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Distortions in time perceptions during task switching

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ABSTRACT

Perceived time passage and time duration were examined in a between-subjects design with four conditions: watching a sitcom, reading a journal article, occasional switching between sitcom and article, frequent switching between sitcom and article. Consistent with our prediction, time "flew by" in the high-entertainment condition that involved watching a sitcom, whereas time "dragged on" in the low-entertainment condition that involved reading a journal article. Switching between the two led to quicker passage of time than the low-entertainment condition, but not the high-entertainment condition. A different pattern was evident for duration estimation, with no difference between the low- and high-entertainment conditions, but a longer estimation of duration in the switching condition. Further, frequency of switching between the sitcom and article did not make a difference. These findings suggest that switching between tasks leads to overestimations of time spent on media.

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1. Introduction

Media multitasking has become a way of life for the younger generation as multitasking is facilitated by the omnipresent media on mobile devices that allow seamless integration of work, play, and social interaction (e.g., Rosen, Mark, & Cheever, 2013; Srivastava, 2013; David, Kim, Brickman, Ran, & Curtis, 2014; Carrier, Cheever, Rosen, Benitez, & Chang, 2009). A recent investigation in the U.S. revealed that half of the teens, when doing homework, "often" or "sometimes" watch TV (51%), use social media (50%), text (60%), and listen to music (76%) (Common Sense Census, 2015). Research has found that such multitasking decreases task performance (Ophir, Nass, & Wagner, 2009; Wang et al., 2012), and some studies have uncovered that multitasking also distorts users' self-perceived ability in that multitaskers tend to overestimate their ability to multitask even when their actual performance suffers from multitasking (Ran, Yamamoto, & Xu, 2016; Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013).

Another intriguing finding is that media multitasking may also influence time perception. When participants were required to watch a commercial and simultaneously monitor another window on the same computer screen in which an "x" or "z" or a black circle appeared, time appeared to be faster (Chinchanachokchai, Duff, & Sar, 2015). Chinchanachokchai and colleagues' article is probably the first published article that reveals the interesting relationship between media multitasking and perceived time passage in an experimental design, which sets a good foundation for future investigation into time perception and media use. However, as pointed out by Chinchanachokchai and colleagues, tasks manipulated in the study were low-level cognitive tasks (Chinchanachokchai et al., 2015, p. 189), whereas real-life multitasking is more complex and sophisticated. Therefore, it is necessary to look at the effects of more naturalistic everyday tasks on time perception.

In addition to task structure, such as switching between tasks, time passage may also be influenced by task content, such as enjoyment of the task. Most of the studies on subjective passage of time have found task enjoyment to be a critical predictor. For example, if a task or an event is perceived as being enjoyable or entertaining, time passes quickly (Watt, 1991; Sucala, Scheckner, & David, 2010). Thus, the focus of this study is to investigate the influence of task content on time passage for high- and low-enjoyment tasks.

Time perception involves not only *time passage*, but also another related yet distinct assessment known as *time duration*. While *time passage* is associated with the psychological perception of time passing quickly or slowly, *time duration* is the assessment of length of time interval. Time duration estimates are widely used in media

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research and significant correlations between time spent on media and attitudinal or behavioral outcomes have been observed in various domains. For example, heavy consumption of television is correlated with a distorted view of reality conveyed in television dramas (Gerbner, Gross, Morgan, & Signorielli, 1994), and more time on mobile phones is correlated with disruption of everyday activities (David, et al., 2014). Despite the centrality of time as a key measure of media use, surprisingly little is known about the psychological process underlying estimation of time for media activities. The widely used measure of retrospective recall of time spent on media activities on a typical day or during a preceding interval is a daunting challenge. Consider an estimate of time spent on texting or email or social media within a 24-h period. With experiences dispersed throughout the day and interwoven into other activities, the temporal summation of those activities is likely to be contaminated by conjoint activities, typically known as media multitasking.

With the pervasiveness of media multitasking or task-switching and the importance of time in media research, a better understanding of the psychological perception of time during media multitasking deserves attention. In this study, we examine two assessments of time: *time passage* and *time duration*. While the former may be tied to a time-based functional explanation of why people multitask or switch tasks, the latter may have important implications for the widely-used, self-reported measure of media use. The purpose of this study is threefold: first, to replicate a previous study on multitasking and time passage using a more naturalistic tasks; second, to examine how the entertainment value of tasks influences time passage and duration; third, to investigate how task switching impacts time passage and time duration estimates.

