BRIEF REPORT

Anticipated Ambiguity Prolongs the Present: Evidence of a Return Trip Effect

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Every event that can occupy a span of time can also warp how long that duration feels. No shortage of factors configures such duration estimates, yet they remain largely confined to events experienced in the present moment. Might future events similarly impact duration? The present investigation leverages a phenomenological return trip effect, which documents subjectively longer outbound journeys relative to identical inbound journeys, to inform this question. Through this lens, the focal event (that which will transpire at the destination) can be decoupled from the focal duration (the span of time between the present moment and arrival at that destination). Four studies document a consistent effect in which ambiguity awaiting at a future event (occurring at the destination) expands the subjective magnitude of present durations (the travel time to the destination). Duration judgments thus appear sensitive to an increasingly broad scope of factors, informing models of temporal cognition.

Keywords: time, duration, ambiguity, uncertainty

Journeys depart from a starting location and arrive at a destination. Round-trip journeys—across the street or across the globe—make two trips: one leg to the destination and another returning to the starting location. Even if the initial leg traverses a path identical to that taken back, the first trip often tends to feel longer in duration than the second, a phenomenon taken as evidence of a return trip effect, To be sure, this relative elongation and contraction, respectively, arises as the product of many different distinct factors.

Nonetheless, explanations for these seemingly shorter return legs tend to center around characteristics of the separate journeys’ paths. Outbound trips appear to take more time than people had expected, causing them to feel particularly long (Van de Ven, Van Rijswijk, & Roy, 2011), and what constitutes the conclusion of journeys varies asymmetrically, such that outbound trips are deemed to be over upon arrival at the destination itself, whereas return trips seem to conclude when the traveler arrives in the general vicinity of the origin, a larger target necessarily hit sooner in time (Raghubir, Morwitz, & Chakravarti, 2011). In noteworthy robustness checks, the apparent abbreviation of return trips arises even when taking a different route home (Van de Ven et al., 2011) but disappears for trips to highly familiar locations other than strictly points of origin (Raghubir et al., 2011). These nuances suggest a separate role not for the route but for destinations. Aside from characteristics of the paths traversed, how else might (inbound) origins differ from (outbound) destinations?

In answering this question, the present investigation considers familiarity not with the route traveled but with what happens before and after traversing it: the events that transpire at origins and destinations. We conjecture that outbound journeys tend to navigate people toward locations at which the events to unfold remain relatively unknowable (“Will salmon be on sale at the store?”) whereas inbound journeys tend to culminate in the rudimentary (“We really should use that salmon in the refrigerator”). Thus, the journeyperson tends to chart his or her outbound course heading toward a location characterized by a greater degree of uncertainty or ambiguity (independent of the location of the destination; “Is the store on this block or the next one?”).

Scalar timing theory (Gibbon, 1977) offers an account by which the same objective duration of time (e.g., the equivalent durations of outbound and inbound journeys) can feel differentially long or brief. It contends that one’s sense of time is regulated by a pacemaker-accumulator system; the pacemaker generates pulses which, when transferred into the accumulator (accessed via attention and tasked with converting pulses to time), determines perceived duration: More pulses signal the passage of more time (i.e., more pulses elongate duration estimates, separable from actual duration; Church, 1984; Maricq, Roberts, & Church, 1981; Zakay & Block, 1997). This type

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of pacemaker-accumulator model has formed the conceptual basis for all manner of phenomena related to duration estimation. For instance, Zakay, Nitzan, and Glicksohn (1983) varied the tempo of a flashing light (i.e., an external prompt inducing more pacemaker pulses) and found a higher flash frequency to generate longer duration estimates. As applied to social-psychological stimuli, this model has similarly been used to explain why faces displaying emotional expressions seem to linger longer than neutral faces (Droit-Volet, Brunot, & Niedenthal, 2004), as do faces of Black men seen by White people anxious at the possibility of seeming racist (Moskowitz, Olcaysoy Okten, & Gooch, 2015).

