Moving, Fast or Slow: How Perceived Speed Influences Mental Representation and Decision Making

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Can the sensation of moving fast versus slow systematically influence consumer behavior? With recent technological innovations, people increasingly experience speed during decision making. They can be physically on the move with their devices or virtually immersed in speed simulated through their devices. Through seven experiments, we provide evidence for a *speed-abstraction effect*, where the perception of moving faster (vs. slower) leads people to rely on more abstract (vs. concrete) mental representations during decision making. This effect manifests for virtually simulated (experiment 1) and physically experienced (experiment 2) movement on moving trains. We suggest that it stems from an underlying speed-abstraction schema where people associate faster speed with abstraction and slower speed with concreteness (experiments 3a–3c). Weakening this schema attenuates the effect (experiment 4). Through a field study, experiment 5 demonstrates that video ads placed on Facebook are more engaging when virtually simulated speed matches the linguistic abstraction level of the message. Dimensions of psychological distance (time, space) and factors influencing mental representation (affect, fluency, spatial orientation) are addressed as possible alternative explanations that cannot account for the effect. We propose a framework for understanding how experiencing speed—both physical and virtual—can influence decision making.

Keywords: speed, mental representation, judgment and decision making, velocity, movement, construal level, information processing

Technology has fundamentally changed the contextual environment in which we make decisions. The proliferation of screens and the ubiquity of internet connectivity make it increasingly common for us to process information or make choices while feeling that we move with faster versus slower speed. Can perceptions of moving with faster versus slower speed—both physically and virtually induced—influence our decision making?

In the physical world, consumers spend an average of 4.5 hours a day on mobile phones and devices (Vision

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Direct 2020). They work, read, and shop on their phones or laptops while on the move, commuting on buses, in trains, cabs, and other forms of transportation.[1] In the United Kingdom, an estimated £23 billion a year is spent by on-the-move commuters—14% of all online sales (WARC 2019). The recent U.S. Census report on commuting notes that commute times have been increasing over time: the average two-way commute is now 55.2 minutes per day, and nearly 40% of people commute for an hour or more (Burd, Burrows, and McKenzie 2021). This is one reason why apps such as Waze have focused on tracking consumer context—90% of users under the age of 50 use map apps. As summarized by Waze's head of agency business development, "The holy grail of marketing is the right person, the right place, [and the] right time. At Waze, we go an extra step: We talk about the right context" (Karaim 2018). Can the speed at which a consumer feels they are physically moving influence their decisions while on their devices?

While the speed of physical movement is one aspect of this consumer context, virtual movement is another. Ubiquitous screen-mediated environments, from mobile phone-sized to movie screen-sized, create immersive visual experiences that simulate the sensation of movement. We spend upward of 12 hours a day in front of screens of all types (Vision Direct 2020), and by 2021, the use of virtual reality and augmented reality technologies is expected to reach 58.9 million and 93.3 million users, respectively, per month in the United States (Petrock 2021). In these environments, managers can convey marketing messages in the form of advertisements, product placements, or in-app purchases that evoke a sensation of speed. Advertisements can simulate the feeling of a moving car or train. Figure 1 includes examples of increasingly common Facebook video ads: a Target ad where the top is of a vehicle rapidly driving away from a school drop-off; a Calm ad of moving leisurely along a train track; and a New England Ford Dealers ad of a Ford Explorer speeding along the road (see https://bit.ly/speedy2021 to view these videos). Can this virtually implied speed influence consumers' mental representation of information they encounter and the decisions they make? For example, in these Facebook video ads, is the linguistic effect of the content influenced by the implied sensation of speed in the video?

Indeed, research in marketing has underscored the importance of understanding how the moving elements of video content can influence consumer perceptions and behavior. For example, Jia, Kim, and Ge (2020) found that the speed at which a product image moves in a video influences its perceived size and evaluation. Li, Shi, and Wang (2019) highlight the increasing use of video by marketers. They catalogue visual variation, such as movement, and content as two key factors that drive video effectiveness. Similarly, Grewal et al. (2021) categorize the key aspects of content dynamics and multimodality that drive consumer behavior—images, content, and movement are highlighted as the most important. In this context, how does a consumer's perceived speed of movement—physically or virtually experienced—influence decision making? This research examines how perceptions of moving with faster versus slower speed can influence mental representation and decision making. "Perceived speed" refers to the inferred relative speed at which people feel they move based on sensory cues. These sensory cues can be virtually experienced through simulated movement or physically experienced through actual movement.

Previous research has focused primarily on how static aspects of the physical environment can influence mental representation and decision making. For example, people can adopt abstract (high-level) versus concrete (low-level) mental representations based on factors such as vertical height (Aggarwal and Zhao 2015) or ceiling height (Meyers-Levy and Zhu 2007). These differences in mental representation shaped by environmental factors have implications for consumer behavior. However, previous research has not examined the effect of dynamic factors in the environment such as experienced speed.

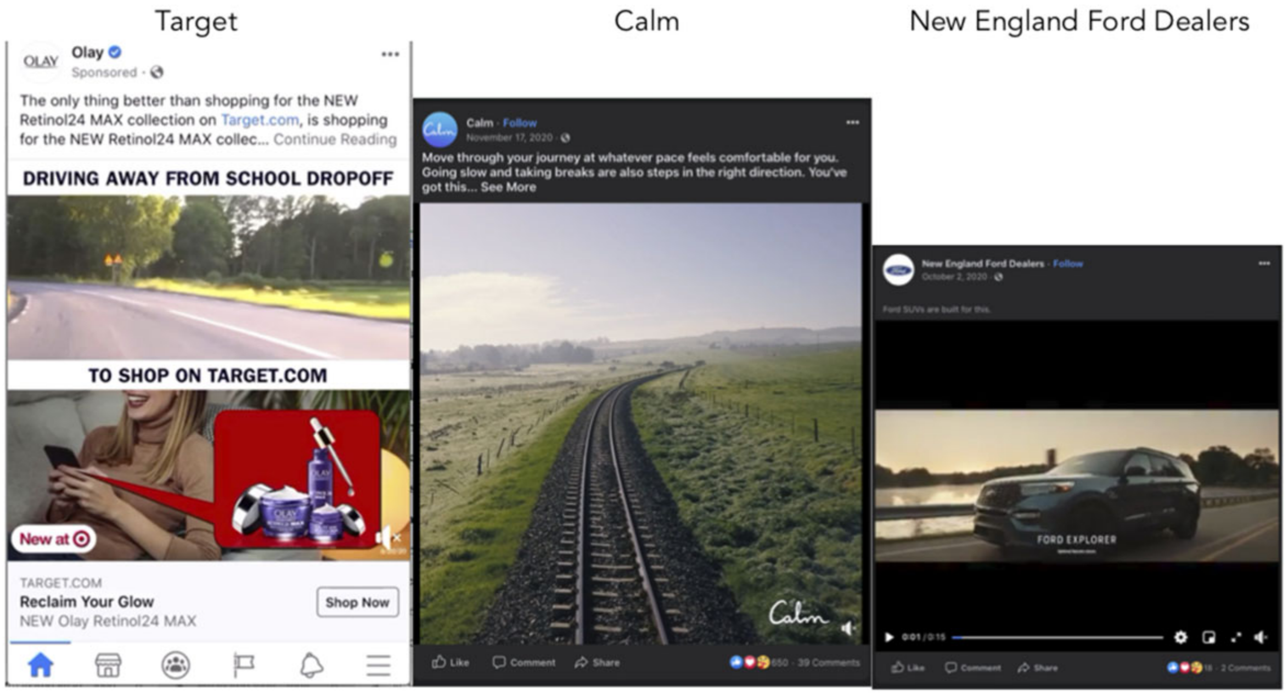
Through experiments evoking speed through virtual movement on devices and physical movement on trains, our investigation demonstrates that the perceived speed of movement can systematically shape the mental representation of decisions. We term this the *speed-abstraction effect*. Feelings of fast movement evoke more abstract mental representations focused on the high-level, desirable aspects of a situation; feelings of slow movement evoke more concrete mental representations focused on the low-level, feasible aspects of a situation. We examine the underpinnings of the effect—an associative *speed-abstraction schema*—where people implicitly and explicitly associate fast movement with abstractness and slow movement with concreteness. Weakening the strength of this schema attenuates the effect. Furthermore, we illustrate that the speed-abstraction effect manifests in practice through ads placed on Facebook.

From a theoretical perspective, our research demonstrates that perceived speed can shape the mental representation of decisions. From a managerial perspective, our research demonstrates that experiencing both physical and simulated speed can influence consumer decision making and engagement with marketing messages. It suggests that perceived speed plays an integral role in shaping customer experience—both because people are often on the move when making decisions and because deliberately designed, immersive environments that simulate speed can influence decision making.

1 Note that the authors do not support the active use of mobile phones while driving.

FIGURE 1

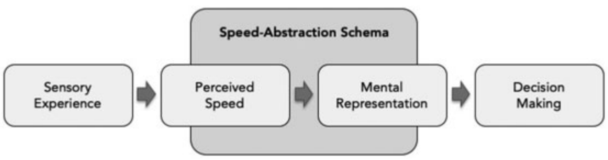
EXAMPLES OF FACEBOOK VIDEO ADS INCORPORATING SPEED



NOTE—See https://bit.ly/speedy2021 for videos of ads.

FIGURE 2

CONCEPTUAL MODEL



THEORETICAL BACKGROUND

Figure 2 outlines the conceptual model behind our theorizing for how the sensation of speed can influence decision making. First, based on the literature on how the brain perceives movement, we describe how sensory experience—both virtual experience through simulated movement and physical experience through actual movement—can shape perceptions of what constitutes fast versus slow speed. Next, we offer evidence for a *speed-abstraction schema* where people have learned over time to associate faster movement with a propensity for abstraction and slower movement with concreteness. Finally, based on research in construal level theory, we describe how the application of this schema while experiencing speed can influence mental representation and decision making.

To focus on how the experience of speed—and not related factors—affects decision making, our investigation includes specific parameters. First, we avoid extreme speeds that might induce specific emotions such as aggression from being stuck in traffic (Hennessy and Wiesenthal 1999) or fear of moving too fast (Schmidt-Daffy 2013). Second, we keep target information static and induce movement outside of the target stimuli both to avoid influencing feelings of disfluency (Alter and Oppenheimer 2008) and to avoid feelings of approach or avoidance from stimuli moving toward or away from the observer (Hsee et al. 2014). For similar reasons, we do not introduce individual objects that move toward observers but focus on inducing the sensation of movement. Finally, to isolate the effects of speed, we are careful not to employ contexts that cause an association between speed and time pressure. We discuss future extensions into these domains in the general discussion.

