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Advertising Effectiveness and Attitude Change Vary as a Function of Working Memory Capacity

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Summary: Prior research has confirmed that the amount of attention paid to an advertisement will influence its effectiveness when it comes to changing consumer attitudes. This study expands on this understanding by exploring how individual differences in the ability to control attention (i.e., working memory capacity; WMC) might further moderate the effect of attention on advertising. Participants who varied in WMC were evaluated on their attitudes towards a consumer brand before and after viewing a video advertisement. While the advertisement did make participants more positive towards the product overall, this change in attitude was directly related to participants' ability to control attention and the degree to which the ad fostered the activation of autobiographical memories. Further, these changes in attitude were unrelated to how well the ad was remembered. This suggests that individual differences in attentional control can influence how advertisements impact customer attitude and the acceptance of persuasive messaging. Copyright © 2016 John Wiley & Sons, Ltd.

The intuitive notion that the more attention an individual devotes to the processing of persuasive messaging or advertising, the more likely that such messages will exert an influence on the opinions or beliefs of the individual, remains an underpinning of current advertising practice (Cialdini, Petty, & Cacioppo, 1981; Hovland, Janis, & Kelly, 1953). For example, attention seems to guide not only what consumers fixate upon and remember (Pieters & Wedel, 2004; Rosbergen, Pieters, & Wedel, 1997), but also what consumers deem as important in a given ad (Mackenzie, 1986). The assumption that sustained attention will improve the effectiveness of an advertisement has spawned numerous advertising methodologies designed to actively capture attention from consumers, including tools such as humor, popular music, shock value, emotion, etc. (Allan, 2006; Dahl, Frankenberger, & Manchanda, 2003; Nielsen, Shapiro, & Mason, 2010; Weinberger & Gulas, 1992). In fact, recent research has also suggested that the active engagement of attention may serve as an avenue for resisting the persuasive effects of an advertisement (Fransen, Verlegh, Kirmani, & Smit, 2015).

The above studies demonstrate that attention and the subsequent effectiveness of a given persuasive message are intrinsically intertwined, and strongly suggest that varying the amount of sustained attention will likely change the potential utility of a given advertisement. This finding is not surprising from a psychological standpoint, as one of the basic tenets of the information processing perspective is that in order for information to affect the cognitive system, it must first gain access to the system via the focusing of attention and attentional processes (Schneider & Shiffrin, 1977). However, separate from the general question of whether individuals actually devote attention to an advertisement is the open question of whether all individuals are even capable of devoting equivalent amounts of attention to a persuasive message or advertisement? In other words, how does normal variability in attentional abilities impact this relationship between sustained attention and attitude change? Further, does this natural variability of attentional resources cause individuals to use attention in similar ways when viewing an advertisement, or might it fundamentally change how individuals react to a persuasive message, for example by influencing the degree to which past memories involving the given product are activated?

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Working memory capacity and advertising

Empirical research has established that within the normal human population individuals do indeed vary in how well they can control their attentional processes and focus on the task-at-hand. This conscious focus requires the active maintenance of relevant information within the short-term memory (STM) system, and the active suppression/ignoring of information that is functionally irrelevant to these goals. In other words, successfully paying attention to anything involves not only the active maintenance and retrieval of relevant information, but also the ability to ignore that which is irrelevant. This theoretical ability is known as working memory capacity (WMC; Baddeley & Hitch, 1974) and has been connected to performance in several complex domains, including performance on standardized intelligence tests, reading comprehension and lower level attention tasks such as the Stroop or anti-saccade tasks (Cowan et al., 2005; Daneman & Carpenter, 1980; Unsworth, Schrock & Engle, 2004).

The predictive relationship between the WM system and performance in the above tasks centers around a few key factors. First, those higher in WMC are more resistive to task demands that might negatively impact executive functions like goal maintenance. For example, in memory span tasks higher WMC individuals are better able to resist the buildup of proactive interference from previous trials, and instead focus on the trial at hand (Lustig, May & Hasher, 2001). Similarly, those higher in WMC are better able to resist distraction in the face of competing stimuli, defined by either similarity (Unsworth & Engle, 2007) or saliency (Conway, Cowan & Bunting, 2001; Unsworth, Schrock & Engle, 2004). In other words, it appears that

higher WMC individuals are better at managing their short-term stores, keeping only the relevant and critical pieces of information readily available and activated.

