

# The Effect of Categorization on Goal Progress Perceptions and Motivation

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Consumers monitor their goal progress to know how much effort they need to invest to achieve their goals. However, the factors influencing consumers' goal progress monitoring are largely unexamined. Seven studies ( $N=8,409$ ) identified categorization as a novel factor that influences goal progress perceptions, with consequences for motivation. When pursuing a goal, categorization cues lead consumers to perceive that their goal-relevant actions are in separate categories; as a result, consumers anchor their estimates of goal progress on the proportion of categories completed and are less affected by the absolute amount of progress made than when categorization cues are not present. As a result, depending on the proportion of categories completed, categorization can lead consumers to infer *greater* progress when they are actually *farther* from their goal, and to infer *less* progress when they are *closer* to their goal. We demonstrate consequences of this effect for consumers' motivation and goal attainment in incentive compatible contexts.

**Keywords:** goal progress, motivation, categorization, persistence

Imagine pursuing a series of eight identical arm exercises at the gym that each take 5 minutes. After finishing two arm exercises, you may feel you are 25% done with the total workout (2/8 exercises completed). Alternatively, imagine that you categorized your exercises into two sets: set 1

of two arm exercises and set 2 of six arm exercises. In this case, after completing set 1 of your workout, you have made the same amount of progress as in the first example. However, would you feel 25% of the way done with your workout (for having completed 2/8 exercises) or would you instead feel closer to 50% of the way done with your workout (for having completed 1/2 sets)? And does whether or not you categorize these exercises affect your subsequent motivation to keep exercising?

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In the current research, we examine how categorization cues, such as arbitrary labels (e.g., sets), similarity between tasks (abs vs. arm workouts), or the organizational sequence of tasks (organized vs. disorganized; [Kahn and Wansink 2004](#)), interact with absolute goal progress to influence consumers' goal progress perceptions, with downstream consequences for motivation.

A key feature of self-regulation theory is that during goal pursuit, consumers monitor their progress to understand how close or far they are from achieving their goal. Goal monitoring affects motivation by encouraging consumers to adjust their behavior if they notice discrepancies between their perceived and desired progress toward a goal ([Carver and Scheier 1998](#); [Harkin et al. 2016](#); [Locke and Latham 1990](#)). While there are moderators that affect the

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progress–motivation relationship (Fishbach, Dhar, and Zhang 2006; Wallace and Etkin 2017), one takeaway from this prior work is that, in single-goal contexts, small discrepancies can be motivating (Schroeder and Fishbach 2015), such that the closer consumers perceive they are to their goal end-state, the greater their motivation to achieve their goal (i.e., the goal gradient effect; Heath, Larrick, and Wu 1999; Hull 1934; Kivetz, Urminsky, and Zheng 2006). This research thus established that perceived progress is one key factor in determining motivation.

Despite the importance of progress perceptions for motivation, research has only begun to examine the factors influencing goal monitoring and the formation of progress perceptions (Campbell and Warren 2015; Huang, Zhang, and Broniarczyk 2012; Soman and Shi 2003). We posit that categorization interacts with absolute progress to influence consumers' progress perceptions. We suggest that when consumers categorize (vs. do not categorize) their goal-relevant actions, their progress perceptions are less sensitive to the absolute amount of progress made toward their goal. For instance, in the opening example, a consumer categorizing their workouts into sets might perceive completing closer to 50% of their workout (i.e., the categorical progress from completing 1/2 sets). However, if the same consumer did *not* categorize their workout with these arbitrary sets, they might perceive that they completed closer to 25% of their workout, the absolute progress made. This effect occurs because categorization leads consumers to anchor their progress perceptions on the proportion of *categories* completed (i.e., categorical progress) and then make insufficient adjustments based on the absolute progress made.

We introduce the categorization effect in goal pursuit: consumers' tendency to overweight the proportion of arbitrary categories (of tasks) completed and rely less on the absolute progress made. We suggest that this effect influences perceptions of progress when categorical progress (i.e., the proportion of categories completed) diverges from absolute progress.

Our primary contribution is in identifying categorization as a novel factor influencing consumers' goal monitoring processes and documenting the mechanism underlying this effect. Goal progress perceptions matter for motivation, yet limited research has addressed the specific factors influencing these goal monitoring processes (Campbell and Warren 2015; Huang et al. 2012; Soman and Shi 2003). We demonstrate that categorization affects consumers' goal monitoring processes by anchoring progress perceptions on the categorical amount of progress made. In doing so, we identify the following antecedents of categorization that lead consumers to naturally categorize their goal-related actions and anchor on categorical progress: (1) arbitrary labels (Eiser and Stroebe 1972; Tajfel 1959; Zhang and Schmitt 1998), (2) similarity versus dissimilarity of actions (Goldstone 1994), and (3) organizational sequence

of actions (Kahn and Wansink 2004). These subtle categorization cues lead consumers to group their goal-related actions into categories, which then affects goal progress perceptions.

Furthermore, in exploring the underlying process of our effect, we contribute to research on anchoring (Simmons, LeBoeuf, and Nelson 2010; Tversky and Kahneman 1974), demonstrating (1) that categorization cues can serve as natural anchors when forming judgments and (2) that, when both categorization and absolute progress cues are accessible, consumers are more likely to naturally anchor on categorization cues and make minimal adjustments for absolute progress, such that their goal progress perceptions are determined more by categorical progress.

Beyond informing our understanding of how consumers form *goal progress perceptions*, we identify consequences of this categorization effect in goal pursuit for consumers' motivation and persistence. We propose and find that categorization moderates the goal gradient effect on motivation. In the absence of categories, consumers are more motivated the more absolute progress they have made. However, when consumers categorize their actions, their motivation is determined by both their categorical progress and their absolute progress.

Finally, we note that in examining dissimilarity of goal-relevant actions and organized versus disorganized sequences of actions as cues for categorization, we are the first to examine how pursuing *different* tasks toward an overall goal can affect perceptions of goal progress. Previous research has focused on progress perceptions and motivation for similar actions (Heath et al. 1999; Jin, Xu, and Zhang 2015; Kivetz et al. 2006; Nunes and Drèze 2006; Wallace and Etkin 2017). Yet, goal pursuit often requires completing different tasks toward an overall superordinate goal (Brunstein 1993; Etkin and Ratner 2012, 2013; Fishbach et al. 2006; Kruglanski et al. 2002). Our research suggests that the sequence of (different) goal-directed actions can matter for perceived goal progress and motivation.

In what follows, we outline our theory for how categorization affects consumers' goal progress perceptions, building on literature on categorization, unit bias, and subgoals, which examined how partitions affect judgments and behavior. We then detail our predictions for how goal progress perceptions influence motivation as a function of categorical and absolute progress, drawing on extant research documenting the relationship between progress perceptions and motivation. We then present seven studies ( $N = 8,409$ ) demonstrating when (i.e., when absolute progress differs from categorical progress) and why (i.e., by anchoring goal progress perceptions on categorical vs. absolute progress) categorization affects goal progress perceptions, with downstream consequences for motivation. Lastly, we conclude with implications for marketers and a general discussion of our findings.

## THEORETICAL DEVELOPMENT

### Goal Progress Perceptions and Categorization Cues

Despite the importance of perceived goal progress on consumer motivation (Bonezzi, Brendl, and De Angelis 2011; Carver and Scheier 1998; Harkin et al. 2016; Kivetz et al. 2006; Koo and Fishbach 2012), limited research has examined the factors influencing how consumers monitor their progress toward a goal, what we refer to as “progress perceptions.” Existing research has found that consumers overweight goal-consistent behaviors relative to goal-inconsistent behaviors in forming their progress perceptions (Campbell and Warren 2015), and that the ease of visualizing the goal outcome matters for perceived progress when close (but not far) from the goal (Cheema and Bagchi 2011). Other research has examined motivational biases in forming goal progress perceptions that consumers employ strategically to enhance motivation. For example, consumers may exaggerate perceived progress when far from a goal to increase perceived goal attainability, yet downplay perceived progress when close to a goal to emphasize the discrepancy between their current state and desired end-state (Huang et al. 2012). We connect this research on goal monitoring processes to the literature on categorization by examining categorization as a cognitive factor influencing consumers’ perceptions of goal progress.

Research on categorization has demonstrated that consumers often spontaneously categorize stimuli (Allport, Clark, and Pettigrew 1954; Brewer 1988; Cohen and Basu 1987; Devine 1989; Fiske and Neuberg 1990). Similarity is one main driver of categorization (Goldstone 1994). People categorize an object as an “A” and not a “B” if it is more similar to the individual items in set “A” than in set “B” (Brooks 1978; Medin and Schaffer 1978; Nosofsky 1986, 1992). In addition to spontaneously categorizing objects based on similarity, other cues in a consumer’s environment can lead to categorization. For example, categorization occurs in the presence of identifying labels (Vallacher and Wegner 1987) and arbitrary labels (Eiser and Stroebe 1972; Tajfel 1959; Zhang and Schmitt 1998). Category labels alone, irrespective of whether they are informative, signal differences between options in a set (Mogilner, Rudnick, and Iyengar 2008; Redden 2008). Such ad hoc categorization leads even unrelated activities to be combined into a single, unified set.

Categorization affects consumers’ perceptions, judgments, and choices for a wide range of stimuli including geographic borders (Maddox et al. 2008; Maki 1982; Mishra and Mishra 2010; Tversky 1992), social groups (Allen and Wilder 1979; Locksley, Ortiz, and Hepburn 1980), choices (Leclerc et al. 2005), and deadlines (Tu and Soman 2014). One way that categorization can affect consumer judgments is by expanding the psychological

distance between items of different categories and reducing the psychological distance between items of the same category (Isaac and Schindler 2014; Mishra and Mishra 2010). For example, consumers exaggerate distances between consecutive items adjacent to category boundaries on ranked lists (Isaac and Schindler 2014) and underestimate the likelihood of a disaster spreading across a different state (i.e., a different category) than the same state (i.e., the same category) (Mishra and Mishra 2010). Based on this research, one outcome of categorization for goal progress perceptions could be that categories expand the psychological distance between goal-related activities, leading consumers to feel that they made less progress on their goals than in the absence of categorization cues. This suggests a main effect of categorization, whereby the presence (vs. absence) of categories decreases perceived progress.

### Categorization Anchors Progress Perceptions on Categorical (vs. Absolute) Progress

However, categorization may impact goal progress perceptions in an alternative way. Rather than decreasing progress perceptions at both high and low progress, categorization may interact with absolute goal progress to influence consumers’ progress perceptions. In particular, when consumers categorize (vs. do not categorize) their goal-relevant actions, they may anchor their progress perceptions on the proportion of *categories* completed (i.e., categorical progress), reducing their reliance on the absolute progress made.

Support for this theorizing comes from prior research examining how the size of units (i.e., one large unit versus several smaller units) affects judgments and behavior. For example, in the food domain, research on unit bias has found that people consume more food as the size of the food unit increases (Geier et al. 2006). That is, people focused more on the unit amount than on the absolute magnitude that unit represents. A similar finding occurs for debt repayment; research has found a correlation between the number of debt accounts repaid and consumers’ debt repayment, whereas there was no relationship between repayment behavior and the dollar amount repaid (Gal and McShane 2012; Kettle et al. 2016). The greater the number of accounts closed predicted the likelihood that consumers repaid their overall debt. These findings are further in line with the rich literature on subgoals; because self-regulation is a function of goal size and proximity to completion, breaking larger goals into smaller component goals can facilitate self-regulation by affecting what unit people attend to (i.e., smaller subgoal vs. larger superordinate goal; Carver and Scheier 1998; Emmons 1992; Locke and Latham 1990; Vallacher and Wegner 1987).

One conclusion from these two streams of research on unit bias and subgoals is that people often focus on the unit

amount, such that varying the size of the unit (i.e., smaller vs. larger units) affects judgments and behavior. Building on this prior work, we examine how varying the presence or absence of a type of unit, categories, affects judgments of progress perceptions by influencing the level of progress people attend to. Specifically, we theorize that when categories are present (vs. absent), consumers attend less to absolute progress when forming goal progress perceptions because they also attend to the amount of categorical progress achieved.

