = 4.58, SD = 0.40$ ),  $F(1, 90) = 58.94, p < .001, \eta_p^2 = .40$ . Results also revealed a significant main effect of orientation,  $F(3, 90) = 111.90, p < .001, \eta_p^2 = .55$ . Specifically, participants’ ratings of each orientation were significantly different from each other, with the highest ratings for “relax” ( $M = 5.76, SD = 0.63$ ), followed by “zoom out” ( $M = 4.93, SD = 0.72$ ), “zoom in” ( $M = 4.38, SD = 0.80$ ), and “pump up” ( $M = 3.84, SD = 0.89$ ). Critically, as predicted, these main effects were qualified by a significant interaction between scenario and orientation,  $F(3, 90) = 177.03, p < .001, \eta_p^2 = .66$  (see Figure 7). Order did not moderate these effects,  $ps > .16$ . In what follows, based on a priori predictions, we examine participants’ endorsement as a function of orientation type, starting with construal level.

**Usefulness of high-level and low-level construal.** To examine whether participants recognized how to create task-motivation fit with construal level even in the presence of distractors, we conducted a 2 (scenario: high-level vs. low-level)  $\times$  2 (construal: high-level vs. low-level)  $\times$  4 (orientation order) mixed ANOVA. Results revealed a nonsignificant main effect of scenario,  $F(1, 90) = 2.20, p = .14, \eta_p^2 = .02$ . There was a significant main effect of construal such that participants rated high-level construal ( $M = 4.93, SD = 0.72$ ) as more useful than low-level construal ( $M = 4.38, SD = 0.80$ ),  $F(1, 90) = 22.45, p < .001, \eta_p^2 = .20$ . Critically, the interaction between scenario and construal level was significant,  $F(1, 90) = 242.35, p < .001, \eta_p^2 = .73$ . Order did not moderate the interaction,  $F(3, 90) = 0.20, p = .89, \eta_p^2 = .01$ .

To interpret this interaction, we first examined whether participants recognized the comparative usefulness of high-level and low-level construal within each type of scenario. As predicted, participants rated high-level construal ( $M = 5.98, SD = 0.78$ ) as more useful than low-level construal ( $M = 3.25, SD = 1.13$ ) for high-level tasks,  $t(93) = 16.34, p < .001, 95\% \text{ CI } [2.40, 3.06], d =$

1.70. Further, consistent with predictions, participants rated low-level construal ( $M = 5.50, SD = 1.01$ ) as more useful than high-level construal ( $M = 3.88, SD = 1.20$ ) for low-level tasks,  $t(93) = 8.48, p < .001, 95\% \text{ CI } [1.25, 2.01], d = 0.88$ . Next, we examined whether participants recognized the usefulness of construal level across scenario types. As expected, participants rated high-level construal as more useful for high-level tasks than low-level tasks,  $t(93) = 14.26, p < .001, 95\% \text{ CI } [1.81, 2.39], d = 1.51$ . By contrast, participants rated low-level construal as more useful for low-level tasks than high-level tasks,  $t(93) = 15.32, p < .001, 95\% \text{ CI } [1.96, 2.55], d = 1.59$ . Taken together, these findings suggest that participants were able to recognize the role of construal level in creating task-motivation fit, despite the presence of distractors.

**Usefulness of distractors.** Next, we examined whether participants rated the distractors as differentially useful for high-level and low-level tasks. To do so, we conducted a 2 (scenario: high-level vs. low-level)  $\times$  2 (distractor: pump up vs. relax)  $\times$  4 (orientation order) mixed ANOVA. Results revealed a significant main effect of scenario, such that participants provided higher ratings of the distractors for the low-level scenarios ( $M = 5.06, SD = 0.64$ ) than the high-level scenarios ( $M = 4.55, SD = 0.52$ ),  $F(1, 90) = 74.43, p < .001, \eta_p^2 = .45$ . There was also a significant main effect of distractor, such that participants rated “take a deep breath and relax” ( $M = 5.76, SD = 0.63$ ) as more useful than “get psyched and get pumped up” ( $M = 3.84, SD = 0.89$ ),  $F(1, 90) = 262.64, p < .001, \eta_p^2 = .75$ . Critically, these main effects were not qualified by an interaction between scenario and distractor,  $F(1, 90) = 0.87, p = .35, \eta_p^2 = .01$ . That is, although the distractors differed in perceived usefulness, these ratings were insensitive to scenario (i.e., endorsement of the distractors did not appear to be guided by attempts to create construal level task-motivation fit). Moreover, effects were not moderated by order,  $ps > .32$ .

**Discussion**

Experiment 5 demonstrated that participants were still able to exhibit metamotivational knowledge of construal level in the absence of “psychoeducation” training and in the simultaneous presence of competing distractors unrelated to construal level. Thus, Experiment 5 provided evidence that participants can recognize

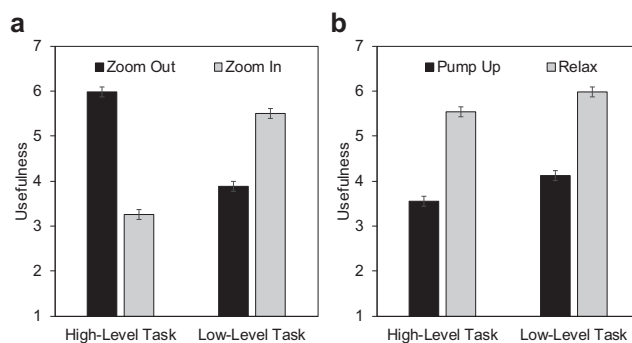


Figure 7. Average endorsement of zooming out and zooming in (a) and getting pumped up and relaxing (b) for tasks that benefit from high-level versus low-level construal (Experiment 5).

how to create task-motivation fit under more stringent or realistic conditions relative to Experiments 2–4. Moreover, Experiment 5 represents a conceptual replication of Experiment 1 with a more diverse sample. Thus, the evidence that people have this metamotivational knowledge does not appear to be the result of methodological artifacts; people indeed appear to have the some of the necessary knowledge to create task-motivation fit.