Sensory Experience and Perceived Speed

How does our sensory experience translate into perceptions of speed? In Berthoz's (2000) review of the literature on how the brain perceives movement, he underscores that our neuromuscular, vestibular, and visual sensory systems that perceive motion are not merely passive receptors that detect and calculate speed. Rather, the brain processes movement using memory-based schema—sometimes called motor response schema—to determine how to respond to a situation at hand and then anticipates a response based on these past consequences and context (Jeannerod 1994; MacKay 1987; Schmidt 1975). In other words, the human brain infers that a particular speed is relatively "fast" versus "slow" based on an individual's previous experience as opposed to some objective experience of speed in miles or kilometers per hour. Speed is inferred through both momentary sensory input and an individual's past experience.

Thus, importantly, inferences of speed based on sensory experience come through both actual, physical movement and implied, simulated movement. If a virtual experience sufficiently mirrors past physical experience, people can feel as though they are moving, even when they are not—known as "vection" (Berthoz 2000). Visual stimulation from moving objects (Lee and Aronson 1974), physical stimulation through vibrations (Berthoz, Pavard, and Young 1975), and virtual reality or gaming environments (Riecke 2010) can all induce vection. Conversely, if people experience fast physical movement, but do not experience sensory stimulation (e.g., visual, auditory, or vestibular), they may not feel they are traveling with speed—for example, consider traveling on a jet airplane at high altitude. Objective speed in miles or kilometers per hour may not perfectly mirror perceived speed on the part of the individual. Thus, perceived speed is the critical construct of interest in our conceptual model. People must experience some sensory input—whether through actual, physical or simulated, virtual movement—that leads to an inference that their speed is relatively fast versus slow. How, then, does this inferred speed shape how people approach the information in their environment when they experience speed?

The Speed-Abstraction Schema

We suggest that people form a learned association between perceptions of speed and how they mentally represent information through their experiences over time—a speed-abstraction schema that associates faster speed with abstraction and slower speed with concreteness. Evidence of this learned association comes from several sources.

One possible source is our experience with the limitations of our perceptual systems. Research in visual and aural perception suggests that simplification and abstraction become necessary as stimuli changes increase in pace. For example, as the speed of objects in our visual field increases, the individual number of objects that our vision can track decreases. At slow speeds, up to eight objects can be tracked, but at faster speeds, sometimes only a single object can be tracked as it becomes impossible to track multiple individual objects moving quickly (Alvarez and Franconeri 2007). At sufficiently high speed, an object does not appear as if it is moving across the visual field, but as a single, visually integrated "motion streak" (Geisler 1999). A light rapidly turned on and off does not appear as having distinct light and dark phases but is seen as a continuous "Gestalt flicker" (Van de Grind, Grüsser, and Lunkenheimer 1973). Similarly, with sounds, as the tempo of a repeated sound increases, "sounds fuse together to form one continuum when the repetition rate is too high" (Moelants 2002), and as the frequency of changes between different pitches increases, the ability to discriminate between them decreases (Zeitlin 1964). We suggest that the natural process of simplification that our perceptual systems take as speed increases is reinforced from a young age. It forms the basis of an intuitively applied memory-based schema (Mandler 1992; Piaget 1977) where people naturally associate faster speed with abstraction and slower speed with concreteness.

Another possible source for this schema is rooted in construal level theory, which demonstrates that people have a natural association between distance and abstraction (Liberman and Trope 1998, 2008; Trope and Liberman 2010, 2011). Construal level theory posits that based on perceptual constraints, abstraction becomes necessary for distant things. For targets that are physically close, it is possible to perceive more concrete details. For targets that are socially close, one knows more concrete details. This association between distance and abstraction is then overgeneralized and extended more broadly—people mentally represent situations based on implied distance. When an unknown future event is framed as occurring in a day, people think of it more concretely than if it is framed as occurring in a year, even when they are given the same objective information about the future event. We posit that the relationship between speed and abstraction is similar in nature to that demonstrated in construal level theory. People naturally associate faster speeds with traveling greater distances, and greater distances with abstraction.

Just as the relationship between distance and abstraction is automatically applied to mental representations in construal level theory, we suggest that it is automatically applied to the relationship between speed and mental representations. Drawing from a frequently used analogy in construal level theory, a near perspective results in a focus on trees while a distant perspective results in a focus on the forest from afar. In the context of movement, imagine looking out the window of a moving train. On a slow-moving train, one is able to focus on individual trees. However, on a fast-moving train, these individual trees become more of a simplified, gestalt, streaking blur. We posit that just as people form an association between distance and abstraction as well as nearness and concreteness through experience, they also form a speed-abstraction schema naturally associating faster speed with a more abstracted, simplified view and slower speed with a more concrete, detailed one. What, then, are the consequences of relying on this speed-abstraction schema when making decisions?

Mental Representation and Decision Making

A rich history of work in construal level theory demonstrates the connection between psychological distance and abstraction on mental representation and decision making (Liberman and Trope 1998; Trope and Liberman 2010, 2011). When a target feels psychologically distant, people rely on more high-level, abstract representations that focus on context-independent, primary features. When a target feels psychologically near, people rely on more low-level, concrete representations that focus on contextualized, secondary features that include incidental details (Liberman and Trope 2008; Trope and Liberman 2010, 2011). With greater temporal and spatial distance, people are more likely to describe "reading" at a high level as "gaining knowledge," rather than at a low level as "following lines of print" (Fujita et al. 2006; Liberman and Trope 1998; Vallacher and Wegner 1989). When making decisions for the distant future, people prefer products attractive along high-level, desirable attributes (e.g., greater functionality, larger assortment size, nonalignable attributes), but when making a decision for the near future, they prefer products attractive along low-level, feasible attributes (e.g., easy to use, smaller assortment size, alignable attributes; Goodman and Malkoc 2012; Liberman and Trope 1998; Malkoc, Zauberman, and Ulu 2005). Due to the underlying speed-abstraction schema, we hypothesize that the perception of moving at faster speed results in more abstract mental representation and choices consistent with desirability, while the perception of moving at slower speed results in more concrete mental representation and choices consistent with feasibility.

OVERVIEW OF THE EXPERIMENTS

To summarize our theorizing, we hypothesize that the sensation of moving faster versus slower can affect mental representation and decision making: feelings of moving fast evoke more abstract mental representations with choices focused on the high-level, desirable aspects of a situation; feelings of moving slow evoke more concrete mental representations with choices focused on the low-level, feasible aspects of a situation.

> **H1:** When people feel they move with faster (vs. slower) speed, they prefer options more attractive on higher level, desirable (vs. lower level, feasible) attributes.

We refer to this as the *speed-abstraction effect*. If this effect stems from perceptions of speed, then both simulated, virtual experiences and actual, physical experiences should drive it. We test this using a virtual, simulated train ride for a single decision (experiment 1) and a physical, actual train ride for multiple decisions (experiment 2).

Addressing the underlying process, we hypothesize that this effect stems from a *speed-abstraction schema* where people naturally associate faster speed with abstraction:

> **H2:** People naturally associate faster speed with higher level, abstract representation and slower speed with lower level, concrete representation.

We test for this schema through evidence of: (1) an association between speed and preference for mental representations (experiment 3a), (2) an implicit association between speed and abstraction (experiment 3b), and (3) an explicit lay belief about speed and abstraction (experiment 3c).

In addition, if the learned association driving this speed-abstraction schema is the basis for the speed-abstraction effect, then introducing information that weakens this association should attenuate the speed-abstraction effect:

> **H3:** Introducing information that is inconsistent with the speed-abstraction schema will attenuate the speed-abstraction effect.

We test this by introducing people to new information that is counter to the learned speed-abstraction schema (experiment 4).

In the last field experiment, we further demonstrate an important implication of the speed-abstraction effect for practitioners. Using video advertisements placed on Facebook, we show that a match between the speed simulated in a video advertisement and the abstraction of the message text results in greater content engagement (experiment 5).

For robustness, we use multiple instantiations of speed, various measures of perceived speed, and a range of established decision-making contexts. Importantly, we theorize that this effect stems specifically from perceived speed and not movement direction, speed serving as an instantiation of other forms of psychological distance (time, space), or other factors shown to influence mental representation (fluency, Alter and Oppenheimer 2008; mood, Labroo and Patrick 2009; spatial orientation, Maglio and Polman 2014). Web appendix A describes software platforms employed; web appendix B includes all stimuli, while appendix A details the text of key stimuli materials. Table 1 summarizes descriptive statistics for dependent measures where perceived speed was manipulated (1, 3a, 3c, 4). Table 2 summarizes alternative explanations addressed, and web appendix C summarizes key descriptive statistics for these measures. Web appendix D includes details on all exclusions. Videos of stimuli, data, and analysis syntax are posted on OSF: http://bit.ly/osf_speed.

EXPERIMENT 1: SIMULATED TRAIN RIDE AND PREFERENCE

Do people who perceive that they are moving with faster versus slower speed prefer options more attractive on higher level, desirable versus lower level, feasible

TABLE 1

PRIMARY DEPENDENT MEASURE DESCRIPTIVE STATISTICS—EXPERIMENTS 1, 3A, 3C, 4

		Slow				Fast			
Exp	Dependent Measures	n	Mean	SD	SE	n	Mean	SD	SE
1	Job preference	148	5.31	3.29	0.27	144	6.73	3.21	0.27
3a	Behavioral Identification (BIF) Score	78	12.51	5.16	0.58	80	14.11	4.63	0.52
3c	Higher-level words chosen	100	1.45	1.17	0.12	98	2.14	1.03	0.11
4	Job preference: Consistent-association	76	5.09	2.99	0.34	78	6.00	3.26	0.37
	Job preference: Opposite-association	73	5.84	3.33	0.39	77	5.23	3.28	0.37
	Higher-level words chosen: Consistent-association	76	1.20	1.27	0.15	78	2.49	0.94	0.11
	Higher-level words chosen: Opposite-association	73	2.27	1.11	0.13	77	1.58	1.16	0.13

NOTE—Scale ranges are as follows: job preference from 1 (prefer lower-level job) to 11 (prefer higher-level job); BIF score from 0 (most concrete) to 25 (most abstract); higher-level words chosen from 0 to 3.

