

# 1995 Feels So Close Yet So Far: The Effect of Event Markers on Subjective Feelings of Elapsed Time

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## Abstract

Why does an event feel more or less distant than another event that occurred around the same time? Prior research suggests that characteristics of an event itself can affect the estimated date of its occurrence. Our work differs in that we focused on how characteristics of the time interval following an event affect people's feelings of elapsed time (i.e., their feelings of how distant an event seems). We argue that a time interval that is punctuated by a greater number of accessible intervening events related to the target event (event markers) will make the target event feel more distant, but that unrelated intervening events will not have this effect. In three studies, we found support for the systematic effect of event markers. The effect of markers was independent of other characteristics of the event, such as its memorability, emotionality, importance, and estimated date, a result suggesting that this effect is distinct from established dating biases.

## Keywords

time perception, time estimation, memory accessibility

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Time . . . persists merely as a consequence of the events taking place in it.

—Martin Heidegger (1924/1992, p. 3E)

People commonly express elapsed time as a subjective sensation or feeling. For instance, when returning to a restaurant, one might remark, “It feels like we were here ages ago.” People express such feelings even for meaningful events whose actual date of occurrence is known. For example, on a recent trip to the memorial of former Israeli Prime Minister Yitzhak Rabin, who was assassinated in 1995, the wife of the first author of this article observed that Rabin’s assassination felt like it had occurred recently, whereas the 1995 birth of her twins felt very distant. In this article, we examine the feeling of elapsed time, a naturally occurring judgment based on “intuitive information about distance” of an event (Friedman, 1993, p.62). We focus on the following question: What makes an event feel more or less distant than another event that occurred around the same time?

People may consider two categories of information when assessing the time elapsed since a target event: (a) characteristics of the event itself and (b) characteristics of the time interval following the event. Prior research on time perception has focused on the first category. For example, events that are

more accessible in memory (Brown, Rips, & Shevell, 1985) or more emotional (Bratfisch, Ekman, Lundberg, & Kruger, 1971) create stronger traces in memory than less accessible and less emotional events. Strong memory traces lead to forward telescoping, the tendency to estimate dates as more recent (Friedman, 1993; Morwitz, 1997). Other work suggests that contextual cues about an event can be used to reconstruct its placement in time (Friedman, 1996). Remembering that one was wearing a heavy coat, for example, indicates that the event occurred in wintertime. Similarly, general event knowledge and metacognitive beliefs may also be used to judge time. For example, people reconstruct the durations of specific military conflicts, epidemics, and other events by using their knowledge of the typical duration of these types of events (Burt & Kemp, 1991). Metacognitive beliefs about the causal relationship between events also influence perceived duration (Faro, Leclerc, & Hastie, 2005).

Here, we focus instead on how characteristics of the time interval subsequent to a target event can affect people’s

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feelings of elapsed time since that event. We draw from research on the joint influence of accessibility and diagnosticity in judgment (Feldman & Lynch, 1988) and concentrate on the effect of subsequent events that are both accessible in memory and perceived to be related to the target event. We label these *event markers*. For instance, for the target event “birth of a child,” a parent might bring to mind many event markers, such as doctor visits, birthdays, and piano recitals. In contrast, the assassination of a prime minister may bring to mind fewer event markers, because related subsequent events are not as accessible. We argue that a time interval punctuated by a greater number of event markers will make the target event feel more distant. Consequently, whereas strength-of-memory models predict that recalling more aspects related to a target event results in judging that event to be more recent, we posit that accessing more related events that occurred subsequent to a target event results in that event feeling more distant.

Our prediction is partly related to research demonstrating that the perceived duration of an event depends on its composition. For instance, episodes are judged to be longer in retrospect when they are more complex (Block & Zakay, 1997), are less routine (Avni-Babad & Ritov, 2003), or provide greater contextual change (Zakay & Block, 2004). Similarly, short episodes occupied by a greater number of components are perceived to be longer, a phenomenon known as the filled-duration illusion (Ornstein, 1969). Thus, an interval is judged to be longer if it is interrupted by 60 words rather than 30 words (Block, 1974); the number of words provides a cue for inferring the duration of the interval. Although event markers exert a similar influence on people’s feelings of elapsed time, they are distinct in three ways. First, markers do not occur in the course of the target event, but rather occur following the event. Second, for the judgments of elapsed time we are interested in, the interval between the target event and the judgment can last several months (rather than minutes, as in most previous research). Third, and most important, we argue that feelings of elapsed time are not affected by simply any event that follows the target, but rather are affected only by accessible and relevant subsequent events.