This conclusion is further bolstered by the results of an experiment that we report in our online supplement (supplemental Experiment 1). Rather than present distractors that were unrelated to construal level, this experiment instead pitted three pairs of construal level strategies against each other: why/how, global/local, and category/exemplar. By presenting multiple construal level strategies simultaneously, we sought to present them to participants as potential competitors. Despite this, participants still recognized all three high-level construal strategies as beneficial for performance on high-level tasks, and all three low-level construal strategies as beneficial for performance on low-level tasks. These data further suggest that the results of Experiments 2–4 are not reducible to methodological factors.

It bears noting that the distractor strategies in Experiment 5 were seen as viable alternatives to high-level and low-level construal. Of note, participants rated the motivational orientation of “relaxing” as generally useful. This finding suggests that there may be times in which a different approach may be chosen over construal level, even when the latter creates task-motivation fit. These findings highlight an important insight: although task and strategy knowledge are necessary conditions for creating task-motivation fit, they may not be sufficient conditions (e.g., Miele & Scholer, 2018). We elaborate on this issue further in the General Discussion.

### Experiment 6: Creating Task-Motivation Fit in Behavioral Choice

Experiment 6 extends the previous experiments by exploring the implications of metamotivational task and strategy knowledge for people’s decision making. To this end, Experiment 6 examined whether individual differences in metamotivational knowledge—as measured by the knowledge assessments used in the previous experiments—can predict people’s behavioral decisions for how to prepare for an upcoming task. Specifically, Experiment 6 first asked participants to assess the usefulness of global versus local mindsets in the metamotivational knowledge assessment. Participants then learned about two tasks with the expectation that they might perform one later in the study: a high-level task (delay discounting; Fujita et al., 2006) and a low-level task (picture completion; Wakslak, Trope, Liberman, & Alony, 2006). Of note, these two tasks were not among those described within the knowledge assessment. After exposure to these tasks, participants were asked to choose the preparatory exercise (i.e., global or local mindset) that would help “set their mind” to perform each of the performance tasks. In this way, we created a context in which participants’ choices ostensibly had consequences for their experience of the performance tasks. This experimental design allowed us to examine the implications of metamotivational knowledge for behavioral choice.

## Method

**Participants.** MTurk workers in the United States with a HIT approval rate >97% participated in exchange for \$0.75 ( $N = 202$ ;  $M_{\text{age}} = 38.92$ ,  $SD_{\text{age}} = 12.01$ , 135 women, 67 men).

**Materials and procedure.** Participants first learned about and practiced the global and local mindset exercises (counterbalanced). They were then presented with 15 scenarios (five each of type; see Table 1) that comprised the domain-general knowledge assessment. In the assessment, participants were asked to provide ratings of task difficulty, task enjoyment, and the perceived usefulness of the global and local mindset exercises (counterbalanced). This part of Experiment 6 is essentially a replication of Experiment 3 with more scenarios.

**Preview of high-level and low-level regulatory tasks.** Participants then read that they would preview two tasks and then choose a preparatory exercise to set their mind for each task. The order of task previews was counterbalanced. The task previews served to familiarize participants with the tasks’ demands so they could make informed choices about them. Critically, participants were instructed that they might be randomly assigned to complete one of these tasks, and if so, they would be provided the corresponding preparatory exercise that they indicated that they preferred. Thus, the choice between preparatory exercises was presented as one with potential consequences for participants’ task experience.

The high-level task (i.e., “Pick Your Prize” task) was an adaptation of the delay discounting scenario used in previous experiments (e.g., Kirby & Maraković, 1996; Kirby, Petry, & Bickel, 1999; see also Fujita et al., 2006; Malkoc et al., 2010). Participants read that they would be making a series of decisions about their preferences for various monetary outcomes that varied in amount and timing. Essentially, the task assessed participants’ preferences for larger-later over the smaller-sooner monetary outcomes. In the practice trials, participants chose between receiving \$55 today or \$75 in 61 days as well as \$34 today or \$50 in 30 days.

The low-level task (i.e., “Spot the Missing Detail” task) was based on the vigilance scenarios used in previous experiments. This vigilance task was adapted from the picture completion task of the Wechsler Intelligence Scale for Children (Wechsler, 1991; see Wakslak et al., 2006). Participants read that they would be asked to identify missing components within images. They were tasked with visually scanning each image systematically, and using the computer mouse to click the region of the picture in which they detected a missing component. In the practice trial, participants were presented with an image of a dresser drawer and practiced scanning the image to identify a missing drawer knob.

**Preferences for high-level versus low-level construal.** After practicing each task, participants were presented with a binary choice between the global versus local mindset exercise to help them “set their mind” to perform as well as possible on the focal task. Following their initial binary choice between the global versus local mindset, they also indicated to what extent they preferred their selected preparatory exercise (1 = *strongly prefer local*, 6 = *strongly prefer global*). Participants also rated the usefulness of the global and local mindset exercises for each task. For clarity and concision, analyses of the continuous measure of

preferences and usefulness ratings, which replicated the binary choice results, are reported in the [online supplement](#).

**Motivation, anticipated task difficulty, and anticipated task enjoyment.** We also assessed several control variables. Participants rated their motivation for each task: To what extent are you motivated to perform well on the task? To what extent are you invested in your performance for the task? To what extent is it important for you to perform well on the task? (e.g., 1 = *extremely unmotivated*, 7 = *extremely motivated*). These were combined to create overall motivation ratings for each task ( $\alpha > .89$ ). Participants also rated anticipated task difficulty and enjoyment. As none of these variables impacted the interpretation of results, we do not discuss them further.

