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Television advertisements create false memories for competitor brands.

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Highlights

False memories for competitor brands can be created by advertisements
We created false memories for competitor brands in experimental and naturalistic studies
False memories for brands increase over time
Competitive clutter can help your competitor get free advertising

Abstract

False memories can be created using the Deese-Roediger-McDermott (DRM) paradigm. This paradigm has been used to induce false memories for words, pictures and has been extended to induce false memories of brand names. We present the first experimental evidence that false memories can be created for competitor brands using television adverts. In the first experiment, participants saw sets of adverts for related products (e.g., types of chocolate), in the second, they watched a television programme interspersed with advertisements. False memories for related but non-presented brands occurred in both experiments. In the second experiment, in which participants were tested using a R(emember)/K(now)/G(uess) recognition task immediately and a week later, correct memory for presented brands decreased over time whilst false memories increased. The findings pose a challenge both for advertisers and for current theories of false memory particularly because the increase in false memory is in the detailed R(emember) responses.

Keywords: false memory; advertisements; recognition, delay

Word count: 6469 (includes abstract, keywords, tables and references)

Introduction

Advertisers spend millions of pounds every year on television adverts designed to enhance recognition of and preference for a target brand. Various studies have explored the powerful ability that adverts have to change one's autobiographical memory for a past event. Braun, Ellis and Loftus (2002) demonstrated that when participants watched an advert for Disney in which it was suggested that they had shaken hands with a non-Disney character (Bugs Bunny) or a Disney character who post-dated their childhood (Ariel, The Little Mermaid), this increased their confidence that these impossible events had indeed happened to them as children. More recently, Rajagopal and Montgomery (2011) demonstrated the 'false experience effect', whereby being exposed to a high imagery advert for a fictitious product variant of a real brand (e.g., Dial Natural soap) increases the likelihood that participants will falsely believe they have tried the non-existent product and that this is accompanied by a similar increase in favourable ratings as exposure to existing brands. Both of these studies show that participants can be intentionally manipulated by adverts to believe a false message delivered by the advert. But is it possible that adverts may also have unintended side-effects such as inadvertently advertising competitor brands?

To explore this question, we move away from autobiographical memory research and turn to another popular method used to explore memory intrusions. The Deese-Roediger-McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995) is used to investigate memory intrusions for lists of words. In the basic paradigm, participants are presented with lists of words such as 'bed, wake, night, dream', which are associatively related to a non-presented lure word, in this case 'sleep'. In subsequent memory tasks such as free recall or recognition, participants

falsely remember the critical lure even though it was not, in fact, presented. In the seventeen years since the seminal Roediger and McDermott paper, there has been a wealth of research investigating the phenomenon (for a review see Gallo, 2006). One of the reasons for its popularity is that it provides a reliable methodology to explore false memory created by word lists under laboratory conditions (Roediger & McDermott, 1995).

Other stimuli more complex than the original associative word lists have also been used to create false memories in the laboratory, such as associated pictures (Israel & Schacter, 1997), categorised pictures (Seamon, Luo, Schlegel, Greene, & Goldenberg, 2000), emotional stimuli (Howe, Candel, Otgaar, Malone & Wimmer, 2010), popular songs (Sherman & Kennerley, 2013) and, most relevant to the current study, brand names (Sherman & Moran, 2011; Sherman, 2013). Sherman and Moran (2011) presented participants with lists of related brand names (e.g., Morrisons, Sainsbury's, Asda, Waitrose). They then asked participants to complete a mathematical task or free recall task and finally, all participants completed a recognition task. List items were correctly recalled 36% of the time, whilst non-presented lure items (e.g., Tesco) were falsely recalled 5% of the time. For recognition memory, participants correctly recalled list items 81% of the time and falsely recognized the non-presented lures 45% of the time.

There are several theoretical explanations for the creation of false memories using the DRM paradigm. Because we are predominantly interested in using the paradigm to explore false memory creation for non-presented adverts, we will briefly outline just two of the major theories, the activation/monitoring account (e.g., Roediger & McDermott, 1995; Roediger, Watson, McDermott & Gallo, 2001) and fuzzy trace theory (e.g., Reyna & Brainerd, 1995). According to the

activation/monitoring account, activation spreads from studied items, (e.g., HSBC, Lloyds TSB etc.) to related items in a semantic network (e.g., Natwest) (Collins & Loftus, 1975). The activation of related but non-presented items at study contributes to source monitoring difficulties which lead participants to falsely remember them at test. The second account, fuzzy trace theory, posits that we create two parallel memory traces at encoding, a verbatim representation of the perceptual details of each of the items being remembered and a gist trace which represents the overall theme or conceptual relationship shared by the encoded items. According to this account, the verbatim traces are responsible for correct memories whilst the gist representation underlies false memories.