This cognitive benefit of controlled attention does also appear to influence how learned information is retrieved from long-term memory (LTM). For example, those higher in WMC are not only better able to generate relevant retrieval cues to initiate a search of LTM, but are also better able to utilize said retrieval cues to perform an organized search of LTM, rather than more random searches as often observed in those lower in WMC (Unsworth, Brewer, & Spillers, 2013). This suggests that differences as a result of WMC could be because of both active maintenance within STM and a more effective search of LTM. Simply, this suggests that higher WMC individuals are better at managing the current state of information in consciousness and more adept at selecting relevant information to be brought into its forefront.

These lines of basic research on WMC have established a direct connection between individual differences in attentional control and subsequent performance in complex tasks, across a myriad of domains. However, to date, no research has explicitly examined the potential interaction between WMC and receptiveness to advertising or persuasive messaging. The closest potential analogue to this application might be drawn from studies of formalized decision making. For example, it has been suggested that higher WMC individuals simply consider more alternatives in a decision-making task (Dougherty & Hunter, 2003). Higher WMC individuals are also more consistent in their decisions and judgments of available solutions (Moore, Clark, & Kane, 2008). Similarly, the introduction of demanding secondary WM loads seems to impair judgment on risky gambling tasks by forcing individuals to split attentional resources between the primary and secondary tasks, thereby making the generation of the necessary affective cues less likely (Hinson, Jameson, & Whitney, 2003). Taken together, the above findings at least partially confirm that executive control, managed by the WMC system, is related to the consideration of decisions and evidence related to this decision. While they do not explicitly address issues of persuasive messaging and the explicit intent to change attitude via advertising, they do provide a useful starting point of which multiple competing predictions might be made regarding this potential relationship.

As higher WMC individuals are better at maintaining relevant information in their STM (Cowan et al., 2005; Unsworth & Engle, 2007), one possible prediction might be that those higher WMC individuals are *more* sensitive to advertising, as they simply have the most pertinent information active and available to consciousness. This is consistent with decision-making research wherein higher WMC individuals were more likely to consider alternatives (Dougherty & Hunter, 2003). However, perhaps a key qualifier of this prediction is the term 'relevant'. If a given advertisement is not deemed relevant, or perhaps exists in contrast to (or at least not 100% in alignment with) the viewers' existing attitudes, higher WMC individuals may be *less* likely to integrate new (or competing) information into their existing attitude structure, and instead choose to eliminate this information from STM. In fact, one could argue that protecting one's own beliefs or values relative to explicit attempts at persuasion represents perhaps the quintessential notion of goal maintenance (i.e., maintenance of self) amid response competition, an executive function already attributed to the WM system (Kane & Engle, 2003). This coincides with other studies on advertising that have found that goal control does seem to affect how consumers view advertisements (Pieters & Wedel, 2007), which subsequently mitigates the change in one's reaction to the advertisement.

As those higher in WMC have been shown to more efficiently activate and search through existing knowledge in LTM (Unsworth et al., 2013), this might also impact knowledge activation in response to viewing an advertisement. For example, if the advertising experience activates positive autobiographical memories related to a given product, it is reasonable to expect that this would increase the chances that an advertisement would resonate with a consumer (Celsi & Olson, 1988). The idea that such autobiographical activation, or 'nostalgia' as it is often referred to in the advertising literature, affects both attention and attitude change has been well established (Muehling, Sprott, & Sprott, 2004; Marchegiani & Phau, 2010). It is of interest to explore whether such autobiographical activation likewise varies as a function of WMC, and perhaps underlies subsequent attitude change. Even if this activation does not vary with WMC, it is important to consider this autobiographical activation as an additional mechanism that might also influence attitude change independent of the WMC system.