We suggest that categorization affects progress perceptions because the proportion of categories completed serves as an anchor, leading consumers' estimates of goal progress to be nudged closer to the proportion of categories completed (Tversky and Kahneman 1974), with insufficient adjustments made based on absolute progress. Research on anchoring has found that judgments are often sensitive to arbitrary numbers that are presented prior to making a judgment. For example, in typical anchoring studies, consumers may be first asked to consider whether some quantity (e.g., the length of the Mississippi River) is greater or less than a provided anchor value (e.g., 1,200 miles). After this consideration, they are asked to make an estimate (i.e., how long is the Mississippi River?). The general finding is that participants' estimates are closer to the anchor (e.g., 1,200) when it is provided (vs. not provided) (Simmons et al. 2010). Anchoring effects are typically explained in terms of selective accessibility of anchor-consistent information. For example, consumers test whether the anchor might be the correct answer (i.e., is the length of the Mississippi River more or less than 1,200 miles) and remain biased by this anchor information in their subsequent estimate (Chapman and Johnson 1999; Mussweiler 2003; Strack and Mussweiler 1997).

We build on this research by suggesting that categorization cues can also serve as arbitrary anchors when forming judgments, such as goal progress perceptions. Categorization research suggests that when category information is present, people naturally attend to and rely on this information (Allport et al. 1954; Brewer 1988; Cohen and Basu 1987; Devine 1989; Fiske and Neuberg 1990). Thus, when both absolute progress and categorical progress information are available, we propose that consumers will naturally attend to first, and thus anchor on, the categorical progress information, and only afterward adjust (insufficiently so) based on absolute progress. As such, we propose that categorization cues affect goal progress perceptions by anchoring estimates of goal progress on categorical progress, with adjustment based on absolute progress.

Formally, we have the following hypotheses:

**H1:** When pursuing a goal, categorization cues lead consumers' estimates of their goal progress to be more sensitive to the proportion of categories completed than to absolute progress.

**H2:** Categorization influences goal progress perceptions because consumers anchor their progress perceptions on the categorical (vs. absolute) progress made.

Importantly, our theory predicts a divergence in perceptions of goal progress when categories are present (vs. absent) specifically in situations when categorical progress diverges from absolute progress. However, when categorical progress is equated to absolute progress (e.g., when one out of two sets have been completed, and in terms of absolute progress, a person is 50% through the task), progress perceptions are less likely to diverge as a function of categorization.

## Consequences of Progress Perceptions for Motivation

Given the relationship between perceived goal progress and motivation, we examine downstream consequences of categorization for motivational outcomes as a function of progress perceptions.

Research on self-regulation presents a theory for how progress perceptions are translated into subsequent motivation. Specifically, in the cybernetic model of self-regulation, perceiving a gap between current and desired rate of goal progress signals negative feedback. Such negative feedback serves to increase motivation relative to when there is no discrepancy (i.e., people are progressing at the desired rate), or when there is a positive discrepancy (i.e., people are progressing at a faster rate than needed). Indeed, a positive discrepancy instead serves as a sign to relax and pursue a presumably neglected goal (Carver 2003). This is especially true of multi-goal contexts, where perceiving sufficient progress leads people to switch to an alternative goal (i.e., goal-balancing; Fishbach et al. 2006; Fishbach and Zhang 2008; Koo and Fishbach 2008).

Whereas a negative discrepancy between actual and desired rate of progress generally increases motivation relative to no discrepancy, a small discrepancy is often more motivating than a larger one (Schroeder and Fishbach 2015; although see Huang et al. 2012, addressed in the General Discussion). In particular, in single-goal contexts, there is a functional benefit to maintaining a goal's motivation prior to completion (Fitzsimons and Fishbach 2010). In such situations, rather than decrease motivation, progress should increase motivation (i.e., the goal gradient effect; Heath et al. 1999; Hull 1934; Kivetz et al. 2006).

Of course, there are a number of factors that can influence and moderate the relationship between goal progress and motivation, including self-efficacy, feedback, goal specificity, and affect (Bandura and Locke 2003; Fishbach and Finkelstein 2012; Wallace and Etkin 2017). For example, focusing on "the small area" (completed actions at low progress or remaining actions at high progress) boosts motivation by making people feel that the marginal impact of

each additional action toward goal achievement is greater (Bonezzi et al. 2011; Koo and Fishbach 2008). Furthermore, when consumers set nonspecific goals or do not focus on their superordinate goal, greater perceived progress leads to lower motivation (Fishbach et al. 2006; Wallace and Etkin 2017). Lastly, successfully achieving subgoals can increase motivation early in goal pursuit but reduce it later in goal pursuit, by shifting focus from goal attainability (can I complete this goal?) to goal value (is this goal desirable?) (Huang, Jin, and Zhang 2017).

Building on this prior research and literature on the goal gradient effect, we theorized that in single-goal contexts that emphasize the superordinate goal, greater perceptions of goal progress increase motivation (Fishbach and Dhar 2005; Fishbach et al. 2006; Kivetz et al. 2006). As such, we predicted that in these contexts, categorization would moderate the effect of absolute progress on motivation. When consumers do not categorize their actions, they are more motivated the more absolute progress they make. However, when consumers categorize their actions, because their progress perceptions are affected by categorical progress, the positive relationship between absolute progress and motivation is attenuated. Formally:

**H3:** Categorization increases (decreases) motivation when the proportion of categories completed falls below (above) the absolute progress level.

## PRESENT RESEARCH

We test these hypotheses across seven studies that examined single-goal contexts with an emphasis on the superordinate goal. To ensure that participants focused on the superordinate goal in our studies, we emphasized the overall goal and/or provided an incentive for reaching this overall goal (Fishbach and Dhar 2005; Fishbach et al. 2006).

In a fitness goal domain, study 1 examined how perceived similarity in actions influences categorization and interacts with absolute progress to determine goal progress perceptions. In studies 2 and 3, using an additional categorical cue, arbitrary labels, we manipulated whether the proportion of categories completed differed from that of absolute progress (lower, equal, or higher) (study 2), and manipulated the number of categories (no categories vs. two vs. four; study 3), directly testing whether consumers overweight the proportion of arbitrary categories completed and discount the absolute amount of progress made in forming their goal progress perceptions. In study 4, we provide support for our underlying process: consumers who categorize their tasks anchor their progress perceptions on the proportion of categories completed and adjust based on absolute progress made. Holding the presence of category cues constant, we manipulated whether categories served as an anchor or not, demonstrating that this effect

occurs because categorical progress serves as an anchor when forming progress perceptions.

Study 5 used a third categorization cue, organization of activities, and explored consequences for motivation. Study 6 examined how categorization influences progress perceptions and motivation in an incentive compatible design, examining actual persistence in a physical workout. Lastly, study 7 demonstrated how categorization and absolute progress interact to determine how consumers plan purchase decisions. We preregistered studies 2–7, reported all exclusions (if any) and all measures testing our main hypotheses (exploratory measures not testing our main hypothesis are reported in web appendix B). In addition, we report four supplemental studies in web appendix D that further support these predictions. We include an OSF link to data, syntax, and materials for all studies: <https://bit.ly/2Qn3U4G>.

## STUDY 1: DISSIMILARITY AS A CUE FOR CATEGORIZATION

Study 1 tested our first hypothesis, examining how categorization of goal-relevant tasks influences consumers' perceptions of goal progress when exercising. As similarity is a main driver of categorization (Goldstone 1994), we examined whether or not manipulating the similarity of actions induces participants to categorize their goal-relevant actions. Participants focused on how a series of exercises either worked out two body parts (two categories) or were part of a single workout (no categories).

To examine whether categorization can nudge goal progress perceptions toward the proportion of categories completed, we tested for an interaction between categorization and absolute progress. Participants imagined completing two out of seven exercises (low progress) or five out of seven exercises (high progress). We predicted an interaction between absolute goal progress (low vs. high progress) and categorization (no categorization vs. categorization) on workout progress perceptions.

Specifically, when the exercises were described as working out two different body parts, we expected participants to categorize the workouts into two distinct categories. After completing one of the workout categories (regardless of the number of exercises completed), participants would perceive having completed one out of two categories and thus their perceptions of progress would be closer to categorical progress (i.e., 50%) rather than absolute progress, compared with when participants focused on similarities between workouts.

As a result, at low progress (i.e., 29%), categorization should lead consumers to perceive they have made more progress, as their estimates will be closer to 50% (the proportion of categories completed). However, at high progress (i.e., 71%), the opposite should occur: categorization

should lead consumers to perceive they have made less progress, as their estimates will be closer to 50% (the proportion of categories completed).

## Method

A total of 801 workers ( $M_{\text{age}} = 36.79$ , range 18–84; 389 males) from Amazon’s Mechanical Turk (MTurk) participated. We randomly assigned participants to condition in a 2 (progress: high vs. low)  $\times$  2 (categorization: categorization vs. no categorization) between-subjects design.

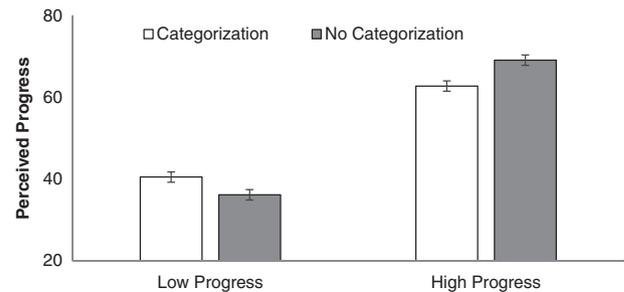
All participants imagined that they decided to do seven workouts at the gym. Each workout would take 5 minutes and they expected the workouts to be equally difficult. In the low progress condition, participants imagined completing two workouts and saw an image of the two exercises they completed (e.g., two upper body workouts: bicep curls and bent over rows; 29% of the workouts completed). They learned that after completing these two workouts, they had five workouts left to go and saw an image of the five exercises remaining (e.g., five ab workouts: sit-ups, flutter kicks, bicycle crunches, leg raises, and leg pull-ins). In the high progress condition, participants imagined completing five workouts and saw an image of the five exercises they completed (e.g., five ab workouts; 71% of the workouts completed). They learned that, after completing these five workouts, they had two workouts left to go and saw an image of the two exercises remaining (e.g., two upper body workouts). We counterbalanced the type of exercises (ab vs. upper body) across progress conditions, with no significant effect of counterbalancing.

Participants viewed identical exercises that emphasized either similarities, inducing no categorization, or differences, inducing categorization, between the workouts. Specifically, in the categorization condition, participants viewed exercises emphasizing the different body part each exercise worked out; for example, referring to the exercises as either upper body workouts or as ab workouts. In the no categorization condition, participants viewed exercises that did not emphasize different parts of the body (workout 1, workout 2, etc.), inducing similarity among the workouts (see [web appendix A1](#) for stimuli). Thus, in the categorization conditions, participants simultaneously learned about their absolute progress (e.g., 71% in high progress or 29% in low progress) and their categorical progress (e.g., 50%); while those in the no categorization conditions only learned about their absolute progress.

We measured perceived progress using two items assessing progress completed and progress remaining so participants were not focused specifically on either progress “to-date” versus “to-go.” These items were adopted from a study manipulating focus on either progress made or progress remaining ([Fitzsimons and Fishbach 2010](#)): progress made, “In thinking about the past and the exercises you have done so far, how much progress have you made

FIGURE 1

STUDY 1: PERCEIVED WORKOUT PROGRESS AS A FUNCTION OF CATEGORIZATION AND ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.



toward your overall workout?” and progress remaining, “In thinking about your future and the exercises you have remaining, how much progress do you still have to make toward your overall workout?” from 0 = “very little” to 100 = “a lot.” From this, we computed a measure of overall progress by reverse coding progress remaining (101—progress remaining) and collapsing it with progress made ( $r = .53$ ).<sup>1</sup> Ancillary measures reported in [web appendix B1](#).

## Results

Regression analyses revealed the predicted categorization (categorization vs. no categorization)  $\times$  progress (high vs. low) interaction on progress perceptions ( $B = -10.68$ ,  $SE = 2.54$ ,  $t(797) = -4.21$ ,  $p < .001$ , 95% CI =  $[-15.66, -5.70]$ ,  $\beta = -.21$ ; [figure 1](#)). As predicted, in the low progress condition, participants perceived they made more progress in the categorization condition than in the no categorization condition ( $M_{\text{categorization}} = 40.57$ ,  $SD = 20.38$ ;  $M_{\text{no categorization}} = 36.22$ ,  $SD = 16.02$ ;  $B = 4.34$ ,  $SE = 1.80$ ,  $t(797) = 2.41$ ,  $p = .016$ , 95% CI =  $[0.81, 7.88]$ ,  $\beta = .10$ ). Furthermore, as predicted, in the high progress condition, participants in the categorization condition perceived that they made less progress than those in the no categorization condition ( $M_{\text{categorization}} = 62.87$ ,  $SD = 18.87$ ;  $M_{\text{no categorization}} = 69.21$ ,  $SD = 16.08$ ;  $B = -6.34$ ,  $SE = 1.79$ ,  $t(797) = -3.55$ ,  $p < .001$ , 95% CI =  $[-9.85, -2.84]$ ,  $\beta = -.14$ ).