TABLE 2

SUMMARY OF ALTERNATIVE EXPLANATIONS ADDRESSED

			Alternative Explanations Tested and Ruled Out				
#	Dependent Measure	Speed Manipulation	Time	Distance	Affect	Ease	Orientation
1	Job Preference	Train Ride Simulation	✓	✓	✓	✓	
2	Gift Preferences	Actual Train Ride		✓			✓
3a	Behavioral Identification Form	Starfield Simulation	✓		✓	✓	✓
3b	Implicit Associations (IAT)	N/A	—	—	—	—	—
3c	Explicit Associations	Train Ride Simulation	✓	✓	✓	✓	
4	Job Preference	Train Ride Simulation	✓			✓	
5	Advertising Engagement	Car Ride Simulation	—	—	—	—	—

NOTE—Shading indicates measures that were significantly different based on perceived speed; "—" = n/a; checkmark indicates that measure cannot account for the effect; see web appendix C for summary statistics.

attributes (H1)? Experiment 1 tests for the speed-abstraction effect in the context of job preference (Aggarwal and Zhao 2015, study 1). Searching for jobs on mobile devices is a common activity. *Glassdoor* estimates that at least 58% of their users search for jobs on mobile devices (Zhao 2018). We manipulated perceived speed through a simulated train ride video, similar to what people might encounter while commuting or through media (e.g., television, movies, ads, video games).

Participants were asked to imagine that they were making decisions on a train while watching a video of scenery outside a train window that was fast or slow. They were then asked their preference between two job options—one requiring more concrete, detail-orientated skills and another requiring more abstract, big-picture skills—followed by questions about perceived speed, time, distance, ease, and the short-form Positive and Negative Affect Schedule (PANAS; Mackinnon et al. 1999). They also answered questions about the experience of watching the video to support the cover story of testing a video simulation. We predict that participants in the fast (vs. slow) speed condition will express greater interest in applying for the job requiring higher level, big-picture-oriented (vs. lower level, detail-oriented) skills, manifesting the speed-abstraction effect (H1).

Method

Participants. Two hundred and ninety-two participants from the Amazon MTurk pool ($M_{age} = 40.1$; 162 female, 126 male, 4 unidentified) completed this study in exchange for $0.65 and were randomly assigned to the fast or slow condition. For brevity, web appendix D contains all technical details on participant exclusions by location, device, etc. for all studies.

Procedure. Participants were asked to imagine that they were making decisions while on a moving train and were shown a video of scenery out of the window for 35 seconds. The train was moving either fast (approximately 140 km/h) or slow (approximately 35 km/h; see OSF for videos: http://bit.ly/osf_speed; web appendix B.1 for stimuli text; web appendix A for software and video details). The videos played automatically and were shown without any controls with the text underneath. Participants were asked to imagine that while on a train, they were using an employment website and had narrowed their search down to two jobs and were considering applying for one. The job descriptions were identical to Aggarwal and Zhao (2015), study 1. Job A required candidates to have project management skills and detail orientation. In contrast, Job B required candidates to have project development skills and a big-picture orientation (see figure 3; appendix A). The jobs were described as similar in terms of salary and promotion, time commitment, and the general degree, skill, and knowledge requirements.

For the key dependent measures, participants were asked to rate their preference for the positions on relative appeal (1 = *A is more appealing*; 11 = *B is more appealing*) and relative likelihood to apply (1 = *definitely apply for A*; 11 = *definitely apply for B*). They were also asked how fast they felt they were moving (1 = *very slow*, 7 = *very fast*), how much time they felt had passed since beginning the study (1 = *a very short period of time*, 7 = *a very long period of time*), how far they felt they had moved since the beginning of the study (1 = *a very short distance*, 7 = *a very long distance*), and how difficult or easy it was to choose between the two jobs (*1* = *very difficult*, 7 = *very easy*). Based on the short-form PANAS (Mackinnon et al. 1999), they were asked to what extent they felt a series of emotions (inspired, alert, afraid, upset, nervous, scared, distressed, excited, enthusiastic, determined, bored; 1 = *not at all*, 7 = *very much*). Then, participants were asked questions about the video as part of the cover story about using a train video. Finally, they were asked demographic questions.

Results and Discussion

Manipulation Check. Those in the fast condition felt they were moving faster ($M = 5.43$, SD = 0.97) than those in the slow condition ($M = 2.31$, SD = 1.00, $t(290) = 27.08$, $p < .0001$, $d = 3.17$), confirming the effectiveness of the perceived speed manipulation.

Job Preference. A mixed analysis of variance (ANOVA) with the two job preference measures as within-subjects dependent measures and speed as the independent measure revealed a significant effect of perceived speed ($F(1, 290) = 13.76$, $p = .0002$, $\eta_p^2 = .05$, see table 1). As evidence of the speed-abstraction effect (H1), participants in the fast condition had greater relative preference for Job B (higher level, big-picture skills) over Job A (lower level, detailed-oriented skills) than those in the slow condition ($M_{fast} = 6.73$, SD = 3.21 vs. $M_{slow} = 5.31$, SD = 3.29).

Possible Alternative Explanations. Further analyses confirmed there was no difference in perceived temporal distance ($M_{fast} = 3.07$, SD = 1.26 vs. $M_{slow} = 3.29$, SD = 1.46, $t(290) = -1.38$, $p = .17$, $d = .16$) or ease ($M_{fast} = 5.38$, SD = 1.36 vs. $M_{slow} = 5.25$, SD = 1.57, $t(290) = .77$, $p = .44$, $d = .09$) by condition, suggesting that these factors do not account for the effect.

While we had pretested the videos to avoid an effect of affect, there was a significant effect of perceived speed on affect ($\alpha = .83$). Participants in the fast condition ($M = 5.50$, SD = 0.86) felt more positive affect than those in the slow one ($M = 5.28$, SD = 0.83, $t(290) = 2.28$. $p = .023$, $d = .27$). However, an analysis with the two job preference measures as the dependent measures, perceived speed as the independent measure, and affect as a covariate still revealed a significant effect of speed ($F(1, 289) = 12.96$, $p = .0004$, $\eta_p^2 = .04$). The effect of affect was not significant ($F(1, 289) = 0.30$, $p = .58$, $\eta_p^2 = .001$) and, thus, cannot account for the results. Similarly, there was a significant effect of perceived speed on perceived distance. Participants felt they had traveled farther in the fast versus slow condition ($M_{fast} = 3.85$, SD = 1.30 vs. $M_{slow} = 2.55$, SD = 1.36, $t(290) = 8.34$. $p < .0001$, $d = .98$). However, an analysis with perceived distance as a covariate still revealed a significant effect of perceived speed ($F(1, 289) = 7.36$, $p = .007$, $\eta_p^2 = .02$) even when controlling for perceived distance ($F(1, 289) = 2.05$, $p = .15$, $\eta_p^2 = .007$), suggesting that perceived distance also cannot account for the results. Although judgments of perceived distance can be related to perceived speed, perceived speed influences judgments even when taking distance into account (see table 2, web appendix C).

EXPERIMENT 2: ACTUAL TRAIN RIDE AND REPEATED CHOICE

Experiment 1 activated perceived speed through a virtual sensory experience—a simulated train ride. Will the speed-abstraction effect also manifest during an actual train ride, where physical movement coincides with aural and vestibular cues? We test this in experiment 2. Participants were approached to complete the study on a wireless tablet during a train ride. They were asked to indicate their preferences between pairs of gift options where one was more attractive along desirable attributes and the other was more attractive along feasible attributes (Baskin et al. 2014). Again, we predict that participants who perceive they are moving at faster speed will choose options attractive along more desirable versus feasible attributes (H1).

Furthermore, conducting the experiment on a train allowed us to examine the effects of direction, perceived distance from the starting point, and perceived distance from the ending point as possible alternative explanations. Note that the train was a commuter train, so unlike an Amtrak Acela train, where high speeds might not always be physically felt, on this commuter train, the clack of the train along the tracks was both heard and felt throughout the ride.

Method

Participants. Data failed to record for one participant, leaving 154 passengers on Israeli commuter trains

FIGURE 3

TRAIN RIDE VIDEO STIMULI EXAMPLE—EXPERIMENT 1

Now imagine that while you are sitting on the train, you go to a job-search website.
After searching for a while on the website, two positions catch your attention. Both positions are for the **same** company.

Below are the key differences between the two jobs:

	Job A	**Job B**
Position title	Business Implementation Manager	Business Planning Manager
Key responsibilities	• Carrying out business plans • Identifying best practices and improvement opportunities	• Developing business plans • Setting overall business goals and objectives
Requirement	• Project management skills • Detail-oriented and efficient	• Project development skills • Big-picture oriented and organized

($M_{age} = 25.7$; 66 female, 88 male) who completed the study in exchange for a snack. Participants indicated the purpose of their ride as traveling to: military service (27%), work (18%), home (17%), leisure (14%), school (13%), or other (10%).

Procedure. Participants on commuter trains in Israel were approached by research assistants and asked if they would complete a survey in exchange for a snack. Train routes were selected to include trains traveling at a variety of speeds ranging up to 150 km/h. The experiment was run during nonpeak times to avoid crowding so that participants could complete the study while safely seated. The study was administered through Qualtrics on touch tablets connected to a mobile internet router (see web appendix E for further details).

Participants were asked to imagine that they would receive birthday gifts and to select their preference between pairs of options presented in randomized order for gifts in six product categories. One option was more attractive along abstract, desirable attributes, and one was more attractive along concrete, feasible attributes (the options were slightly revised from Baskin et al. 2014; see appendix A and web appendix B.2). For each product category, participants selected their preferred option and completed filler questions on the gift categories. They then answered demographic questions and questions about their ride: the stations where they boarded and departed the train, how physically close they felt to the starting and ending points (1 = *not at all*, 9 = *very much*), and how slow or fast they felt the train was moving while completing the study as the key dependent measure of perceived speed (1 = *very slow*, 9 = *very fast*). Finally, they were asked the purpose of their ride and whether they were sitting facing forward or backward.

Results and Discussion

Product Choices. A repeated measures logistic regression was conducted where product choice was the repeated dependent measure (option attractive along low-level, feasible features = 0; option attractive along high-level, desirable features = 1) and perceived speed was the independent variable (mean centered, $M = 5.23$, SD = 1.88). The analysis revealed a significant effect of perceived speed (β = .10, SE = .04, $z = 2.58$, p = .01, odds ratio = 1.10). Participants who felt they were traveling with faster speed were more likely to select products attractive along high-level, desirable attributes than low-level, feasible attributes, supporting H1. This provides further evidence of the speed-abstraction effect using a continuous measure of perceived speed during actual physical movement, even with repeated choices.

Possible Alternative Explanations. Conducting the study on a moving train allowed us to test whether direction and perceived distance from the starting or ending point could account for the results. The same repeated-measures logistic regression was conducted with direction as a covariate (forward = 0, backward = 1). The effect of perceived speed remained significant (β = .10, SE = .04, $z = 2.56$, p = .01, odds ratio = 1.11) while the effect of direction was not significant (β = .0087, SE = .14, z = .06, p = .95, odds ratio = 1.01). The same analysis was conducted with perceived distance from the destination as a covariate. The effect of perceived speed remained significant (β = .10, SE = .04, $z = 2.57$, p = .01, odds ratio = 1.11) while the effect of perceived distance from the destination was not significant (β = .026, SE = .03, $z = 1.03$, p = .30, odds ratio = 1.03). Similarly, an analysis was conducted with perceived distance from the starting point as a covariate. The effect of perceived speed remained significant (β = .11, SE = .04, $z = 2.60$, p = .009, odds ratio = 1.11) while the effect of perceived distance from the starting point was not significant (β = −.029, SE = .03, $z = -1.04$, p = .30, odds ratio = .97).