There are increasing numbers of advertisements shown on television and the effects of this 'clutter', both competitive and non-competitive, have been investigated (e.g., Kent & Allen, 1993; Ha & Litman, 1997; Pieters, Warlop & Wedel, 2002). Whilst these studies have found that both types of clutter reduces the effectiveness of adverts by reducing memory for the brands being advertised, no studies have yet been conducted to explore whether competitive clutter increases false recognition or recall of competitor brands. The DRM paradigm provides us with an ideal framework with which to explore the impact of seeing multiple related advertisements. Accordingly, in experiment 1, we present participants with sets of adverts related to specific brand categories (e.g., adverts for beers). We then test their recall and/or recognition memory for the brands presented. Although Sherman and Moran (2011) found false memory for brand names, we might expect that adverts would provide sufficient additional information and imagery so that viewers were better able to discriminate between adverts they had and had not seen.

Previous research investigating effects of modality in the DRM paradigm (e.g., Smith & Hunt, 1998) have found lower levels of false memory following visual presentation of word lists relative to auditory presentation, whilst research using static pictures to induce false memories (e.g., Israel & Schacter, 1997) found lower levels of false recognition using pictures relative to words. We were keen to explore the effect of visual–only presentation of the adverts (analogous to watching television with the sound muted) with visual and auditory presentation (analogous to watching television with the sound on). In order to explore this we showed half our participants the adverts with the sound on and the other half with the sound turned off.

Experiment 1

Method

Participants

48 native English speaking undergraduates from Keele University participated in the experiment. Their mean age was 21 years (SD=0.98) and there were 24 females. They did not receive course credit but were entered into a prize draw for 2 £10 book vouchers as an incentive to participate.

Stimuli

The stimuli were constructed based on a pilot study in which 30 participants (who did not take part in the main study) were asked to write down the first 5 products they could think of related to each of 25 different product categories (e.g., perfumes, soft drinks, mobile phones etc). The responses were collated and rank ordered. 8 categories (shampoos, banks, cars, board games, beers, fast food, chocolate and cleaning products) were chosen based on a combination of factors such as number of responses for each brand, avoiding brand duplication across categories (e.g., Tesco for supermarket and mobile phone provider) and availability of advertisements.

Spoken mention of the brand names ranged from 1-5 per advert (mean = 1.77, SD = .93), whilst visual presentation of the name ranged from 1-16 occurrences per advert (mean = 4.23, 3.47), equating to 5.9 seconds viewing time per advert (SD = 4.9).

For each of the 8 categories, the most popular brand mentioned was used as the critical non-presented lure. Advertisements for 6 of the next most popular brands in each of the 8 categories were sourced from the internet in order to form 'lists' or groups of related advertisements. Six advertisements were chosen for each set in order to avoid the blocks of advertisements becoming too long. The advertisements all contained both visual and auditory brand name references. The 8 sets of 6 adverts were divided into two groups for counterbalancing purposes. Each participant was thus presented with 4 lists of 6 advertisements. Half the participants saw and heard the advertisements, whilst the other half watched the advertisements with the sound off. Recordings of the advertisements used are available from the first author on demand.

Procedure

The study received ethical approval from the School of Psychology Ethics Committee. Participants were tested individually. They were told that they would be presented with a number of video clips and that they would be asked to complete some (unspecified) tasks relating to the clips afterwards. They then watched 4 groups of adverts presented on a computer, which lasted 13.5 minutes in total. Each group of 6 related adverts were presented together and they were preceded with the words 'BLOCK ONE', 'BLOCK TWO' and so on. Two different presentation orders were randomized across participants to prevent order effects, but as per Roediger and McDermott (1995) the order of the brand names in each list was kept constant, with the advert relating to the most frequently produced brand name presented first and the advert relating to the least often produced brand name presented last.