In summary, we predict that even events that occurred around the same time and are similarly memorable, emotional, or important may differ in how distant they feel: Events

associated with a greater number of markers will feel more distant. Indeed, we show that the effect of markers on subjective feelings of elapsed time holds even after controlling for an event’s estimated date. We suggest that this is because subjective judgments of temporal distance are more impressionistic and therefore more sensitive to accessing event markers than objective judgments of elapsed time. Further, objective date estimations, studied in previous research, are likely to also rely on other sources of information, such as contextual cues and general knowledge about duration (Burt & Kemp, 1991; Friedman, 1996), which potentially dampen the effect of event markers.

We tested our hypothesis in three studies involving public and autobiographical events that occurred weeks, months, and years in the past. We examined correlational data gathered by measuring event markers for public events (Study 1), manipulated the accessibility of related and unrelated events following an autobiographical event (Study 2), and manipulated the number of related events following a target event that we created in the laboratory (Study 3). An important feature of our studies is that we controlled for memorability, emotionality, importance, and estimated dates of the target events. Thus, we establish the effect of event markers over and above the effects of event-specific characteristics documented in previous research.

## Study 1: Measuring Markers

In Study 1, we tested our event-marker hypothesis using public events. We hypothesized that events associated with a greater number of markers will feel more distant than events associated with fewer markers.

### Method

University of Southern California (USC) undergraduate students ( $N = 164$ ) participated in Study 1 for course credit. They were asked to indicate whether they were aware of each of eight political and cultural public events that had taken place 16 to 33 months prior to the study (see Table 1 for events and dates; the events were presented either in the order listed in the table or in the reverse order). Participants were asked to make a series of judgments only for those target events that they were aware of ( $M = 6$ ). For each of these events, they first indicated their subjective feeling of elapsed time on a scale

**Table 1.** Study 1 Events

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1. First generation of iPhones sold (6/29/07, 16 months)
  2. Nancy Pelosi becomes the first woman Speaker of the House (1/4/07, 22 months)
  3. Four players from the Duke lacrosse team are charged with rape (4/18/06, 30 months)
  4. Ben Bernanke becomes chairman of the Federal Reserve (2/1/06, 33 months)
  5. TV star Anna Nicole Smith dies (2/8/07, 20 months)
  6. Virginia Tech student kills 32 people (4/16/07, 18 months)
  7. Senator Barack Obama announces presidential bid (2/10/07, 20 months)
  8. Britney Spears shaves her head (2/16/07, 20 months)
- 

Note: The dates of the events and the number of months elapsed at the time of the study are in parentheses. The dates were not given to participants.

from 1 (*feels very recent*) to 15 (*feels very distant*). Participants then rated the extent to which each target event “triggered subsequent events,” using a scale from 1 (*feels like it triggered few events*) to 15 (*feels like it triggered many events*); this was our measure of event markers.

These measures were followed by ratings of several control variables; participants provided ratings for each control variable for all events before providing ratings for the next variable (i.e., ratings for memorability for all events were completed, followed by emotionality ratings, etc.). As in prior research (e.g., Burt & Kemp, 1991), we measured how well each event was remembered on a scale ranging from 1 (*not at all*) to 7 (*perfectly*). We also measured each event’s emotionality on a scale from 1 (*not at all emotional*) to 7 (*extremely emotional*) and its importance on a scale from 1 (*not at all important*) to 7 (*extremely important*). Participants then estimated the number of months passed since each event. They also indicated the month and year in which they believed the target events had occurred, and we used these dates to calculate a measure of the number of months passed. The direct and calculated estimates of the number of months passed were significantly correlated ( $r = .55, p < .0001$ ). We report only the analyses controlling for directly estimated months; analyses based on calculated months yielded equivalent results.