## Discussion

Overall, study 1 supported our hypothesis that categorization can affect progress perceptions in an important goal domain (exercise). Using similarity as a categorization cue, we found that either categorizing a series of completed and

<sup>1</sup> We find a similar pattern of results when separately analyzing progress made and progress remaining measures on their own, which we report in [web appendix C](#) (Tables S1 and S2).

remaining exercises into separate categories or not moderated the effect of absolute progress on perceived goal progress. At both low and high goal progress, consumers' goal progress perceptions were sensitive to category progress (one out of two categories; ~50%) when their goal-relevant actions were categorized (vs. not) (H1). This led consumers who categorized their actions to perceive they had made greater goal progress than those who did not categorize their actions when absolute progress was low, and to perceive they had made lower goal progress than those who did not categorize their actions when absolute goal progress was high.

This study manipulated categorization through perceived dissimilarity (vs. similarity) within a set of exercises. Using the same paradigm, we replicated these findings when consumers imagined completing actually different activities as well as when their activities were categorized with arbitrary labels (supplemental studies 1 and 2 in [web appendix D](#)).

## STUDY 2: CATEGORIZATION AFFECTS PROGRESS PERCEPTIONS WHEN CATEGORICAL PROGRESS DIFFERS FROM ABSOLUTE PROGRESS

Our theory predicts that categorization affects progress perceptions such that consumers are more sensitive to category progress and less sensitive to absolute progress relative to those who do not categorize their goal-relevant actions. If this were true, we should be more likely to observe an effect of categorization when consumers' absolute progress differs from the proportion of categories completed.

The current study tested this prediction. Participants were assigned to a categorization or no categorization condition and indicated perceived progress when absolute progress made was lower than the proportion of categories completed (low progress; 29%), equal to the proportion of categories completed (equal progress; 50%), or higher than the proportion of categories completed (high progress; 71%). We predicted two interactions. First, we predicted an interaction such that at low (vs. equal) progress conditions, the difference in progress perceptions between categorization (vs. no categorization) conditions would be more *positive*, signaling that people infer *more* progress when categories are present (vs. absent) and absolute progress is lower (vs. equal) to categorical progress.

Second, we predicted an interaction such that at high (vs. equal) progress conditions, the difference in progress perceptions between the categorization (vs. no categorization) conditions would be more *negative*, signaling that people infer *less* progress when categories are present (vs. absent) and absolute progress is higher (vs. equal) to categorical progress. This study further introduced a new categorization cue, arbitrary labels, and assessed progress

perceptions on a single 7-point scale to ensure results were not sensitive to elicitation method.

## Method

We preregistered this study for 1,200 participants on MTurk. A total of 1,199 workers participated ( $M_{\text{age}} = 36.24$ , age range 18–78, 543 males). We randomly assigned participants to condition in a 3 (progress: high vs. equal vs. low)  $\times$  2 (categorization: categorization vs. no categorization) between-subjects design.

Participants imagined that they decided to complete 14 upper body workouts at the gym for 5 minutes each and that these workouts would be equally difficult. Participants in the categorization condition learned that they had 14 workouts that were described under two separate, uninformative labels, set 1 of exercises and set 2 of exercises. Participants in the no categorization condition learned they had 14 exercises, which were not grouped under a label.

In the low progress-no categorization condition, participants imagined completing four workouts with 10 workouts left to go (i.e., 29% completed). In the low progress-categorization condition, this was described as completing set 1 of four workouts, with set 2 of 10 workouts left to go. In the equal progress-no categorization condition, participants imagined completing seven workouts with seven workouts left to go (i.e., 50% completed). In the equal progress-categorization condition this was described as completing set 1 of seven workouts, with set 2 of seven workouts left to go. In the high progress-no categorization condition, participants imagined completing 10 workouts with four workouts left to go (i.e., 71% completed). In the high progress-categorization condition, this was described as completing set 1 of 10 workouts, with set 2 of four workouts left to go. Thus, in the categorization conditions, participants learned about absolute progress (i.e., number of exercises) and categorical progress (i.e., sets of exercises) simultaneously on the same page; in the no categorization conditions, participants only learned about absolute progress (see [web appendix A2](#) for stimuli).

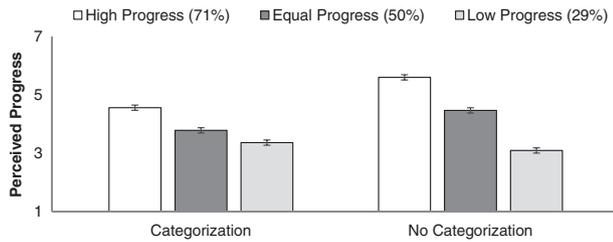
We measured perceived progress on a single 7-point scale: "Think about the progress you made and the progress you have remaining. At this point in your workout, how much progress overall do you feel you made?" (1 = "a little progress, just starting out"; 7 = "a lot of progress, almost done").

## Results

As preregistered, we regressed progress perceptions on three dummy variables representing the low progress condition, the high progress condition, and the categorization condition, and two variables representing the (categorization vs. no categorization)  $\times$  (low vs. equal progress) interaction, and the (categorization vs. no categorization)  $\times$

FIGURE 2

STUDY 2: PERCEIVED PROGRESS AS A FUNCTION OF CATEGORIZATION AT LOW (29%), EQUAL (50%), AND HIGH (71%) ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.



(high vs. equal progress) interaction. As predicted, we found a significant categorization  $\times$  low (vs. equal) progress interaction ( $B = .95$ ,  $SE = .18$ ,  $t(1,193) = 5.29$ ,  $p < .001$ , 95% CI = [0.60, 1.31],  $\beta = .23$ ), such that the difference in progress perceptions between the categorization and no categorization conditions (i.e., categorization minus no categorization) was more positive at low progress ( $M_{\text{categorization}} = 3.38$ ,  $SD = 1.41$ ,  $M_{\text{no categorization}} = 3.10$ ,  $SD = 1.22$ ) than equal progress ( $M_{\text{categorization}} = 3.80$ ,  $SD = 1.45$ ;  $M_{\text{no categorization}} = 4.48$ ,  $SD = .96$ ) (see figure 2).

Also, as predicted, we found a significant categorization  $\times$  high (vs. equal) progress interaction ( $B = -.36$ ,  $SE = .18$ ,  $t(1,193) = -1.97$ ,  $p = .049$ , 95% CI = [-0.71, -0.002],  $\beta = -.09$ ), such that the difference in progress perceptions between categorization and no categorization conditions (i.e., categorization minus no categorization) was more negative at high progress ( $M_{\text{categorization}} = 4.57$ ,  $SD = 1.52$ ;  $M_{\text{no categorization}} = 5.61$ ,  $SD = .97$ ) than equal progress ( $M_{\text{categorization}} = 3.80$ ,  $SD = 1.45$ ;  $M_{\text{no categorization}} = 4.48$ ,  $SD = .96$ ).

We also conceptually replicated study 1: simple effects analysis revealed that categorization (vs. no categorization) significantly increased progress perceptions at low progress ( $B = .27$ ,  $SE = .13$ ,  $t(1,193) = 2.12$ ,  $p = .034$ , 95% CI = [0.02, 0.52],  $\beta = .09$ ), whereas categorization (vs. no categorization) significantly decreased progress perceptions at high progress ( $B = -1.04$ ,  $SE = .13$ ,  $t(1,193) = -8.14$ ,  $p < .001$ , 95% CI = [-1.29, -0.79],  $\beta = -.34$ ).

We note that there was also an effect of categorization at equal progress—participants perceived lower progress when exercises were categorized than when they were not ( $B = -.68$ ,  $SE = .13$ ,  $t(1,193) = -5.37$ ,  $p < .001$ , 95% CI = [-0.93, -0.43],  $\beta = -.22$ ). One possibility is that when the proportion of tasks completed equals the proportion of categories completed at 50%, the presence (vs. absence) of categories expands the psychological distance between goal-related activities (Isaac and Schindler 2014; Mishra and Mishra 2010), decreasing progress perceptions, which

we further discuss in the general discussion. Importantly for our theory however, when the proportion of tasks completed differs from the proportion of categories completed (e.g., 29% of the tasks completed, but 50% of the categories completed), the tendency to anchor progress perceptions on the proportion of categories completed outweighs this main effect of categorization.

## Discussion

This study provided evidence for our proposed effect that, when categories are present, perceptions of progress are sensitive to the proportion of categories completed as well as absolute progress made (H1). In particular, *only* when consumers' absolute progress diverges from the proportion of categories completed do we find the predicted effect.

Second, this study shows that arbitrary labels are also a categorization cue that can affect goal progress perception. Thus, using two well-established categorization cues in studies 1 and 2 (similarity and labels; Redden 2008), we provide converging evidence that categorization influences people's goal progress perceptions. Finally, we replicated the effect of categorization and absolute progress on perceived progress using a new single-item measure of progress perceptions, demonstrating that this effect is not sensitive to elicitation method.

## STUDY 3: PROPORTION OF CATEGORIES COMPLETED AFFECTS GOAL PROGRESS PERCEPTION

Studies 1 and 2 found that progress perceptions diverge when categories are present (vs. absent). We expect this occurs because when completing 1/2 categories, goal progress perceptions anchor on the proportion of categories completed (i.e., 50%). To provide further evidence for this account, the current study expanded beyond this two-category design, comparing the effect of having no categories, two categories, or four categories on progress perceptions. We predicted an interaction between the proportion of categories completed and absolute progress made on goal progress perceptions. Specifically, in the low progress condition, we anticipated that consumers would perceive *greater* progress when completing one out of two categories (50%) versus no categories (i.e., 2 out of 11 workouts completed; 18% absolute progress) and versus one out of four categories (25%). We expected this to reverse for the high progress condition, such that perceptions of progress would be *lower* when completing one out of two categories (50%) versus no categories (i.e., 9 out of 11 workouts completed; 82% absolute progress) and versus three out of four categories (75%).

## Method

We preregistered this study for 1,800 participants on Prolific. A total of 1,801 workers participated. As preregistered, we excluded participants who failed the attention check ( $n = 132$ ), leaving 1,669 ( $M_{\text{age}} = 30.66$ ; age range 18–82; 856 males).

We randomly assigned participants to condition in a 2 (progress: high vs. low)  $\times$  3 (categorization: four categories vs. two categories vs. no categories) between-subjects design. All participants imagined that they were working out at the gym with a trainer and had 11 workouts to complete. Each workout would take 5 minutes to complete, involve their upper body, and be equally difficult. The workouts were divided into four sets in the four categories conditions, two sets in the two categories condition, and no sets in the no category condition.

Across the low progress conditions, participants imagined completing two out of 11 workouts (18% of the workout overall). Participants in the four categories-low progress condition imagined completing one set of workouts (consisting of two workouts), with three sets left to go (consisting of nine workouts total). Participants in the two categories-low progress condition imagined completing one set of workouts (consisting of two workouts), with one set left to go (consisting of nine workouts total). Participants in the no categories-low progress condition imagined completing two workouts, with nine workouts left to go (with no sets).

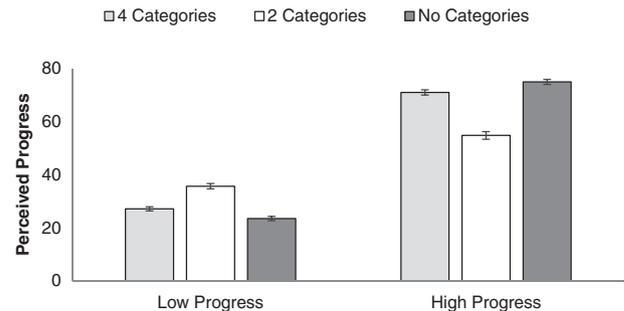
In the high progress conditions, participants imagined completing nine out of 11 workouts (82% of the workout overall). Participants in the four categories-high progress condition imagined completing three sets of workouts (consisting of nine workouts total), with one set left to go (consisting of two workouts). Participants in the two categories-high progress condition imagined completing one set of workouts (consisting of nine workouts), with one set left to go (consisting of two workouts). Participants in the no categories-high progress condition imagined completing nine workouts, with two workouts left to go (with no sets).

