

**THE IMPACT OF MORTALITY SALIENCE  
ON MIND WANDERING DURING READING:  
A COGNITIVE TEST OF TERROR MANAGEMENT THEORY**

by

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Abstract

The effects of mind wandering on normal reading have been explored recently in studies using self-paced reading (Schooler, Reichle, & Halpern, 2004) and eye tracking (Reichle, Reineberg, & Schooler, 2009). These studies demonstrate our propensity to lapse into episodes of mindless reading, but shed little light on its causality. Furthermore, behavioral studies suggest that reminders of death (mortality salience) evoke an evolutionary defense mechanism capable of embracing distractions to eliminate thoughts of death (Pyszczynski, Greenberg, & Solomon, 1999). Thirty participants were primed with either reminders of their own death or reminders of a painful experience. Participants then read a neutral passage while self-reporting episodes of mind wandering and while responding to probes inquiring the status of their level of awareness. It was predicted that participants primed to be mortality salient would be caught by probes and mind wander less frequently due to increased engagement in the text in order to distract themselves from notions of their mortal vulnerability. The results partially confirm these predictions: All participants engaged in mind wandering to a comparable extent. Mortality salience-primed individuals self-reported far fewer instances of mind wandering than individuals who received a control (pain) prime, suggesting that reminders of death affect the ability to realize that mind wandering is happening.

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## INTRODUCTION

As members of a literate society, it is often expected of us to take a piece of text and derive meaning from it. Most of the time this is possible, but not without issues along the way. We can all recall times when our eyes were actively engaged in reading, but our minds were unintentionally somewhere else. This is the phenomenon of mind wandering during reading, which is often called “zoning out.” Recently, this introspective phenomenon has been scientifically explored to determine any detrimental effects it may have on cognitive processes, such as eye movement control and comprehension (Reichle, Reineberg, & Schooler, 2009; Schooler, Reichle, & Halpern, 2004).

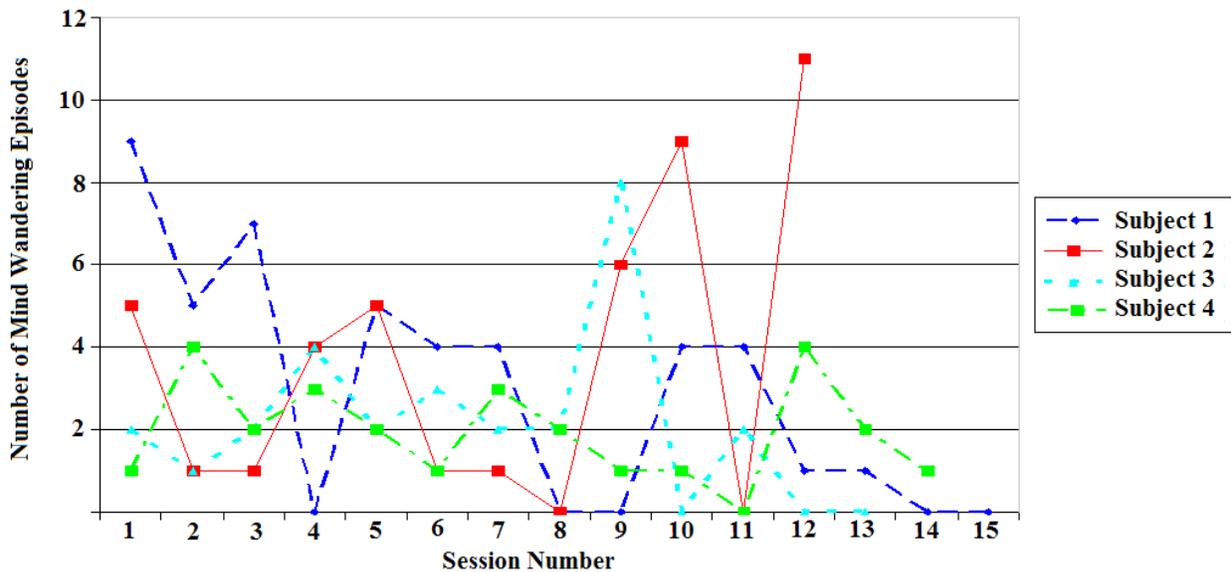
Mind wandering is a common phenomenon that is not unique to the task of reading. Real world behavioral studies have used probing to show that zone-outs occur in all kinds of settings and in response to a variety of activities and cognitive states (Kane et al., 2007). Behavioral sampling studies use digital devices to randomly probe participants throughout the day to report their level of mental involvedness in their current activity. People are more likely to zone out when tired, bored, or during an unpleasant and highly stimulating situations. People are less likely to zone out when concentrated and engaged in enjoyable activities. According to Kane et al., challenging and novel behavior does not seem to increase the propensity to zone out. Probe-caught zoning out frequency is highly variable in these studies with participants responding affirmatively to probes anywhere from 0-92% of the time. Unfortunately, participants