We then informed all participants that they would not be asked to complete a preparatory exercise nor a performance task.<sup>6</sup> Finally, participants reported demographics, responded to our attention checks, and were then debriefed and compensated.

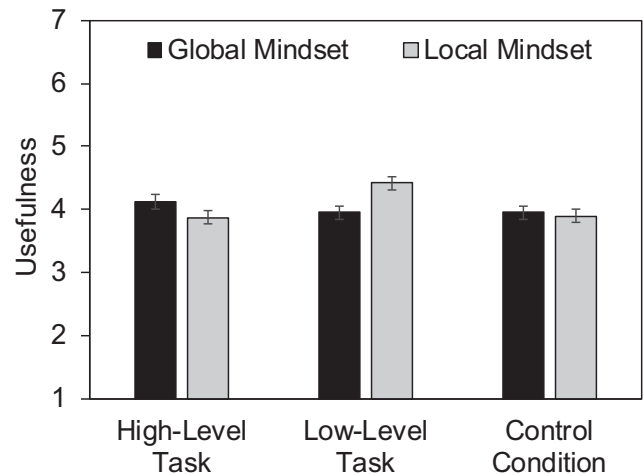
## Results

Using the exclusion criteria detailed above, we had a final  $N = 160$ .

**Domain-general metamotivational knowledge.** Participants' ratings of the perceived usefulness of global and local mindsets in response to the hypothetical scenarios represented an assessment of their domain-general metamotivational knowledge. As mentioned previously, these analyses represent a replication of Experiment 3. To analyze these data, we conducted a 3 (scenario: high-level vs. low-level vs. control)  $\times$  2 (preparatory exercise: global vs. local mindset)  $\times$  2 (order: global first vs. local first) mixed ANOVA. Results revealed a significant main effect of scenario,  $F(2, 316) = 13.44, p < .001, \eta_p^2 = .08$ . The main effect of preparatory exercise was not significant,  $F(1, 158) = 2.65, p = .11, \eta_p^2 = .02$ . Critically, consistent with predictions, the interaction between scenario and preparatory exercise was significant,  $F(2, 316) = 25.97, p < .001, \eta_p^2 = .14$ .

To explore this interaction, we first examined participants' recognition of the comparative effectiveness of global versus local mindsets given a particular scenario (see [Figure 8](#)). As expected, for high-level scenarios, participants recognized that the global mindset ( $M = 4.13, SD = 1.39$ ) would be more useful than the local mindset ( $M = 3.87, SD = 1.24$ ),  $t(159) = 4.49, p < .001, 95\% CI [0.15, 0.38], d = 0.36$ . In contrast, for low-level scenarios, participants recognized that the local mindset ( $M = 4.42, SD = 1.37$ ) would be more useful than the global mindset ( $M = 3.95, SD = 1.15$ ),  $t(159) = 5.49, p < .001, 95\% CI [0.30, 0.63], d = 0.45$ . There were no significant differences in the control condition between the usefulness ratings of global ( $M = 3.95, SD = 1.32$ ) and local mindsets ( $M = 3.90, SD = 1.29$ ),  $t(159) = 0.73, p = .47, 95\% CI [-0.07, 0.16], d = 0.07$ . As in Experiment 3, these results suggest that people can differentiate whether the global versus local mindset should be more effective for a given regulatory task.

Next, we examined participants' endorsement of a given preparatory exercise across scenarios. As expected, participants rated the global mindset as more useful for high-level relative to low-level and control scenarios, *HL versus LL*:  $t(159) = 1.89, p = .06, 95\% CI [-0.01, 0.36], d = 0.16$ ; *HL versus control*:  $t(159) = 3.07, p = .003, 95\% CI [0.06, 0.30], d = 0.24$ . In contrast, participants rated the local mindset as more useful for low-level relative to



*Figure 8.* Average endorsement of global and local mindsets for tasks that benefit from high-level construal versus low-level construal versus neither (control; Experiment 6).

high-level and control scenarios, *LL versus HL*:  $t(159) = 8.06, p < .001, 95\% CI [0.41, 0.68], d = 0.65$ ; *LL versus control*:  $t(159) = 7.08, p < .001, 95\% CI [0.37, 0.66], d = 0.57$ . Again, as before, these findings suggest that participants generally appreciated that the same preparatory exercise is differentially useful across the various hypothetical tasks.

**Behavioral choice.** Recall that participants chose between two preparatory exercises in anticipation of the delay discounting task and picture completion task. These choices represented an opportunity for participants to create task-motivation fit in preparation for a performance task. Providing evidence for our primary hypothesis, a McNemar test revealed that participants' choices of global versus local mindsets differed significantly as a function of task,  $p < .001$ . Specifically, results revealed that a greater percentage of participants chose the global (56.2%) versus local mindset (43.8%) in anticipation of the delay discounting task, and the local (71.9%) versus global mindset (28.1%) in anticipation of the picture completion task (see [Table 5](#)). These results, moreover,

<sup>6</sup> As our primary dependent variable was behavioral choice between the global versus local mindset for each task, we did not ask participants to complete a preparatory exercise and performance task for three critical reasons. First, although it is important to assess the extent to which metamotivational knowledge is associated with successful task performance, task and strategy knowledge represent necessary but not sufficient conditions for task-motivation fit (e.g., [Miele & Scholer, 2018](#); see also Experiment 5). The other necessary conditions (e.g., the ability to detect one's current motivational state—i.e., self knowledge; [Scholer & Miele, 2016](#)) deserve systematic investigation in their own right, and are, thus, beyond the scope of the present article. Moreover, even when people have the requisite metamotivational knowledge (task, strategy, and self knowledge), the link between knowledge and performance depends on successful knowledge implementation. Factors such as motivation, opportunity, and ability can impact knowledge implementation. We elaborate on these important future directions in the General Discussion, but suggest that they are beyond the scope of the present work. Third, as performance was not the critical dependent variable, we saw little value in the increased cost and burden on participants that implementing these materials and procedures would require.