After all the blocks of adverts had been presented, half the participants were asked to spend 5 minutes completing maze puzzles, whilst the other half were given 5 minutes to write down as many brand names from the adverts as they could remember. This, in the spirit of Roediger and McDermott (1995), was to allow comparison of recognition memory both preceded and not preceded by free recall. All participants were then asked to complete a Remember/Know/Guess (RKG) recognition memory task after Tulving (1985). This task comprised 32 brand names presented in a randomised order: 1 non-presented critical lure brand name and 1 presented brand name from each of the 4 seen lists (from position 3 in the presentation order), 1 critical lure brand name and 1 brand name from each of the 4 non-seen lists (from position 3 in the presentation order), and 16 unrelated brand names (2 from each of 8 unused categories). Participants had to circle or underline each item if they recognized it from the study phase of the experiment. For each item identified, they then had to circle an 'R', 'K' or 'G' to the right of that item to indicate whether their memory for the item was highly detailed and vivid (R), certain but less detailed (K) or whether they thought it probably was there but could recall no details for it (G). The instructions were adapted from those published in Dewhurst and Anderson (1999).

Results

Recall

407 brand names were recalled in total. There was correct recall of 391 (68%) list items. There were 5 (5%) lures and 9 related intrusions recalled in total. There were 2 unrelated intrusions. Because the numbers of false recall were so low, no further analyses by participant were conducted.

An item analysis revealed that only the bank category and the beer category gave rise to false recall of the non-presented critical lure item: these gave rise to 8% and 33% of false recall respectively. The categories of cleaning products, cars and shampoos gave rise to related intrusions.

Recognition

The overall results are presented in Table 1. This shows the mean proportions of overall recognition and recognition broken down into R, K and G responses for list items, lures and unrelated (filler) items following audio-visual or visual presentation of adverts[1].

Table 1. Results from Experiment 1 recognition task (SDs in brackets).

	Overall recognition	**Remember**	**Know**	**Guess**
Audio-visual (Recall)				
List items	.833 (.123)	.687 (.241)	.125 (.250)	.021 (.072)
Lures	.167 (.195)	.042 (.097)	.104 (.167)	.021 (.072)
Filler items	.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)
Audio-visual (Maze)				
List items	.896 (.167)	.687 (.285)	.188 (.241)	.021 (.072)
Lures	.292 (.209)	.104 (.129)	.125 (.169)	.063 (.155)
Filler items	.010 (.036)	.000 (.000)	.005 (.018)	.005 (.018)

[1] As indicated in the Method section, the sets of advertisements were counterbalanced. One lure and one list item from each set were included in the recognition test as well as the unrelated filler items. Since participants only incorrectly recognised 2 list items and 2 lures from the counterbalanced lists they were not exposed to, these have been excluded from the results.

Visual (Recall)				
List items	.896 (.128)	.688 (.304)	.146 (.310)	.062 (.113)
Lures	.271 (.328)	.104 (.167)	.104 (.167)	.063 (.155)
Filler items	.047 (.144)	.005 (.018)	.005 (.018)	.037 (.108)
Visual (Maze)				
List items	.979 (.072)	.625 (.272)	.292 (.298)	.062 (.113)
Lures	.437 (.285)	.125 (.199)	.083 (.163)	.229 (.249)
Filler items	.010 (.024)	.000 (.000)	.000 (.000)	.010 (.024)

A 2 x 2 x 3 mixed analysis of variance (ANOVA) with 2 between-subjects factors: intervening task (free recall, maze) and presentation format (audio-visual, visual) and 1 within-subjects variable, stimulus type (list item, lure, unrelated items) revealed a main effect of stimulus type on overall recognition ($F(2,88)=347.30$, $MSE=282.98$, $p<.001$, $\eta_p^2=.88$). Pairwise comparisons (all ps$<.05$) revealed that there were more list items recognised than lure items and more lure items recognised than filler items (.90 vs. .29 vs. .02). There was a main effect of intervening task ($F(1,44)=5.17$, $MSE=327.37$, $p<.05$, $\eta_p^2=.11$), with more items recognised following the maze task than the recall task (.44 vs. .37). Lastly, there was a main effect of presentation format ($F(1,44)=5.99$, $MSE=327.37$, $p<.05$, $\eta_p^2=.12$), with more items recognised in the visual condition than in the audio-visual condition (.44 vs. .37). There were no significant interactions (all ps$<.05$).