## Results and discussion

For each participant, we calculated the average response to each measure across all the events that the participant had indicated being aware of and used these averages in the analysis. Participants underestimated how much time had passed since the target events by approximately 3 months ( $M = 3.1$ ),  $t(163) = 5.09, p < .0001$ . These estimates were not affected by marker ratings,  $F(1, 162) < 1$ . In subsequent analyses, we controlled for the estimated number of months in order to establish the unique effect of markers on subjective feelings of elapsed time.

We regressed participants’ average subjective feelings of elapsed time on order of the events in the survey, as well as average memorability, emotionality, importance, and estimated number of months passed since the target events. The order in which events were listed had a small effect,  $F(1, 157) = 3.55, p = .06$ ; events felt more recent when they were listed in the order presented in Table 1 ( $M = 8.59$ ) than when they were listed in the reverse order ( $M = 9.35$ ). Memorability, importance, and estimated number of months passed had no significant effects on feelings of elapsed time (all  $F_s < 1$ ). Results for emotionality replicated prior research: As events were perceived to be more emotional, they were perceived to have occurred more recently ( $\beta = -0.4$ ),  $F(1, 157) = 2.6, p = .11$ . Most critical to our prediction, after we controlled for these variables, when target events were perceived to have triggered a greater number of subsequent events, these target events felt significantly more distant ( $\beta = 0.2$ ),  $F(1, 157) = 5.45, p = .02$ .

These findings indicate that the perceived number of subsequent events triggered by a target event is related to how distant the target event feels. The target events in this study were known, public events that varied in the number of perceived subsequent events that they triggered. Thus, although correlational, this study offers an ecologically valid test of our hypothesis and shows that the effect of markers is independent of other, previously documented dating biases (e.g., telescoping).

## Study 2: Manipulating Marker Accessibility

Our interpretation of the results of Study 1 is predicated on the assumption that participants spontaneously accessed subsequent events related to the target event—and not subsequent events unrelated to the target event—when they assessed feelings of elapsed time. Study 2 manipulated the nature and the number of events participants accessed when thinking about an important target event: the day participants received their college-admission letter. We predicted that only events perceived to be related to the target event would influence participants’ feelings of elapsed time and that accessing a greater number of related events would lead to greater feelings of elapsed time. Furthermore, we expected that events that spontaneously came to mind would tend to be related to the target event.

## Method

USC undergraduates ( $N = 124$ ) participated in Study 2 for course credit. This study followed a 3 (nature of events)  $\times$  2 (number of events) between-subjects design. Participants were asked to think about the day they received their letter of admission to USC and then were asked to recall specific events triggered by that letter (related-events condition), news events that had occurred since they received the letter (unrelated-events condition), or simply any events that had occurred since they received the letter (unspecified-events condition). Participants were then asked to write down either one or four of these events, depending on their assigned condition. This manipulation was intended to make more or fewer subsequent events relatively accessible when participants made subsequent judgments. Next, using the same scales as in Study 1, participants indicated their subjective feelings of elapsed time since receiving the admission letter, how many months ago the event had occurred, how well they remembered receiving the letter, and how emotional and important the event had been. Finally, they were asked to indicate the month and year in which they received their admission letter and reported how difficult it was to generate the list of subsequent events. We also collected several demographic measures, including native language, that we controlled for in the analysis.

## Results

Our manipulations affected three control variables: memorability, difficulty, and estimated number of months passed since

the event. (As for Study 1, we report only the analyses using directly estimated months, but analyses based on calculated months were equivalent.) Participants who recalled only one event perceived the target event as more memorable ( $M = 5.8$ ) than those who recalled four events ( $M = 5.3$ ),  $F(1, 118) = 3.39$ ,  $p = .07$ , regardless of the nature of the event. Recalling related events ( $M = 3.6$ ) and recalling unrelated events ( $M = 4.1$ ) were seen as equally difficult,  $F(1, 118) = 1.41$ ,  $p = .24$ , and were jointly seen as more difficult than recalling unspecified events ( $M = 2.5$ ),  $F(1, 118) = 17.88$ ,  $p < .0001$ . Participants also estimated more months to have passed since the target event when they recalled four events ( $M = 18.2$ ) rather than one event ( $M = 14.0$ ),  $F(1, 118) = 5.27$ ,  $p = .02$ .