in the Kane et al. experiment were unable to self-report any episodes of mind-wandering throughout the day.

Early reading-specific studies have shown that readers are often unaware of their inability to maintain full attentiveness towards text. These deficits can range from unawareness of textual inconsistencies within text (Garner & Kraus, 1981, 1982) to not detecting blatant semantic violations within sentences (Schooler, McSpadden, Reichle, & Smallwood, 2009). Mind wandering could be responsible for these observations. Self-paced reading methodology was used to see if self-reported episodes of mind wandering occurred, their frequency, and their impact on comprehension (Schooler et al., 2004). Subjects were asked to monitor themselves for times during which they realized they were no longer engaged in the text. On average, these subjects reported experiencing mind wandering 5.30 times per hour. Also, probes were used to catch participants in the middle of an episode of mind wandering. These probes caught participants 13% of the time, suggesting that, on average, participants were mind wandering without being aware of doing so approximately 13% of the time. The ratio of affirmative probe responses to the total number of probes received in a period of time, or “probe caught ratio”, is seen as the most valid measure of how often an individual is zoning out.

A recent eye-tracking experiment (Reichle et al., 2009) exploited the observation that episodes of mind wandering could be identified to examine the effects of mind wandering on readers’ eye movements and associated cognitive processes just prior to the self-report of affirmative probe response. In this study, four subjects read an entire novel (*Sense and Sensibility* by Jane Austen) in one hour blocks while self-reporting episodes of mind wandering and while responding to probes. There were fewer self-reported episodes of mind wandering per participant ( $M = 1.66$  per hour of reading) in this eye-tracking experiment compared to the similar self-

paced reading version ( $M = 5.30$ , Schooler et al., 2004). This could have been due to the presence and repeated reminder of a comprehension test at the end of each hour of reading in the eye-tracking experiment, or due to the novel experience of reading on the eye-tracker. The results of this eye-tracking experiment also showed that both the lexical and higher-level (e.g., syntactic) cognitive processes associated with guiding readers' eye movements during normal reading are absent during intervals of mind wandering, suggesting that future exploration of the mind wandering paradigm is worthwhile for cognitive scientists. Furthermore, because this study took place over 12-15 sessions, longitudinal analysis of episodes of mind wandering is possible.



**Figure 1.** Number of mind wandering episodes per session per subject (Reichle et al., 2009).

For example, Figure 1 shows the number of episodes of mind wandering during each session for each of the four subjects. Sessions were scheduled by the participants on a week to week basis to capture a recreational-like reading experience. Each participant had some sessions in which there were zero episodes of mind wandering and other sessions in which there were many zone-outs.

The observed variance in self-reported mind wandering frequency suggests that there may be factors that affect the likelihood of engaging in mind wandering behavior, which was one impetus for the current study.

That is, just as mind wandering in a variety of real-life situations (see Kane et al., 2007) is influenced by mood, interest level, and level of fatigue, among other things, so too is mind wandering during reading likely to be subject to the same influences. This implies that individual difference measures such as general reading ability or reading comprehension skill may have limited usefulness in explaining mind-wandering rates, because there are temporal fluctuations in likeliness to zone out and these fluctuations are likely to be influenced by a variety of different variables. Because general reading skill and reading comprehension ability are fairly consistent over long periods of time, these variables are unlikely to contribute to the propensity for a given individual to zone out within particular time intervals.