To examine the relationship between WMC and advertising effectiveness, an experiment was conducted where participants who varied in WMC were initially tested on their range of attitudes towards a consumer product/brand, and then asked to view a video advertisement on said product. Attitudes were evaluated again after viewing, and any changes were compared relative to variation in WMC. Participants were also evaluated for their remembrance of the advertisement, and the degree to which the advertisement activated autobiographical memories within them.

METHOD

Participants

One-hundred twelve native English speakers from a large public university in the United States were solicited for participation in this experiment. Any participants that reported having watched the target advertisement (described below) outside of the current experiment were excluded from the final analysis. Nine participants were excluded from the final analysis for this reason, resulting in a revised total sample size of $N = 103$ individuals. The current sample was approximately 77% female, with an average age of 20.58 ($SD = 5.04$) years. All participants were compensated with extra credit in a psychology course at the university.

Materials

Demographic survey

Participants completed a demographic survey that assessed their age, sex and class standing at university. Participants were also asked to rate on a scale of 1–10 their (1) general feelings towards coffee and coffee-based products, and (2) how frequently during a given week they would consume coffee or coffee-based products. On these measures, lower scores indicated either more dislike or lower consumption of coffee or coffee-based products.

Attitude survey

Both before and after viewing the ad, participants were asked to complete a survey that evaluated their attitudes towards the consumer brand (Starbucks™) used here. This survey consisted of 23 items, in which the participants were asked to rate on a scale of 1–10 how much they agreed or disagreed with each item. These items are available in Table 1. These 23 items were focused on several themes or common activities mentioned or targeted by the advertisement. Items that were reversed scored are indicated in Table 1. A higher score thus indicates a more positive attitude towards the target advertisement or product. Within the current sample, this survey demonstrated a high degree of reliability (Cronbach's $\alpha = .84$).

Advertisement. Participants watched a commercial advertisement for the Starbucks™ coffee chain, which was part of their advertising campaign '*Meet Me at Starbucks*' circa 2014 entitled '*One-Day*'. This advertisement was only released online and was available to view either through the Starbucks™ website or through their YouTube™ channel. The advertisement was 5 minutes and 45 seconds long, and viewed on a 19″ computer monitor, with resolution 1600×900. This advertisement portrayed several vignettes about individuals in 28 different countries at their respective Starbucks™ locations, and their subsequent activities during their time there, likely with the goal of demonstrating the myriad opportunities and experiences available at the retail chain. This advertisement is currently available at http://meetme.starbucks.com/mobile, and was presented in English audio (or subtitled in English for any foreign dialogue in the ad).

An existing commercial advertisement and consumer brand were selected for several reasons. First, this ensured that the production value of the advertisement was high, and functionally equivalent to other real advertisements that participants might encounter. This guarantees a higher degree of ecological validity, and that any observed effects in this lab setting are likewise reasonable to expect in natural settings. Second, it also ensured that participants were familiar with the brand, and had some existing opinion on the brand formed independent of the experiment. This allows for a more realistic evaluation of the effect of the given advertisement on a demographic (i.e., university students, younger adults) that are not only commercially critical to the company that created the advertisement, but also prominently featured in the advertisement itself.

Advertisement memory

In order to ensure that participants were attending to the advertised message, participants completed a brief measure that evaluated how well they recalled details of the advertisement. This memory assessment consisted of five multiple-choice questions that tested information explicitly presented in the advertisement (e.g., What social activity was NOT shown in the ad?). This is seen as a proxy for the amount

Table 1. Actual attitude survey items and the difference in scores on average from pre-post administration after advertisement viewing