We propose a functional-level account by which a greater degree of uncertainty characterizing destinations will similarly make time feel longer. Examining this contention through the lens of a return trip effect allows for important points of divergence from prior work on duration estimation. First, journeys operate on a larger time scale (minutes, hours) than the brief moments (milliseconds, seconds) predominating time perception methodology (e.g., Bar-Haim, Kerem, Lamy, & Zakay, 2010). Second, during those brief moments, a stimulus is presented with the intent of varying how time is perceived during its presentation; for example, participants view an emotional face for a set amount of time, then estimate how long they spent looking at it (Droit-Volet & Meck, 2007). Conversely, journey destinations (like grocery stores) cannot be experienced concurrent with journeys themselves (like the trip from home to the grocery store), affording the novel opportunity to examine whether variation in not a present but a future stimulus (specifically, its ambiguity) might also impact duration in the present.

In a pilot examination of this possibility, we asked 78 volunteers at the University of Toronto Scarborough to indicate the extent to which they agreed with two statements: “My home and the events that happen there are predictable and unambiguous” and “I tend to experience the ‘return trip effect,’ where it feels like it takes less time to get back home than it does to get to places outside my home.” A positive correlation emerged (Pearson R = 0.27, p = 0.017, such that the more participants found their home predictable and unambiguous, the more they tended to experience return trip-like phenomena. This suggests that there is more to the judgment of duration than momentary faces and flashes but, rather, that anticipation of future events might similarly color time perception. Three studies test this hypothesis, all using a between-subjects analysis of variance (ANOVA) approach. Study 1 provides initial evidence using a hypothetical scenario task; it targeted a sample of at least 50 participants for each of the two experimental conditions, the high end of previous sample sizes used in research on return trip effects. Studies 2 and 3 have participants experience and then evaluate one-way and round-trip journeys, respectively; in light of both the effect size observed in Study 1 and the more demanding nature of data collection, these studies targeted a reduced sample of at least 40 participants for each of the two experimental conditions.

Study 1

Our account predicts that traveling toward destinations hosting relatively unambiguous events makes those journeys seem to pass relatively quickly. Should this be true, then any destination whose events are characterized by such certainty (and not only one’s home) should witness a similar abbreviation of duration. Study 1 tests this proposition for a nonhome destination.

Method

One-hundred and four volunteers (35 females, M<sub>age</sub> = 34.17) were recruited from Amazon’s Mechanical Turk platform to participate in a study about traveling in exchange for a small cash reward. Participants were asked to imagine that they had to drive from their home to their favorite restaurant in the city in which they live; a friend was said to be organizing a party there, and participants were randomly assigned to a condition in which that party was framed as more or less ambiguous. Specifically, participants in the ambiguous (unambiguous) condition were told that

Your friend wants to keep the party as surprising as possible (to minimize any potential surprises), so as you’re driving there you do not know (you know) what food will be served, how long the party will last, or (and) who will be there.

Participants were then asked “How long would the drive to this party feel to you?” on a scale ranging from 1 (very short) to 7 (very long). To address a potential confound, participants next responded to a question that asked “How familiar are you with the restaurant you were thinking of?” on a scale ranging from 1 (not at all) to 7 (very). Thereafter, they reported basic demographic information before concluding the survey.

Results

Traveling to an ambiguous party felt subjectively longer (M = 4.35, SD = 1.15) than traveling to a more certain party (M = 3.11, SD = 1.33), F(1, 102) = 25.96, p < .001, η² = .20. Although participants brought to mind their favorite restaurant prior to the ambiguity manipulation, they reported its familiarity after it, and a significant effect emerged such that those traveling to the unambiguous party indicated more familiarity (M = 5.27, SD = 1.39) than those traveling to the ambiguous party (M = 4.27, SD = 1.93), F(1, 101) = 9.05, p = .003, η² = .08. An analysis of covariance confirmed that the effect of ambiguity on duration held even in adjusting for this divergence in familiarity, F(1, 100) = 19.53, p < .001, η<sup>2</sup> = .16, with familiarity not proving statistically reliable, p = .25.

Study 2

Study 1 relied upon a hypothetical experience of travel, meaning that participants rated journey durations that they had not actually experienced. While we suspect that predicted subjective duration correlates highly with actual subjective duration, only a real travel paradigm (which we use in Study 2 as well as Study 3) could preclude many alternative interpretations. The particular methodology adopted in Study 2 allowed us to control for the objective duration of travel to an ambiguous or unambiguous destination, isolating the role of destination ambiguity in time perception.

