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Dissociating explicit and implicit effects of cross-media advertising

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Knowledge of cross-media advertising effects is mainly based on explicit psychological measures, such as self-reports. To fully understand the mechanisms responsible for the success of cross-media advertising, it is important to also use implicit measures. We used both types of measures to assess whether exposure to different media combinations affects the cognitive and evaluative impact of advertising. Results show that participants performed better on all explicit and implicit measures of memory and brand preference after exposure (versus no exposure) to target ads, which validated the use of these measures. Comparison of cross-media versus single medium exposure showed differences on the explicit level, but not on the implicit level. This suggests (1) that cross-media advantages may be driven by explicit rather than implicit memory mechanisms, and (2) that implicit advertising effects may require more drastic manipulations than context changes, such as varying the combination of media used for exposure to advertising.

Keywords: cross-media; advertising effectiveness; implicit measures; implicit memory

1. Introduction

Advertisers have numerous types of media at their disposal. They often follow an integrated marketing communications (IMC) strategy in which they use more than one medium type in their campaigns (Naik and Raman 2003). In such a cross-media campaign, consumers are exposed to advertisements on TV and on the internet, for example, rather than only on TV. The rationale behind this is not only that such cross-media campaigns reach a broader audience than campaigns within a single medium, but also that they affect this audience more effectively (see Voorveld and Valkenburg 2013). However, not much empirical research has been performed on how cross-media campaigns effectively influence consumers, and the known studies have all used *self-reports* to measure the impact of cross-media campaigns (Chang and Thorson 2004; Chatterjee 2012; Confer and McGlathery 1991; Dijkstra, Buijtels, and van Raaij 2005; Edell and Keller 1989; Stammerjohan et al. 2005; Tang, Newton, and Wang 2007; Voorveld, Neijens, and Smit 2011, 2012; Wakolbinger, Denk, and Oberecker 2009). A consequence of using self-reports is that participants are reminded of the exposure to the advertising campaign and/or explicitly asked to recollect or elaborate on this exposure. As we will argue, this will evoke decision strategies that might give a biased and incomplete view of cross-media impact on consumers.

Implicit measures of consumer cognition and evaluation are less susceptible to these issues, and can therefore provide novel insights in advertising effectiveness. Several

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recent studies in advertising have already started using implicit measures to complement or confirm the knowledge that we have gained from self-reports (see Chartrand 2005; Chartrand and Fitzsimons 2011; Dimofte 2010; Duke and Carlson 1993; Krishnan and Chakravarti 1999 for an overview, and for applications in advertising see Lee 2002; Maison, Greenwald, and Bruin 2004; Northup and Mulligan 2013; Shapiro 1999; Shapiro and Krishnan 2001; Shapiro, MacInnis, and Heckler 1997; Yoo 2007, 2008). However, this implicit approach has not yet reached cross-media investigations. We add implicit measures to our examination of cross-media effectiveness to fill in this gap in the cross-media literature, which is dominated by explicit measurements and has therefore formulated theories that largely depend on explicit memory processes. Furthermore, the addition of implicit measures increases the validity of cross-media research, both because these measures do not rely on the elaborative decision-making strategies that explicit measures do rely on (which may not be natural or which may give away the researcher's hypothesis), and because this allows additional, potentially implicit, processes to manifest. Finally, regardless of whether any implicit processes are detected, any *dissociation* (discrepancy, difference) between the findings from explicit and implicit measurements will give a more complete account of the psychological mechanisms that underlie cross-media effectiveness. As will become clear, the results do indeed support a dissociation between explicit and implicit measurements of cross-media impact. This dissociation defines the boundaries of cross-media effects, and thereby also defines *the circumstances under which cross-media advertising is effective*. This is not only a valuable contribution to the scientific literature, but further research along these lines will also be important for practice to create optimal advertising strategies. In the next sections, we will discuss these points one by one.