Thus, while moving on a train, passengers manifested the speed-abstraction effect—regardless of whether passengers faced forward or backward and even when taking into account perceived distance from the starting point or ending point.

THE SPEED-ABSTRACTION SCHEMA

The first two experiments provide evidence for the speed-abstraction effect through train rides that are both simulated (experiment 1) and physical (experiment 2): when people felt they moved with faster speed, they had a greater preference for options attractive along higher level, desirable versus lower level, feasible attributes (H1). We suggest that people have a speed-abstraction schema they automatically apply when they encounter the sensation of speed, much like the automatic association they apply between distance and mental representation that underlies construal level theory. In three studies, we test for evidence of this underlying schema, where people naturally associate faster speed with abstraction and slower speed with concreteness (H2). First, using the Behavioral Identification Form (BIF; Vallacher and Wegner 1989), we test whether people prefer actions framed more abstractly when they feel they move with faster speed (experiment 3a). Second, using the implicit association test (IAT), we examine whether people implicitly associate words related to fast speed with words related to abstractness and words related to slow speed with words related to concreteness (experiment 3b). Third, we test if this association is also explicit in people's lay theories by taking a subset of the words from experiment 3b and asking people which they would associate with experiencing faster or slower simulated speed (experiment 3c). Our aim is to provide evidence for this associative schema through preference between mental representations, implicit associations, and explicit lay beliefs.

EXPERIMENT 3A: PREFERENCE BETWEEN MENTAL REPRESENTATIONS

Do people naturally associate moving with faster speed with more abstract mental representations (H2)? Experiment 3a tests this. For robustness, we used an alternative manipulation of perceived speed—a moving starfield that simulates movement in space, similar to a video game. Participants completed a study with a fast or slow starfield moving behind the BIF (Vallacher and Wegner 1989), commonly used to measure level of mental representation (Fujita et al. 2006; Liberman and Trope 1998). A series of actions (*making a list*) were described with two possible options: one higher level (*getting organized*) and one lower level (*writing things down*). Participants selected their preferred description for each. If people rely on more abstract mental representations when they feel they are moving with faster speed, they should have a greater preference for higher level action identifications than those who feel they are moving with slower speed. To rule out alternative explanations, participants answered questions about perceived time, movement direction, ease, and affect.

Method

Participants. Data failed to record for two participants, leaving 158 individuals from the Prolific online panel who were fluent in English and had not previously completed a study with the BIF. They completed the study for £1.00 (M_{age} = 35.4; 97 female, 61 male). The program randomly assigned participants to the fast or slow condition.

Procedure. The entire study ran with a starfield that emanated from the center of the screen such that people felt they were moving forward either at a fast or slow speed. It was programmed in JavaScript (video posted on OSF: http://bit.ly/osf_speed; see web appendix B.3A for text). In the slow condition, the stars moved at approximately 100 pixels per second, and in the fast condition, they moved at approximately 2,000 pixels per second. Participants were told that the experiment would involve a series of unrelated studies. The first task was to watch a series of six spaceships in the center of the screen and to answer questions about them (see figure 4). This task ensured that participants looked at the screen. Each ship faded in for one second, was displayed for nine seconds, and then faded out for one second. There was a one-second break between ships. Participants then completed the BIF (Vallacher and Wegner 1989) where each action (*making a list*) was presented at the top of the screen, and participants were asked to "Select the button next to the description that best describes the behavior to you." One response was represented at a higher level (*getting organized*), and one response was represented at a lower level (*writing things down*).

FIGURE 4

STARFIELD STIMULI EXAMPLE—EXPERIMENT 3A

NOTE—Starfield moved behind ship.

Finally, participants were asked questions about their experience: "How fast does it feel like you are moving?" (1 = *very slow*, 7 = *very fast*), "How much time do you feel has passed since the beginning of the survey?" (1 = *a very short period of time*, 7 = *a very long period of time*), "To what extent did you feel you were moving..." (1 = *backward*, 7 = *forward*),[2] and "How easy or difficult did you find the task of selecting which action you thought fit best?" (1 = *very difficult*, 7 = *very easy*). They also completed the short-form PANAS (Mackinnon et al. 1999), answered demographic questions, and chose their favorite spaceship.[3]

Results and Discussion

Manipulation Check. Confirming the effectiveness of the perceived speed manipulation, participants in the fast condition (M = 4.61, SD = 1.42) felt they were moving faster than those in the slow condition (M = 3.65, SD = 1.46, $t(156) = 4.19$, $p < .001$, $d = .67$).

Total BIF Score. To analyze the results of the BIF, high-level options were coded as 1, and low-level options were coded as 0. Scores from the items were summed into an index (0 to 25), where higher scores indicated a greater preference for higher level, abstract representations. Supporting H2, a t-test with perceived speed as the independent measure and BIF score as the dependent measure revealed that those in the fast condition selected a larger number of abstract action identifications (M = 14.11, SD = 4.63) than those in the slow condition (M = 12.51, SD = 5.16, $t(156) = 2.05$, $p = .042$, $d = .33$, see table 1).

Possible Alternative Explanations. There was no effect of perceived speed on ease (M_{fast} = 5.39, SD = 1.34 vs. M_{slow} = 5.45, SD = 1.50, $t(156) = -.27$, $p = .79$, $d = .04$), the extent to which people felt they were moving forward versus backward (M_{fast} = 5.30, SD = 1.48 vs. M_{slow} = 5.03, SD = 1.42, $t(156) = 1.19$, $p = .24$, $d = .19$), the short-form PANAS scale ($\alpha = .78$, M_{fast} = 5.37, SD = .76 vs. M_{slow} = 5.41, SD = .74, $t(156) = -.28$, $p = .78$, $d = .04$), or how much time they felt had elapsed during the study (M_{fast} = 2.80, SD = 1.08 vs. M_{slow} = 3.06, SD = 1.15, $t(156) = -1.48$, $p = .14$, $d = .24$). Thus, perceived time,

2 Direction of movement was measured to ensure that those in the fast condition did not feel they were moving forward more than those in the slow condition. The starfield emanated from the screen center as if moving forward.

3 The second author has always wanted to publish a paper involving spaceships and was excited to finally find a way to make it so.

perceived direction of movement, ease, and affect cannot account for the results (see table 2 and web appendix C).

EXPERIMENT 3B: IMPLICIT SPEED-ABSTRACTION ASSOCIATION

The results of experiment 3a suggest that the feeling of moving with faster speed leads people to prefer abstract (vs. concrete) representations of an action, supporting H2. Do people naturally associate concepts related to moving fast with those of abstractness and concepts related to moving slow with those of concreteness? Similar to how Bar-Anan, Liberman, and Trope (2006) tested for an association between distance and mental representation using the IAT (Greenwald et al. 2003), we use the IAT to test for an association between speed and mental representation. The assumption behind the IAT is that when people associate concepts together more naturally, they will categorize them together more quickly versus when asked to categorize concepts together they do not feel are as associated. We predict that participants will respond faster when concepts related to fast are paired with those related to abstractness and when concepts related to slow are paired with those related to concreteness compared to when the pairings are reversed.

Method

Participants. Three hundred and three participants from the Amazon MTurk pool ($M_{age} = 39.7$; 121 female, 180 male, 2 unidentified) completed this experiment in exchange for $0.60.

Following the procedures outlined in Carpenter et al. (2019), participants who responded in less than 300 milliseconds for 10% or more of the trials were eliminated from the analysis. Based on these procedures outlined and per the preregistered analysis plan (posted in OSF: http://bit.ly/osf_speed), 96 participants were eliminated based on their response times.

Procedure. Participants completed an IAT survey in Qualtrics using the software and templates outlined in Carpenter et al. (2019). They were asked to categorize words into one of two response categories. Six words each describing moving slow (*deliberate*, *crawl*, *measured*, *low-speed*, *creep*, and *leisurely*) and moving fast (*quick*, *swift*, *speedy*, *high-speed*, *rapid*, and *dash*) were selected.[4] Seven words each describing concreteness (*detailed*, *defined*, *precise*, *specific*, *local*, *controlled*, and *low-level*) and abstractness (*big-picture*, *universal*, *broad*, *global*, *general*, *automatic*,[5] *high-level*) were selected based on prior construal level theory literature (Bar-Anan, Liberman, and Trope 2006; Dhar and Kim 2007; Fujita et al. 2019; Liberman and Trope 2008; McCrea, Weiber, and Myers 2012; Rim, Uleman, and Trope 2009; Trope and Liberman 2010, 2011).

Following the IAT procedure, participants were asked to categorize words that appeared in the center of the screen as quickly as possible into one of the categories listed at the top left- or right-hand side of the screen using either the “E” (left) or “I” (right) keys (see web appendix B.3B for complete description of procedures; Greenwald et al. 2003). The position of the categories was counterbalanced, and a description of the categories and the words categorized for each block are outlined in table 3. Blocks 1 and 2 were practice blocks familiarizing participants with the speed- and abstraction-related words. Blocks 4 and 7 were the target blocks with either compatible (e.g., “fast” with “abstract”; “slow” with “concrete”) or incompatible (e.g., “fast” with “concrete”; “slow” with “abstract”) category pairings, each preceded by a practice block (blocks 3 and 6). If block 4 was of compatible pairings, then block 7 was of incompatible pairings, and vice versa. Error feedback was provided by displaying an “X” until the error was corrected (Greenwald et al. 2003). Participants then completed key demographics.

Results and Discussion

Compatible Versus Incompatible Pairs. IAT responses were analyzed by D-score algorithm using the R package outlined by Carpenter et al. (2019), based on the procedures of Greenwald et al. (2003). Blocks with words associated with the combination of “fast” with “abstract” and “slow” with “concrete” were paired as the compatible blocks. Blocks with words associated with the combination of “fast” with “concrete” and “slow” with “abstract” were paired as incompatible blocks. We predicted that the response time would be faster for compatible blocks than for incompatible blocks, indicating an implicit association between compatible concepts.