Thus, participants learned about absolute progress (number of exercises) and categorical progress (sets of exercises) simultaneously on the same page in the four categories and two categories condition; participants in the no categories condition only received information about absolute progress (see [web appendix A3](#) for stimuli).

Participants answered the progress perception questions from study 1 on a scale from 0 = “very little” to 100 = “a lot.” We computed a measure of overall progress by reverse coding progress remaining (101—progress remaining) and averaging it with progress made ( $r = .74$ ). Ancillary measures are reported in [web appendix B2](#).

FIGURE 3

STUDY 3: PERCEIVED PROGRESS AS A FUNCTION OF PROPORTION OF CATEGORIES AT LOW VERSUS HIGH ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.



## Results

As preregistered, we conducted a linear regression on progress perceptions from three dummy variables representing the high progress condition, the four categories condition, and the no categories condition, and two variables representing the four (vs. two) categories  $\times$  progress interaction and the no (vs. two) categories  $\times$  progress interaction.

Replicating studies 1 and 2, we found a significant no (vs. two) categories  $\times$  progress interaction ( $B = 32.36$ ,  $SE = 2.05$ ,  $t(1,664) = 15.82$ ,  $p < .001$ , 95% CI = [28.35, 36.37],  $\beta = .45$ ). Under low progress, participants perceived that they made significantly greater progress in the two categories condition than in the no categories condition ( $M_{\text{two categories}} = 35.69$ ,  $SD = 16.68$ ;  $M_{\text{no categories}} = 23.52$ ,  $SD = 13.72$ ;  $B = -12.18$ ,  $SE = 1.44$ ,  $t(1,663) = -8.44$ ,  $p < .001$ , 95% CI = [-15.01, -9.35],  $\beta = -.22$ ). However, under high progress, participants perceived that they made significantly less progress in the two categories condition than in the no categories condition ( $M_{\text{two categories}} = 54.85$ ,  $SD = 24.34$ ;  $M_{\text{no categories}} = 75.04$ ,  $SD = 15.50$ ;  $B = 20.18$ ,  $SE = 1.45$ ,  $t(1,663) = 13.91$ ,  $p < .001$ , 95% CI = [17.34, 23.03],  $\beta = .36$ ).

In addition, as predicted, we found a significant four (vs. two) categories  $\times$  progress interaction ( $B = 24.73$ ,  $SE = 2.05$ ,  $t(1,663) = 12.09$ ,  $p < .001$ , 95% CI = [20.72, 28.74],  $\beta = .35$ , [figure 3](#)). Under low progress, participants perceived making significantly less progress in the four (vs. two) categories condition ( $M_{\text{four categories}} = 27.17$ ,  $SD = 13.03$ ;  $M_{\text{two categories}} = 35.69$ ,  $SD = 16.68$ ;  $B = -8.53$ ,  $SE = 1.46$ ,  $t(1,663) = -5.86$ ,  $p < .001$ , 95% CI = [-11.38, -5.67],  $\beta = -.15$ ), which reversed under high progress ( $M_{\text{four categories}} = 71.05$ ,  $SD = 16.50$ ;  $M_{\text{two categories}} = 54.85$ ,  $SD = 24.34$ ;  $B = 16.20$ ,  $SE = 1.44$ ,  $t(1,663) = 11.28$ ,  $p < .001$ , 95% CI = [13.38, 19.02],  $\beta = .29$ ).

Furthermore, although we did not specify this in our pre-registration, our theory also predicts a difference in progress perceptions between four categories and no categories at low and high progress. That is, those in the four categories condition will anchor their progress perceptions on the proportion of categories completed (low progress = 25%; high progress = 75%), whereas the no categories condition will anchor their progress perceptions closer to 18% versus 82%. In line with this, at low progress, progress perceptions in the four categories condition were significantly greater than the no categories condition ( $M_{\text{four categories}} = 27.17$ ;  $M_{\text{no categories}} = 23.52$ ;  $B = 3.65$ ,  $SE = 1.44$ ,  $t(1,663) = 2.53$ ,  $p = .012$ , 95% CI = [0.82, 6.48],  $\beta = .06$ ), which significantly reversed at high progress ( $M_{\text{four categories}} = 71.05$ ;  $M_{\text{no categories}} = 75.04$ ;  $B = -3.98$ ,  $SE = 1.45$ ,  $t(1,663) = -2.74$ ,  $p = .006$ , 95% CI = [-6.83, -1.13],  $\beta = -.07$ ).

## Discussion

When consumers categorize their goal-relevant actions, their progress perceptions are more sensitive to the proportion of categories completed and less sensitive to the absolute progress. As a result, they perceive that they have made less progress after completing one out of four categories than after completing one out of two categories, when holding the absolute amount of progress constant. Furthermore, they perceive that they have made more progress after completing three out of four categories than after completing one out of two categories, when holding the absolute amount of progress constant. In addition, we conceptually replicated studies 1 and 2, that when completing one out of two categories, the presence (vs. absence) of categories increases progress perceptions at low progress and decreases it at high progress (H1).

### STUDY 4: CATEGORIZATION AFFECTS PROGRESS PERCEPTIONS BY ANCHORING ESTIMATES ON CATEGORICAL PROGRESS

The current study tested our proposed process that the effect of categorization on goal progress perceptions occurs because consumers anchor their estimates of goal progress on the proportion of categories completed (H2). To test this, we held the presence of categories constant and manipulated whether categorical progress served as an anchor or not. Specifically, whereas the categorization conditions in studies 1–3 provided information on categorical and absolute progress simultaneously, the current study varied the presentation order of information about categorical and absolute progress.

Prior research on anchoring has found that arbitrary numerical information that is presented first, before a subsequent estimate, moves that estimate closer to the arbitrary

number (Simmons et al. 2010; Tversky and Kahneman 1974). We thus manipulated whether people anchor on categorical progress or absolute progress by manipulating which information was presented first. In the category anchor condition, categorical progress was presented first, and on a separate screen, followed by absolute progress, leading categories to serve as an anchor. In the progress anchor condition, absolute progress was presented first, and on a separate screen, followed by categorical progress, leading absolute progress to serve as an anchor. In the categorization condition, as in our previous studies, categorical progress and absolute progress were presented simultaneously. We accordingly compared our categorization and no categorization conditions from studies 1–3 with these new, category anchor and progress anchor conditions.

As in our previous studies, we first predicted a significant interaction between categorization (vs. no categorization)  $\times$  progress. Then, to determine whether people naturally anchor on categorical progress in the categorization condition, we compared categorization (vs. category anchor)  $\times$  progress, predicting a nonsignificant interaction implying that when categorical information and absolute progress information are provided simultaneously, people naturally anchor on categorical information. Lastly, to provide evidence that our observed categorization effect is driven by consumers anchoring on categorical progress rather than absolute progress, we tested for a significant interaction between categorization (vs. progress anchor)  $\times$  progress.

## Method

We preregistered this study for 1,200 participants on Prolific. A total of 1,202 workers participated. As preregistered, we excluded participants who failed the attention check ( $n = 100$ ), leaving 1,102 ( $M_{\text{age}} = 37.73$ ; age range 18–79; 518 males).

We randomly assigned participants to condition in a 2 (progress: high vs. low)  $\times$  4 (categorization: categorization vs. no categorization vs. category anchor vs. progress anchor) between-subjects design. Similar to study 3, all participants imagined that they were working out at the gym with a trainer and had 11 workouts to complete. Each workout would take 5 minutes, involve their upper body, and be equally difficult. The workouts were divided into two sets in the three conditions with categories (i.e., “categorization,” “category anchor,” and “progress anchor” conditions) and no sets in the no categorization condition.

In the low progress-no categorization condition, participants imagined completing 2 out of 11 workouts (18%) as in study 3. In the low progress-category anchor condition, participants saw information on categorical progress on one page and then saw information about absolute progress on a second page. On the first page, they read that they had two sets of workouts, set 1 and set 2, and that they had

TABLE 1  
STUDY 4: REGRESSION ANALYSIS PREDICTING PROGRESS PERCEPTIONS

Variables	B	Test statistic	95% CI	$\beta$
High progress dummy variable	23.17 (2.32)	$t(1,094) = 10.00, p < .001$	18.63, 27.72	.42
No categorization dummy variable	-11.38 (2.15)	$t(1,094) = -5.30, p < .001$	-15.60, -7.16	-.18
Category anchor dummy variable	3.62 (2.17)	$t(1,094) = 1.67, p = .095$	-0.63, 7.87	.06
Progress anchor dummy variable	-10.89 (2.14)	$t(1,094) = -5.08, p < .001$	-15.10, -6.69	-.18
No categorization (vs. categorization) $\times$ high (vs. low) progress	32.78 (3.06)	$t(1,094) = 10.71, p < .001$	26.77, 38.78	.41
Category anchor (vs. categorization) $\times$ high (vs. low) progress	-.36 (3.07)	$t(1,094) = -.12, p = .907$	-6.39, 5.67	.00
Progress anchor (vs. categorization) $\times$ high (vs. low) progress	30.05 (3.05)	$t(1,094) = 9.84, p < .001$	24.06, 36.04	.37

NOTE.—Categories condition is the reference group. SE in parentheses.

completed set 1. On the second page, they learned that set 1 consisted of two upper body workouts and set 2 consisted of nine upper body workouts. In the low progress-progress anchor condition, participants first saw information on absolute progress on one page and then saw information about categorical progress on a second page. On the first page, they read that they completed two upper body workouts with nine upper body workouts remaining. On the second page, they then learned that their trainer considers these workouts to be part of two sets, set 1 consisting of two workouts and set 2 consisting of nine workouts. In the low progress-categorization condition, participants learned they completed one set of workouts (consisting of two upper body workouts), with one set left to go (consisting of nine upper body workouts), identical to the low progress-two categories condition from study 3.

In the high progress-no categorization condition, participants imagined completing 9 out of 11 workouts (82%) as in study 3. In the high progress-category anchor condition, on the first page, participants learned that they had two sets of workouts, set 1 and set 2, and that they had completed set 1. On the second page, they then learned that set 1 consisted of nine upper body workouts and set 2 consisted of two upper body workouts. In the high progress-progress anchor condition, on the first page, participants learned that they completed nine upper body workouts with two upper body workouts remaining. On the second page, they then learned that their trainer considers these workouts to be part of two sets, set 1 consisting of nine workouts and set 2 consisting of two workouts. In the high progress-categorization condition, participants learned that they completed one set of workouts (consisting of nine upper body workouts), with one set left to go (consisting of two upper body workouts), identical to the high progress-two categories condition from study 3.

Thus, across progress manipulations, participants in the no categorization condition only learned about absolute progress; participants in the category anchor condition learned about categorical progress first and then learned about absolute progress; participants in the progress anchor condition learned about absolute progress first and then learned about categorical progress; participants in the

categorization condition learned about categorical and absolute progress simultaneously. Whereas information on categorical progress (number of sets completed) was available in the category anchor, progress anchor, and categorization conditions, we predicted that participants would only anchor on categorical progress when this information was presented first (i.e., category anchor condition) or presented simultaneously with absolute progress (i.e., categorization condition) (see [web appendix A4](#) for stimuli).

Participants answered the progress perception questions from study 1 on a scale from 0 = “very little” to 100 = “a lot.” We computed a measure of overall progress by reverse coding progress remaining (101—progress remaining) and averaging it with progress made ( $r = .76$ ).

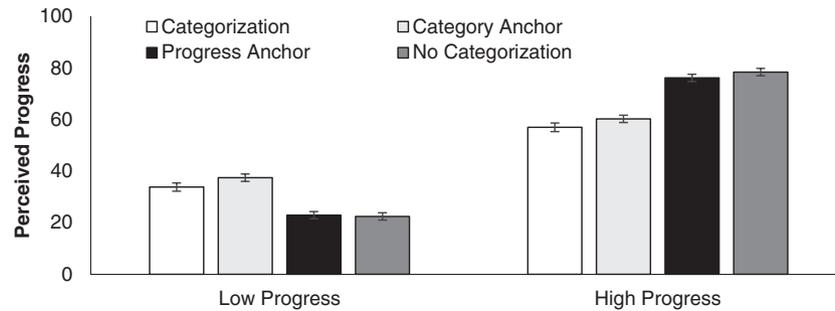
## Results

As preregistered, we conducted a linear regression on progress perceptions from a dummy variable representing the high progress condition, three dummy variables representing the categorization conditions (with the “categorization” condition as the reference group), and three variables representing the no categorization (vs. categorization)  $\times$  progress interaction, the category anchor (vs. categorization)  $\times$  progress interaction, and the progress anchor (vs. categorization)  $\times$  progress interaction (see [table 1](#)).