1.1. The history of cross-media research

The rationale behind cross-media advertising is that the different medium types can create a super-additive effect, a *synergy effect*, in which the impact of a combination of media exceeds the impact of the sum of its individual parts (Naik and Raman 2003). The ultimate goal of cross-media advertising therefore is to evoke synergy and create the greatest possible persuasion effect (Caywood, Schultz, and Wang 1991, in Chang and Thorson 2004). The known studies on cross-media effectiveness have used different measures of persuasion effects, which can broadly be divided into two categories: cognitive impact and evaluative impact. Studies on cognitive impact have assessed, for example, whether cross-media campaigns result in more attention to the message (e.g., Chang and Thorson 2004; Tang, Newton, and Wang 2007), more or different thoughts evoked by the message (e.g., Chang and Thorson 2004; Edell and Keller 1989; Voorveld, Neijens, and Smit 2011), or better memory for the brands (e.g., Chatterjee 2012; Tang, Newton, and Wang 2007). Studies on evaluative impact have examined, for example, whether cross-media exposure results in an improved brand attitude (e.g., Chatterjee 2012; Edell and Keller 1989; Voorveld, Neijens, and Smit 2011) or an increased intention to purchase the brand (e.g., Dijkstra, Buijtels, and van Raaij 2005; Voorveld, Neijens, and Smit 2011). Despite some mixed results, these studies indeed generally showed an advantage of cross-media campaigns over single-medium campaigns with respect to their cognitive and evaluative impact on consumers.

But what are the mechanisms that underlie these cross-media advantages? Different studies have provided different interpretations of the nature of cross-media synergy effects. The suggested processes that are held responsible for these effects include encoding variability (e.g., Stammerjohan et al. 2005; Tavassoli 1998; Unnava and Burnkrant

1991), repetition–variation (e.g., Gibson 1996; Schumann, Petty, and Clemons 1990; Stammerjohan et al. 2005; Yaveroglu and Donthu 2008), complementarity (Dijkstra 2002), differential attention (MacKenzie 1986; Stammerjohan et al. 2005; Unnava and Burnkrant 1991), and forward encoding (e.g., Dijkstra 2002; Edell and Keller 1989; Voorveld, Neijens, and Smit 2011). Reviewing these accounts reveals that they are all built upon one general underlying axiom, that being *variability*. This axiom dictates that processing information across different medium types causes more variability in the encoding and retrieval of the information than (repeatedly) processing information within a single medium.[1] How this is cognitively advantageous is best explained by the encoding specificity principle of Tulving and Thomson (1973).

According to this principle, the memory trace of an event is determined by the specific encoding operations evoked by a situation. Thus, when a similar message is presented in two different media, it will be encoded in two different ways in the brain of the consumer. In other words, two different memory pathways are created for this message. As a result, advertising in multiple media should lead to a broader, more complex memory network with more memory traces (pathways) for a single concept than advertising within a single medium. This leads to a cognitive advantage, because a broader associative network enhances the likelihood that the information will be effectively retrieved (cf., Tulving and Thomson 1973). This process of creating new memory structures and effectively retrieving the information from these structures is at the core of how *explicit* (episodic) memory works (e.g., Anderson et al. 1998; Bower 1996). Thus, as the present review of the literature shows, cross-media effectiveness has been examined with explicit measurements only, and theory has therefore been based on explicit retrieval processes only. We argue that implicit measurements are necessary to either complement these explicit theories (in case implicit memory processes also play a part) or verify these theories (in case no evidence for implicit processes is found).

1.2. Increasing validity: explicit versus implicit measures

Explicit (self-report) measures in cross-media research explicitly remind participants about prior ad exposure and/or require them to consciously recollect or elaborate on aspects of this exposure (cf., the definition by Schacter 1987). This has several negative consequences for the assessment of consumer responses to cross-media advertising, three of which we will discuss. Consider a case in which participants are presented with ads in different media combinations, after which they are asked to report about their recall of the brands from the ads, their attitudes towards these brands, and their intention to purchase these brands.

A first problem is that participants are explicitly reminded of the prior exposure, in this case by referring to the event during which the ads were viewed (recall) or referring to the brands in the ads (attitude and purchase intention). In a natural situation, however, people might not explicitly think about exposure to ads when evaluating or selecting a brand. Asking people to use strategies that they would not normally use may affect their preferences and decisions in ways that are alien to an actual decision situation. This limits the ecological validity of the findings (Duke and Carlson 1993). For a successful measurement of cross-media impact, it is important that the strategies during the test procedure match the strategies used by the consumer in a naturalistic setting.