D-Score Analysis of Response Latency. The mean response latencies for the compatible and incompatible category pair blocks were calculated and are summarized in table 4. Following procedures recommended by Greenwald et al. (2003), D-scores were calculated where a positive D-score indicates a greater relative association between the concepts of “fast” with “abstract” and “slow” with “concrete” (compatible) than between the concepts of “fast” with “concrete” and “slow” with “abstract” (incompatible). Consistent with our hypothesis, we found that the mean D-score was positive and significantly different from zero ($M = 0.24$, $SD = 0.45$, $t(206) = 7.71$, $p < .001$, $d = .54$), indicating that participants responded significantly faster when asked to group words associated with

4 These words were selected as commonly used synonyms taken from a thesaurus for the words “slow” and “fast.”

5 “Automatic” is drawn from the memory-based work in construal level theory that illustrates that abstract construals increase reliance on automatic categorization, such as spontaneous trait inference and stereotypes (McCrea et al.2012; Rim et al.2009).

TABLE 3

IAT BLOCK DESCRIPTIONS—EXPERIMENT 3B

Block	Function	Trials	Categories	Words Categorized
1	Practice	20	Fast or Slow	Fast: *quick*, *swift*, *speedy*, *high-speed*, *rapid*, *dash* Slow: *deliberate*, *crawl*, *measured*, *low-speed*, *creep*, *leisurely*
2	Practice	20	Abstract or Concrete	Abstract: *big-picture*, *universal*, *broad*, *global*, *general*, *automatic*, *high-level* Concrete: *detailed*, *defined*, *precise*, *local*, *specific*, *controlled*, *low-level*
3	Practice	20	Compatible or Incompatible	All words from blocks 1 and 2 tested with compatible (Fast + Abstract; Slow + Concrete) OR incompatible (Fast + Concrete; Slow + Abstract) category pairs
4	Test	40	*Same as above*	*Same as above*
5	Practice	20	Fast or Slow	Same words as block 1 with reversed categories
6	Practice	20	Compatible or Incompatible	Same words as blocks 3 and 4 tested with the opposite category of pairs (e.g., if compatible in blocks 3 and 4, then incompatible)
7	Test	40	*Same as above*	*Same as above*

NOTE—Categories were counter-balanced on the right and left.

TABLE 4

IAT RESPONSE LATENCIES (MILLISECONDS)—EXPERIMENT 3B

Condition	Function	Trials	Categories	Mean	SD
Compatible	Practice	20	Fast + Abstract; Slow + Concrete	1364	435
Compatible	Test	40	Fast + Abstract; Slow + Concrete	1218	358
Incompatible	Practice	20	Fast + Concrete; Slow + Abstract	1515	479
Incompatible	Test	40	Fast + Concrete; Slow + Abstract	1358	390

compatible pairings than with incompatible pairings. These results provide further evidence that people have an underlying implicit association between the concepts of "fast" and "abstract" and the concepts of "slow" and "concrete."

EXPERIMENT 3C: EXPLICIT SPEED-ABSTRACTION LAY BELIEFS

Experiment 3b provides evidence that people have an implicit association between concepts related to speed and abstraction, supporting H2. Experiment 3c tests for an explicit lay belief. Using the same train simulation as in experiment 1, people were induced to feel they were moving fast or slow, shown a subset of the words from experiment 3b, and then asked which of them they associated with processing information while moving at that specific speed.

Method

Participants. One hundred and ninety-eight participants from the Amazon MTurk pool ($M_{age} = 38.9$; 100 female, 97 male, 1 unidentified) completed this experiment. Participants were paid $0.65 and randomly assigned by the Qualtrics program to the fast or slow condition.

Procedure. Participants were told that they would complete a simulated decision-making task on a train (see web appendix B.3C). They were told they would first spend time on a page that simulated movement with a train video. They saw the same fast or slow train video as in experiment 1. Participants were then given a subset of the words from experiment 3b in pairs: detailed/generalized, specific/broad, controlled/automatic. For each pair, participants were asked to select the word they would associate most with processing information at the speed they felt they were moving (*"Moving at this speed, I think I would process information in a way that is more…"*). In order to ensure that participants did not feel they were forced to choose words when they felt no association, the instructions also specified: "Pick one of the two if you feel any kind of association at all. If you don't feel that either choice is remotely related to how you would process information, you can skip that pair." They were then asked the same series of questions about perceived speed, time, distance, ease, PANAS, and the videos as in experiment 1.

Results and Discussion

Manipulation Check. Confirming the effectiveness of the manipulation, a *t*-test revealed that those in the fast condition felt they moved faster than those in the slow condition ($M_{fast} = 5.34$, SD = .92 vs. $M_{slow} = 2.87$, SD = 1.32, $t(196) = 15.21$, $p < .0001$, $d = 2.17$).

Lay Beliefs. As a measure of lay beliefs between speed and abstraction, concrete options (detailed, specific, controlled) were coded as 0 and abstract options (generalized, broad, automatic) were coded as 1. Out of the 198 participants, a total of 5 did not select an option for at least one of the pairs. A *t*-test analysis removing the five participants with any missing values for the pairs revealed that participants in the fast condition chose more words consistent with abstract processing ($M = 2.14$, SD = 1.03) than those in the slow condition ($M = 1.45$, SD = 1.17), $t(191) = 4.29$, $p < .0001$, $d = .62$, see table 1). A repeated measures logistic regression analysis without participant listwise deletion yielded the same results (see web appendix F).

Possible Alternative Explanations. Analyses confirmed no difference between conditions for perceived temporal distance ($M_{fast} = 2.84$, SD = 1.43 vs. $M_{slow} = 2.88$, SD = 1.65, $t(196) = -.20$, $p = .84$, $d = .03$), affect ($\alpha = .75$; $M_{fast} = 5.17$, SD = .86 vs. $M_{slow} = 5.27$, SD = .86, $t(196) = -.81$, $p = .42$, $d = .12$) or ease ($M_{fast} = 6.09$, SD = 1.08 vs. $M_{slow} = 6.32$, SD = .99, $t(196) = -1.55$, $p = .12$, $d = .22$). There was a significant effect of perceived speed on perceived distance. Participants in the fast condition felt they had traveled farther than those in the slow condition ($M_{fast} = 3.37$, SD = 1.54 vs. $M_{slow} = 2.77$, SD = 1.49, $t(196) = 2.78$. $p = .006$, $d = .395$). A covariate analysis taking perceived distance into account revealed that its effect was not significant ($F(1, 190) = .03$, $p = .86$) while that of perceived speed was significant ($F(1, 190) = 17.02$, $p < .0001$, $f = .29$). Thus, these alternative explanations cannot account for the results (see table 2, web appendix C).

EXPERIMENT 4: MODERATING THE STRENGTH OF THE SPEED-ABSTRACTION SCHEMA

Experiments 3a–3c provide convergent evidence for a speed-abstraction schema where people naturally associate moving with faster speed with abstraction and moving with slower speed with concreteness (H2). This is reflected in preferences for representations when moving with fast versus slow speed (3a), implicit associations between speed and abstraction (3b), and explicit lay beliefs connecting speed and abstraction (3c). If this underlying association is a basis for the speed-abstraction effect, then introducing information that weakens the association between faster speed and abstractness and between slower speed and concreteness should attenuate the speed-abstraction effect (H3). We test this in experiment 4 by using a paradigm similar to study 4b of Sackett et al. (2010), which demonstrated that when time was manipulated to feel like it was passing faster, people rated their experience during that time as more fun. More specifically, they showed that this effect was because people had an association between "time flies" and "having fun" that they automatically apply whenever they felt like time was flying. To demonstrate the role of this underlying association, in their study, one set of participants was given information consistent with the association between "time flies" and "having fun" (e.g., "time does actually fly when you are having fun" and engaged in "enjoyable activities") while experiencing time that either flew or dragged. Another set was given information inconsistent with this association to weaken it (e.g., "time doesn't actually fly when you're having fun" but flies when engaged in "unpleasant activities") while experiencing time that either dragged or flew. The effect of "time flies" was attenuated in the second set of participants—they rated the experience as less enjoyable when they felt that time was flying than those who received the association-consistent information.

Using the stimuli from experiment 1, we employ a similar paradigm and introduce information that is either consistent or inconsistent with the speed-abstraction schema. We predict that in conditions where participants are presented with information inconsistent with the speed-abstraction schema (i.e., associating "fast" with "concreteness" and "slow" with "abstractness"), the speed-abstraction effect will be attenuated relative to participants who are presented with information consistent with this schema (i.e., associating "fast" with "abstractness" and "slow" with "concreteness," H3). We predict an attenuation rather than a reversal of the effect because, similar to Sackett et al. (2010), we expect that introducing information during an experiment counter to a learned association will lead to competing concepts that attenuate effects of the learned association rather than entirely reverse its effects.

Method

Participants. Fifteen participants failed the attention check and were removed from the analysis, leaving 304 desktop computer users from the Amazon MTurk pool, who completed the study in exchange for $0.65 ($M_{age} = 39.0$; 125 female, 178 male, 1 unidentified). They were randomly assigned by the Qualtrics program to one of four conditions in the 2 (perceived speed: slow vs. fast) × 2 (schema information: consistent vs. inconsistent) between-subjects design.

Procedure. JavaScript was included in the "look and feel" option of the Qualtrics program to run a looping video of a scene looking out the window of a slow- or fast-moving train behind the questionnaire (see figure 5).[6] The schema information manipulation described how visual sensory information is processed. In order to maintain a credible cover story around this additional information, it was necessary to create a more immersive video environment where participants could more clearly observe the scenery than with the format used in experiment 1. Note that the additional information focused on visual sensory information and not on moving at a particular speed so as not to create a demand effect focused on speed. Therefore, we limited the study to participants on desktop computers due to the differences in display between desktops and

6 The videos in experiment 4 are different from those used in experiment 1 because the new format required higher resolution files.

FIGURE 5

TRAIN VIDEO BACKDROP STIMULI EXAMPLE—EXPERIMENT 4

NOTE—Video moved behind text.

laptops. On desktop computers, there was adequate room to view all stimuli text and the video in the background. On laptop computers, however, participants could not see the video and also view the full text of the stimuli behind the video (see web appendix D for details).

With the slow or fast video moving in the full window behind the study, participants were asked to imagine they were on a train, looking at the scene outside their window (see web appendix B.4). Similar to Sackett et al. (2010),[7] they were then presented with the schema information manipulation—a description of prior research that was either consistent or inconsistent with their schema between speed and abstraction. For participants in the schema-consistent information conditions, those in the slow condition were told:

> *Note that previous research has shown that visual sensory input can influence the way people process information.*

> *Adding moving visual sensory input causes people to process information in a more* ***detailed and specific*** *way as they see the elements of the scenery.*

Those in the fast condition were given the same text, except that "generalized and broad" replaced the words "detailed and specific." In these conditions, the additional information provided was consistent with the schema associating speed and abstraction.