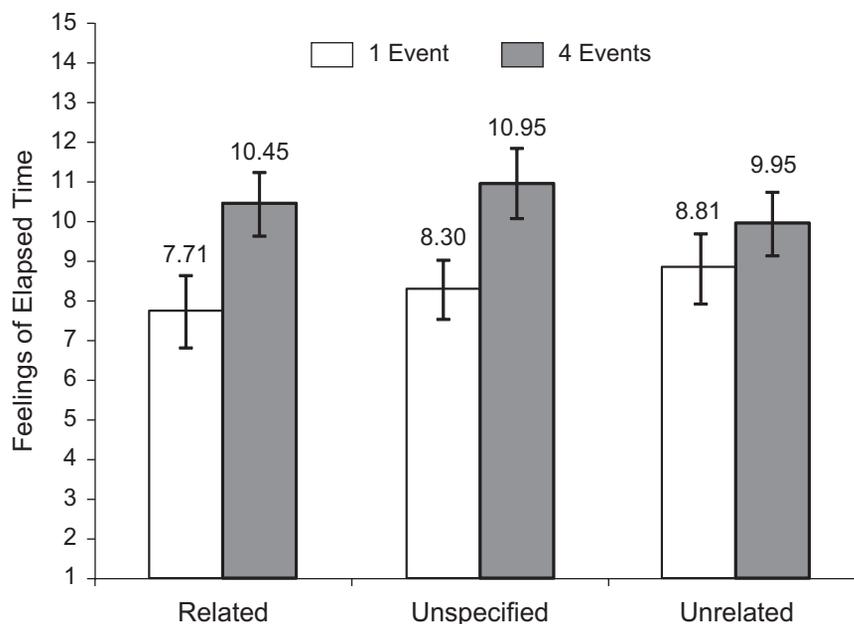
We controlled for these and other factors by regressing feelings of elapsed time on the participant's native language; the target event's memorability, emotionality, and importance; the difficulty of recalling subsequent events; the estimated number of months passed since the target event; and the nature and number of events recalled and their interaction. Memorability was associated with greater feelings of recency ( $\beta = -0.7$ ),  $F(1, 112) = 5.22$ ,  $p = .02$ . A greater number of estimated months passed was marginally associated with receipt of the letter feeling more distant ( $\beta = 0.06$ ),  $F(1, 112) = 2.93$ ,  $p = .09$ . Perceived difficulty of generating events was also associated with feelings of recency ( $\beta = -0.4$ ),  $F(1, 112) = 5.10$ ,  $p = .03$ .

Most important, the number of events that participants had been asked to recall exerted a significant effect on feelings of elapsed time,  $F(1, 112) = 8.66$ ,  $p < .01$ . Planned contrasts revealed that respondents who accessed more event markers

felt that the target event was more distant in both the related-events condition,  $F(1, 112) = 5.26$ ,  $p = .02$ , and the unspecified-events condition,  $F(1, 112) = 8.66$ ,  $p < .01$ , but not in the unrelated-events condition,  $F(1, 112) < 1$  (see Fig. 1).

This analysis suggests that for subsequent events to affect feelings of elapsed time, they must be related to the target event. To further test this idea, we asked two independent judges to code each generated event on whether "receiving the admission to USC triggered this event"; ratings were made on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Coders could also indicate that a generated event was a "nonevent"; 39 listed events (e.g., "excited") received this classification ( $\kappa = .69$ ,  $p < .0001$ ). For the remaining 271 events, the two coders' ratings were highly correlated ( $r = .82$ ), and ratings for each event were averaged for the analysis.<sup>1</sup> As predicted, events recalled in the related-events condition were rated as more related to the target event ( $M = 5.8$ ) than were events in the unrelated-events condition ( $M = 2.0$ ),  $F(1, 265) = 171.75$ ,  $p < .0001$ . More important, events recalled in the unspecified-events condition were also rated as more related to the target event ( $M = 4.9$ ) than were those recalled in the unrelated-events condition,  $F(1, 265) = 80.95$ ,  $p < .0001$ , although slightly less related to the target event than were those recalled in the related-events condition,  $F(1, 265) = 5.83$ ,  $p = .02$ . These findings support our argument that people tend to spontaneously access related events and that these more accessible and relevant events affect feelings of elapsed time.