Method

Ninety-four volunteers (59 females, M<sub>age</sub> = 19.88) were recruited from the University of Toronto Scarborough to participate in a study about traveling in exchange for course credit. Experimental sessions were conducted in groups of up to eight participants. Participants were seated at stations facing a large video projector. The experimenter explained that participants would
watch a video based upon a scenario, which they were to internalize vividly during the video. Specifically, all participants envisioned driving home from school where their aunt was waiting for a visit. Sessions were randomly assigned to a condition in which the scenario was designed to be either ambiguous or unambiguous (e.g., not knowing or knowing, respectively, upcoming topics of conversation and meal choices; see Appendix). The scenarios were matched for length and tone and were read aloud by the experimenter prior to the video. The video was 7.5 min in duration and depicted a drive from one location to another from the first-person perspective of the driver (filmed with a head-mounted camera). The experimenter eliminated all sources of time information for the entirety of the experiment (e.g., participants put their phones away; the clock in the room was covered; the timer on the computer and video player were covered).

After the video, participants estimated the duration of the video (in minutes and seconds). Thereafter, they reported basic demographic information before concluding the survey.

**Results**

Traveling to an ambiguous visit from an aunt felt longer ($M = 537.79$ s, $SD = 247.52$) than traveling to a more certain visit ($M = 446.63$ s, $SD = 125.83$), $F(1, 92) = 5.00, p = .028, \eta^2 = .05$. Because this difference emerged despite the journeys in the two conditions lasting the same objective amount of time, destination ambiguity appears to play a unique role in subjective duration independent of isolated potential confounds (e.g., rate of travel).

**Study 3**

Having examined variation in ambiguity for events at both outbound (Study 1) and homebound (Pilot Study and Study 2) journeys, Study 3 integrates both legs in a single design. A lab setting approximated the experience of a return trip effect, with the study commencing in one room, moving to a separate room, and then returning to the original room in order to conclude the study.

**Method**

Eighty-one volunteers (54 females, $M_{age} = 19.65$) were recruited from the University of Toronto Scarborough to participate in a study about traveling in exchange for course credit. Participants were told that the first task for the study would take place in a separate location and that they would be walking there with the experimenter. Participants were randomly assigned to a condition in which that first task was framed as more or less ambiguous. Specifically, participants in the ambiguous (unambiguous) condition were told that “In order to make the task surprising (to minimize any potential surprises), we will not tell you (will first tell you) what task you will be performing there.” For those in the ambiguous condition, it continued, “You will find out what task it is when you arrive;” for those in the unambiguous condition, it continued “You will perform a letter-search task when you arrive, circling specific letters that appear in a series of words.” The task instructions then told participants to signal to the experimenter, who would escort them to the separate location (one floor below in the same building). Upon arrival, all participants were given the letter-search task (containing the same instructions). They were presented with a 131-word passage from the novel *My Struggle* (Knausgård, 2015) and asked to review the text and circle every appearance of the letter “a.” When they had finished, they signaled to the experimenter, who escorted them to the room in which the study had begun. After returning to the original room, participants were reseated at the same computer terminal that had presented the original instructions and proceeded through the remainder of the experimental materials. First, they were asked “You just made two trips: an initial trip and a return trip. Which trip felt shorter to you?” on a scale ranging from $-5$ (return trip felt a lot shorter) to $5$ (initial trip felt a lot shorter). As control questions, participants next evaluated the letter-search task that they had performed on three dimensions (difficult, boring, and entertaining) on a scale ranging from $1$ (not at all) to $7$ (very). Thereafter, they reported basic demographic information before concluding the survey.

**Results**

The primary measure of interest was constructed such that more negative numbers indicated a stronger return trip effect. An outbound journey toward an ambiguous task elicited a stronger experience of the return trip effect ($M = -2.44, SD = 1.72$) than did an outbound journey toward a more certain task ($M = -1.48, SD = 2.26$), $F(1, 79) = 4.67, p = .034, \eta^2 = .06$. The ambiguity manipulation did not differentially make the letter-search task more or less difficult, boring, or entertaining, $ps > .4$.