First, we tested for the basic categorization (vs. no categorization)  $\times$  progress interaction predicting progress perceptions as in studies 1–3. As predicted, and replicating our previous studies, we found a significant interaction ( $B = 32.78, t(1,094) = 10.71, p < .001$ , see [table 1](#) and [figure 4](#)). Under low progress, participants perceived that they made significantly greater progress in the categorization condition ( $M = 33.81, SD = 15.08$ ) than in the no categorization condition ( $M = 22.44, SD = 12.36; B = -11.38, SE = 2.15, t(1,094) = -5.30, p < .001, 95\% CI = [-15.60, -7.16], \beta = -.18$ ). However, under high progress, participants perceived that they made significantly less progress in the categorization (vs. no categorization) condition ( $M_{\text{categorization}} = 56.99, SD = 23.05; M_{\text{no categorization}} =$

FIGURE 4

STUDY 4: PERCEIVED PROGRESS AS A FUNCTION OF CATEGORIZATION CONDITION AT LOW VERSUS HIGH ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.



78.39,  $SD = 14.99$ ;  $B = 21.40$ ,  $SE = 2.18$ ,  $t(1,094) = 9.82$ ,  $p < .001$ ,  $95\% CI = [17.12, 25.68]$ ,  $\beta = .34$ ).

Next, to determine whether consumers naturally anchor on categorical progress when both categorical and absolute progress are provided simultaneously (i.e., in the “categorization” condition), we compared our categorization condition with the condition in which we manipulated participants to anchor on categorical progress (i.e., category anchor condition). As predicted, there was a nonsignificant categorization (vs. category anchor)  $\times$  progress interaction ( $B = -.36$ ,  $t(1,094) = -.12$ ,  $p = .907$ ; [table 1](#)). This nonsignificant interaction implies that when both categorical and absolute progress information are provided simultaneously, people naturally anchor on categorical progress information.

As additional evidence that our categorization effect was driven by consumers anchoring on categorical progress, we tested for an interaction between categorization (vs. progress anchor) and low (vs. high) progress. In the progress anchor condition, although participants’ actions are categorized, categorical information is provided after information about absolute progress. Participants in this condition should accordingly anchor their estimates of goal progress on absolute progress, rather than categorical progress. If our categorization effect is driven by anchoring on categorical progress, progress perceptions in the categorization condition should diverge from those in the progress anchor condition. As predicted, we found a significant categorization (vs. progress anchor)  $\times$  progress interaction ( $B = 30.05$ ,  $t(1,094) = 9.84$ ,  $p < .001$ ; [table 1](#)). Under low progress, participants perceived that they made significantly more progress in the categorization condition ( $M = 33.81$ ,  $SD = 15.08$ ) than in the progress anchor condition ( $M = 22.92$ ,  $SD = 11.89$ ;  $B = -10.89$ ,  $SE = 2.14$ ,  $t(1,094) = -5.08$ ,  $p < .001$ ,  $95\% CI = [-15.10, -6.69]$ ,  $\beta = -.18$ ). However, this significantly reversed under high progress ( $M_{\text{categories}} = 56.99$ ,  $SD = 23.05$ ;  $M_{\text{progress anchor}}$

$= 76.14$ ,  $SD = 16.89$ ;  $B = 19.15$ ,  $SE = 2.18$ ,  $t(1,094) = 8.80$ ,  $p < .001$ ,  $95\% CI = [14.88, 23.43]$ ,  $\beta = .31$ ).

Since category anchor and progress anchor conditions anchor on different information, we also find a significant category anchor (vs. progress anchor)  $\times$  absolute progress interaction ( $B = 30.41$ ,  $SE = 2.84$ ,  $t(1,094) = 10.72$ ,  $p < .001$ ,  $95\% CI = [24.84, 35.98]$ ,  $\beta = .28$ ). At low progress, progress perceptions were greater in the category anchor (vs. progress anchor) condition ( $B = -14.52$ ,  $SE = 2.01$ ,  $t(1,094) = -7.21$ ,  $p < .001$ ,  $95\% CI = [-18.47, -10.57]$ ,  $\beta = -.23$ ). At high progress, progress perceptions were lower in the category anchor (vs. progress anchor) condition ( $B = 15.89$ ,  $SE = 2.00$ ,  $t(1,094) = 7.96$ ,  $p < .001$ ,  $95\% CI = [11.97, 19.81]$ ,  $\beta = .26$ ).<sup>2</sup>

Lastly, we find a significant category anchor (vs. no categorization)  $\times$  absolute progress interaction ( $B = 33.14$ ,  $SE = 2.84$ ,  $t(1,094) = 11.65$ ,  $p < .001$ ,  $95\% CI = [27.56, 38.72]$ ,  $\beta = .41$ ), but a nonsignificant progress anchor (vs. no categorization)  $\times$  absolute progress interaction ( $B = -2.73$ ,  $t(1,094) = -.97$ ,  $p = .334$ ,  $\beta = -.03$ ).<sup>3</sup> This pattern of results supports our claim that when categorical information does not serve as an anchor, as in the progress anchor condition, people are less sensitive to categorical progress than when it does serve as an anchor, as in the category anchor condition.

2 To confirm that those in the progress anchor condition still attend to information on categorical progress, we conducted a pilot test examining participants’ memory for categorical progress information in the progress anchor versus category anchor conditions ([web appendix E](#)). We find participants who did not significantly differ in their ability to recall information on categorical progress across conditions (category anchor = 80.4% vs. progress anchor = 82.0%;  $\chi^2(1, N = 101) = .04$ ,  $p = .836$ ,  $\Phi = .02$ ).

3 Although not our primary hypothesis, this nonsignificant interaction suggests that people in the progress anchor condition make minimal adjustments based on categorical progress, which we discuss further in [web appendix D4](#).

## Discussion

Study 4 provides evidence for our underlying process that our categorization effect is driven by consumers anchoring their goal progress perceptions on categorical progress (H2). Holding the presence of categories constant, but manipulating whether or not information on categorical progress served as an anchor, attenuated the effect. When categorical progress information is presented before absolute progress information (i.e., when categories serve as an anchor), we find evidence for our categorization effect. However, when category progress information is presented after absolute progress information (i.e., when categories do not serve as an anchor), categorization was less likely to affect progress perceptions.

This study further rules out an alternative mechanism for our finding: that consumers simply form an average of their category progress, and absolute progress, when forming their goal progress perceptions. If this were the case, we would not expect a difference between the three conditions providing categorical information (i.e., categorization, category anchor, and progress anchor conditions). Furthermore, it suggests that consumers do not anchor on absolute progress and adjust based on categorical information. Indeed, in the progress anchor condition, participants were first presented with absolute progress and thus anchored on absolute progress, such that their progress perceptions were more similar to the no categories condition than the category anchor condition.

We also conducted supplemental study 4 listed in [web appendix D4](#) in which we included a “pure category” condition. In this condition, participants did not receive absolute progress information and only received categorical progress information. We demonstrate that consumers are more sensitive to categorical progress when absolute progress information is not available than when this information is available, demonstrating further that our categorization effect is due to anchoring on categorical progress and adjusting based on absolute progress.

Having provided evidence for our anchoring and adjustment process, the remaining studies turn to consequences of this categorization effect for motivation. We thus return to the design of study 1, examining the interaction between the presence (vs. absence) of categories and low (vs. high) absolute progress on progress perceptions, with implications for motivation.

### STUDY 5: ORGANIZATION SEQUENCE AFFECTS CATEGORIZATION TO INFLUENCE PROGRESS PERCEPTIONS AND MOTIVATION

Study 5 tested a consequence of the interaction of categorization and absolute progress on progress perceptions for motivation. In single-goal environments when the

superordinate goal is salient and rewarding, consumers are more motivated to complete a goal the more progress they perceive they have made (Kivetz et al. 2006). As a result, consumers closer to accomplishing their goal are more bothered by an interruption and find their current task more attractive than those farther from their goal (Jhang and Lynch 2015). Thus, we expected participants at low progress to be more motivated to complete their current task and report it as more attractive when categories were present (vs. absent), which would reverse at high progress.

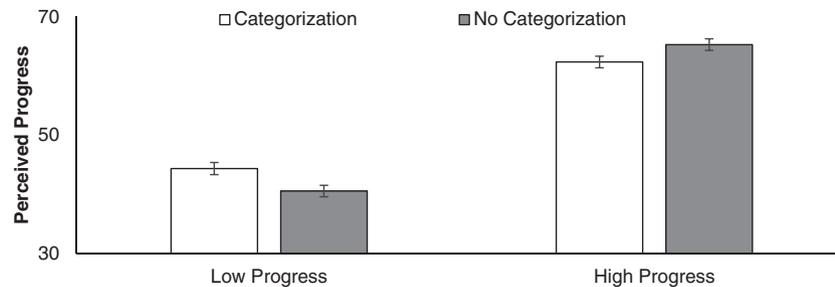
In addition, this study utilized a third categorization cue, the organizational sequence of goal-related actions (i.e., organized vs. disorganized; Hoch et al. 1999; Kahn and Wansink 2004). We predicted that when activities are presented in an organized sequence, consumers will categorize their goal-relevant activities, leading them to anchor their goal progress perceptions on the proportion of categories completed. However, if the same activities are not organized, they will anchor their goal progress perceptions on the actual progress they have made, as there is no cue for categorization.

## Method

We preregistered this study for 1,200 participants on MTurk. A total of 1,196 workers ( $M_{\text{age}} = 36.31$ ; age range 18–78; 559 males) participated. We randomly assigned participants to condition in a 2 (progress: high vs. low)  $\times$  2 (categorization: categorization vs. no categorization) between-subjects design. Participants imagined working on a series of math and verbal brainteasers. In the no categorization condition, these exercises were presented in a disorganized sequence (i.e., verbal–math–math–verbal–math–math–math). In the categorization condition, the verbal exercises were grouped together and the math exercises were grouped together.

In the low progress conditions, participants imagined completing three out of five exercises (i.e., completed 37.5%). Specifically, in the low progress-no categorization condition, they completed “verbal–math–math” exercises with “verbal–math–verbal–math–math” exercises remaining; in the low progress-categorization condition, they completed “verbal–verbal–verbal” exercises with “math–math–math–math” exercises remaining. In the high progress conditions, participants completed five out of three exercises (i.e., completed 62.5%). Specifically, in the high progress-no categorization condition, they completed “verbal–math–math–verbal–math” with “verbal–math–math” remaining; in the high progress-categorization condition, they imagined completing “math–math–math–math–math” with “verbal–verbal–verbal” remaining (see [web appendix A6](#)). Thus, in the categorization conditions, participants simultaneously learned about their absolute progress (e.g., 62.5% in high progress or 37.5% in low progress) and their categorical progress (e.g., 50%); while

FIGURE 5

STUDY 5: PERCEIVED PROGRESS AS A FUNCTION OF CATEGORIZATION AND ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.

those in the no categorization conditions only learned about their absolute progress.

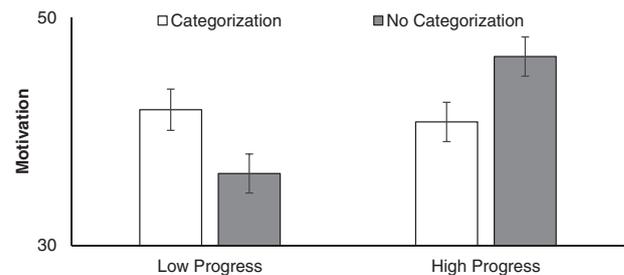
Participants answered a single-item measure of perceived progress, “Think about the progress you made and the progress you have remaining on these brainteasers. At this point, how much progress overall do you feel you made?” from 0 = “very little” to 100 = “a lot.”