To test for possible effects of explicitly requiring participants to write events down, in a follow-up study we asked



**Fig. 1.** Rated feelings of elapsed time as a function of the manipulations of event markers in Study 2. Participants were asked to recall and list either one or four events subsequent to the target event. Depending on condition, the nature of the events was unspecified, specified as being related to the target event, or specified as being unrelated to the target event. A higher rating indicates a greater feeling of elapsed time. Error bars represent standard errors of the mean.

participants to simply think about related subsequent events without writing them down. Although asking participants merely to think about the events sacrificed some experimental control, this thought task better approximates the intuitive, impressionistic process that we propose people engage in. University of Pennsylvania undergraduates ( $N = 129$ ) were asked to think about one ( $n = 63$ ) or four ( $n = 66$ ) events that were triggered by their letter of admission to the university.<sup>2</sup> We replicated our findings: Controlling for the target event's characteristics and the task's difficulty, we found that prompting participants to think about a greater number of events led to feelings of greater elapsed time since the target event ( $M_s = 11.1$  in the one-event condition and 9.3 in the four-events condition),  $F(1, 122) = 8.28, p < .01$ .

## Discussion

Our results demonstrate that the nature and accessibility of subsequent events affect subjective feelings of elapsed time. Respondents who were asked to recall a greater number of related events indicated greater feelings of elapsed time since receiving their admission letter than did those who were asked to recall fewer markers. Moreover, even without explicit instructions to do so, people naturally tended to retrieve related events, thus influencing their feelings of elapsed time. In contrast, unrelated events did not act as event markers and did not influence feelings of time. By manipulating the number and nature of events brought to mind, we demonstrated that feelings of elapsed time are influenced by the accessibility and relevance of subsequent events—an effect that is independent of memorability, emotionality, importance, difficulty, and any effect of estimating when the event occurred.

## Study 3: Manipulating Marker Numerosity

Our first two studies relied on participants' memories of events and markers that they had previously experienced. In Study 3, we created a target event for participants to experience and experimentally manipulated the number of related subsequent events. The target event was a choice task during an hour-long laboratory session. Subsequent event markers consisted of follow-up e-mails that were sent over the course of a month and included short tasks related to the initial choice.

## Method

To create the initial target event, we asked University of Pennsylvania undergraduates to complete a 10-min choice task as part of an hour-long laboratory session in which they participated. The experiment was conducted in two waves, employing similar procedures but different stimuli. In one of the waves, participants ( $n = 161$ ) were assigned either to choose a charity from a click-for-charity Web site or to choose a USB drive; in each case, the choice was made from a set of seven. In the other wave, participants ( $n = 131$ ) chose and watched

one 3- to 4-min comedic film out of a set of three films. Each respondent participated in only one of the waves and thus experienced only one of the stimulus domains.

In both waves of data collection, participants were recruited to complete follow-up tasks sent via e-mail. They were randomly assigned to receive either one or four follow-up tasks. Our analyses are based on the 63 participants across both waves who did not participate in other lab studies during the month of our study and who completed all required follow-up tasks and the final rating task. Although our rate of exclusion and attrition was high, it was not unexpected given the longitudinal nature of the experiment and the fact that participants were not informed about the nature and frequency of the follow-up tasks initially. Note that participation rates were equivalent across the experimental conditions, resulting in approximately equal sample sizes ( $n_s = 33$  for the one-event condition and 30 for the four-events condition), and were not differentially affected by our manipulation.