There was a main effect of stimulus type on R responses ($F(2,88)=220.04$, $MSE=288.11$, $p<.001$, $\eta_p^2=.83$) and pairwise comparisons revealed that there were more list items remembered than lure items and more lure items remembered than

filler items (.67 vs. .09 vs. .00). There was a main effect of stimulus type on K responses ($F(2,88)=12.77$, $MSE=322.41$, $p<.001$, $\eta_p^2=.23$) and pairwise comparisons revealed that there were more list items known than lure items and more lure items known than filler items (.19 vs. .10 vs. .00). There were no other significant main effects or interactions (all *p*s>.05).

Discussion

The first experiment has demonstrated that false memories, particularly measured by recognition, can be created for brand names when participants are presented with as few as 6 television adverts. The false recognition rates are not as high as correct memory performance, but they are significantly higher than incorrect memory for unrelated filler items. Whereas correct recognition for list items is predominantly reflected in detailed R responses, for false recognition, there is a spread across R, K and G responses. This is consistent with previous research on brand names (Sherman & Moran, 2011) and with research on category based wordlists (e.g., Dewhurst & Anderson, 1999). False recall levels are low, although item analysis reveals that this is partly due to the lists used. It is also likely to be due to the fact that only 6 adverts were presented in each category. Whilst false memories have been found using as few as 3 items from the original DRM lists (Robinson & Roediger, 1997), these occurred at a reduced rate, and brand names already give rise to fewer false memories than associative lists (Sherman & Moran, 2011) so it is likely that the current finding reflects floor effects induced by the number of stimuli presented.

The results from the modality manipulation demonstrate lower levels of false recognition in the audio-visual condition relative to the visual condition. Taken to its logical conclusion, this would suggest that audio-visual (e.g., television) adverts

would be less likely to provide unintended promotion of competitor brands than either auditory only (radio) or visual only (e.g., muted television watching, print media) adverts. However, somewhat unexpectedly, correct recognition was also lower following audio-visual study than visual study. Law and Braun (2000) and Brennan and Babin (2004) explored the effectiveness of product placement in television shows and found that correct recognition of brands was greater following audio-visual exposure than just visual exposure. It is not entirely clear why we found the reverse pattern, although it might be related to the fact that there were more visual presentations of the brand names in most adverts relative to auditory presentations. One possibility is the presence of both auditory and visual information might well have served to divide participant's attention, causing a more conservative response at test for both list and lure items.[2]

The crucial finding from this first experiment however, is that false memories can be created for brands using competitor advertisements. Yet how relevant is this finding for real life exposure to adverts? As Gallo (2010) observes, there are complex differences between the laboratory and real life which can call into question the generalisability of findings from the lab to real life settings and several researchers (e.g., Freyd & Gleaves, 1996) have questioned how relevant the DRM paradigm is to false memories that occur outside the laboratory.

In the second experiment, we seek to use a more naturalistic experimental design, asking participants to watch an episode of a television programme with advert breaks before, during and after the programme. Advertisers often favour certain scheduling slots to screen their adverts, which can mean that competitor adverts can occur within a short space of time. Mandese (1993), for example, reports that in the

[2] Thanks to an anonymous reviewer for this suggestion.

US, 41% of television advertisements aired during prime-time are up against at least one competitor brand being aired within the same hour. In order to retain the spirit of the DRM paradigm whereby related items are presented together, yet also to explore a more realistic scenario whereby they are seen with intervening adverts or indeed sections of the programme being viewed, half the participants saw the advertisements blocked in product categories, for the other half they were randomised.

Drawing on the laboratory based DRM research to inform our hypothesis, McDermott (1996, experiment 2) presented half her participants with 45 words consisting of 3 lists of 15 words either blocked into lists or randomly ordered with no more than 3 related items ever appearing next to each other. The blocked or random presentations were presented 5 times to participants and after each presentation, they had a free recall task. Finally, they were asked to return a day later for a final recall task. Correct recall increased across the trials until the final test a day later when it decreased and was generally better in the blocked condition than the random condition. False recall decreased across trials, but was not eliminated, and then increased the following day. Blocking also marginally increased false memory, so we might expect that blocked presentation of adverts will give rise to higher levels of false recognition.