Table 5  
Behavioral Choice for the Global and Local Mindsets for the Delay Discounting (DD) and Picture Completion (PC) Tasks in Experiment 6

Behavioral Choice	Local mindset for PC task	Global mindset for PC task	Total
Local Mindset for DD task	50 (31.3%)	20 (12.5%)	70 (43.8%)
Global Mindset for DD task	65 (40.6%)	25 (15.6%)	90 (56.2%)
Total	115 (71.9%)	45 (28.1%)	160 (100%)

provide a revealing window into individual differences. Specifically, 40.6% of the sample chose the correct preparatory exercise for both tasks, whereas 12.5% chose the wrong preparatory exercise for both tasks. Further, 31.3% overgeneralized the benefits of the local mindset and 15.6% overgeneralized the benefits of the global mindset. This pattern of behavioral decisions is consistent with the proposition that although most generally understand the benefits of high-level versus low-level construal for various performance tasks, there may be important individual differences in the accuracy of this knowledge.

We also conducted nonparametric binomial tests on participants' choices within each task to examine whether participants' choices differed from chance (i.e., from 50%). As expected, participants' choice of the local mindset for the picture completion task (71.9%) was significantly different from chance,  $p < .001$ . While participants' choice of the global mindset for the delay discounting task (56.3%) was not significantly different from chance ( $p = .13$ ), percentages were directionally consistent with our hypotheses. Mediation analyses (reported and depicted in Figure 10 in the online supplement), suggest that the effect of task type on behavioral choices is mediated by the perceived usefulness of the preparatory exercises in promoting performance.

**Using domain-general metamotivational knowledge to predict behavioral choice.** Next, we examined whether the domain-general knowledge assessment predicted choices of preparatory exercises in anticipation of the delay discounting versus picture completion tasks. To do so, we created a high-level knowledge

index by subtracting the usefulness ratings of the local mindset from the global mindset for high-level scenarios and averaged the difference scores. We also created a low-level knowledge index by subtracting the usefulness ratings of the global mindset from the local mindset for low-level scenarios and averaged the difference scores. Knowledge indices were moderately correlated,  $r(160) = .39, p < .001$ . To predict behavioral choices from domain-general knowledge, we conducted a mixed effects logistic regression with an unstructured covariance matrix. Specifically, we simultaneously regressed binary choices (0 = local mindset, 1 = global mindset) on task (within-participants; effects-coded:  $-0.5 =$  picture completion,  $0.5 =$  delay discounting), high-level knowledge, low-level knowledge, the interaction between task and high-level knowledge, and the interaction between task and low-level knowledge—modeling participant as a random effect and all other variables as fixed effects. Continuous predictors were standardized before computing interaction terms. Parallel analyses of the continuous ratings of preferences revealed similar results and are reported in the online supplement.

**High-level knowledge.** Analyses revealed a significant effect of task,  $\beta = 1.43, SE = 0.28, z = 5.04, p < .001$ . This effect was qualified by the predicted interaction between task and high-level knowledge,  $\beta = 1.07, SE = 0.35, z = 3.03, p = .002$  (see Figure 9a). To explore this interaction, we first examined these data as a function of amount of knowledge across tasks. Consistent with predictions, those who were 1 SD above the mean on high-level knowledge were 12.15 times as likely to choose the global mindset for the delay discounting versus picture completion task ( $OR = 12.15, 95\% CI [4.76, 36.39], p < .001$ ), whereas those who were 1 SD below the mean on high-level knowledge were not any more likely to do so ( $OR = 1.43, 95\% CI [0.68, 3.05], p = .38$ ). Next, we analyzed these same data as a function of knowledge within each task. As expected, analyses suggested that high-level knowledge predicted choice of the global versus local mindset in anticipation of the delay discounting task ( $OR = 1.65, 95\% CI [1.07, 2.70], p = .03$ ). Somewhat surprisingly, high-level knowledge also led to an increased tendency to choose the local over the global mindset in anticipation of the picture completion task ( $OR = 0.57, 95\% CI [0.32, 0.93], p = .04$ ). This unexpected effect may be the

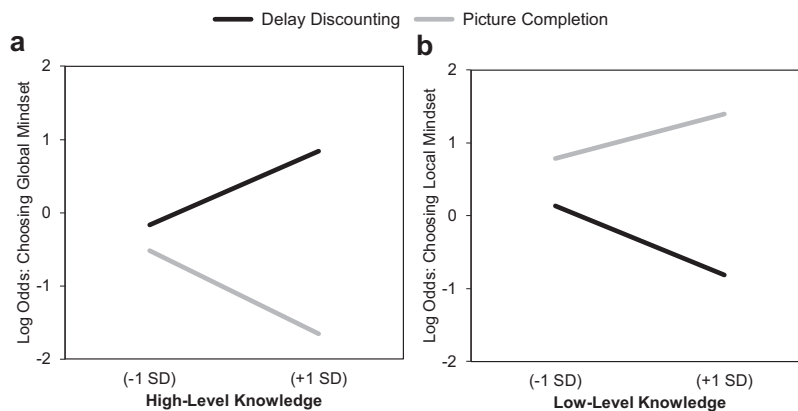


Figure 9. Individual differences in high-level knowledge (a) and low-level knowledge (b) predict the log odds of choosing the global (a) versus local (b) mindset for the delay discounting task and picture completion task (Experiment 6).

result of the binary nature of the choice context—knowing well that one should not use one preparatory exercise may promote choice of the other. We elaborate on this issue further in the Discussion. Nevertheless, in summary, knowledge of the benefits of global relative to local mindsets predicted choice of the global mindset induction in anticipation of the delay discounting relative to picture completion task—providing initial evidence that one might be able to use a domain-general knowledge measure based on hypothetical scenarios to predict actual behavioral choices.