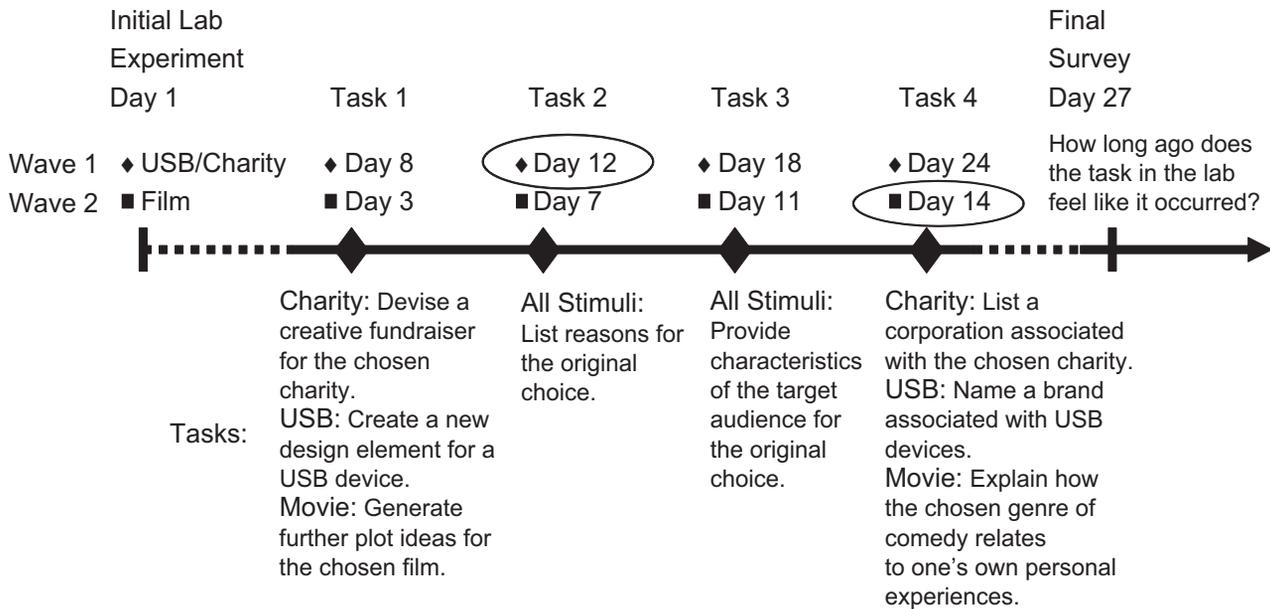
We designed the follow-up tasks to simulate event markers that would appear to be related to the initial task. These tasks, which were sent via e-mail, probed participants for various thoughts related to the initial choice task; the specific questions depended on the assigned stimulus domain (see Fig. 2 for details). Each task lasted approximately 2 min and was administered on-line.

Twenty-seven days after the initial lab session, all participants were e-mailed the final survey, which they had to complete within 48 hr. They reported their subjective feeling of elapsed time since the initial choice task, as well as the task's memorability and emotionality. In addition, participants estimated the actual date, including month, day, and year, on which they participated in the initial choice task in the lab. The final survey made no reference to the intervening tasks.

## Results and discussion

Participants overestimated how much time had passed since the initial session by an average of 5 days ( $M = 5.2$ ),  $t(63) = 3.65, p < .001$ . There was no difference in estimated days passed between conditions,  $F(1, 61) < 1$ .

To test our event-marker hypothesis, we estimated subjective feeling of elapsed time as a function of the number of event markers, their memorability, their emotionality, and the estimated number of days passed. In this regression model, we controlled for differences between waves using a term that nested stimulus (charity, USB, film) within wave (1, 2).<sup>3</sup> Differences in stimuli and wave did not affect subjective feelings of elapsed time,  $F(2, 56) = 1.16, p = .32$ , and  $F(1, 56) = 1.48, p > .2$ , respectively. Neither did memorability,  $F(1, 56) = 1.43, p = .23$ ; emotionality ( $\beta = -0.5$ ),  $F(1, 56) = 2.74, p = .10$ ; or estimated number of days passed,  $F(1, 56) < 1$ . Most important, as predicted, when we controlled for these variables, subjective feelings of elapsed time increased with the number of event markers ( $M_s = 9.1$  for the one-event condition and 10.5 for the four-events condition),  $F(1, 56) = 4.91, p = .03$ .