Lastly, because buying choices are rarely made the instant an advert has been watched, a week long delay between study and test was introduced for half the participants. Research investigating the effects of delay on false memories using the DRM paradigm has so far had mixed results. Payne, Elie, Blackwell and Neuschatz (1996), Thapar and McDermott (2001) and Seamon, Luo, Kopecky, Price, Rothschild, Fung and Schwartz (2002) all found that both true and false recognition decreased over different time spans, but found that false recognition decreased less. In contrast,

Lampinen and Schwartz (2000) and Neuschatz, Payne, Lampinen and Toglia (2001) found that both true and false recognition decreased in a similar way over time with false recognition no greater than true recognition after a two day delay, whilst Colbert and McBride (2007) found that false recognition declines more quickly than correct recognition. These studies all used the original DRM associative lists. Studies using other stimuli, have observed increases in false recognition after a delay. Howe et al (2010, experiment 3) found that adults' false memories for negative-emotional DRM lists increased over a week, whilst those for neutral lists stayed constant. Seamon, et al (2000) found that false recognition for non-presented pictures of items related to presented category pictures increased over 3 days. Most relevant to the current investigation, Sherman (2013) found that false memory for brand names increased over a week in both between and within-subjects designs.

We use recognition for the second experiment, partly due to the low levels of false recall observed in the first experiment and partly because as Law (2002) observes, recognition is "the measure of choice for researchers studying the impact of advertising on consumer memory" (p368). This is based on research by Singh, Rothschild and Churchill (1988) amongst others, whose research suggested that it is "sensitive, discriminating and shows memory loss over time" (p79).

Experiment 2

Method

Participants

40 native English speaking undergraduates from Keele University participated in the experiment[3]. Their mean age was 21.8 years (SD=3.03) and there were 18 females.

Stimuli

Three categories of brands were used as stimuli (beers, cars, banks). These categories had given rise to significant levels of false memory in Sherman and Moran (2010). Five adverts per category from 2010 were downloaded from the internet and arranged into 3 groups (see Appendix 2). These groups of adverts were then spliced as pseudo advert breaks into the recording of an episode of a television programme (Green Wing) so that there was an advert break at the start, middle and end of the programme. Two versions were made, one with adverts blocked with one category per advert break and another with them randomly spread across the 3 breaks. Recordings of the clips and advertisements used are available on request from the first author.

Procedure

The study received ethical approval from the School of Psychology Ethics Committee. Participants were tested individually or in pairs to facilitate timely data collection. They were told that they would be watching a recording of a television programme (Green Wing) and that they would later be asked questions about the characters and events in the programme. The blocked/randomised variable was manipulated between subjects. Half the participants then watched the programme interspersed with blocks of related adverts, whilst half watched the programme interspersed with the same adverts randomised. After the programme, all participants were asked to complete a questionnaire about the programme. Time of test was also manipulated between subjects and so following the questionnaire, half the participants

[3] Whilst the majority of participants received no course credit or financial payment, the final 8 who were collected out of term time did receive book tokens worth £10.

from each of the blocked and randomised groups were asked to complete an R/K/G recognition task for the brands seen during the advert breaks, whilst the other half were asked to return a week later for further questions about the programme. These participants also completed the recognition task when they returned a week later. The recognition task consisted of 3 brand names which had been presented (1 from each set), 3 related but non-presented lure brand names, and six unrelated brand names. The recognition items appeared in a randomised order.

Results

The overall results are presented in Table 2. This shows the mean proportions of overall recognition and recognition broken down into R, K and G responses for list items, lures and unrelated (filler) items at time 1 and time 2.

Table 2. Results from Experiment 2 recognition task (SDs in brackets).