2. Time passage and time duration

Researchers who examine the psychology of time make a distinction between prospective and retrospective estimations (Block, 1992; Zakay & Block, 2004). In prospective estimation, participants are cued in advance to attend to the duration of a stimulus and subsequently asked to estimate its duration. Participants offer multiple assessments for stimuli of different durations in a controlled laboratory setting, which are used to determine underlying psychometric functions. Such prospective estimations are explained using a hypothetical psychological clock that consists of a pacemaker that generates ticks, an accumulator that stores the clicks, and a switch that opens and closes the gate between the pacemaker and accumulator to mark the beginning and end of an assessment interval. Although concrete neural mechanisms that serve such functions have not been identified, prospective estimations of time appear to fit the predictions of this hypothetical model.

Assessment of time in communication research, however, involves thinking back to prior experiences or estimating a typical experience, both involving retrospection. Under retrospective estimation, two distinct assessments of time have been examined – time *duration* and time *passage*. *Duration* is the subjective estimate of time interval in seconds, minutes or hours, and *passage* is the psychological perception of time along a bipolar continuum with flight (time flew by) and stagnation (time dragged on) as anchors. References to such phenomenological experiences of passage of time are found in tropes such as “a watched pot never boils” or “time flies when you are having fun.”

Interestingly, time duration and passage have been found to be unrelated and explained through different mechanisms (Wearden, 2005). Consider this experiment in which one group of participants was assigned to watch a 9-min movie clip and the other group assigned for the same duration to a waiting room condition without a specific task or activity. When asked to rate passage of time, time seemed to pass quickly in the video condition, whereas time seemed to pass slowly in the waiting room condition. After the assessment of time passage, participants in both conditions were assigned to a reading activity for 10 min, which served as a distractor. Then both groups were asked to think back to the first phase of the study and provide an estimate of time duration in minutes. Now estimates of time duration were found to be longer in the video condition than in the waiting-room condition. In other words, perceptions of time flying by did not result in estimates of shorter time durations. To account for these findings, researchers have advanced an attention explanation for time passage and a memory explanation for time duration (Wearden, 2005).

The attention explanation is based on the reasoning that when sufficient attentional resources are available to think about time or to check the clock, time seems to crawl by slowly, as in the waiting room or “watched pot never boils” experience (Brown, 1997; Sucala et al., 2010). In contrast, when attentional resources are scarce, such as when watching a movie or exciting sporting event, time goes by quickly because of lack of attentional resources to allocate to the temporal dimension (Chinchanachokchai, et al., 2015; Wearden, 2005). The attentional explanation is not new and was noted by James (1890) who observed that time passes slowly when we are attentive to its passage.

The attention model can also explain the “losing track of time” phenomenon that is central to flow experiences (Csikszentmihalyi, 1990). Flow is a subjective state that individuals report when they are completely absorbed in something to the point of forgetting time, fatigue, and everything else but the activity itself. The defining feature of flow is full attention involvement in moment-to-moment activity (Csikszentmihalyi, 2014). Attention is fully invested in the task at hand, thus causing the “losing track of time” (Nakamura & Csikszentmihalyi, 2002). Further evidence for the attentional explanation is found in studies in which time appears to pass by quickly when engaged in a demanding activity that requires deeper processing than in a less demanding activity that can be accomplished with less cognitive effort (Sucala et al., 2010).

In essence, the attentional model suggests that temporal and non-temporal information compete for limited attentional resources from a common pool. To the extent that a concurrent non-temporal task is demanding or vying for attention, less attentional resource is available for temporal processing, thus creating the perception of speedy passage of time (Sucala et al., 2010). Among other variables, the entertainment value of the activity is correlated with attention and has been highlighted as a predictor of time passage. When a task or an event is perceived as entertaining or enjoyable, time passes quickly (Watt, 1991; Sucala et al., 2010; Sackett, Meyvis, Nelson, Converse, & Sackett, 2010). Based on the foregoing review of passage of time, we predict that time will pass quickly when the participant is engaged in an entertaining activity, such as watching a sitcom, than when engaged in less entertaining activity, such as reading an abstract journal article.

H1. Passage of time will be perceived to be quicker when experiencing a more entertaining media activity than a less entertaining activity.

From the psychological perception of time passage, which is tied to the limited capacity of attention (Lang, 2000), we shift to retrospective estimation of time duration, also described as *remembered time*, which is related to memory (Block & Reed, 1978). For remembered time, cues stored in memory serve as temporal markers and retrospective estimates of time duration are based on a summation of these markers (Ornstein, 1969). Some of these markers, such as contextual changes in a stimulus, have rich