**Low-level knowledge.** Further, as predicted, results revealed a significant interaction between task and low-level knowledge,  $\beta = 0.78$ ,  $SE = 0.31$ ,  $z = 2.54$ ,  $p = .01$  (see Figure 9b). To explore this interaction, we again first analyzed the effect of amount of knowledge across tasks. Consistent with predictions, those who were 1 *SD* above the mean on low-level knowledge were 9.09 times as likely to choose the local mindset for the picture completion versus delay discounting task ( $OR = 9.09$ , 95% CI [3.91, 23.93],  $p < .001$ ), whereas those who were 1 *SD* below the mean on low-level knowledge were not significantly more likely to do so ( $OR = 1.91$ , 95% CI [0.92, 4.00],  $p = .08$ ). Next, we examined the effect of knowledge within each task. Low-level knowledge did not predict choice within the picture-completion task ( $OR = 0.74$ , 95% CI [0.46, 1.12],  $p = .18$ ), although it was directionally consistent with predictions. That is, greater low-level knowledge was generally associated with choice of local mindsets in anticipation of the picture-completion task. Low-level knowledge did, however, predict choices within the delay discounting task ( $OR = 1.61$ , 95% CI [1.08, 2.54],  $p = .03$ ). The latter finding parallels the unexpected effect of high-level knowledge on choice of the “mismatching” picture completion task. In summary, although not definitive, these findings provide initial evidence that one might be able to assess domain-general knowledge using hypothetical scenarios to predict actual behavioral choices.

## Discussion

Findings from Experiment 6 provided further evidence that people recognize how to create task-motivation fit in the context of construal level theory. In addition to replicating Experiment 3, Experiment 6 yielded two novel contributions. First, the previous five experiments observed metamotivational knowledge in hypothetical scenarios; Experiment 6 extended these observations to behavioral choice. Thus, rather than represent inconsequential beliefs, metamotivational knowledge appears to shape the decisions people make as they pursue their goals. Second, although results were not entirely conclusive, Experiment 6 provided preliminary evidence that one can predict behavioral choices from individual differences in metamotivational knowledge—measured by a domain-general assessment based on hypothetical scenarios.

Though choosing the correct preparatory exercise for both tasks was the modal response (40.6% of participants), a substantial proportion of participants overgeneralized the benefits of the local and global mindsets (31.3 and 15.6%, respectively). This is consistent with the proposition that although people generally understand the benefits of construal level for various tasks, there may be important individual differences in their beliefs. Although correct beliefs may lead to task-motivation fit (and perhaps enhanced task experiences), misbeliefs may lead to systematic nonfit (and per-

haps poor task experiences). These findings highlight one of the central insights of the metamotivational approach: assessments of metamotivational knowledge may not only predict who is more or less likely to succeed or fail in self-regulation, but also specifically on what tasks.

Findings from Experiment 6 also present an interesting direction for future research. Results revealed that high-level knowledge predicted choice of the local mindset in anticipation of the mismatching picture completion task and that low-level knowledge predicted choice of the global mindset in anticipation of the mismatching delay discounting task. While greater metamotivational knowledge may be useful in determining if a strategy *facilitates* performance on certain tasks, Experiment 6 highlights that knowledge may also sensitize participants to whether the same strategy *disrupts* performance on other tasks. The use of a binary choice context in the present experiment may have helped reveal this subtle distinction—a research question worthy of future investigation.

## General Discussion

The present research sought to explore two necessary conditions for people to create task-motivation fit: task knowledge and strategy knowledge. Indeed, seven experiments (and an eighth reported in the [online supplement](#)) demonstrated that people understand how to create task-motivation fit when faced with tasks in which performance benefits differentially from high-level versus low-level construal. Specifically, all experiments showed that people recognize high-level and low-level construal as motivational orientations that promote performance on tasks that demand high-level and low-level construal, respectively (task knowledge). Experiments 2–4 and 6 further demonstrated that people can identify different construal level inductions as strategic means to instantiate the preferred motivational orientation of a given task (strategy knowledge). Notably, participants in these experiments recognized a variety of construal level mindset inductions as effective preparatory exercises for high-level and low-level performance tasks (see also [supplemental Experiment 1](#)). Moreover, Experiment 5 demonstrated that this knowledge was evident even under more stringent and realistic conditions (i.e., having multiple options to consider for each task; see also [supplemental Experiment 1](#)). Further, Experiment 6 demonstrated that those with greater metamotivational knowledge were more likely to create task-motivation fit through their choice of preparatory exercises when they anticipated completing a performance task. Taken together, these experiments suggest that people have metamotivational task and strategy knowledge, and individual differences in such knowledge may predict how they regulate motivation in preparation for a task.

This research offers several novel contributions. First, these experiments demonstrate that lay people appreciate the distinct demands presented by high-level versus low-level regulatory tasks. Critically, the current findings revealed that people also understood that such demands are best addressed through different means. That is, people recognized the functional roles of high-level construal and low-level construal in goal pursuit. These findings extend a long tradition of research suggesting that goal success requires matching the right motivational orientation to the challenge at-hand (e.g., Fujita, 2011; Gollwitzer, 1990; Heck-



hausen & Gollwitzer, 1987; Higgins, 2000; Kashdan & Rottenberg, 2010; Mann et al., 2013; Miele & Scholer, 2018; Scholer & Miele, 2016).

Second, though previous work has demonstrated that experimentally manipulating construal level can promote goal outcomes, the current work presents novel evidence that people may have the requisite metamotivational knowledge to create task-motivation fit on their own. More research is clearly needed to show that this process can occur spontaneously outside of the laboratory when not prompted by an experimenter. Nevertheless, the present work suggests that rather than reflecting some artificial lab-based process, people have at least two types of requisite knowledge to use construal level adaptively to increase the likelihood of securing desired outcomes.