Item	Difference pre-post *M*(*sd*)	*t*(102)
1. Is Starbucks a place where people go to do business?	2.04(1.70)	12.18*
2. Is Starbucks a place where people go to reunite with old friends?	.99(1.33)	7.55*
3. Is Starbucks a place where people go to make new friends?	2.33(1.98)	11.94*
4. Is Starbucks a place where people go to say goodbye?	1.50(2.17)	7.02*
5. Do you think that Starbucks is inviting for all communities?	.79(1.70)	4.72*
6. Do you think that Starbucks feels consistent across all its stores?	.82(1.46)	5.70*
7. Is Starbucks a place where people go to be creative?	1.84(1.83)	10.20*
8. Do you think Starbucks promotes kindness?	1.02(1.28)	8.09*
9. Do you think Starbucks promotes anxiety? (reverse score)	.80(1.25)	6.50*
10. Do you think Starbucks promotes a modern atmosphere?	.20(.76)	2.67*
11. Is Starbucks a place where people go to be alone? (reverse score)	.87(1.89)	4.67*
12. Do you think Starbucks promotes sadness? (reverse score)	.24(.92)	2.65*
13. Do you think Starbucks promotes relaxation?	.17(1.72)	1.00
14. Is Starbucks a place where people go to read?	−.53(1.49)	3.61*
15. Is Starbucks a place where people go to write?	.10(1.45)	.70
16. Do you think Starbucks is consumer friendly?	.60(.99)	6.15*
17. Do you think Starbucks supports cultural diversity?	1.70(1.84)	9.38*
18. Is Starbucks a place where people go to hang out with friends?	1.13(1.43)	8.02*
19. Do you think Starbucks promotes a family environment?	1.99(1.93)	10.46*
20. Do you think Starbucks promotes personalized service?	.73(1.50)	4.94*
21. Is Starbucks a place where people go to pass time?	.65(1.59)	4.15*
22. Do you think that Starbucks is inviting for all ages?	.48(1.70)	2.87*
23. Do you think Starbucks promotes joy?	.95(1.34)	7.20*

*Significantly different from 0; $p < .01$.

Note. More positive scores indicate a change in attitude that is more favorable towards each item at post-test; negative scores indicate a change in attitude that is less favorable towards each item at post-test.

of sustained effort or attention participants paid to the advertisement. Lower scores would be indicative of ignoring the advertisement, whereas higher scores would represent the opposite.

Autobiographical memory assessment

This measure was drawn from Sujan, Bettman, and Baumgartner (1993), and consists of two questions that asked participants to evaluate on a scale of 1–10, how much the viewed advertisement activated either (1) personal memories or (2) memories unrelated to one's personal experience. The first question was reverse worded and coded, and the ratings for these two items were averaged together to form a composite score. Higher scores indicate greater activation of autobiographical measures.

Working memory capacity assessment

To evaluate participants' WMC, all participants completed Symmetry Span (SSpan), which has been demonstrated to be both a reliable and valid assessment of WMC (Unsworth, Redick, Heitz, Broadway, & Engle, 2009). In this task, participants were asked to judge whether a simple figure was symmetrical across the vertical axis, and then to remember a spatial location from within a 4 × 4 array for later test. Set sizes ranged between two and five trials, and participants completed each set size 3 times. The maximum score on this test is 42, and overall scores were only analyzed if they maintained a criterion accuracy level of 80% or more on average across the symmetry portion of the task (Conway et al., 2005). This task takes approximately 15 minutes to complete, and is administered on the computer via E-prime™ experimental software.

Procedure

After obtaining informed consent, participants were given 8 minutes to complete the Demographic Survey, and then the first administration of the Attitude Survey. When participants had completed these surveys, they were instructed to put on headphones and watch the advertisement. Participants were advised that they would be asked questions about the advertisement after viewing, so to watch carefully and watch the advertisement in its entirety. Participants were also told how long the advertisement was, and that they would be given 8 minutes to watch the advertisement, which enabled them to re-watch portions of the advertisement if they chose to. After participants indicated that they had finished watching the advertisement to their satisfaction, they then completed the second administration of the Attitude Survey, which contained a re-ordered presentation of the initial administration. Participants also indicated on this second administration whether they had or had not seen this advertisement previously. After completion of the second Attitude Survey, participants then completed the Advertisement Memory and Autobiographical Memory Assessments. Finally, participants then completed the SSpan task, after which they were debriefed and dismissed. The entire experiment took no longer than 1 hour.