	Overall recognition	**Remember**	**Know**	**Guess**
Time 1 (Blocked)				
List items	.867 (.233)	.600 (.344)	.167 (.176)	.100 (.161)
Lures	.400 (.344)	.133 (.322)	.200 (.233)	.067 (.141)
Filler items	.167 (.314)	.000 (.000)	.050 (.112)	.117 (.261)
Time 1 (Randomised)				
List items	.900 (.161)	.767 (.225)	.100 (.161)	.033 (.105)
Lures	.533 (.391)	.133 (.172)	.167 (.283)	.233 (.274)
Filler items	.067 (.117)	.000 (.000)	.050 (.112)	.017 (.053)
Time 2 (Blocked)				

List items	.900 (.161)	.733 (.306)	.133 (.233)	.034 (.105)
Lures	.933 (.211)	.500 (.423)	.300 (.246)	.133 (.236)
Filler items	.117 (.315)	.017 (.053)	.100 (.263)	.000 (.000)
Time 2 (Randomised)				
List items	.833 (.283)	.633 (.367)	.167 (.236)	.033 (.105)
Lures	.767 (.225)	.333 (.222)	.267 (.306)	.167 (.236)
Filler items	.133 (.205)	.033 (.070)	.050 (.112)	.050 (.081)

A 2 x 2 x 3 mixed analysis of variance (ANOVA) with 2 between-subjects factors: presentation format (blocked, randomised) and time of test (immediate, week later) and 1 within-subjects variable, stimulus type (list item, lure, unrelated items) revealed a main effect of stimulus type on overall recognition ($F(2, 72)=107.81$, $MSE=559.41$, $p<.001$, $\eta_p^2=.75$) and pairwise comparisons showed that there were more list items recognised than lure items and more lure items recognised than filler items (.88 vs. .66 vs. .12). There was also a main effect of time of test ($F(1,36)=5.22$, $MSE=897.38$, $p<.05$, $\eta_p^2=.13$), with more items recognised at time 2 than at time 1 (.61 vs. .49) and a significant interaction between stimulus type and time of test ($F(2, 72)=8.98$, $MSE=559.41$, $p<.001$, $\eta_p^2=.20$). Simple effects analysis revealed that false recognition of lures increased over time (.47 vs. .85, $p<.01$), whilst both list items and filler items remained constant. There were no other significant main effects or interactions (all ps$>.05$).

There was a main effect of stimulus type for R responses ($F(2, 72)=88.38$, $MSE=517.23$, $p<.001$, $\eta_p^2=.71$) and pairwise comparisons showed that there were more list items remembered than lure items and more lure items remembered than

filler items (.68 vs. .28 vs. .01). There was a borderline significant effect of time of test ($F(1, 36)=3.59$, $MSE=882.97$, $p=.07$, $\eta_p^2=.09$) with more R responses at time 2 than time 1 (.38 vs. .27). There was also a significant interaction between stimulus type and time of test ($F(2, 72)=4.76$, $MSE=517.23$, $p<.05$, $\eta_p^2=.12$). Simple effects analysis revealed that remember responses to lures increased over time (.13 vs. .42, $p<.01$), whilst both list items and filler items remained constant. There was a main effect of stimulus type for K responses ($F(2, 72)=6.87$, $MSE=425.67$, $p<.01$, $\eta_p^2=.16$) and pairwise comparisons showed that there were more lure items known than list items or filler items (.23 vs. .14 vs. .06). There were no other significant main effects or interactions (all ps$>.05$).

General Discussion

Results from Experiment 2 confirm the findings from Experiment 1 that false memories can be created using television advertisements. Furthermore, they can be created using a semi-naturalistic methodology whereby they are shown during a television programme. Experiment 2 further extends the findings by revealing an increase in false recognition with a week's delay between study and test.

Exploring the findings from experiment 2 in more depth, there was no main effect of blocking related advertisements together. Whilst this runs counter to the predictions based on the DRM literature (e.g., McDermott, 1996), McDermott did find false memories for the non-blocked items but at a lower rate. Differences in the nature of the stimuli (words vs. adverts) could account for this difference. From an applied perspective, the fact that blocking is not necessary for competitor brand false memories to be created is compelling evidence that this is not simply an artefact of a laboratory experiment, but rather a real concern.

Turning to the effect of time, not only did false recognition increase when a week's interval occurred between study and test, but the increase occurred predominantly in the remember responses. This is consistent with the findings from Sherman (2013) who found that false recall and recognition of brand names increased with a week's delay in both between and within-subjects experiments. The increase in recognition she observed was also reflected in the remember responses. Whilst other DRM researchers who have found an increase in false recognition over time have not used the remember/know procedure (e.g., Howe et al, 2010; Seamon et al, 2000), Holmes and Weaver (2010) did observe an increase in remember responses over time in their study exploring misinformation effects. They asked participants to assemble a package of items to donate to the Salvation Army, including 4 toiletry items. They then received information about previous care packages which either mentioned the same brands that they had packed, or different ones and the same or additional categories of brand. Either 10 minutes or a week later, participants completed a remember/know recognition task for the items they had packed. In the condition in which different categories of brand were suggested, remember responses to falsely remembered items increased over a week.