Finally, this work highlights how a metamotivational approach allows researchers to generate nuanced predictions regarding individual differences in goal success versus failure. That is, this conceptual framework allows for not only between-subjects predictions about *who* is likely to experience positive versus negative self-regulatory outcomes, but also within-subject predictions about *which* regulatory tasks a given person will likely perform well. Consider, for example, a tennis player who mistakenly believes high-level construal is always beneficial for goal pursuit. This individual may be very successful at resolving the self-control dilemmas necessary to practice diligently every day, but struggle to perform his or her very best once it is game time on *this* court in *this* tournament. The opposite might be expected of an individual who mistakenly believes that low-level construal is always beneficial. In this way, this work provides an important foundation for the rather limited research literature on individual differences within the context of construal level theory, and encourages the development of novel assessment tools and interventions tailored to address the specific regulatory challenges with which an individual struggles.

## Future Directions

**Implementing knowledge to promote performance.** As noted earlier, an important future direction of the present research is to establish that the metamotivational knowledge that we have documented in the present article is associated with various regulatory outcomes, including performance. However, there are many reasons why the relation between metamotivational knowledge and regulatory outcomes may not be as straightforward as one might initially assume. We detail these below.

Although metamotivational task and strategy knowledge are *necessary* conditions for people to create task-motivation fit on their own, they are not *sufficient* conditions (Miele & Scholer, 2018; Scholer & Miele, 2016). To successfully create task-motivation fit, people must not only identify what motivational state might be optimal for a given task and how to instantiate that state, but they must also have accurate insight into their current motivational state—that is, self knowledge (see Flavell, 1979; Pintrich, 2002, for a similar argument regarding metacognition). This latter type of knowledge is what allows people to determine whether and to what extent they need to modulate their motivation to prepare for the task at-hand. Not only is self knowledge yet another necessary condition for people to create task-motivation fit on their own, but it may also interact with task and strategy

knowledge to predict performance outcomes. Consider, for example, people who have task and strategy knowledge, but lack self knowledge. They may mistakenly believe they are in the most advantageous motivational state for a task when they are in fact not and suffer poor outcomes. Alternatively, people may accurately assess their current motivational state, but lack the strategy knowledge of how to modulate it to fit current task demands. Thus, future investigations of whether knowledge predicts outcomes should consider self knowledge as a distinct yet equally critical component of the metamotivational framework.

It is also important to note that construal level may not be the only motivational state relevant for the various tasks that people might encounter in their goal-directed efforts. Although they might recognize that performance on a given task may benefit from high-level versus low-level construal, people may also have competing beliefs about the usefulness of alternative motivational states (e.g., Scholer & Miele, 2016). The results of Experiment 5, for example, suggest that people may endorse activating another motivational orientation (e.g., taking a deep breath and relaxing) as much as adopting a particular construal level (e.g., zooming in to have a narrow perspective), even if the former does not have the same construal-based benefits as the latter. In preparation for any given performance task, these competing beliefs may lead people to instantiate an alternative motivational orientation, rather than the one that might best create task-motivation fit. Therefore, a carefully designed future investigation will need to assess people's knowledge of multiple (and potentially competing) motivational states.

Furthermore, the link between knowledge and performance depends on successful knowledge implementation, which is also contingent on many factors. That is, although people may understand what motivational state can best serve a task and understand how to instantiate it, they may not be sufficiently motivated to do so (Miele & Scholer, 2018). Those who are more motivated to regulate their motivation should be more likely to put their metamotivational knowledge into practice (Smit, De Brabander, Boekaerts, & Martens, 2017; Wolters & Benzon, 2013; Wolters & Rosenthal, 2000). Second, even if people possess accurate metamotivational knowledge, they may lack the opportunity (e.g., insufficient planning, time, or resources) to apply what they know. Future work may examine, for example, how people can use implementation intentions to facilitate the translation of knowledge into behavior (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). Finally, people may have the requisite knowledge but lack the ability to put it into action. One might expect, for example, that people who struggle to switch flexibly between motivational states would be less effective at instantiating the state that they know to be most appropriate and, thus, exhibit weaker relations between knowledge and outcomes. Future research might leverage work on individual differences in executive functioning (particularly task-switching), which may be informative for understanding and investigating this sort of flexibility (Friedman et al., 2008).

**Facilitation versus disruption.** As alluded to earlier, whether metamotivational knowledge sensitizes people to what facilitates versus disrupts performance remains an open question. The use of alternative research designs, such as presenting preparatory exercises that neither promote nor hinder task performance, may allow researchers to address this issue. Future

work might also examine whether situational or individual differences sensitize people to facilitation versus disruption, such as a focus on promoting gains versus preventing losses (e.g., Higgins, 1997, 1998).

**Selecting tasks, given a motivational orientation.** The present research presented participants with a task and asked which motivational orientation would best promote performance. Future research may examine the opposite. That is, when engaged in a particular construal level, which task do people choose to perform? This question highlights an important aspect of goal pursuit—deciding *when* to complete *which* tasks. For example, people high (vs. low) in trait self-control prefer to do challenging exercises earlier in the day, presumably because that is when they have more regulatory resources (Delose, vanDellen, & Hoyle, 2015; Kouchaki & Smith, 2014). Similarly, Scholer and Miele (2016) show that when given a prevention (vs. promotion) preparatory exercise, people prefer to complete vigilant (vs. eager) tasks. Creating task-motivation fit by regulating the choice of tasks rather than one's motivational orientation may be particularly useful for people who struggle to switch flexibly between motivational orientations. One might also expect that those with greater metamotivational self knowledge would be particularly skilled at deciding which tasks to undertake next, based on accurate insight into their current motivational state. Similarly, those who have more freedom to decide which tasks to do at a given time may be more likely to create task-motivation fit by choosing appropriate tasks rather than by regulating motivation. We might note that rigid implementation of this method could also be maladaptive if it results in avoidance of important tasks. In summary, whether people recognize which tasks fit their current construal level is an important future research direction.