RESULTS AND DISCUSSION

Descriptive statistics for all demographic measures are available in Table 2. Correlations between all measures are included in Table 3. To evaluate the effect of the advertisement, difference scores were computed on the numeric ratings for each question across pre-post administrations. Higher difference scores indicated that the participants agreed more with attitude statements after viewing the advertisement, and scores of zero, or negative scores, indicated no change in attitude or disagreement with the statements on the attitude measure (Table 1). These 23 item difference scores were then averaged together to form a composite score, reflecting the amount of overall change related to viewing the advertisement. Across the total 23 items, the

Table 2. Descriptive statistics for demographic, attitude, memory, WMC and autobiographical activation measures

	M(*sd*)	Skew (*SE* = .24)	Kurtosis (*SE* = .47)
1. Please rate your feelings on coffee and coffee-based products. *(1–10 scale, 1 being 'Strongly Dislike' and 10 being 'Strongly Like')*	7.02(2.79)	−.73	−.60
2. How often do you drink coffee or consume coffee-based products in a normal week? *(1–10 scale, 1 being 'Never' and 10 being 'Frequently')*	5.17(3.30)	.20	−1.44
3. Attitude survey pre-post difference	17.56(13.97)	.43	.80
4. Advertisement memory *(max score 5)*	3.83(1.10)	−.87	.60
5. Autobiographical activation composite *(max score 10)*	6.24(2.56)	−.33	−.99
6. Symmetry span *(max score 42)*	27.65(6.27)	−.37	−.28

Table 3. Correlation matrix between demographic, attitude, memory, autobiographical and WMC measures

	1	2	3	4	5	6
1. Please rate your feelings on coffee and coffee-based products.	1					
2. How often do you drink coffee or consume coffee-based products in a normal week?	.79*	1				
3. Attitude survey pre-post difference	−.01	−.01	1			
4. Advertisement memory	−.10	−.06	.03	1		
5. Autobiographical activation composite	.21*	.22*	−.19*	−.10	1	
6. Symmetry span	.14	.13	−.25*	.18	−.10	1

*$p < .05$.

average change for all participants was 17.56 rating points ($SD = 13.97$), suggesting that the advertisement produced a measureable positive difference from zero on viewer attitudes overall ($t(102) = 12.76$, $p < .001$). As is visible in Table 1, this change in attitude was significantly different from zero across nearly all individual items on the questionnaire (21 of the 23 items) as evidenced by one-sample *t*-tests for each item, further suggesting that the advertisement had a broad effect on participant attitude across items.

As is visible in Table 3, general attitudes towards coffee/coffee-based products were positively correlated with the frequency of consuming such products ($r = .79$, $p < .05$). Further, remembering the details of the advertisement did not vary as a function of these general attitudes ($r = -.10$, $p > .05$), suggesting that participants were not initially biased one way or another to pay more attention to the advertisement. Not surprisingly, autobiographical activation was positively correlated with both existing general attitudes ($r = .21$, $p < .05$) and the attitude change observed on the attitude survey ($r = -.19$, $p < .05$). This autobiographical activation was not significantly correlated with remembering the ad, nor WMC ($rs < -.10$, $ps > .05$), suggesting that this activation did not increase or interact with attentional focus. Finally, WMC was negatively correlated with attitude change ($r = -.25$, $p < .05$) and was not predictive of how well participants remembered the ad ($r = .18$, $p > .05$). This later finding is interesting as it suggests that sustained attention to the advertisement was more or less equivalent across variations in working memory, and the explicit memory of ad details should not underlie any observed differences in attitude change. This complex pattern of inter-correlations is explored further in the next set of analyses.

Working memory and attitude change

To evaluate the primary question of whether the change in attitude towards the target product was consistent across variations in working memory, a hierarchical linear regression analysis was conducted. WMC, advertisement memory, autobiographical activation and their attitudes towards (and frequency of) coffee consumption were entered in the model simultaneously to test for the unique contribution of each predictor variable towards attitude change.