This is not to say, however, that there are not specific cognitive states that might make a reader more or less likely to engage in zoning-out behavior. For example, it has been postulated that, in the absence of attention, alternative (and mostly personal) goals become activated (Smallwood & Schooler, 2006). If a text disengages a reader by activating an alternative but distracting personal goal, then the reader may stop attending to the text and zone out more frequently. Alternatively, it is reasonable to suspect that if the text strongly engages a reader in its topic, then there might be less zoning out activity. From the perspective of an educator having the ultimate goal of decreasing zoning-out behavior, there are two possible manipulations that are suggested by the above. First, a reader could be placed into a state making them more likely to be engaged in a certain piece of text. Alternatively, reading material could be personalized to a reader's tastes and interests so that the alternative goals often activated during mind wandering

are addressed by the text, possibly decreasing the likeliness to mind-wander. However this second manipulation may be difficult and may have little-to-no practical importance for cognitive reading research, because experiments often require participants to read very specific materials. It is impractical to address the interests of a reader in anything other than purely recreational reading.

Therefore, the current experiment is an attempt to use the first manipulation. Participants in reading experiments often arrive in a cognitive state completely unknown to the experimenter. These cognitive states may have an impact on the performance on tasks in these experiments (i.e., the likeliness to mind-wander). To test the idea that such states do account for some of the variability in zoning-out rates across time and within subjects, a strong manipulation is needed to universally engage readers in text. One such strong manipulation that has proven useful in behavioral studies is a mortality salience manipulation. Reminders of death have been used to manipulate the behavior of subjects in a variety of behavioral experiments (Greenberg, Pyszczynski, Solomon, Rosenblatt, Veeder, Kirkland, & Lyon, 1990), but have been used in a limited way in the cognitive realm. *Terror Management Theory (TMT)* can explain the theoretical reasoning behind using mortality salience as an effective means of manipulating the cognitive state of an individual in the reading paradigm; how TMT does so is discussed next.

### ***Terror Management Theory***

Terror Management Theory, based on the works of Ernest Becker (1973), deals with how humans cope with the realization of their own death (Greenberg, Pyszczynski, & Solomon, 1986; Solomon, Greenberg, & Pyszczynski, 1991). Humans are incapable of species dominance through speed, strength, or the types of physical adaptations that contribute to the evolutionary fitness of

other species; instead, we rely on sophisticated cognitive adaptations to aid us in the constant struggle for reproduction and dominance. TMT proponents argue that the realization of our own death is made possible by our highly evolved brains/intelligence. Additionally, humans form worldviews that unite groups as a buffer to deal with the feelings and fear evoked by this realization. This can be seen on demographic maps: People are readily divided on a geographical basis by groups that have similar ideas about the world, such as their religious beliefs, similar physical qualities, etc. Additionally, Becker (1973) says that “all historical religions address themselves to this same problem of how to bear the end of life.”

The core assumption of TMT is that it is terrifying to contemplate our own death. Because of this, TMT posits that, on top of worldview development, there are innate brain processes that aid in defending against death related thoughts. Recently, a dual process system of coping with mortality salience was proposed (Greenberg, Arndt, Simon, Pyszczynski, & Solomon, 2000; Pyszczynski, Greenberg, & Solomon, 1999). This dual system consists of two types of defenses. *Proximal defenses* are direct responses to conscious thoughts of death. For example, rationalizing, denial, and distraction seeking are immediate responses to conscious thoughts of death. *Distal defenses* are unconscious responses to material that questions a person’s worldview. Distal defenses attempt to validate that person’s belief that they are living a meaningful and worthy life. For example, increased belief in a worldview that offers an immortality solution would be a distal defense because the sense of security obtained from such a belief eases notions of mortality.

Several studies have explored the effects of *mortality salience* (reminders of death, MS) on social behavior. First, studies have found that reminders of death tend to strengthen peoples’ admiration for ideas and others that express that same worldview. At the same time, MS tends to

increase aversion to ideas and people that express a different worldview (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989). This experiment was done in the United States of America, a culture in which prostitution is punishable by fines and in which rewards are given to citizens who assist in the arrest of criminals. After a group of participants was reminded of their own mortality, they recommended a higher value monetary fine for a fictional prostitute who had been caught and also recommended a higher reward for a citizen who assisted in an arrest when compared to a group of participants who had not been reminded of their mortality prior to the assessments. Next, terminally ill patients (ones close to death) who believed their life and actions were in alignment with the values of their worldview were comforted by this cohesion at the end of their life (Edmonson, Park, Chaudoir, & Wortmann, 2008). Finally, a recent political preference study used TMT (Landau et al., 2004). A group of participants who were primed to think about their own death showed a preference for a conservative charismatic candidate in the 2004 presidential election regardless of their previously-stated political affiliation. Participants expressed comfort in the conservative candidate's protective viewpoints.