At this point, participants imagined that they received a call from a telemarketer offering them a \$10 credit to a store they liked for completing a survey. Participants completed two questions assessing their motivation to finish the brainteasers (adapted from [Jhang and Lynch 2015](#);  $r = .70$ ): (1) “How attractive would you find it to continue completing the brainteasers (without answering the telemarketer’s survey)?” (0 = “not at all attractive” to 100 = “very attractive”) and (2) “How likely would you be to keep working on the brainteasers (without answering the telemarketer’s survey)?” (0 = “not at all likely” to 100 = “very likely”). We averaged the answers to these questions as our measure of motivation.

## Results

**Progress perceptions.** As preregistered, we found a significant categorization  $\times$  progress interaction ( $B = -6.73$ ,  $SE = 1.98$ ,  $t(1,192) = -3.40$ ,  $p < .001$ , 95% CI =  $[-10.60, -2.85]$ ,  $\beta = -.14$ ; [figure 5](#)). At low progress, participants in the categorization condition perceived that they made significantly more progress than those in the no categorization condition ( $M_{\text{categorization}} = 44.35$ ,  $SD = 17.94$ ;  $M_{\text{no categorization}} = 40.56$ ,  $SD = 16.97$ ;  $B = 3.79$ ,  $SE = 1.41$ ,  $t(1,192) = 2.68$ ,  $p = .007$ , 95% CI =  $[1.02, 6.57]$ ,  $\beta = .09$ ). At high progress, participants in the categorization condition perceived they made significantly less progress than those in the no categorization condition ( $M_{\text{categorization}} = 62.34$ ,  $SD = 17.78$ ;  $M_{\text{no categorization}} = 65.27$ ,  $SD = 15.59$ ;  $B = -2.93$ ,  $SE = 1.38$ ,  $t(1,192) = -2.12$ ,  $p = .034$ , 95% CI =  $[-5.64, -0.22]$ ,  $\beta = -.07$ ).

FIGURE 6

STUDY 5: MOTIVATION AS A FUNCTION OF CATEGORIZATION AND ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.

**Motivation.** As predicted, we found a significant categorization  $\times$  progress interaction predicting motivation ( $B = -11.35$ ,  $SE = 3.49$ ,  $t(1,192) = -3.25$ ,  $p = .001$ , 95% CI =  $[-18.19, -4.50]$ ,  $\beta = -.16$ ; [figure 6](#)). At low progress, participants in the categorization condition were significantly more motivated ( $M = 41.91$ ,  $SD = 29.77$ ) than those in the no categorization condition ( $M = 36.31$ ,  $SD = 28.68$ ;  $B = 5.60$ ,  $SE = 2.50$ ,  $t(1,192) = 2.24$ ,  $p = .025$ , 95% CI =  $[0.71, 10.50]$ ,  $\beta = .09$ ), which reversed at high progress ( $M_{\text{categorization}} = 40.84$ ,  $SD = 29.98$ ;  $M_{\text{no categorization}} = 46.58$ ,  $SD = 31.96$ ;  $B = -5.74$ ,  $SE = 2.44$ ,  $t(1,192) = -2.36$ ,  $p = .019$ , 95% CI =  $[-10.53, -0.96]$ ,  $\beta = -.09$ ).

**Moderated mediation.** We conducted a moderated mediation analysis to test our proposed process that categorization differentially influences motivation through progress perceptions as a function of absolute progress. Specifically, we predicted that in the low progress condition, an organized (vs. disorganized) sequence would *increase* motivation by increasing perceived progress and that in the high progress condition, an organized (vs. disorganized) sequence would *decrease* motivation by decreasing perceived progress. Our mediation model (SPSS Macro

PROCESS, Model 7) included categorization as the independent variable, absolute progress as the moderator, perceived progress as the mediator, and motivation as the dependent measure. Consistent with our hypothesis, we found that progress perceptions mediated the interaction in the predicted direction (index =  $-1.38$ ,  $SE = .56$ , 95% CI =  $[-2.5876, -0.4726]$ ; 10,000 resamples) with no significant direct effect (95% CI =  $[-3.6786, 3.1469]$ ). At low progress, categorization (vs. no categorization) increased motivation because people perceived making greater progress ( $B_{\text{indirect}} = .78$ ,  $SE = .36$ , 95% CI =  $[0.1783, 1.5726]$ ); at high progress, categorization (vs. no categorization) decreased motivation because people perceived making less progress ( $B_{\text{indirect}} = -.60$ ,  $SE = .33$ , 95% CI =  $[-1.3451, -0.0550]$ ).

## Discussion

Study 5 demonstrated that the mere organization of goal-relevant activities can influence categorization, leading consumers to anchor their goal progress perceptions more categorical progress than on absolute progress, relative to when categories are absent. Second, this study demonstrated that these progress perceptions have implications for consumer motivation. Participants were more motivated to continue their task, rather than be interrupted by a marketing promotion, the closer they perceived they were to accomplishing their goal (H3).

## STUDY 6: CATEGORIZATION INFLUENCES WORKOUT COMPLETION

In the current study, we moved to an incentive compatible design to further test how goal progress perceptions influence consumers' motivation. This study used similarity (vs. dissimilarity) between activities to manipulate categorization as in study 1. Participants actually completed a series of physical exercises that were similar (all upper body exercises or all ab exercises) or different (some ab and some upper body exercises). We manipulated absolute progress by giving participants a choice to continue or quit the workout after completing two (low progress) or five (high progress) exercises out of seven. We predicted an interaction between categorization and absolute progress on motivation to complete an actual workout, which would be mediated by progress perceptions.

## Method

We preregistered this study for 1,600 participants on MTurk. A total of 1,601 workers participated. We identified and excluded 12 duplicate IP addresses in our data (results remain unchanged including these responses). As preregistered, to ensure our effects were applicable to actual exercises, we only included participants who indicated

that they tried all of the exercises to the best of their ability (79.8% of the sample) leaving 1,267 ( $M_{\text{age}} = 36.26$ , age range 18–76, 563 males). All results reported below still reach statistical significance when all participants are included in the analyses (see [web appendix B3](#)).

We randomly assigned participants to condition in a 2 (progress: high vs. low)  $\times$  2 (categorization: categorization vs. no categorization) between-subjects design. Participants completed a series of seven simple 30–40-second physical exercises that could be done in an office or home. These exercises were presented in clips from videos posted on Youtube.com, and participants were asked to follow the instructor in each clip. Participants could opt out of the survey after learning they would need to complete physical exercises and before assignment to condition or being informed about the exact exercises they would do.

In the no categorization condition, the seven exercises were either all ab or all upper body exercises. In the categorization condition, the seven exercises were a combination of ab and upper body exercises. In the low progress conditions, participants completed two exercises before indicating their goal progress perceptions (i.e., 29% completed). More specifically, participants in the low progress-no categorization condition completed two ab or upper body exercises with five ab or upper body exercises left to go; participants in the low progress-categorization condition completed two ab or upper body exercises with five upper body or ab exercises left to go. In the high progress conditions, participants completed five exercises before indicating their goal progress perceptions (i.e., 71% completed). More specifically, participants in the high progress-no categorization condition completed five ab or upper body exercises with two ab or upper body exercises left to go; participants in the high progress-categorization condition completed five ab or upper body exercises with two upper body or ab exercises left to go (see [web appendix A7](#) for stimuli). Thus, in the categorization conditions, participants simultaneously learned about their absolute progress (e.g., 71% in high progress or 29% in low progress) and their categorical progress (e.g., 50%); while those in the no categorization conditions only learned about their absolute progress.

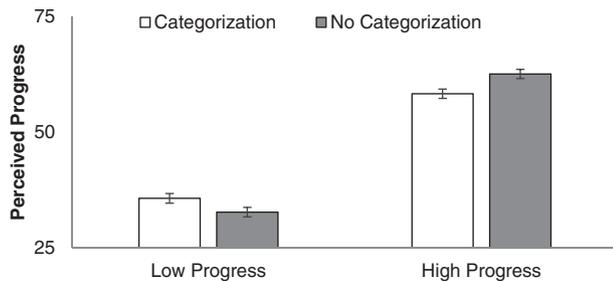
Participants then answered the progress perception questions from study 1 (0 = "very little" to 100 = "a lot"). We computed a measure of overall progress by reverse coding progress remaining (101—progress remaining) and collapsing it with progress made ( $r = .40$ ).<sup>4</sup>

After answering these questions, participants chose whether or not to complete the remaining exercises for a

<sup>4</sup> Although significant, this correlation is lower than our previous studies. We speculate this is because this study involved consumers' real behavior, which is noisier, and manipulated similarity, and thus the activities that consumers completed are different in some cases than those they have remaining.

FIGURE 7

STUDY 6: PERCEIVED PROGRESS ON A PHYSICAL WORKOUT AS A FUNCTION OF CATEGORIZATION AND ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.



5-cent bonus (they would have to complete either two or five exercises depending on condition). If they chose to complete the workout, they were presented with the remaining exercises; if they chose not to complete the workout, they forfeited the bonus and were directed to the end of the survey. At the end of the study, we asked, “Did you actually follow the exercises in the video?” Response options were (1) “Yes, I tried all of the exercises to the best of my ability (79.8%),” (2) “Kind of, I just tried a few (17.6%),” and (3) “No, I didn’t try to complete any of them (2.6%).”

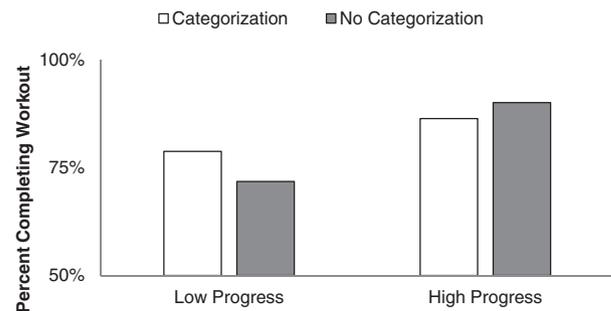
## Results

**Progress perceptions.** We conducted a regression of categorization  $\times$  progress on perceived progress. Replicating studies 1–5, as predicted, we found a significant interaction ( $B = -7.27$ ,  $SE = 2.03$ ,  $t(1,263) = -3.57$ ,  $p < .001$ , 95% CI =  $[-11.26, -3.28]$ ,  $\beta = -.14$ ; figure 7). Under low progress, participants in the categorization condition perceived that they made significantly greater progress than those in the no categorization condition ( $M_{\text{categorization}} = 35.63$ ,  $SD = 15.75$ ;  $M_{\text{no categorization}} = 32.64$ ,  $SD = 14.81$ ;  $B = 2.99$ ,  $SE = 1.47$ ,  $t(1,263) = 2.04$ ,  $p = .041$ , 95% CI =  $[0.12, 5.86]$ ,  $\beta = .07$ ). This pattern reversed under high progress, with participants in the categorization condition perceiving that they made significantly less progress than those in the no categorization condition ( $M_{\text{categorization}} = 58.23$ ,  $SD = 21.37$ ;  $M_{\text{no categorization}} = 62.51$ ,  $SD = 19.32$ ;  $B = -4.28$ ,  $SE = 1.41$ ,  $t(1,263) = -3.03$ ,  $p = .002$ , 95% CI =  $[-7.05, -1.51]$ ,  $\beta = -.10$ ).

**Motivation.** We also found the predicted categorization  $\times$  progress interaction on participants’ decision to complete the remaining exercises ( $B = -.74$ ,  $SE = .31$ , Wald = 5.79,  $p = .016$ , OR = .47; figure 8). Under low progress, participants in the categorization condition were significantly more likely to complete the exercises ( $M = 78.8\%$

FIGURE 8

STUDY 6: COMPLETION OF A PHYSICAL WORKOUT AS A FUNCTION OF CATEGORIZATION AND ABSOLUTE PROGRESS. BARS ARE  $\pm$ SEM.



than those in the no categorization condition ( $M = 71.8\%$ ;  $B = .38$ ,  $SE = .19$ , Wald = 4.05,  $p = .044$ , OR = 1.46), which reversed, although not significantly, under high progress ( $M_{\text{categorization}} = 86.4\%$ ;  $M_{\text{no categorization}} = 90.1\%$ ;  $B = -.36$ ,  $SE = .24$ , Wald = 2.21,  $p = .138$ , OR = .70).