**Fig. 2.** Timeline of Study 3. Participants in the four-events condition performed all four tasks; those in the one-event condition performed only the circled task (on Day 12 or Day 14, depending on the wave in which they participated).

Study 3 conceptually replicated Studies 1 and 2 using an experimentally created target event and experimentally controlled markers. It is worth emphasizing that participation took place over an entire month, and that, relative to the host of other activities participants were involved in during that time, the target event and its markers were practically meaningless in their lives. Thus, the difference in the number of follow-up tasks between conditions exerted a negligible effect on how “full” participants’ subsequent weeks were (cf. Ornstein, 1969). As a result, we can attribute the difference in feelings of elapsed time to the influence of event markers. The robustness of the markers effect is further evidenced by the fact that it was replicated across different operationalizations of markers and across two experimental waves. It also bears mentioning that the number of event markers influenced participants’ subjective feeling of elapsed time even though participants were not explicitly prompted to recall the markers.

## General Discussion

Time has been of great interest to scholars in the sciences and humanities. Across these disciplines, time is not viewed as an absolute concept; instead, it is viewed as subject to the perspective of the observer and influenced by the events that take place in its course. Similarly, people’s intuitive perceptions of time also seem to be systematically influenced by an event’s placement relative to and connection with other events in time.

These systematic influences often lead to the perplexing sense that two events known to be temporally proximal feel temporally different; one event feels more recent, and the other feels more distant. Whereas prior research has identified

certain characteristics of the event itself that can explain this effect (e.g., importance, memorability, emotionality), our investigation focused on the characteristics of the time interval following the event. We propose that the feeling of distance from a target event depends on the number of event markers, that is, accessible events that are perceived to be related to that target. Our findings support the hypothesis that only accessible and relevant events serve as markers. Although causally related events, as in Study 3, fulfill these preconditions, our experiments do not address the role of causality as a necessary condition for events to function as markers. We leave this question to future research.

Our studies used a variety of approaches to demonstrate the effect of event markers on feelings of elapsed time. We measured markers (Study 1), manipulated the accessibility and the degree of relevance of subsequent events that could serve as markers (Study 2), and, finally, created both the target event and its markers (Study 3). The target events included both public events and autobiographical events that took place between 1 month and 3 years prior to our studies. These events ranged from the more meaningful, such as receiving a college acceptance letter, to the more meaningless, such as participating in a study. The fact that our predictions held across such a wide range of settings demonstrates the importance of event markers in determining feelings of elapsed time.

Our event-marker hypothesis presents a novel mechanism to explain people’s feelings of elapsed time. In particular, our data cannot be explained by strength-of-memory models (Brown et al., 1985) and are not anticipated by research on the filled-duration illusion (Ornstein, 1969). Furthermore, in all our studies, we measured and controlled for characteristics of

a target event that contribute to the dating biases established in previous research. The fact that we obtained an independent effect of event markers while controlling for these characteristics attests to the robust influence of event markers on time perception. Moreover, we have demonstrated that the effect of markers on subjective feelings of elapsed time holds even after controlling for the estimated date of the target event. Although dating and feelings of elapsed time are related, dating tends to be the result of more deliberative temporal location assessments, whereas feelings of elapsed time are impressionistic temporal distance judgments (Friedman, 1996); we suggest that, as a result, feelings may be more sensitive to the accessibility experience that comes from retrieving event markers.

Finally, not only are feelings of elapsed time commonly used in everyday language, but these feelings may also be particularly important inputs into the timing of future actions. Feeling that more time has elapsed since one last engaged in a behavior (e.g., cutting one's hair, donating to charity) may prompt one to engage in that behavior earlier than one might have otherwise. We leave this and other possible applications of event markers to future research.

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### Declaration of Conflicting Interests

The authors declared that they had no conflicts of interests with respect to their authorship and/or the publication of this article.

### Notes

1. Results were the same when we retained all 310 events in the analyses.
2. A similar study asked USC undergraduates to think about two or eight events. The results paralleled those of the other two studies reported.
3. An analysis using only experimental wave as a dummy variable revealed the same results.

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