For participants in the schema-inconsistent information conditions, those in the slow condition were given the same first sentence as above, and then told that:

> *Adding moving visual sensory input causes people to process information in a more* ***generalized and broad*** *way as they see the elements of the scenery.*

Those in the fast condition were given the same text, except that "detailed and specific" replaced the words "generalized and broad." In these conditions, the additional information provided about processing was inconsistent with the schema associating speed and abstraction.

Next, participants were told that they would look out the window for a while. The participants viewed the moving

7 In Sackett et al. (2010), study 5, participants are told "Research has shown that limiting sensory input can cause time to feel like it [flies/drags] by more [quickly/slowly]."

train scenery without any additional text for 25 seconds. Modeled after Sackett et al. (2010), to ensure that the information presented was read, participants were told that, "In our past research, many participants have reported feeling they processed information in a [detailed and specific/generalized and broad] way because of the visual sensory experience with the video on the train" and were asked, "To what extent did this happen for you?" (1 = *not at all*, 7 = *very much*). Again, this question specifically did not involve speed to avoid creating any speed-related demand effects.

Participants were then presented with the same job choice task as in experiment 1, followed by the same word associations task as in experiment 3c. Finally, they were asked about perceived speed, perceived time, ease, questions about the video, and demographic questions.

Results and Discussion

Manipulation Checks. Confirming the effectiveness of the perceived speed manipulation, a two-way ANOVA with perceived speed (fast vs. slow) and schema information (consistent vs. inconsistent) as the independent measures revealed only a main effect of perceived speed where those in the fast conditions ($M = 5.23$, SD = 1.09) felt they were moving faster than those in the slow conditions ($M = 2.45$, SD = .96; $F(1, 300) = 557.41$, $p < .0001$, $\eta_p^2 = .65$).

To confirm the effectiveness of introducing information consistent versus inconsistent with the speed-abstraction schema, we examined whether the additional information affected participants' association between speed and abstraction. Each of the three pairs of word associations were coded and summed as in experiment 3c. A two-way ANOVA with perceived speed (fast vs. slow) and schema information (consistent vs. inconsistent) as independent measures and the sum of the word associations (concrete: detailed, specific, controlled = 0; abstract: generalized, broad, automatic = 1) as the dependent measure revealed a significant main effect of perceived speed ($F(1, 300) = 5.42$, $p = .021$, $\eta_p^2 = .02$) and a significant interaction between perceived speed and schema information ($F(1, 300) = 58.93$, $p < .0001$, $\eta_p^2 = .16$). The main effect of schema information was not significant ($p = .50$). Confirming the effectiveness of the schema information manipulation, in the consistent conditions, those in the fast condition ($M = 2.49$, SD = .94) selected more abstract words than those in the slow condition ($M = 1.20$, SD = 1.27; $F(1, 300) = 50.72$, $p < .0001$, $\eta_p^2 = .14$). In the inconsistent conditions, those in the slow condition ($M = 2.27$, SD = 1.11) selected more abstract words than those in the fast condition ($M = 1.58$, SD = 1.16; $F(1, 300) = 14.11$, $p = .0002$, $\eta_p^2 = .04$). Thus, the manipulation effectively reversed the relationship that participants held between speed and abstraction.

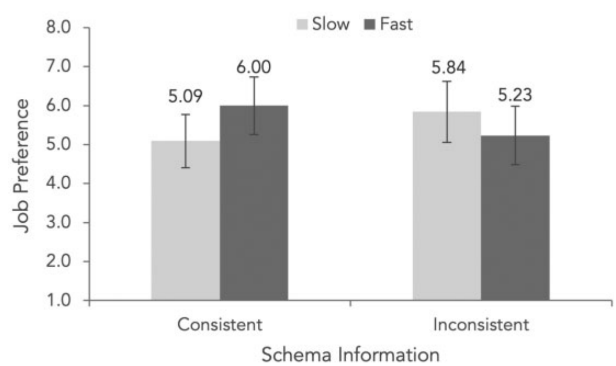
Finally, to confirm that the schema information did not feel more or less believable to participants by condition, the same analysis was conducted with responses to the question "to what extent does this occur for you?" in reference to the schema information. The results revealed no effect of speed ($p = .50$), schema information ($p = .24$), or their interaction ($p = .19$), indicating that participants found the association manipulation equally credible in all conditions.

Job Preference. We conducted a mixed ANOVA with the two job preference measures as the within-subjects dependent measure and perceived speed and schema information as the two independent measures. The analysis revealed only a significant interaction ($F(1, 300) = 4.43$, $p = .036$, $\eta_p^2 = .01$, see figure 6). The main effects of perceived speed ($p = .61$) and schema information ($p = .90$) were not significant. Mirroring the results in experiment 1, in the schema-consistent conditions, those in the fast condition ($M = 6.00$, SD = 3.26) had a greater relative preference for the job that required a big-picture orientation than those in the slow condition ($M = 5.09$, SD = 2.99; $F(1, 300) = 3.71$, $p = .055$, $\eta_p^2 = .01$). However, in the schema-inconsistent conditions, this effect is attenuated—the difference between those in the slow condition ($M = 5.84$, SD = 3.33) and fast condition ($M = 5.23$, SD = 3.28) was not statistically significant ($F(1, 300) = 1.17$, $p = .28$, $\eta_p^2 = .004$).

When presented with information that visual sensory input leads people to process in a way that is consistent with the speed-abstraction schema (i.e., slow with "detailed and specific" and fast with "generalized and broad"), the results of experiment 1 replicate the speed-abstraction effect. However, when presented with information that visual sensory input leads people to process in a way that is inconsistent with the speed-abstraction schema (i.e., slow with

FIGURE 6

EFFECT OF SPEED AND SCHEMA INFORMATION ON JOB PREFERENCE—EXPERIMENT 4



NOTE—Error bars represent the 95% confidence interval.

"generalized and broad" and fast with "detailed and specific"), weakening the speed-abstraction relationship, the effect is attenuated (supporting H3). Because the speed-abstraction schema is both an implicit association and explicit lay theory that people hold about the relationship between speed and abstraction, the schema-inconsistent information is likely to cause an attenuation of the effect, rather than a reversal. Entirely reversing a learned association with a single informational manipulation is unlikely.

Possible Alternative Explanations. A two-way ANOVA with perceived speed (fast vs. slow) and schema information (consistent vs. inconsistent) as independent measures and perceived temporal distance and ease as dependent measures revealed no significant main or interaction effects (*p*s from .24 to .92). Thus, neither perceived temporal distance nor ease can fully account for the speed-abstraction effect (see table 2).

EXPERIMENT 5: FACEBOOK VIDEO AD FIELD STUDY

Experiments 1 and 2 demonstrate the speed-abstraction effect through both virtual and physical movement, while experiments 3a–c and 4 provide evidence for an underlying speed-abstraction schema and its importance. In our theorizing, we suggest that people's perceptions of speed activate this schema. If the speed-abstraction effect implies that people associate faster speed with abstractness and slower speed with concreteness, can advertising effectiveness increase by simulating a sensation of speed that matches the relative abstraction of the text?

Previous research has shown that a match between message framing and mental representation can result in more positive evaluations, such as the match between "how" (concrete) versus "why" (abstract) messages and temporal frame (Kim, Rao, and Lee 2009), the match between framing a loss (concrete) versus gain (abstract) and temporal frame (White, MacDonnell, and Dahl 2011), and the match between an interdependent (concrete) versus independent (abstract) self-view and temporal frame (Spassova and Lee 2013). This suggests that a similar positive effect can occur when combining abstraction and speed if there is a match between "how" (concrete) versus "why" (abstract) message framing and simulating slow versus fast speed.

We test this in a field study with four video advertisements placed on Facebook and measure engagement with the videos in terms of propensity to view the actual content. To comport with IRB requirements that we cannot place ads for products we do not directly sell or that might potentially harm consumer welfare, we placed ads encouraging people to use sunscreen—a slightly modified version of the stimuli from Kim and Duhachek (2020). The ads were placed immediately before the Labor Day Weekend in early September, a weekend commonly spent outside. The text of each video ad described either "why" (abstract) or "how" (concrete) to use sunscreen on a visual background set to music with a couple driving in a car on a road at either fast or slow speed. The video used the perspective of moving with a car as it went down the road. We hypothesize that when people experience a match between the message and the background speed (e.g., "why" message with fast speed; "how" message with slow speed), they are more likely to engage with the ad and view it longer.

We measure engagement in terms of Facebook's "three-second play" and "thruplay" measures. The three-second play indicates when people have watched at least three seconds of an ad. "Thruplay" indicates when people have watched at least 50% of an ad. Because viewing tends to decrease as time passes, the three-second play is the broadest possible net of retargeting individuals interested in the video content for future communication that is allowed by Facebook.

Method

Participants. Four video ads were placed on Facebook in a 2 (message: concrete vs. abstract) × 2 (simulated speed: slow vs. fast) design using the AB testing tool on September 1–2, 2020, reaching 40,557 impressions (gender: 55% female, 44% male, 1% unspecified[8]).

Stimuli Design. Four 30-second length ads were designed to increase awareness of sunscreen use based on the text ads in Kim and Duhachek (2020; video ads posted on OSF: http://bit.ly/osf_speed). The mental representation of the stimuli was manipulated through the ad message, and speed was simulated through the background images and music. In the concrete message condition, "How to Use Sunscreen" was displayed at the top of the frame throughout, with the moving image beneath it. Overlaid on the bottom of the video were "how" messages that appeared one-by-one in succession: apply sunscreen 30 minutes before going out; use SPF30 or higher to block UVA and UVB light; reapply every two hours or after swimming—it is easy to use. In the abstract message condition, "Why Use Sunscreen" was displayed at the top of the frame of the video with the following "why" message appearing at the bottom one-by-one in succession: using sunscreen means healthy skin; works against premature aging and skin cancer; reliable protection for the long-term—it is important to use. The text of these messages was pretested ($n = 100$) to ensure that the messages were seen as abstract versus concrete while not differing in influence on intent to use sunscreen (see web appendix G, pretest A).

Speed was simulated through a video of a couple driving in a convertible car along the road, moving at fast versus

8 Age could not be specifically identified, but age ranges were as follows: 20% ages 18–24, 23% ages 25–34, 17% ages 35–44, 19% ages 45–54, 22% ages 55–64.

slow speed, accompanied by corresponding music. These two videos were selected based on a pretest of five possible videos ($n = 250$) to ensure that the videos induced feelings of fast versus slow speed while not affecting affect (see web appendix G, pretest B).