**Moderated mediation.** The analysis of moderated mediation revealed a significant index for the indirect effect (index =  $-.13$ ,  $SE = .05$ , 95% CI =  $[-0.23, -0.05]$ ; 10,000 resamples; PROCESS model 7; Hayes 2015) with no significant direct effect (95% CI =  $[-0.18, 0.40]$ ). At low progress, categorization (vs. no categorization) increased workout completion by increasing perceptions of progress ( $B_{\text{indirect}} = .05$ ,  $SE = .03$ , 95% CI =  $[0.01, 0.11]$ ); at high progress, categorization (vs. no categorization) decreased workout completion by decreasing perceptions of progress ( $B_{\text{indirect}} = -.08$ ,  $SE = .03$ , 95% CI =  $[-0.15, -0.02]$ ).

## Discussion

Study 6 replicated the effect of categorization on goal progress perceptions, using similarity as a cue for categorization. Furthermore, it demonstrated an important consequence of goal progress perception on consumer motivation in an incentive compatible context: participants could earn a bonus for completing the task. Furthermore, none of our prior studies had participants who complete actually different tasks; we only manipulated perceptions of similarity (study 1) or studied hypothetical scenarios with similar or different tasks (supplemental study 1). However, participants in study 6 completed actually different tasks in the categorization conditions or similar tasks in the no categorization conditions. The effect of categorization on perceived progress held despite noise that is introduced from participants completing different tasks, providing additional evidence of the robustness of this effect.

## STUDY 7: CATEGORIZATION INFLUENCES PURCHASE DECISIONS

In study 7, we examined how categorization influences consumers' perceptions of their progress in consuming nutritional juices, a product needed to achieve a weight loss goal. Furthermore, we examined how perceived consumption progress influences choice of when to buy more of this product, an important measure for consumers' restocking decisions. We predicted that categorization and absolute progress interact to predict perceived progress in product consumption, with implications for when consumers decide to repurchase the product (i.e., restock). Specifically, we predicted that, at low progress, the presence (vs. absence) of categories would increase perceived progress on product consumption, speeding up repurchase. We expected the opposite to occur at high progress.

Furthermore, studies 5 and 6 assessed progress perceptions before motivation. To ensure that consumers' motivation was not contingent upon first responding about perceived progress, we assessed consumer motivation prior to measuring perceived progress in the current study.

### Method

We preregistered this study<sup>5</sup> for 1,200 participants on MTurk. A total of 1,201 workers participated. As preregistered, we excluded participants who failed the attention check ( $n=25$ ), leaving 1,175 ( $M_{\text{age}} = 36.51$ , age range 18–81, 585 males). All participants imagined they were trying to lose weight and bought nutritional juices as meal replacements. Participants read that the nutritional juices were from the same company, tasted the same, and were equally likely to help them lose weight. Participants read that they bought 11 nutritional juices in total.

Participants were randomly assigned to condition in this 2 (progress: high vs. low)  $\times$  2 (categorization: categorization vs. no categorization) between-subjects design. We manipulated categorization via arbitrary labels as in studies 2–4. In the categorization conditions, participants read that their juices were in two packages, one regular package (with two juices) and one jumbo package (with nine juices). Participants were presented with absolute progress information (i.e., number of juices) and categorical progress information (packages of juices) simultaneously (i.e., on the same page). In the no categorization condition, participants were not told that the juices were in different packages; they only had information on absolute progress.

Specifically, in the low progress conditions, participants imagined consuming two juices, with nine juices left (18% consumed). In the low progress-categorization condition,

they imagined consuming one package (consisting of two juices), with one package remaining (consisting of nine juices). In the high progress conditions, participants imagined consuming nine juices, with two juices left (82% consumed). In the high progress-categorization condition, they imagined consuming one package (consisting of nine juices), with one package remaining (consisting of two juices) (see [web appendix A8](#) for stimuli). Thus, in the categorization conditions, participants simultaneously learned about their absolute progress (e.g., 82% in high progress or 18% in low progress) and their categorical progress (e.g., 50%); while those in the no category conditions only learned about their absolute progress.

We asked participants, “Your goal is to have enough nutritional juices to last the rest of the month. You can order more nutritional juices now (if you order now they will definitely arrive on time). Or you can wait to see if the nutritional juices will be on sale (if you wait, your order may not ship in time). At this point, what would you decide to do?” with the choice of “Order Now—I will pay full price, but have it delivered on time” or “Wait a few days—I may get a sale, but it could be delayed.” On the next page, participants were asked about their juice consumption (i.e., progress perceptions), “Think about the nutritional juices you’ve consumed so far and the nutritional juices you have remaining. At this point, how much of your nutritional juice supply do you think you’ve consumed?” from 0 = “very little” to 100 = “a lot.”

### Results

**Progress perceptions.** We found a significant categorization  $\times$  progress interaction predicting perceived product consumption ( $B = -27.95$ ,  $SE = 2.57$ ,  $t(1,172) = -10.87$ ,  $p < .001$ , 95% CI =  $[-32.99, -22.91]$ ,  $\beta = -.40$ ). Under low progress, participants in the categorization condition perceived that they consumed significantly more juice ( $M = 31.10$ ,  $SD = 20.75$ ) than those in the no categorization condition ( $M_{\text{no categorization}} = 22.43$ ,  $SD = 15.53$ ;  $B = 8.67$ ,  $SE = 1.82$ ,  $t(1,172) = 4.77$ ,  $p < .001$ , 95% CI =  $[5.10, 12.23]$ ,  $\beta = .14$ ), which significantly reversed under high progress ( $M_{\text{categorization}} = 55.73$ ,  $SD = 28.43$ ;  $M_{\text{no categorization}} = 75.01$ ,  $SD = 21.66$ ;  $B = -19.28$ ,  $SE = 1.82$ ,  $t(1,172) = -10.60$ ,  $p < .001$ , 95% CI =  $[-22.85, -15.71]$ ,  $\beta = -.32$ ).

**Motivation.** We also found a significant categorization  $\times$  progress interaction predicting participants' decision to buy the nutritional juices now ( $B = -1.05$ ,  $SE = .24$ ,  $Wald = 18.79$ ,  $p < .001$ ,  $OR = .35$ ). Under low progress, participants in the categorization condition were significantly more likely to buy the juices now than those in the no categorization condition ( $M_{\text{categorization}} = 51.7\%$ ;  $M_{\text{no categorization}} = 41.2\%$ ;  $B = .42$ ,  $SE = .17$ ,  $Wald = 6.43$ ,  $p = .011$ ,  $OR = 1.52$ ), which significantly reversed under high

5 The preregistration notes that consumption was measured before purchase due to an error in the preregistration, when in reality purchase was measured before consumption (link to survey: <https://osf.io/tq2r9/>).

progress ( $M_{\text{categorization}} = 57.1\%$ ;  $M_{\text{no categorization}} = 71.3\%$ ;  $B = -.62$ ,  $SE = .17$ ,  $Wald = 12.75$ ,  $p < .001$ ,  $OR = .54$ ).

**Moderated mediation.** The analysis of moderated mediation revealed a significant index for the indirect effect (index =  $-.43$ ,  $SE = .07$ ,  $95\% \text{ CI} = [-0.5849, -0.3063]$ ; 10,000 resamples) with no significant direct effect ( $95\% \text{ CI} = [-0.2368, 0.2325]$ ). At low progress, categorization (vs. no categorization) increased reported purchase intention motivation by increasing perceptions of progress ( $B_{\text{indirect}} = .13$ ,  $SE = .03$ ,  $95\% \text{ CI} = [0.0838, 0.1971]$ ); at high progress, categorization (vs. no categorization) decreased purchase intention motivation by decreasing perceptions of progress ( $B_{\text{indirect}} = -.29$ ,  $SE = .05$ ,  $95\% \text{ CI} = [-0.4120, -0.2061]$ ).

## Discussion

Study 7 replicated and extended our effects to consumer purchase intentions. This study found that categorization interacts with absolute progress to influence consumers' perceived progress in consuming a product. Furthermore, we demonstrate how these progress perceptions influence the timing of consumers' purchase decisions. Consumers exhibited greater intentions to repurchase drinks sooner at low progress when categories were present (vs. absent) and lower intentions to repurchase drinks sooner at high progress when categories were present (vs. absent). Lastly, we demonstrate that our motivational effects are not contingent upon first asking participants about their goal progress perceptions, as these results held when asking about repurchase intentions before asking about progress perceptions.

## META-ANALYSIS OF CATEGORIZATION EFFECT

To provide an estimate of the effect size found across the seven studies reported here and the four supplemental studies reported in [web appendix D](#), we conducted a meta-analysis of the main effect of categorization (i.e., two categories vs. no category condition) on goal progress perceptions as a function of absolute progress (low vs. high) ([McShane and Böckenholt 2017](#)). Consistent with our hypothesis, the meta-analysis revealed that, across all studies, categorization increased progress perceptions when absolute progress was low ( $M_{\text{categorization}} = 34.49$ ,  $SE = 4.58$ ;  $M_{\text{no categorization}} = 27.54$ ,  $SE = 4.58$ ; contrast =  $6.95$ ,  $95\% \text{ CI} = [0.57, 13.33]$ ) and decreased progress perceptions when absolute progress was high ( $M_{\text{categorization}} = 43.11$ ,  $SE = 4.59$ ;  $M_{\text{no categorization}} = 63.84$ ,  $SE = 4.58$ ; contrast =  $-10.73$ ,  $95\% \text{ CI} = [-17.13, -4.32]$ ). [Table 2](#) summarizes effect sizes in studies 1–7 for this main effect of categorization (i.e., two categories) versus no categorization.

**TABLE 2**

SUMMARY OF EFFECT SIZE BETWEEN CATEGORIZATION AND NO CATEGORIZATION CONDITIONS AT LOW AND HIGH PROGRESS FOR STUDIES 1–7

	Progress	Categorization	No categorization	Cohen's <i>d</i>
Study 1	Low	40.57 (20.38)	36.22 (16.02)	.24
	High	62.87 (18.87)	69.21 (16.08)	-.36
Study 2	Low	3.38 (1.41)	3.10 (1.22)	.21
	Equal	3.80 (1.45)	4.48 (.96)	-.55
Study 3	High	4.57 (1.52)	5.61 (.97)	-.82
	Low	35.69 (16.68)	23.52 (13.72)	.80
Study 4	High	54.85 (24.34)	75.04 (15.50)	-.99
	Low	33.81 (15.08)	22.44 (12.36)	.83
Study 5	High	56.99 (23.05)	78.39 (14.99)	-1.10
	Low	44.35 (17.94)	40.56 (16.97)	.22
Study 6	High	62.34 (17.78)	65.27 (15.59)	-.18
	Low	35.63 (15.75)	32.64 (14.81)	.20
Study 7	High	58.23 (21.37)	62.51 (19.32)	-.21
	Low	31.10 (20.75)	22.43 (15.53)	.47
	High	55.73 (28.43)	75.01 (21.66)	-.76

*NOTE.*—SD in parentheses. Progress perceptions measured from 0 = "very little" to 100 = "a lot," except study 2, which utilized a 7-point scale. Cohen's *d* signals standardized effect sizes for main comparisons across studies (i.e., small:  $d = .2$ , medium:  $d = .5$ , and large:  $d = .8$ ; [Cohen 1992](#)). In study 3, categorization refers to the two categories condition.

## GENERAL DISCUSSION

In seven studies reported here and four supplemental studies (reported in [web appendix D](#)), we demonstrate the effect of categorization of goal-relevant actions on goal progress perceptions and the downstream consequences for motivation. In particular, we demonstrate that, when consumers categorize their goal-relevant tasks, they anchor their estimates of goal progress on the proportion of categories completed (i.e., one out of two categories in studies 1, 2, and 4–7, in addition to one or three out of four categories in study 3), adjusting based on the absolute progress. Consumers who do not categorize their completed and remaining tasks do not exhibit this effect; their estimates of goal progress are closer to absolute goal progress made. Similarly, when categories are present, but categorical progress information is not an anchor, we are less likely to observe this categorization effect (study 4).

We demonstrate three natural antecedents of this effect: the perceived similarity versus dissimilarity of actions (studies 1 and 6), the presence of arbitrary labels (studies 2–4, 7), and the organization of activities (study 5). The effect of categorization on goal progress perceptions has important downstream consequences for motivation and persistence. Categorization affects progress perceptions, which influences consumer motivation to complete mental exercises and physical exercises (studies 5 and 6; supplemental study 3) and to restock a product sooner (study 7). However, we acknowledge that motivation is likely multiply determined, and that perceived progress from goal monitoring is only one input to motivation.