The current study uses conscious reminders of death to invoke proximal defenses. Often, distraction-seeking is used to push out these reminders of death. Distraction seeking coupled with rationalizing and denial are effective means of suppressing conscious reminders of death. An example of proximal defense might be the adoption of a diet and workout plan after hearing the news of a friend's death due to heart disease. Dieting and exercise are distracters from the loss, and these also allow the individual to rationalize that their health-seeking behavior will protect them from a similar fate.

Until now, there has been limited application of TMT in the cognitive realm. A mortality salience induction may be a powerful tool for cognitive scientists studying mind wandering. For

example, to change the cognitive state of a reader, with the ultimate goal of changing their likeliness to mind wander, proximal defense against death related thoughts can be used. Because individuals should try to distract themselves from thoughts of death, one might predict that, if a reader is primed with a mortality salience induction, the reader should be more likely to engage in reading material that was not related to death as a distraction. Furthermore, studies of mind wandering behavior indicate that this increased engagement will translate to less zoning out (i.e., fewer self-reported instances of mind wandering and more “no” responses to mind wandering probes). Alternatively, readers not primed with reminders of death may be subject to the normal amount of mind wandering behavior associated with a participant reading text unrelated to their current cognitive state. If successful, this experiment will supplement on-line evidence in support of TMT; previous experiments have used questionnaires to assess the effects of proximal and distal defense mechanisms and—as such—say little about the underlying cognitive bases of those mechanisms. The present study will “ground” these mechanisms in the more basic cognitive processes by demonstrating that the mechanisms interact with (i.e., influence) the information processing operations associated with normal reading.

Previous experiments have asked people to self report episodes of zoning out while reading at their own pace, and have also randomly probed people who are reading to see if they are attending to the text. Lastly, participants were asked comprehension questions after reading to see how well they understood the text. All of these means will be used to measure mind wandering during a self-paced reading experiment while manipulating participants’ cognitive state with a priming task.

## METHOD

### *Participants*

Thirty participants were recruited from the University of Pittsburgh Oakland campus. Participants were between 19 and 25 years of age, were native English speakers, and had normal or correct-to-normal vision. All were paid \$10 for participation in the study.

### *Procedure Overview*

The experiment had two parts and lasted one hour. First, participants filled out a personality questionnaire. For half of the participants ( $n = 15$ ), the questionnaire contained a section asking questions about their feeling towards death (i.e., a *mortality salience, MS*, prime). The other half received a similar questionnaire but with questions about pain instead of death. After completing the questionnaire, participants read a neutral article at their own pace while self-reporting episodes of mind wandering and responding to probes that attempted to catch participants zoning out. At the conclusion of the session, participants answered a basic comprehension test.

### ***Personality Questionnaire***

Participants began the hour-long session by completing a four-part personality questionnaire. A MS-inducing section was placed after two distracter tasks for half of the participants. This section asked two open-ended essay format questions. The first essay asked: *Please describe the emotions that the thought of your own death arouses in you.* The second essay asked: *Write down as specific as you can, what you think will happen to you physically when you die.* One other distracter section followed the MS-inducing questions. The personality questionnaire has been used as an effective MS induction task in several studies (see Landau et al., 2004). Control participants received a similar four-part personality questionnaire, but with questions asking about a painful experience instead of death. The first pain question asked: *Please describe the emotions that the thought of being in intense pain arouses in you.* The second pain question asked: *Write down as specific as you can, what you think will happen to you physically when you are in intense pain.* The pain questions controlled for any effects due to thoughts of unpleasant topics (death vs. pain). The personality questionnaire lasted no longer than 10 minutes, and the experimenter was not in the room while the participant filled it out.