Results indicate that the overall model predicted a significant portion of variance ($R^2 = .13$, $F(5, 97) = 2.76$, $p < .05$). However, only WMC ($\beta = -.30$, $p < .001$) and autobiographical activation ($\beta = -.24$, $p < .05$) were significantly reliable predictors of this change in attitude. Higher WMC individuals were *less* likely to change in attitude towards the commercial message. Similarly, those that were more likely to activate autobiographical memories were also less likely to demonstrate a change in attitude towards the target message. Feelings towards coffee ($\beta = .13$), frequency of coffee consumption ($\beta = -.02$) and memory of the advertisement ($\beta = .07$) all failed to reliably predict this change in attitude towards the advertised product ($p > .05$). This suggests that even taking into account preexisting attitudes towards the target product, and the amount of information explicitly remembered from the advertisement, there was a significant effect of both WMC and autobiographical activation attitude change.

To further evaluate a potential interaction between the amount of autobiographical activation and WMC, an interaction term between these variables was calculated and entered in the second block of the analysis. Results indicated that the addition of this interaction term did not significantly enhance the amount of variance predicted in the model ($R^2\ \Delta = .008$, $p > .05$). This further suggests that differences in autobiographical activation are not interacting with differences in WMC to produce attitude change.

This overall pattern of results is consistent with previous research on WMC that suggests that those higher in this capacity are better able to maintain relevant goals in the face of interference, thereby preserving performance. For example, studies on goal maintenance (e.g., Kane & Engle, 2003) have suggested that higher WMC individuals are better able to preserve behaviors consistent with these goals, which in this case appears to be the preservation of current attitudes towards a consumer brand. This appears to be an active, though perhaps implicit, process; higher WMC individuals did not ignore the ad to a greater degree than lower WMC individuals (as evidenced by no difference in the memory for the advertisement). Further, as there did not appear to be more negative pre-existing attitudes towards the brand or domain (i.e., attitudes towards coffee or Starbucks) associated with either WMC group, this suggests that participants had no pre-existing reason or justification to explicitly resist the persuasive message. This corroborates research on advertising that suggests that attention can be related to the resistance of persuasive messaging (Fransen et al., 2015), although suggests a less explicit mechanism by which this resistance occurs.

These overall findings are also consistent with advertising research that suggests that other mechanisms outside of attention may influence attitude change (e.g., Petty, Cacioppo, & Schumann, 1983). However, the results of the current study potentially specify the mechanism by which messaging may affect user attitudes, in this case autobiographical activation. These results confirm that this autobiographical mechanism is in fact separate from attentional control, and does not vary in relation to differences in WMC. While it is not explicitly clear how autobiographical activation produces attitude change, it is possible to speculate several reasons. For example, it could be that this activation is perhaps reflective of more emotional processing of an advertisement (consistent with the nature of autobiographical memories), separate from a more explicit cognitive appraisal of the material (Dillard & Shen, 2012; Ramsay, Yzer, Luciana, Vohs, & MacDonald, 2013). It may also be that participants who remember real life events base their ratings on their actual experiences, rather than the contrived scenario presented in the advertisement. While these explanations are purely speculative, it does appear that autobiographical retrieval seemed to have an insulating effect against attitude change induced by the advertisement, and the mechanism remains an interesting topic for future research.

CONCLUSIONS

The relationship between attitude change and sustained attention has long been documented in advertising research.

The current study sought to refine this understanding by accounting for individual differences in how well individuals can control their attention. Of interest was whether this variation in attentional control abilities would reliably predict how likely individuals would be to demonstrate a change in attitude after viewing an advertisement. Results suggest that the observed attitude change was not only correlated with WMC, but remained so after controlling for preexisting attitudes/consumption, how well participants remembered the ad and the degree to which the ad invoked autobiographical memories within the viewer. Those individuals higher in WMC were *less* likely to experience a shift in attitude versus other individuals lower in WMC. In other words, those higher in WMC were less likely to be receptive to the persuasive message in the advertisement, despite remembering equal amounts of information about the advertisement, and controlling for pre-existing attitudes towards the target product (coffee).

The degree of autobiographical activation was also indicative of less attitudinal change. Those participants that reported a strong sense of activation (or perhaps nostalgia) were less likely to experience a shift in attitudes, likewise independent of learning, existing attitudes or WMC. Finally, WMC and autobiographical activation do not appear to interact, suggesting at least some independence relative to how these factors affect attitudes. This study has thus identified two novel predictors of attitude change in relation to advertising, and provides a useful framework to consider additional questions relative to attentional control and advertising.