## Theoretical Contributions

This research contributes to two distinct sets of literature: motivation and categorization. In the motivation domain, this research furthers our understanding of how consumers form their goal progress perceptions. Whereas research has examined the factors that influence the motivating and demotivating effects of monitoring goal progress (Fishbach and Dhar 2005; Wallace and Etkin 2017), less research has examined what factors influence perceptions of goal progress to begin with. This limited work has demonstrated that consumers perceive greater goal progress when they have a “head start” (Kivetz et al. 2006), that goal-consistent behaviors help progress more than inconsistent behaviors hurt progress (Campbell and Warren 2015), and that people are motivated to exaggerate perceived progress when farther from accomplishing their goal as a strategy to increase their persistence (Huang et al. 2012). We contribute to this research by demonstrating a cognitive effect on consumers’ goal monitoring that influences motivation: categorization of completed and remaining tasks. Thus, we provide further understanding into when and why consumers’ perceived goal progress deviates from their objective goal progress.

Second, within the motivation domain, prior research has largely relied on the goal gradient effect/goals-as-reference-point framework to describe the positive motivational benefits of perceived progress on specific goals when superordinate goals are salient (Fishbach et al. 2006; Heath et al. 1999; Kivetz et al. 2006). However, this framework has solely examined consumers’ motivation to reach a goal comprised of identical tasks. We generalize this framework by demonstrating how categorizing completed and remaining tasks in goal pursuit influences both goal progress perceptions and resulting motivation. Importantly, in a single-goal environment when the superordinate goal is made salient, the motivational benefit of greater absolute progress is reduced for consumers close to accomplishing their goal who have categorized their completed and remaining tasks (vs. not).

This research also broadens our understanding of antecedents of the “unit bias.” Prior research has focused on differences between the size of units (i.e., larger vs. smaller units) but has not examined specific cues that lead people to naturally attend to and rely on units in their judgments. We provide evidence of several categorization cues that lead consumers to divide their goal-relevant actions into categories or “units.” Furthermore, we expand upon this research by examining how categorization (vs. no categorization) interacts with absolute goal progress to influence consumers’ goal progress perceptions and motivation. In doing so, we provide new insights into when categorizing (vs. not categorizing) goal-relevant actions is more or less motivating. In particular, we demonstrate that consumers are often more motivated when they categorize their goal-

relevant actions at low progress, but less motivated when they categorize their goal-relevant actions at high progress.

By using dissimilarity (vs. similarity) as a cue to categorization, we connect to research examining the role of variety in motivation. Prior research has studied the impact of variety within a set of means on motivation (Etkin and Ratner 2012, 2013). For example, imagining using a variety of protein bars motivated people to work out when they perceived they had made low progress on their workout goal, but imagining using an identical set of protein bars was more motivating when people perceived they had made high progress on their goal (Etkin and Ratner 2012). Our findings build on this prior research in several key ways. First, we examine the impact of an unexplored type of variety on motivation, variety (or perceived variety) *between* sets of means rather than *within* one set of means. That is, rather than examining how identical or varied activities within a set influence motivation, we examine how variety between sets influences motivation. Second, we demonstrate how perceived variety affects goal progress perceptions (rather than just motivation), which this previous research did not examine. Furthermore, we move beyond manipulations of similarity to other cues of categorization, with consequences for perceived progress and motivation.

These results further contribute to the research on natural categorization by integrating findings from the categorization literature into the motivation literature. While research has shown that people categorize deadlines, geographic borders, and social-in-groups and out-groups (Allen and Wilder 1979; Maddox et al. 2008; Maki 1982; Mishra and Mishra 2010; Leclerc et al. 2005; Locksley et al. 1980; Tu and Soman 2014; Tversky 1992), the current research extends these findings to a yet unexplored judgment domain: goal-related actions.

Lastly, these findings also contribute to research on anchoring (Simmons et al. 2010; Tversky and Kahneman 1974) by demonstrating that categorical progress information can be used as an anchor in goal progress perceptions. Furthermore, we demonstrate that, when both absolute progress and categorical progress data are available simultaneously, consumers are more likely to naturally anchor on the categorical progress information.

## Practical Implications

Many goals that consumers set out to complete consist of tasks that are not identical and/or are categorized in various ways. As demonstrated in study 5, consumers’ willingness to pause their goal may depend on how much progress they perceive they have made. This research thus has implications for when marketers should consider targeting consumers for sales that require immediate action or for market research surveys. In determining when to target

consumers, marketers should consider both consumers' absolute goal progress in addition to how consumers categorize their tasks.

Furthermore, as demonstrated in study 6 and supplemental study 3, consumers' decision to persist in a task is affected by both their absolute goal progress and how their tasks are categorized. One common problem marketers face is a low response rate and completion rate in market research surveys (Millar and Dillman 2011). To increase the number of surveys completed, marketers could consider categorizing questions in these surveys to increase goal progress perceptions, leading to increased persistence. Marketers could determine where in the survey customers are most likely to drop out and then categorize the tasks accordingly. For example, if consumers are most likely to drop out 20% into the survey, marketers could consider categorizing the survey questions into three units, with the first 20% of the questions comprising two out of the three units. Consumers may be more likely to persist at this point, perceiving they made closer to 66% of progress on the survey rather than 20%.

Relatedly, consumers can now customize many products, such as customizing laptops with specific screen sizes, screen resolutions, and memory. However, if consumers feel that the process of co-creating a product is too long, they may abandon the customization process and thus postpone the choice to buy the product entirely. Companies can consider categorizing the steps in a customization process to increase the perceptions of progress at points at which consumers are more likely to abandon the process.

Categorization also affects how much of their products consumers feel they have consumed, as indicated in study 7. Thus, the timing of consumers' purchase decisions may depend both on how their products are packaged and on how much they have actually consumed. For example, if someone buys two boxes of coffee pods, an 8-count box and a 16-count box, after finishing the 8-count box, they may feel they are closer to running out of coffee than if they had bought one 24-count box. Tracking consumers' purchases and consumption could allow marketers to more accurately predict when consumers are motivated to buy additional products, and thus help marketers more efficiently target them.

Lastly, marketers can use these findings to motivate their consumers via loyalty programs. In particular, marketers could consider making their message system dynamic to consumers' absolute progress in the program. Imagine consumers need to get 10 points to receive a reward in a loyalty program. If a consumer has already earned three points and has plateaued, the company could help the consumer categorize her past points, for example, by decreasing the similarity between points earned and points remaining. Marketing messages could be sent suggesting the consumer needs to buy something different from their previous

purchases to get the next seven points, or the company could use labels to categorize past purchases and future purchases into different sets.

## Future Directions

The current research provides an initial test of the effect of categorization on goal progress perceptions, but there are numerous avenues for future research. For one, future research can examine how other cues beyond the ones studied here impact progress perceptions and motivation. Prior research has demonstrated that level of construal influences categorization; a more abstract (vs. concrete) construal is associated with a focus on similarity and more inclusive categorization (Trope, Liberman, and Wakslak 2007). This suggests that manipulations of categorization may be more effective when people are processing at a lower construal level. Indeed, when people categorize consumption at lower levels, they are less likely to satiate than when they categorize more broadly (Redden 2008). Beyond abstract versus concrete processing, there may be other cues to categorization that could affect progress perceptions.

Another question pertains to the relationship between categorization cues and subgoals in influencing motivation. Subgoals are defined as preestablished, smaller steps toward the achievement of an overarching goal (Heath et al. 1999; Huang et al. 2017), and as such, likely serve as cues for categorization. However, categorization cues may not necessarily manipulate subgoals, as they do not always manipulate the goal structure. That is, research on subgoals distinguishes between an overall goal structure and a focus on the individual parts (i.e., subgoals) that make up the overall goal. Subgoals thus manipulate whether an activity is one integrated goal versus an accumulation of subgoals (Huang et al. 2017), which may be distinct from categorization. For example, categorization cues can occur through the organizational sequence of activities, holding the different types of activities constant, which may be less likely to manipulate the goal structure. Furthermore, similarity versus dissimilarity can serve as a categorization cue, which may also be less likely to manipulate the goal structure. Future research can further distinguish between categorization cues and subgoals, and the effects of both on goal progress perceptions and subsequent motivation.

In our studies, greater progress leads to greater motivation at both high and low progress. However, other research has found that at high absolute goal progress, consumers are less motivated with greater perceived progress (Huang et al. 2012). One difference between this prior work and the current studies may be the method of assessing motivation. Motivation in the current studies was operationalized as a choice to pursue a goal (e.g., study 5: avoid an interruption during goal pursuit vs. not; study 6: continue vs. quit a goal; study 7: buy now vs. later).

However, prior research measured motivation as amount of *effort* consumers exerted toward the goals (e.g., time spent on a goal; Huang et al. 2012). Future research should disentangle if the effect of progress on motivation differs depending on how it is measured.

Indeed, discrepancies in self-regulation at times have contrasting functions, such that greater perceived discrepancies increase motivation, whereas smaller discrepancies (i.e., increased closeness to the goal) decrease motivation. Thus, at times, it is possible that perceiving a greater discrepancy could be more motivating, although in general research suggests that, to the extent a discrepancy in the rate of progress exists, a small discrepancy is often more motivating than a larger one (Schroeder and Fishbach 2015). Furthermore, it is possible that in multi-goal contexts, or when people perceive making more progress than they feel they need to, that increased perceptions of progress could be demotivating, such that people reduce their efforts on the current goal and/or switch to a different goal.

We note that the current research mainly focused on the effect of categorization (vs. no categorization) at high and low progress. However, in examining this question, study 2 provided an initial test of how categorization affects progress perceptions when absolute and categorical progress are equated. In this study, perceived progress was greater when categories were absent (vs. present). One possibility is that when the proportion of tasks completed equals the proportion of categories completed, the presence of categories expands the psychological distance between goal-related activities, such that consumers feel they made less progress on their goals, in line with a main effect of categorization (Isaac and Schindler 2014; Mishra and Mishra 2010). Yet one could imagine an alternative account whereby the presence of categories shrinks the distance between tasks, thus increasing perceived progress. More work is needed to determine conclusively how categories affect progress perceptions in these situations.

We further note that in documenting our underlying process—that people anchor on categorical progress—we open the door to additional research questions on the role of anchoring in progress perceptions. In examining whether categorical progress served as an anchor, we manipulated the presentation order of categorical versus absolute progress information (study 4). Additional research can test *why* people naturally anchor on categorical progress in the first place. One possibility is that people spontaneously process category progress information when it is available and view information on absolute progress through this lens (Allport et al. 1954; Brewer 1988; Cohen and Basu 1987; Devine 1989; Fiske and Neuberg 1990). Alternatively, because categorical progress is often easier to compute than absolute progress, consumers may naturally start their progress estimate by anchoring on this information.

In addition, prior research suggests that people are more motivated when they focus on their progress completed at low absolute progress, and progress remaining at high absolute progress (i.e., the small area hypothesis; Bonezzi et al. 2011; Koo and Fishbach 2008). In the current research, we focused people at low and high progress on both their progress completed and remaining; future research can examine whether people naturally shift to focusing on the proportion of categories completed versus remaining as a function of absolute progress.

Lastly, the current research focused on goals with a specific end point (i.e., discrete goals) and suggests that perceptions of progress are driven by both the categorization of completed and remaining tasks and the amount of absolute progress made. Future research can examine how categorization of actions toward nonspecific goals affects progress perceptions and motivation.

## Conclusion

This article suggests that the manner in which consumers categorize their completed and remaining tasks when pursuing a goal systematically influences their goal progress perceptions and motivation. As prior research building off of the goals-as-reference-point framework has mainly focused on identical and uncategorized tasks, understanding how perceptions of categorization affect goal pursuit is a ripe area for future research.

## DATA COLLECTION INFORMATION

Both authors jointly collected and analyzed the data for studies 1–7 from Amazon MTurk and Prolific. Data were collected for study 1 from Amazon MTurk in the spring of 2018, study 6 from Amazon MTurk in the summer of 2018, study 2 from Amazon MTurk in the spring of 2019, study 3 from Prolific in the summer of 2019, studies 5 and 7 from Amazon MTurk in the summer of 2019, and study 4 from Prolific in the winter of 2020. OSF link to data, syntax, materials, and preregistrations for all studies: <https://osf.io/f57bg/>.

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