### ***Self-paced Reading***

After administration of the priming questionnaire, participants were instructed on the self-paced reading portion of the experiment. A methodology similar to that found in Schooler et al. (2004) and Reichle et al. (2009) was used. Participants were given a brief description of the zoning-out phenomenon. Key parts of this description explained the phenomenon as follows: “At some point during the reading, you realize you have no idea what

you just read” and that “not only were you not really thinking about the text, you were thinking about something else altogether.” Prior to reading, participants were given instructions to navigate through the passage. The “F” key (forward) and “B” key (back) were used to advance forwards and backward through the text (one page at a time) during the experiment. Participants were instructed to hit the “Z” (zoning out) key if they realized at any point in time that they were no longer paying attention but had been moving their eyes over text. They were also told that a probe would randomly ask them if they were zoning out. The “Y” key (yes) and “N” key (no) were used to respond to these probes. The probe was set to randomly occur after 120-240 seconds (sampled from a uniform distribution) of reading had happened without either a self-reported zone out or previously occurring probe. The timer for the probe carried over page changes (e.g., participants might read through several pages of text before having to respond to a probe).

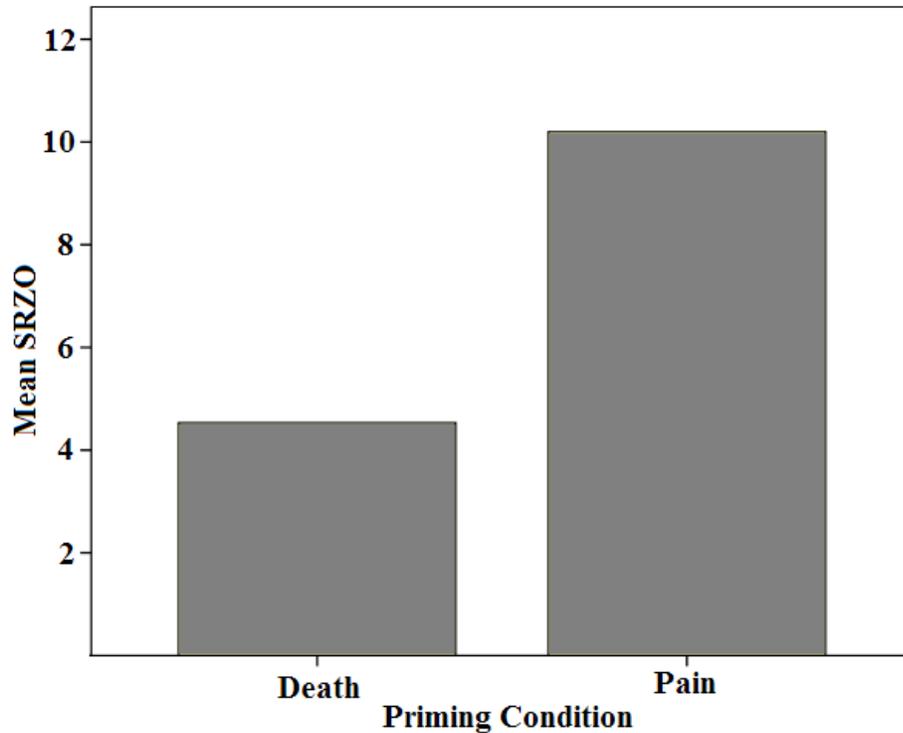
Participants were led to believe that they could choose one of three possible passages to read. This deception was used to maintain the illusion of recreational reading. Regardless of the passage selected by the participant, they were always presented with the same neutral passage, *My Life in Forbidden Lhasa* by Heinrich Harrer. This article was considered neutral because the plot contained no references to death. The passage was presented on a PC computer screen using Eye-Link Experiment Builder software and a standard keyboard for input. The reading lasted until approximately five minutes were left in the hour, which allowed sufficient time for a comprehension test and compensation. The reading portion of the experiment typically lasted between 40 and 45 minutes.

Finally, participants completed twelve four-alternative multiple-choice questions to determine how well they remembered and comprehended the text. This number of questions is in

line with previous experiments which used a comprehension test at the end of one hour of reading (e.g., Schooler et al., 2004). The questions did not require any deep thought about the text, but instead tested memory of basic plot details found in the text. The comprehension test also included a section asking the participants to rate their interest in the passage they had just read, their reading skill, and their familiarity with the passage (in case they had previously read the article or were familiar with a movie based on the story).