**Cross-cultural generalization.** Future research should test to what extent metamotivational knowledge generalizes across cultures. The present research may be criticized for focusing largely on WEIRD participants in the United States (Western, Educated, Industrialized, Rich, and Democratic; Henrich, Heine, & Norenzayan, 2010). There is, however, little a priori reason to expect that the current effects would not generalize across cultures. Nevertheless, a more systematic cross-cultural investigation is worthy of future research.

**Development of metamotivational knowledge.** Future research should also examine how people learn to create task-motivation fit. Children may learn this from caregivers and teachers. For example, children may be taught to construe self-control dilemmas (e.g., cheating during a game rather than being honest) in high-level terms (e.g., “think about why”), and behaviors that require precision (e.g., how to write their names) in low-level terms (e.g., “think about how”). People may also gain insight through logical reasoning. For example, people may deduce that thinking about the big picture promotes high-level task performance, whereas immersing oneself in the details promotes low-level task performance. People may, moreover, learn to create task-motivation fit through trial-and-error. Insight into knowledge development may not only improve educational methods with which to promote self-regulation, but may also provide insight into the basic nature of this knowledge—such as how explicitly aware people are of their metamotivational knowledge.

## Advancing Motivation Science

More broadly, this research speaks to the generative potential of adopting a metamotivational perspective (Fujita et al., 2019; Miele & Scholer, 2018; Scholer & Miele, 2016; Scholer et al., 2018), and its ability to advance motivation science. Future research may extend this approach to other key distinctions in motivation science, such as intrinsic versus extrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000), learning versus performance goals (Dweck & Leggett, 1988), and so forth. This novel approach seeks to address innovative research questions concerning people's knowledge and goal-directed regulation of motivational orientations to address regulatory demands. In turn, new insights may help to progress the field's understanding of goal achievement by facilitating the development of fine-tuned interventions to teach those who lack the requisite knowledge to regulate motivation. We embrace metamotivation as the “next frontier” of motivation science and are eager to see future work advancing this approach.

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## Appendix A

### Instructions for All Experiments

#### Experiment 1

People often spend time thinking about upcoming events, and they can think about the same event in many different ways.

For example, an event can be thought of how we can orient toward it, such as “zooming out to have a broad perspective” or “zooming in to have a narrow perspective.”

Some orientations can prepare us to help us reach our goals, whereas other orientations can prevent us from reaching our goals.

#### Experiments 2a and 2b

People often spend time thinking about upcoming events, and they can think about the same event in many different ways. For example, every activity can be thought of in terms of the

reasons WHY people engage in it or in terms of the process of HOW people engage in it.

When people consider WHY they perform an action, they think about the broader\* purpose or meaning of the behavior. When people consider HOW they perform a behavior, they think about the steps involved in the action and the specific means used to complete it.

Consider the activity of “reading a novel.” It is equally possible to consider the reasons WHY one reads a novel (e.g., to relax after a stressful day) or the process of HOW one reads a novel (e.g., by moving one’s eyes over lines of text). Some of these ways of thinking help us reach our goals, whereas other ways of thinking can prevent us from reaching our goals.

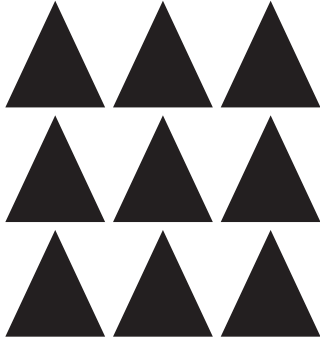
\*NOTE: In Experiment 2b, we omitted the word “broader” out of concern of introducing a confound in the description of thinking about why.

(Appendices continue)

**Experiments 3 and 6**

People often spend time looking at images, and they can see the same image in many different ways. For example, an image can be represented in terms of the overall shape it creates or in terms of the individual shapes of which it consists.

Consider the following example. It is equally possible to see the overall shape (e.g., a square) or the individual shapes of which it consists (e.g., triangles).



Different ways of looking at images can be thought of as different “mindsets.” Some mindsets can prepare our thinking to help us reach our goals, whereas other mindsets can prevent us from reaching our goals. In this study, you will learn about two mindsets.

**Experiment 4**

People often spend time thinking about different objects, and they can think about the same object many different ways. For example, an object can be considered in terms of the specific examples that go into it or in terms of the overall category that it fits into.

Consider the following example. It is equally possible to think of a specific example of that object (e.g., a poodle) or the overall category that the object fits into (e.g., animal).

<b>DOG</b>	
Example: Poodle	Category: Animal

Different ways of thinking about objects can be thought of as different “mindsets.” Some mindsets can prepare our thinking to help us reach our goals, whereas other mindsets can prevent us from reaching our goals. In this study, you will learn about two mindsets.