It is possible that the current pattern of results may be predicted by other factors. One such suggestion may be confounding differences across WMC groups. For example, low WMC individuals may be less able or less accurate in their reproduction of attitudes (independent of manipulation), or perhaps are more sensitive to demand characteristics induced by the manipulation. As the current study did not include a separate condition where participants who varied in WMC were simply asked to repeat their ratings towards the target product without watching the advertisement, the current study cannot speak directly to these claims. However, there are several suggestions from the current study, and others, which seem to suggest that these concerns are exaggerated.

To begin, the speculation that high and low WMC individuals simply differ in their ability to reproduce information retrieved from long-term memory (LTM) has not been supported empirically in prior research. In other words, there is no reason to expect that the simple accurate retrieval of information (in this case attitudes) should be different across individuals who vary in WMC. Previous studies have found that in memory retrieval tasks that do not induce high levels of interference, or need for executive control, simple memory span is nearly identical across lower and higher WMC individuals (e.g., Conway & Engle, 1994; Daneman & Merikle, 1996). It is only when situations invoke higher levels of attentional or executive control that memory span differences begin to arise across individuals who vary in WMC. It is argued here that reporting an existing attitude relative to a product is indeed an example of a low-interference task; one that does not intrinsically contain any mechanism for interference, or other demand on executive control. As such, there is little reason to expect that participants who vary in WMC would fundamentally differ in their ability to accurately reproduce this attitude, thus retrieved from their LTM system. Further, where half of the WMC distribution less able to accurately retrieve simple information from LTM in a reliable fashion, one would also expect that reliability metrics for the Attitude Survey would also be likewise very low, as participants would thus be unable to accurately recall related attitudes towards the target product. This was not observed here, and the Attitude Survey produced a high level of reliability overall.

The argument that the current pattern of results is potentially a function of differential sensitivity to demand characteristics also appears unlikely. It is argued here that there was no explicit demand made on participants to change their attitudes towards a product, either positively or negatively. Participants were not explicitly asked to consider the advertisement when providing their second ratings, nor were they asked to adjust their ratings based on the viewing of said advertisement. Thus, they were neither encouraged, nor discouraged, from changing their ratings (positively or negatively) and just simply asked to provide them a second time. As such, it is difficult to attribute the current pattern of effects to the differential perception of demand characteristics, when quite simply no such explicit characteristic was articulated. Further, given that participants were told that they were viewing an actual advertisement, it is even more likely that all participants inferred a similar demand (i.e., buy this consumer product), as ecologically speaking this is the primary usage of advertisements in the real world, where such usage and purpose are familiar to participants on a common sense level. We acknowledge that while it is entirely possible that higher WMC individuals might infer more or different demands than lower WMC individuals, this would be an interesting avenue for future research as to date such a relationship has not been explored fully. For example, it is possible that mitigating the perception or creation of subjective demand characteristics might be an example of how WMC, and differences in executive control, relate to the reception of advertising.

As the current study only evaluated attitudes, independent of actual consumer behavior, it is of interest whether these observed attitude changes are likewise reflected in the purchasing trends of actual consumers, and whether WMC likewise mediates this behavior. It would also be interesting to better understand how characteristics of advertisements might further impact this relationship between WMC and attitude change/behavior. For example, considerations of the length, mode of delivery, repeated or extended viewing, and perhaps even content might provide interesting insight into what characteristics serve as cues or indicators to encourage or dissuade acceptance of the message, as mediated by variations in WMC.

Future studies should explore how differences in preexisting attitudes might further modify this relationship. For example, do these effects become even more exacerbated in situations where participants have an especially negative (or positive) pre-existing attitude towards the brand or

product? If this is the case, higher WMC individuals that have a low product opinion, for example, may be even less receptive to an advertisement than those with a high product opinion. Conversely, it would be interesting to see if this kind of pre-existing attitude might serve as a salient marker thereby enabling even lower WMC individuals to better resist the persuasive message. Finally, it would be useful to understand how the apparent independent factors of autobiographical activation and WMC might be simultaneously leveraged to maximize advertisement acceptance.

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