## RESULTS

Overall, participants were caught mind wandering 13% of the time without being aware of doing so. *Probe caught ratio (PCR)* is the ratio of affirmative probe responses to the total number of probes received. Participants receiving the death prime were caught mind wandering while unaware of doing so an equal number of times as control participants ( $M = .114$  vs.  $M = .139$ ;  $t(28) = .487$ ,  $p = .630$ ). Participants in the mortality salience condition received only marginally more probes than control participants ( $M = 9.40$  vs.  $M = 7.53$ ),  $t(28) = -1.80$ ,  $p = .082$  ( $1-\beta = .413$  for  $p = .05$ ). Overall, *self-reported zone-out rate (SRZO)* was 7.37 times during the 45-minute session. Figure 2 shows that, as predicted, participants receiving the mortality salience prime self-reported fewer episodes of zoning out ( $M = 4.53$ ,  $SD = 3.81$ ) than participants receiving the pain prime ( $M = 10.2$ ,  $SD = 8.51$ ). The difference between the two groups was significant,  $t(28) = -2.35$ ,  $p = .026$ .

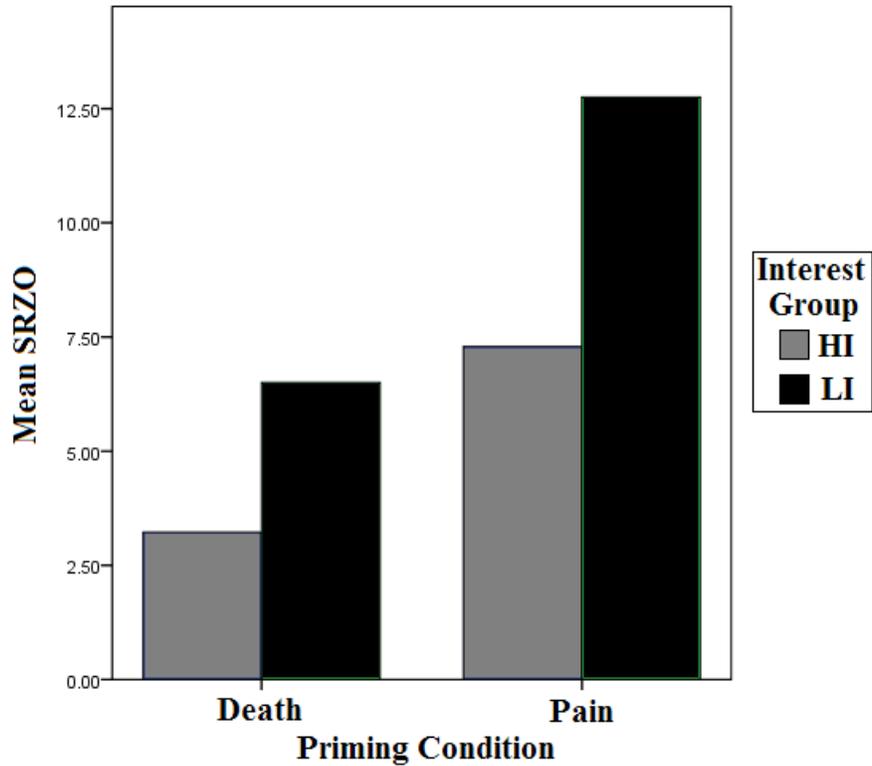


**Figure 2.** Mean self-reported zone-out rate (SRZO) as a function of priming condition.

Overall responses to the text comprehension questions were well above chance ( $M = 85.53\%$  vs.  $M = 25\%$ ;  $t(28) = 26.7$ ,  $p < .001$ ). There was a marginal effect of priming condition on comprehension with participants who received the death prime performing better ( $M = .893$ ,  $SD = .094$ ) than participants receiving the pain prime ( $M = .817$ ,  $SD = .141$ ), but the difference was not significant,  $t(28) = 1.73$ ,  $p = .095$ . SRZO rate was negatively correlated ( $r = -.432$ ) to performance on the comprehension test,  $F(1, 28) = 6.44$ ,  $p = .017$ . Similarly, probe caught ratio was negatively correlated ( $r = -.58$ ) to comprehension,  $F(1, 28) = 14.4$ ,  $p = .001$ . This suggests that mind-wandering had a detrimental effect on comprehension, with participants who mind-wandered comprehending less of the text.