The increase in false memory over a delay can be accounted for by current theories of false memory, although this is somewhat unsatisfactory because they also accommodate previous findings of decreases over time. For example, according to the activation/monitoring account, activation might be expected to decrease over time, albeit possibly at different rates for presented and non-presented items, thus accounting for observations of differential decreases over time (e.g., McDermott, 1996; Seamon et al 2002). Source monitoring arguably becomes harder over time as more and more memorial details are lost, and thus memory might rely more heavily

on the overall sense of a list, thus keeping false memories to non-presented items higher than correct memories and even causing an increase in false memories over time. Alternatively, test-based associative activation might be responsible for the increase (Gallo, 2006).

According to fuzzy trace theory, the gist trace that is responsible for false memories (and which also gives rise to the subjective experience of familiarity) decays more slowly than the verbatim representation responsible for correct memories (which gives rise to recollection) and so false memories are more persistent than correct memories and even increase over time. Whilst both of these theories can account for the increase in false memories over time, the current findings are problematic for the theories as they are unable to account for the increase in false remember responses observed over time. Instead both theories would predict that any increase in false memories should be reflected in an increase in know (familiarity based) responses.

One possible explanation for the observed increase in both overall false recognition and remember responses is that because advertisements are real life stimuli and advertise products that are all around us, participants are potentially re-exposed to the brands introduced in the advertisements throughout the intervening week between study and test. This might well have the effect of acting as one or repeated study episodes thus a) strengthening the memory for (resulting in increased remember responses) and b) increasing the source confusion for those items. However because the same could be said for associated word lists or negative word lists, this is by no means a definitive explanation and theories need to take these findings into account.

Practical applications

No matter what the precise details of the mechanism underlying the effect are, the current studies have demonstrated that false memories for brands can be induced by watching competitor's advertisements. As outlined in the Introduction, previous research on the impact of advertising has focussed on how effectively adverts can deliberately manipulate people into believing things that aren't true (e.g., Braun et al, 2002, Rajagopal & Montgomery, 2011). Research has also focussed on how both competitive and non-competitive clutter can reduce the effectiveness of advertisements (e.g., Kent & Allen, 1993; Ha & Litman, 1997; Pieters et al, 2002). However, as Hammer, Riebe and Kennedy (2009) suggest more recently, whilst clutter is a concern for advertisers, it is still under-researched. In particular, previous research has only been concerned with whether the brands being advertised have been remembered. Our study is the first to demonstrate that an additional unwanted side effect of clutter is that advertisements can unintentionally promote competitor brands. We have demonstrated this in a traditional laboratory experiment (Experiment 1) and also in a more naturalistic study (Experiment 2). When advertisements are shown during a television programme, even when they are not blocked by category, they still give rise to false memories for non-presented competitor brands and crucially this effect increases over time.

By the very nature of the experiments reported here, the brands used fall into selected product categories. For example, Galaxy, Lindt, Thorntons are all brands of chocolate. What the current experiments do not tease apart and what advertisers might be advised to explore is whether it is the brand name itself or the product being advertised which activates and facilitates memory for their competitor brand/product. Customer-based brand equity occurs when "the customer is familiar with the brand and holds some favourable, strong, and unique associations in memory" (Keller,

1993: 1). A crucial word here is 'unique'. Whilst it might be relatively straightforward for Nike to create a unique brand, when a not-unique product such as a pair of trainers appears in one of their adverts, does this activate other brands which also produce trainers? Should this prove to be the case, Nike might be well advised to focus on advertising its name and building "favourable, strong and unique associations" rather than promoting its latest product. On the other hand, if it is the brand name itself which activates competitors, clearly more work on achieving uniqueness is required.

Further research is also needed to investigate whether the false memory effect – predominantly benefits leading brands or whether there is a more widespread effect and can the effect be reduced, eliminated or potentially even harnessed by advertisers in some way? Although advertisers may be aware that competitive clutter reduces memory for advertised brands, if competitor brands and their products are simultaneously benefitting from the clutter without even being part of it, clearly current approaches to tackling clutter need to be reassessed.