Procedure. Using the Facebook AB testing tool, individuals were exposed to one of the four video advertisements on their main News Feed. The ads were displayed shortly before Labor Day to encourage sunscreen use during the weekend that is commonly seen as marking the end of summer. In order to attract more attention to the ad on the holiday weekend, the following text was placed above all four versions of the video ad: "Remember to use sunscreen year-round, even when it is cloudy or cool. A Labor Day Weekend reminder!" (see figure 7). A website with landing page was required for the ads, which led to an actual webpage with information about sunscreen use (https://www.sunscreen.works/), but the video was meant to offer self-contained advice. The Facebook Ad Manager platform recorded, by condition, the number of people who viewed the ad for at least three seconds (three-second play) and 15 seconds (thruplay).

Results and Discussion

Three-Second Play Analysis. We conducted a logistic regression with simulated speed (slow = −1, fast = 1) and message (concrete = −1, abstract = 1) as the independent factors, and whether or not a three-second play occurred (no = 0, yes = 1) as the dependent variable. The analysis revealed only a significant interaction (β = .051, Wald $\chi^2 = 13.34$, p = .0003, odds ratio = 1.05). A contrast analysis revealed that for the abstract message, the proportion of ad views was significantly higher for fast versus slow simulated speed ($M_{fast} = 16.1\%$ vs. $M_{slow} = 14.9\%$; β = .046, Wald $\chi^2 = 5.81$, p = .016, odds ratio = 1.05). Conversely, for the concrete message, the proportion of views of the ad was significantly higher for slow versus fast simulated speed ($M_{slow} = 16.5\%$ vs. $M_{fast} = 15.0\%$; β = −.056, Wald $\chi^2 = 7.55$, p = .006, odds ratio = .95, see figure 8).

Thruplay Analysis. A logistic regression with the same independent variables and whether or not thruplay occurred as the dependent variable (e.g., viewing the video for 15 or more seconds; no = 0, yes = 1) revealed a marginally significant effect of message (β = −.067, Wald $\chi^2 = 3.29$, p = .070, odds ratio = .94) where participants were more likely to view the ad with the concrete versus abstract message ($M_{concrete} = 2.0\%$ vs. $M_{abstract} = 1.8\%$; and a marginally significant interaction (β = .068 Wald $\chi^2 = 3.45$, p = .063, odds ratio = 1.07). The planned contrast analysis revealed that as with the three-second play, for the abstract message, the proportion of ad views was significantly higher when

FIGURE 7

EXAMPLE OF AD NEWS FEED: CONCRETE, SLOW CONDITION AND ABSTRACT, FAST CONDITION—EXPERIMENT 5

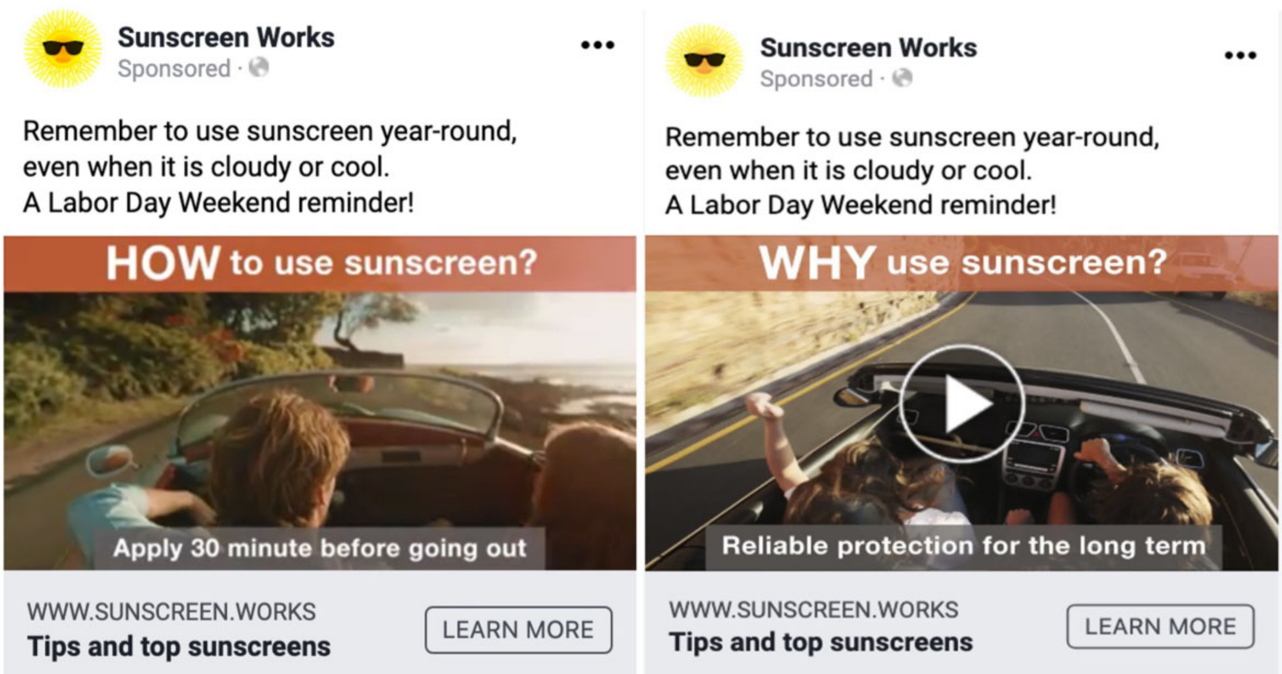
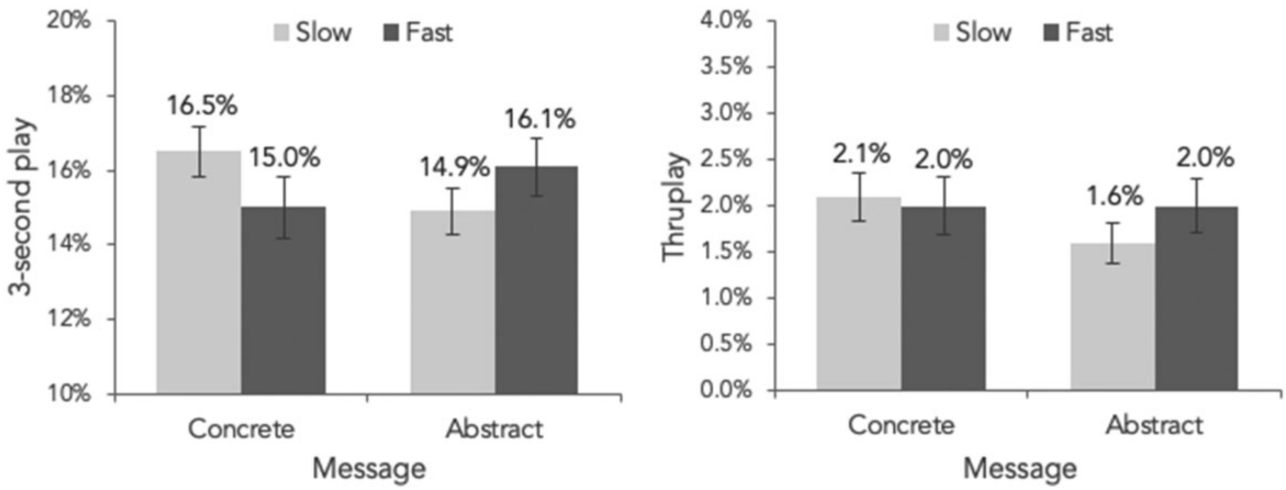


FIGURE 8

EXPERIMENT 5 RESULTS: THREE-SECOND PLAY AND THRUPLAY



NOTE—Error bars represent 95% confidence intervals.

paired with simulated speed that was fast versus slow ($M_{\text{fast}} = 2.0\%$ vs. $M_{\text{slow}} = 1.6\%$; $\beta = .12$, Wald $\chi^2 = 5.69$, $p = .017$, odds ratio = 1.13). However, for the concrete message, the proportion of ad views was almost identical by speed ($M_{\text{fast}} = 2.0\%$ vs. $M_{\text{slow}} = 2.1\%$; $\beta = -.013$, Wald $\chi^2 = .06$, $p = .81$, odds ratio = .99, see figure 8).

Discussion. Through a field experiment using 30-second video ads placed on Facebook, experiment 5 provides supporting evidence that simulated speed, even in brief video ads, can result in greater engagement with an ad when there is a match between speed and abstraction. For three-second play, which allows future retargeting of customers, more participants viewed the ad with an abstract message when it was accompanied by fast versus slow simulated background speed. Conversely, more participants viewed the ad with a concrete message when it was accompanied by a slow versus fast background. While the pattern of results remained similar for the longer thruplay dependent measure, as more time passed, participants viewing the concrete message were more likely to view the ad longer overall. This might be because the ad with the concrete message was more appealing overall because it was placed immediately before Labor Day weekend and highlighted Labor Day weekend in the text, making it more relevant due to its concrete near-time horizon. Overall, experiment 5 demonstrates that managers can design messages and environments with simulated speed that can influence consumer engagement.

GENERAL DISCUSSION

Today's technologies have made speed a more integral part of consumers' everyday experience. People can read or shop on mobile devices or laptops while commuting. Firms can engineer experiences for people with virtual simulations of speed through video (ads, programs), gaming, or virtual reality technology. These technologies continue to develop at a rapid pace and grow in adoption among consumers. Our research is the first to examine how speed felt during an experience can influence mental representation and decision making. Seven experiments provide evidence for the proposed conceptual framework where (1) perceived speed, evoked through both virtual and physical movement, can influence decision making; (2) perceived speed influences mental representation and decision making (*speed-abstraction effect*); (3) people have a schema implicitly and explicitly associating speed with abstraction (*speed-abstraction schema*); and (4) weakening this schema attenuates the speed-abstraction effect.

Supporting H1 and as evidence of the speed-abstraction effect, people made choices consistent with an abstract, high-level mental representation when they experienced faster speed, and choices consistent with a concrete, low-level mental representation when they experienced slower speed. This effect manifested for dependent measures such as job preference (experiments 1, 4), product choice (experiment 2), and advertisement engagement (experiment 5). It was evoked both across speed manipulated through visual simulation (experiments 1, 4, 5) and speed experienced on moving trains (experiment 2) and in both single (experiments 1, 4) and multiple (experiment 2) choice contexts.

Importantly, people have a speed-abstraction schema that underscores this effect—they naturally associate faster speed with abstractness and slower speed with concreteness. We find convergent evidence supporting H2. First, when people experienced faster (vs. slower) speed, they had a greater preference for abstract (vs. concrete) representations of actions (experiment 3a). Second, an IAT test demonstrates that concepts related to "fast" are implicitly associated with "abstract" and concepts related to "slow" are implicitly associated with "concrete" (experiment 3b). Third, when people felt they were moving with faster (vs. slower) speed, they had an explicit lay belief that they would process information in a way that was more abstract (vs. concrete; experiment 3c). Underscoring the role of this schema, introducing new information that weakens this association attenuates the speed-abstraction effect (experiment 4).