Participants were separated into two groups based on reported interest level in the reading passage. Interest was measured on a Likert scale of 1 to 10, with 10 representing the most

interest in the passage and 1 representing the least interest in the passage. Overall, the passage was rated at an interest level of  $M = 5.96$  ( $SD = 2.52$ ). Performance on the comprehension test was positively correlated ( $r = .7$ ) to interest level in the passage,  $F(1, 28) = 26.9$ ,  $p < .001$ , indicating that participants who were interested in the passage probably read more carefully. Participants who reported an interest level less than “6” (i.e., approximately the mean) were assigned to a “low interest” (LI) group. Participants who reported an interest level greater than “6” were assigned to the “high interest” (HI) group. HI participants scored higher on the comprehension test ( $M = .922$ ,  $SD = .093$ ) than LI participants ( $M = .779$ ,  $SD = .111$ ),  $t(28) = 3.81$ ,  $p = .001$ . An analysis of variance showed that there was no interaction between interest level and priming condition ( $F = .213$ ,  $p = .648$ ), but the variables were additive in regard to SRZO rate. Figure 3 shows that HI participants who received the death prime self-reported the fewest number of zoning-out episodes ( $M = 3.22$ ,  $SD = 2.27$ ) while LI participants receiving the pain prime self-reported the most episodes of zoning out ( $M = 12.8$ ,  $SD = 5.95$ ).



**Figure 3.** Mean self-reported zone-out rate (SRZO) as a function of priming condition and interest group.

Together, these results involving self-reported interest level provide a validity check that, as a whole, the group of participants were reading the passage with varied levels of interest, in a more or less “normal” manner.

## DISCUSSION

Confirming the findings of Schooler et al. (2004), the current study showed that self-paced reading is useful technique for examined periods of mindless reading. When asked to monitor an internal phenomenon, such as mind wandering, participants are capable of realizing that they have experienced such an event and report these instances. On average, participants reported zoning out 7.37 times in the 45 minutes of reading. This number is greater than, but comparable to, the findings of Schooler et al. (2004) ( $M = 5.3$  self-reports per hour). In the same study, participants were caught zoning out by a probe 13% of the time, which is equivalent to the current studies findings. Results of the current study also agree with those of Reichle et al. (2009). Probes caught participants zoning out 9% of the time, which is slightly less than the current study's 13%. Previously, self-paced reading seemed to be more prone to a higher rate of self-reported zoning out when compared to studies that introduced an eye-tracker into similar methodology (Schooler et al., 2004, vs. Reichle et al., 2009). The results of the current study are in agreement, in that there were more episodes of self-reported zoning out in the current study than in comparable eye-tracking studies (7.367/45 min. vs. 1.60/60 min.) This may lend support for the idea that the novel or uncomfortable experience of the eye-tracker may keep readers more engaged and concentrated. Kane et al. (2007) also found that participants were caught by probes less frequently when concentrated in a task. This supports the notion that mind wandering in a real world environment is similar to mind-wandering in the reading paradigm. Finally, the

negative relationship between comprehension and mind wandering was common in all three reading studies that used a similar methodology. This further confirms the intuition that overall comprehension will suffer if more mind wandering is happening. In previous mind wandering studies, participant's interest level in the material was not assessed. The current study found that interest level may be a predictor of overall comprehension. Higher scores on the comprehension test were observed for individuals that expressed the highest level of interest in the passage they had just read. This supports the intuition that interesting text will engage a reader to a higher degree.

The current study attempted to test the role of terror management in online cognitive processes while also investigating the highly variable nature of self-reported zoning-out in the reading paradigm. As predicted, participants who were manipulated to think about their own death prior to reading a passage exhibited significantly less self-reported zoning-out behavior when compared to counterparts who were primed with questions about another unpleasant experience, pain. This observation suggests that there is a certain degree of mental flexibility in regard to zoning out, meaning that an individual can be in a cognitive state that increases or decreases the likeliness to report zoning-out. Contrary to this notion would be the idea that zoning-out propensity is an individual difference possibly dictated by general reading skill. Interestingly, participants in both conditions were caught by probes an equivalent number of times. This suggests that even though participants who received a MS prime reported far fewer episodes of mind wandering, they were in fact zoning out just as much as control participants. This suggests that, although the propensity to mind wander was the same in the two groups, participants in the MS condition were less apt to notice their own mind wandering. Terror Management Theory can be applied to these observations.