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Appendix 1 – Brands featured in the advertisements in Experiment 1

Category	**Critical lure brand**	**Brands featured**
Banks	Lloyds TSB	Natwest, Barclays, HSBC, Santander, Halifax, RBS
Beers	Carlsberg	Carling, Stella Artois, Heineken, Guinness, Budweiser, Grolsch
Board games	Monopoly	Scrabble, Cluedo, Pictionary, Trivial Pursuit, Articulate, Cranium
Cars	Ford	BMW, Jaguar, Mercedes, Renault, Volkswagen, Audi
Chocolate	Cadbury	Galaxy, Mars, Lindt, Kinder, Milkyway, Thorntons
Cleaning products	Mr Muscle	Dettol, Fairy, Flash, Cif, Cillit Bang, Pledge
Fast food	McDonalds	KFC, Burger King, Subway, Pizza Hut, Dominoes, Wimpy
Shampoo	Head & Shoulders	Herbal Essences, L'Oréal, Pantene, Tresemmé, Aussie, John Frieda

Appendix 2 - Brands featured in the advertisements in Experiment 2

Category	**Critical lure brand**	**Brands featured**
Banks	Natwest	Barclays, Halifax, HSBC, Lloyds TSB, Nationwide, Santander
Beers	Budweiser	Becks, Fosters, Kronenbourg, Heineken, Carlsberg, London Pride
Cars	Ford	Audi, Peugeot, Volkswagen, Volvo, Nissan, Renault

Table 1. Results from Experiment 1 recognition task (SDs in brackets).

	Overall recognition	**Remember**	**Know**	**Guess**
Audio-visual (Recall)				
List items	.833 (.123)	.687 (.241)	.125 (.250)	.021 (.072)
Lures	.167 (.195)	.042 (.097)	.104 (.167)	.021 (.072)
Filler items	.000 (.000)	.000 (.000)	.000 (.000)	.000 (.000)
Audio-visual (Maze)				
List items	.896 (.167)	.687 (.285)	.188 (.241)	.021 (.072)
Lures	.292 (.209)	.104 (.129)	.125 (.169)	.063 (.155)
Filler items	.010 (.036)	.000 (.000)	.005 (.018)	.005 (.018)
Visual (Recall)				
List items	.896 (.128)	.688 (.304)	.146 (.310)	.062 (.113)
Lures	.271 (.328)	.104 (.167)	.104 (.167)	.063 (.155)
Filler items	.047 (.144)	.005 (.018)	.005 (.018)	.037 (.108)
Visual (Maze)				
List items	.979 (.072)	.625 (.272)	.292 (.298)	.062 (.113)
Lures	.437 (.285)	.125 (.199)	.083 (.163)	.229 (.249)
Filler items	.010 (.024)	.000 (.000)	.000 (.000)	.010 (.024)

Table 2. Results from Experiment 2 recognition task (SDs in brackets).

	Overall recognition	**Remember**	**Know**	**Guess**
Time 1 (Blocked)				
List items	.867 (.233)	.600 (.344)	.167 (.176)	.100 (.161)
Lures	.400 (.344)	.133 (.322)	.200 (.233)	.067 (.141)
Filler items	.167 (.314)	.000 (.000)	.050 (.112)	.117 (.261)
Time 1 (Randomised)				
List items	.900 (.161)	.767 (.225)	.100 (.161)	.033 (.105)
Lures	.533 (.391)	.133 (.172)	.167 (.283)	.233 (.274)
Filler items	.067 (.117)	.000 (.000)	.050 (.112)	.017 (.053)
Time 2 (Blocked)				
List items	.900 (.161)	.733 (.306)	.133 (.233)	.034 (.105)
Lures	.933 (.211)	.500 (.423)	.300 (.246)	.133 (.236)
Filler items	.117 (.315)	.017 (.053)	.100 (.263)	.000 (.000)
Time 2 (Randomised)				
List items	.833 (.283)	.633 (.367)	.167 (.236)	.033 (.105)
Lures	.767 (.225)	.333 (.222)	.267 (.306)	.167 (.236)
Filler items	.133 (.205)	.033 (.070)	.050 (.112)	.050 (.081)