*(Appendices continue)*

## Appendix B

### Scenarios for All Experiments

Type	Scenario
Low-level	Please begin by imagining that you are taking part in a task designed to test your writing ability. The test requires that you read a long written passage that contains various misspellings. Your task will be to identify and correct these typos. Imagine that you want to perform as well as you can on the writing test, but you know it will require a lot of attention to find and fix the misspellings.
Low-level	Please begin by imagining that you are taking part in a task designed to test your hand-eye coordination. The test requires that you shoot basketball free throws. The goal is to get as many of the basketballs as possible to go through the hoop in a set amount of time. Imagine that you want to perform as well as you can on the test of hand-eye coordination, but you know you really need to get in the zone to avoid making mistakes.
Low-level	Please begin by imagining that you are taking part in an experiment during which you will be shown a number of words. For each word, your task is to identify what color font the word is written in. In some cases, the word and the color will match (ex: BLUE). In other cases, the word and the color will not match (ex: BLUE), which will require you to ignore the meaning of the word and focus only on font color. Imagine your task is to identify the font color as quickly and as accurately as possible, but you know it will take effort to direct your attention away from the meaning of the word.
Low-level	Please begin by imagining that you are taking part in a task designed to test your vigilance, or your ability to pay careful attention to details. The vigilance test requires that you read a long written passage and cross out any instances of the letters “z” or “q”. Imagine you want to perform well on the vigilance test, but you know it will require full concentration to identify these rarely used letters within the long passage.
Low-level	Please begin by imagining that you are taking part in a task designed to test your accuracy and precision. The test requires that you throw darts at a dartboard located 20 feet away. The goal is to get as many of the darts as possible as close to the center of the dartboard as possible. Imagine that you want to perform as well as you can on this test of accuracy and precision, but you know you will need to fully focus to get it just right.
Low-level	Please begin by imagining that you are taking part in a task designed to test your motor skills. The test requires that you play a round of miniature golf. The goal is to putt as many of the golf balls as possible into the hole with as few swings as possible. Imagine that you want to perform as well as you can on this motor skills test, but you know you will have to monitor your strokes to not make any unnecessary mistakes.
High-level	Please begin by imagining that you must make a choice between recycling a bottle of water or throwing it away. While you value recycling and believe that it is important, there is no recycling bin nearby, only a trashcan, so you will have to carry the water bottle around with you until you can recycle it. Imagine that you want to recycle the bottle to improve the environment, but you know it will be inconvenient since there is no recycling bin nearby.
High-level	Please begin by imagining that you’re about to choose between two money options. If you choose Option 1, you will immediately receive \$30. If you choose Option 2, you will receive \$60 in three months. Though it would be nice to get \$30 right now, you know that you would receive more money in the long run if you choose Option 2 (\$60). Imagine that your goal is to convince yourself to choose Option 2 (\$60), but this is challenging because you’re tempted to receive \$30 immediately.
High-level	Please begin by imagining that you are about to be evaluated by your boss. Your boss has written two letters, one describing your strengths and one describing your weaknesses, and then asks you to choose which letter you will read. You believe that hearing about your strengths will make you feel good, but you know that hearing about your weaknesses will help you improve and get better at your job. Imagine you really want to choose the information about your weaknesses to get better at your job, but you know that hearing about your strengths will make you feel good.
High-level	Please begin by imagining that you are a college student taking an important class in your major and you have a midterm in that class tomorrow morning. However, your friends have invited you to hang out tonight and watch a movie that you’ve been waiting to see. Imagine that doing well on the midterm is an important goal to you, but you’re tempted to procrastinate and hang out with your friends instead of studying for your midterm.
High-level	Please begin by imagining that you have gotten into a disagreement with a friend. The situation has made you very angry, but you still value your friendship. Imagine you want to control your emotions to avoid escalating the argument, but this is challenging because of your level of anger.
High-level	Please begin by imagining that you are very involved in a community organization that is very important to you. At a recent meeting, a group member spoke out against the group and suggested that to achieve its goals, the group would have to change. You know that improving the organization involves taking criticism seriously, even though hearing the criticism is unpleasant. Imagine you really want to listen to criticism about your organization because you want it to be better, but you love the organization and don’t enjoy hearing it criticized.
Control	Please begin by imagining that you are about to take a bus across town to meet a friend at a coffee shop. You are looking forward to meeting up with your friend and have some time to daydream as the bus makes its way across town. Imagine that you really want to daydream during the bus ride.
Control	Please begin by imagining that you are about to meditate. You have had a busy week and you are eager to spend some time in quiet contemplation. You really want to quiet your thoughts and come out of this meditation session with a calmed mind. Imagine that your goal is to relax during this meditation session.

(Appendices continue)

## Appendix B (continued)

Type	Scenario
Control	Please begin by imagining that you are about to unwind after a long week. You are looking forward to relaxing on your couch and watching a movie. You recently got a free trial for an online movie database that features hundreds of top-rated movies from every genre. You are eager to look through all your options. Imagine your goal is to choose a movie.
Control	Please begin by imagining that you have received a coupon from your favorite restaurant for a free dessert. On your birthday, you have dinner at that restaurant and then you start to look over the dessert menu. You are looking forward to getting a free dessert and you are eager to indulge on your special day. Imagine that your goal is to savor and enjoy the free dessert.
Control	Please begin by imagining that you are addressing envelopes to mail for the holidays. You enjoy sending out holiday cards and thinking about your friends and family all around the country. You really want to get the cards in the mail tomorrow so your loved ones can receive them soon. Imagine your goal is to address every envelope by the end of the evening.
Control	Please begin by imagining that you are going out to dinner with friends for the evening. You are looking forward to trying a new restaurant and spending time with friends. Imagine your goal is to have a pleasant and enjoyable evening.

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### **New Policy for the *Journal of Personality and Social Psychology***

The *Journal of Personality and Social Psychology* is inviting replication studies submissions. Although not a central part of its mission, the *Journal of Personality and Social Psychology* values replications and encourages submissions that attempt to replicate important findings previously published in social and personality psychology. Major criteria for publication of replication papers include the theoretical importance of the finding being replicated, the statistical power of the replication study or studies, the extent to which the methodology, procedure, and materials match those of the original study, and the number and power of previous replications of the same finding. Novelty of theoretical or empirical contribution is not a major criterion, although evidence of moderators of a finding would be a positive factor.

Preference will be given to submissions by researchers other than the authors of the original finding, that present direct rather than conceptual replications, and that include attempts to replicate more than one study of a multi-study original publication. However, papers that do not meet these criteria will be considered as well.

Submit through the Manuscript Submission Portal at (<http://www.apa.org/pubs/journals/psp/>) and please note that the submission is a replication article. Replication manuscripts will be peer-reviewed and if accepted will be published online only and will be listed in the Table of Contents in the print journal. As in the past, papers that make a substantial novel conceptual contribution and also incorporate replications of previous findings continue to be welcome as regular submissions.