According to TMT, human behavior is deeply rooted in an innate fear of death. Mortality salience priming has been used to evoke proximal defenses in behavioral studies (Greenberg et al., 1990; Landau et al., 2004). Studies suggest that distractions-seeking (Pyszczynski et al., 1999; Greenberg et al., 2000) is a common response to overt reminders of death. The current study showed that, in response to MS, participants were more engaged in a passage of text. This increased engagement is a form of distraction seeking. The passage administered to the participants was neutral in nature, meaning there were no death-related topics. By engaging in this neutral text, the mind is put at ease and notions of human mortality are alleviated.

According to Smallwood and Schooler (2006), mind wandering is often accompanied by thoughts irrelevant to the task, which are often personal. Because our fear of death is so deeply intertwined into everyday behavior, perhaps reminders of death override these competing personal goals often associated with mind wandering. When the only competing personal goal is one that the mind has evolved to avoid conscious thoughts of, the decrease in self-reported mind wandering makes sense.

How is the roughly equivalent PCR between the two priming conditions accounted for? Perhaps reminders of death are affecting metaconsciousness, meaning that MS affects our ability to realize we are zoning out. Also, perhaps the mind wandering that causes a participant to self-report is different from the mind wandering caught by probes. One can imagine that as a reader slips away from normal reading they become more and more engrossed in whatever thoughts their mind has wandered to. Self-reporting occurs after some time when a reader realizes that there is clearly a mismatch between their intended goal and their current activity. In the current study, all participants were zoning out to an equal extent, but some readers never got to the point where they were so deeply involved in alternative thoughts that they realized so and self-

reported. Again, viewing the neutral passage as a distraction from the reminders of death may help to explain this. MS-primed participants, who were caught by just as many probes as control participants, may have only been starting to zone out or involved in a superficial type of mind wandering when caught by probes. Self-reporting was scarce because MS-primed individuals benefit from maintaining an increased engagement in the neutral passage rather than lapsing further into personal thoughts, potentially thoughts influenced by the reminders of death.

Another interesting observation in the current study was the additive effects of interest level and priming condition. Participants who has high interest in the text and who received the MS prime exhibited the least amount of zoning out behavior. When a MS primed individual is seeking a distraction through reading a neutral passage, we have witnessed a decrease in zoning out already. If the participant happens to find the distraction that they are engaging in to be particularly interesting, then an even further decrease in mind-wandering is observed. Participants with little interest in the passage who received the control prime exhibited the most amount of zoning-out behavior. These participants lack the increased engagement associated with reading an interesting passage as well as the decrease in mind wandering associated with increased engagement as a result of distraction seeking. MS-primed participants in the LI group and pain-primed individuals in the HI group exhibited roughly equivalent amounts of mind wandering behavior. These observations may suggest that the increased engagement as a result of distraction seeking is stronger than the increased engagement from partaking in an interesting task.

The current study could be adapted in several ways in the future. First, the incorporation of eye-tracking would be useful to see if the findings of Reichle et al. (2009) are present in a short-term (one session only) study of mind wandering during reading. Second, it would be

interesting to observe the effects of death-related text on mind wandering activity. The MS prime hidden within a personality assessment has proven to be a useful tool in TMT research, but perhaps a passage about death would be an alternative. And if the passage is not neutral, will zoning-out activity increase in an attempt to dwell on neutral thoughts (i.e. – the alternative personal thoughts often associated with mind wandering).

Is it possible to be “zoned in” 100% of the time? The results suggest that even in an extremely engaged state, readers still lapse into some mind wandering. Even though such a suggestion may be outside the scope of the current study, perhaps there is a benefit to mind wandering. When engaged in any activity, it may be maladaptive to devote 100% effort and attention to said activity. This would hinder our ability to consider other possible activities. One can imagine that the activation of alternative goals during mind wandering in other activities may act as a reminder to perform an important task. Additionally, it may stand to reason that an engagement level of less than 100% might improve the ability to switch tasks.

In conclusion, it has been demonstrated that the phenomenon of mind-wandering, particularly within the reading paradigm, is still only understood to a limited degree. There are factors that may increase or decrease the likelihood to zone out or the likelihood to be aware that we are zoning out. Additionally, the usefulness of MS manipulations within the cognitive realm has been demonstrated. The current study shows that online cognitive processes are affected in some way by reminders of death, and that self-paced reading utilizing behavioral sampling techniques is a valid way to measure such effects.

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