Finally, studies outside of the lab highlight important managerial implications. Experiment 2, which was conducted on commuter trains, demonstrates the speed-abstraction effect for a continuous measure of perceived speed on a series of product choices. This suggests that managers should understand the physical environment in which their customers make decisions and collect this data in conjunction with behavioral data when possible. Unearthing patterns in the behavior of groups of consumers could suggest implications for interface design or design of ads placed on commuter transportation. In a similar design context, the Facebook ad experiment 5 demonstrates that managers can design messages and environments with virtual speed that influence consumer engagement. Video ads placed on Facebook that combined fast motion with a why-oriented (abstract) message or slow motion with a how-oriented (concrete) message were more engaging to viewers than when speed and abstraction did not match. Across the studies, perceived time, distance, affect, fluency, ease, and directional orientation were ruled out as possible alternative explanations (see table 2).

Theoretical Implications and Future Research

Dynamic Effects of Speed. Our research makes several theoretical contributions. While previous research has shown that static elements of the physical environment can influence mental representation (Aggarwal and Zhao 2015; Meyers-Levy and Zhu 2007), our research examines how a dynamic aspect of the environment—perceived speed—can influence mental representation. Other work has examined how implied motion versus nonmotion through static images (Cian, Krishna, and Elder 2014), movement of target stimuli (Hsee et al. 2014, Jia et al. 2020), or customers pacing through a retail store (Van Den Bergh et al. 2016) can affect behavior. Our work is unique in examining how the incidental experience of perceived speed in the environment—both virtual and physical—can influence consumer behavior.

Broadening the Range of Speeds Explored. As a first step toward understanding how perceived speed influences mental representation, the focus of our investigation was specifically on speeds that would not evoke strong, specific emotions. Future research could examine the effect of speeds that evoke specific emotions that might override the speed-abstraction effect. For example, slow speeds can be relaxing or frustrating. Fast speeds can cause people to feel exhilaration and happiness or fear. Different types of emotions are also associated with different levels of mental representation (Labroo and Patrick 2009). A related question is also how nonmovement versus movement might affect mental representation. Is a static state more concrete than slow movement? Or will it depend on expectations of movement? While our studies on trains involved continuous measures of speed, future research could examine the extent to which the relationship between speed and abstraction is linear across a more diverse range of speeds.

Role of Sensory Activation. Our investigation focused on evoking the sensation of speed through visual and physical movement. Future research could examine the extent to which the relationship between speed and mental representation holds for other types of sensory activation. Will the same effect hold for aural cues in the environment? For static images that imply movement? Or when people merely imagine, rather than actually experience, simulated speed? Will it hold when imagining or thinking about others while experiencing speed? Or for other concepts associated with relative speed such as personal busyness (Bellezza, Paharia, and Keinan 2016) or the pace of life (Husemann and Eckhardt 2019)? Our theorizing suggests that the strength of the relationship between perceived speed and mental representation will depend on the extent to which the sensory experience activates the speed-abstraction schema. Future research can further examine whether and what imagined and associated experiences can evoke similar effects.

Ego-centric Versus Non-ego-centric Movement. Our research focused on ego-centric movement, where people were induced to feel they were moving, versus non-ego-centric movement where people feel things move around them while they stay still.[9] Gentner, Imai, and Boroditsky (2002) show that metaphors involving ego-centric movement versus non-ego-centric movement can influence the mental conceptualization of moving forward versus backward through time. Similarly, future work could examine whether the speed-abstraction effect manifests when people feel objects move with speed in their environment as

9 The key reason for this was to avoid fluency effects that could stem from the sensation of moving text.

opposed to themselves moving. For example, would the effect manifest if one stands on a train platform and sees a train quickly passing by? Or would the effect manifest if target stimuli were to rotate rapidly in place without a sensation of ego-centric movement (e.g., if a target product were to spin quickly versus slowly on the screen).

The Interaction of Speed × Time = Distance. Finally, our work contributes to the construal level theory literature, which has primarily examined the role of psychological distance in terms of time and space on mental representation (Liberman and Trope 2008; Trope and Liberman 2010). Ours is the first to examine the role of the interrelated construct of perceived speed. We demonstrate that speed, in and of itself, can affect mental representation outside of the role of perceived time or distance through the incidental experience of speed in the environment. Future research can more explicitly examine the effect on mental representation when speed, time, and distance interact. For example, when people feel that time is limited, they tend to engage in more concrete processing (Körner and Volk 2014). We were careful to ensure that faster speeds did not result in a sensation of time constraints or time pressure, but if faster speeds were to evoke more limited time, would the speed-abstraction effect reverse? Furthermore, we conducted analyses to examine the effects of speed above and beyond those of distance. However, fast changes in the visual environment could at some point materially influence perceptions of passing time, creating other multiplicative effects on mental representation outside of the effects of speed (Block 1974; Ornstein 1975; Zauberman et al. 2009). What are the effects of speed when inferring time or distance, given that perceived time is seen as a metaphor for perceived spatial distance? According to the typical speed × time = distance equation, faster speed can simultaneously be associated with shorter time and greater distance (Boroditsky and Ramscar 2002; Kim, Zauberman, and Bettman 2012). Examining the intersection of these three constructs and when each is more or less salient during decision making is a rich area of future research.

Managerial Implications

Physical Movement. Our findings also have important implications for managers when considering the physical context in which their customers are making decisions. Mobile technology makes it increasingly likely that people make decisions while experiencing speed. People search for information, make purchases, work, and play games while on the move in vehicles. Our research indicates that consumers' mental representations and decision making can change as a function of perceived speed. When they feel they are traveling with faster speed, they prefer options and information represented more abstractly. Therefore, it is important for managers to be aware of these effects and, where possible, to collect data on the physical context in which their customers are making decisions and might feel they move with faster or slower speed. Tracking consumer decisions when they are on the move can help managers explore any systematic patterns they observe. For example, if a significant number of customers are on fast-moving commuter trains on their mobile phones during certain hours, ads placed on devices during these times could have more abstract, why-oriented messages.

Furthermore, for firms placing ads on transportation—buses, subways, commuter trains—having information about the speed at which people travel along particular routes and whether they perceive these speeds as faster versus slower could inform message design. Collecting this data can allow managers to derive insights from their consumers' activities. As technology continues to develop, it may become possible to render different types of interfaces with different messages to consumers depending on their detected location and speed. Future work can also examine to what extent different types of physical cues (visual vs. aural vs. vestibular) can affect perceptions of speed and evoke the speed-abstraction schema.

Virtual Movement. Importantly, our research shows the important influence that simulated movement can have on decision making. Managers can actively construct consumer environments where messages are conveyed and decision-making occurs. Simulated movement at different speeds—whether on cars, trains, or roller coasters—is increasingly used in video ad design. Virtual reality and gaming environments offer product placement, purchase, and advertising opportunities. As illustrated in the Facebook field study, advertisements can be designed to match the simulated speed experience with the framing of the message. Thus, managers are presented with opportunities to match text and images with virtual speed to improve the design of interfaces and messages in the consumer environment.

CONCLUSION

As technology continues to develop, it will become increasingly important to understand how speed—both physical and virtual—shapes customer experiences. Our research provides a conceptual model for understanding how the incidental experience of speed can influence mental representation and decision making, which, we hope, provides rich groundwork for future theorizing and research.

DATA COLLECTION INFORMATION

The first author managed the data collection by research assistants at Reichman University for experiment 2, which was conducted with participants on public trains in Israel. The second author managed the data collection for the

Facebook field study for experiment 5. The first and second authors jointly managed the data collection for experiments 1, 3b, 3c, 4, and pretests A and B for experiment 5 through the MTurk online panel, and experiment 3a using the Prolific online panel. Data were collected from 2014 through 2020. All data were analyzed separately and jointly by the first and second authors using different statistical programs (SAS, SPSS, and R), confirming all results, and discussed with the third author. Data are stored on OSF: http://bit.ly/osf_speed

APPENDIX A

STIMULI SUMMARY—EXPERIMENTS 1, 2, AND 4

Experiments 1 and 4: Job Preference		
Description	Job A: More detailed-oriented position	Job B: More big-picture-oriented position
Position title	Business Implementation Manager	Business Planning Manager
Key responsibilities	• Carrying out business plans • Identifying best practices and improvement opportunities	• Developing business plans • Setting overall business goals and objectives
Requirements	• Project management skills • Detail-oriented and efficient	• Project development skills • Big-picture-oriented and organized

Experiment 2: Gifts on a train		
Product category	More feasible option	More desirable option
Photo album software	A normal photo album-editing software that is able to create standard-sized, hard cover photo albums. The software allows basic photo-editing and has only simple design functions. Since this is a program aimed at the consumer market, the few features that it possesses are easy to use.	A high-end photo album-editing software that is able to create photo-albums in different sizes and a variety of covers. The software allows professional editing of photos and has various design functions. However, it is hard to use and requires some time in order to understand how to use the many features.
Coffee maker	An ordinary coffee maker that does its job and is easy to use. It can only make basic coffee. It is extremely reliable and does not usually break down.	A high-end coffee maker, which is able to brew a variety of coffee types including espresso and cappuccino. However, it requires a while to learn how to use it correctly and also requires frequent cleaning and part replacement.
Video game	A video game that has been rated by magazine reviewers as being of normal quality with basic graphics. However, the game is easy to pick up and play with friends.	A video game that has been rated by magazine reviewers as high quality with state-of-the-art graphics. Unfortunately, it has a large learning curve and requires a long time to learn how to play.
Movie tickets	Movie tickets to a movie released about two months ago in your local area. As this movie has been in theaters for a while and a lot of people have seen it, these tickets can be redeemed for any showtime during the week. Reviews have suggested that this is an OK movie (score of 7 by reviewers).	Movie tickets to a brand-new hit movie that is premiering in your local area. Since this is a new movie that has not been in theaters before, these tickets are only for a Tuesday night several nights after the premiere. Reviews have suggested that this is an excellent movie (score of 9 by reviewers).
Restaurant gift certificate	A gift certificate to an ordinary Italian restaurant (score of 6.5 out of 10) that is about a five-minute drive away.	A gift certificate to an upscale Italian restaurant (score of 9.2 out of 10) that is about a one-hour drive away.
Desk	A desk with basic features (score of 3 out of 5 stars). Comes fully assembled. Simply remove it from the box and it is ready to use.	A desk with advanced features, including drawers, sliding keyboard tray and elevated monitor shelf (score of 4.5 out of 5 stars). Comes disassembled with components in the box, including drawers, joints, and hinges.

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