**General Discussion**

Across four studies, destination ambiguity shaped the experience of travel time: The more ambiguous the events expected to take place at destinations, the longer journeys felt. In and of themselves, return trip-like effects derive from a confluence of factors (Raghubir et al., 2011; Van de Ven et al., 2011), and to this body of work the present investigation adds uncertainty as a novel sufficient (though not necessary) condition to observe subjectively shorter inbound journeys relative to outbound trips. More broadly, in examining characteristics of a journey’s destination and not its path, the present investigation lends greater nuance to previous research on dynamic movement. This growing body of work has investigated directional differences arising as a function of approaching or receding from destinations (Maglio & Polman, 2014), with destinations toward which people are oriented feeling closer than those away from which they are oriented (see also Hsee, Tu, Lu, & Ruan, 2014; Maglio & Polman, 2016). Here, orientation was held constant while experimental materials were concocted to examine, independently, the events expected to transpire at those destinations (i.e., their ambiguity). While the literature on dynamic movement has embraced consideration of future-oriented thought (i.e., mental simulation of targets like destinations; Markman, Klein, & Suhr, 2009), the literature on time perception has focused primarily on present-oriented factors in shaping duration. Emotional stimuli slow the progression of time while being perceived (Moskowitz et al., 2015; Noulhiane, Mella, Samson, Ragot, & Pouthas, 2007); pleasantly engaging flow states engross one’s mind in the task at hand and cause time to fly by (Csikszentmihalyi, 1997). From this perspective, the present investigation suggests that the scope of factors capable of configuring time perception and duration judgments...
need not remain confined solely to those experienced in the here and now.

Still, perhaps it may not be the experience of uncertainty per se but rather the arousal that it begets (Bar-Anan, Wilson, & Gilbert, 2009; Ellsberg, 1961; Hsu, Bhatt, Adolphs, Tranel, & Camerer, 2005) or the regulation of it that expands time (insofar as uncertainty might constitute a state that people spontaneously seek to dampen). When research participants in one study that investigated this latter construct were assigned to a self-regulation condition (made to downplay their emotions while watching a film clip), they afterward estimated that the clip had lasted longer than those not assigned to regulate their emotions (Vohs & Schmeichel, 2003). In this same investigation, longer duration estimates—in the regulation condition—led those participants to persist for less time on a subsequent task that required sustained effort, highlighting one of the many important consequences of perceiving time as subjectively long. Other examples abound, ranging from task initiation and repetition to enjoyment (e.g., Sackett, Meyvis, Nelson, Converse, & Sackett, 2010). Future work remains necessary to illuminate the processes accounting for the relationship between an ambiguous future and a lengthy delay to its onset, whether ambiguity has a similar or divergent impact on different means of time estimation (Block & Zakay, 1997), and how ambiguity’s expansion of time might make people more or less likely to engage in different thoughts and behaviors. Regardless, trips toward ambiguity feel longer than trips toward certainty, documenting not just an isolated peculiarity of duration estimation, but a new, future-oriented take on temporal cognition.

References


(Appendix follows)
Appendix

Materials for Study 2

Certain Condition

It’s Friday, and you are on your way from school to your house, where your aunt will be waiting for a visit. This visit, to you, is quite certain and unambiguous. The memory of your last encounter with your aunt is specific and unambiguous, so you know what to expect while she’s there. The conversation topics are always ordinary and customary. You know what she will be discussing with you because she always talks a lot about the weather and how much you have grown. Your aunt is going to cook for you this weekend, and you know what she will cook because she always makes the usual mac and cheese. She already mentioned what she has in mind for the weekend, so there is a clear agenda. She said that her husband would also be coming along, so you know exactly what to expect.

Uncertain Condition

It’s Friday, and you are on your way from school to your house, where your aunt will be waiting for a visit. This visit, to you, is quite uncertain and ambiguous. The memory of your last encounter with your aunt is vague and ambiguous, so you do not know what to expect while she’s there. The conversation topics are always surprising and unexpected. You do not know what she will be discussing with you because she loves to bring up new topics. Your aunt is going to cook for you this weekend, but you do not know what she will cook because she has many recipes. She didn’t say anything about what you will be doing this weekend, so there is no agenda. She didn’t mention if she is the only one coming or if there will be other people there, so you do not know what to expect.

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