Second, explicitly asking such questions after a manipulation can make participants aware of the researcher's hypothesis (Newell and Shanks, in press), which is sufficient to make them act accordingly (e.g., Doyen et al. 2012). This is especially relevant

considering that many participant samples consist of students, who often have at least some familiarity with experimental procedures and manipulations. For example, all of the samples in the cited experimental studies on cross-media effectiveness consisted of students, and these students were often even enrolled in an advertising curriculum. This could have increased their sensitivity to the experimenters' hypotheses and may have biased their task performance in the direction of the hypotheses.

Third, asking participants to consciously reflect about their mental processes may not yield reliable results, because most cognitive and behavioural processes have unconscious roots. Though this may not necessarily be an issue when measuring an outcome (e.g., recall or attitude), it is problematic when asking about the processes that underlie these outcomes (e.g., asking what people thought during the task or asking how they reached a certain decision). Research has shown that consumer behaviour is often mediated by processes that occur outside of conscious awareness (Chartrand 2005). If people are asked about processes of which they have little or no conscious awareness, their mental content is likely inaccessible to introspection (Nosek, Hawkins, and Frazier 2011; Wilson and Brekke 1994), after which they may create a memory in hindsight (Roediger 1990) that can be based on false lay beliefs about the mind (Nisbett and Wilson 1977; Wilson and Brekke 1994).

Contrary to self-reports, implicit measures do not explicitly refer to a prior experience and do not require conscious or intentional recollection of this experience (cf., Schacter 1987). They measure whether people's performance on a seemingly unrelated task has improved as a result of having experienced a prior event (Roediger 1990; Roediger, Guynn, and Jones 1994; Schacter 1987). On implicit memory tests, for example, participants are not asked to recollect the words or ads they have previously seen, but they are asked to report the first word or brand that comes to mind. This way, task performance can be used as an index of whether prior exposure to ads affected the participant without requiring conscious recollection of this exposure, which benefits the validity of the findings.

1.3. Dissociating mechanisms: explicit versus implicit processes

It is important to distinguish between implicit and explicit *measures* and *processes*. Whereas people's performance on explicit memory measures (in the lab) depends on explicit retrieval processes (in the brain), this relationship is not as simple for implicit measures and processes. Though implicit measures are able to detect implicit processes, they do not by definition do so. That is, there is no guarantee that implicit measures do not pick up on explicit processes as well (for excellent discussions of this point see e.g., Gawronski 2009; Gawronski, LeBel, and Peters 2007). For this reason, it can be important to use both types of measures when assessing psychological processes: any dissociations between the two types of measurements give information on the relative contribution of explicit (elaborative) and implicit (subconscious) processes. Such a dissociation indicates that there must have been a difference in the underlying processes. For example, finding implicit but not explicit effects indicates that implicit processes must have played a part in people's task performance, and vice versa.

In one of the earliest and most famous dissociation studies, for example, Graf and Schacter (1985) used explicit and implicit memory measures on amnesic patients. They found that amnesiacs performed worse than healthy participants on explicit measures, but similar on implicit measures. These findings demonstrated that, though amnesic patients are impaired when explicitly recollecting a prior experience (because they are unable to create a new memory pathway for the new experience), they have an intact ability to strengthen existing memory pathways (associations) based on prior experience. Since this

finding, many more studies have found dissociations between explicit and implicit measures that have provided vital novel insights in the mechanisms that underlie human behaviour (see, e.g., Shapiro and Krishnan 2001; van Reijmersdal, Rozendaal, and Buijzen 2012; Waiguny, Nelson, and Marko 2013; Yang et al. 2006; Yang and Roskos-Ewoldsen 2007; Yoo 2008 for dissociations between implicit and explicit measures of memory and attitudes in communication research).

We focus on the addition of implicit measures to extend cross-media theory, which is currently primarily based on explicit measures and processes. Given that the state of the art in cross-media research has demonstrated explicit advantages of cross-media over single medium advertising, we hypothesize to replicate these findings and find cross-media advantages on our explicit measures of brand memory and brand evaluation. Importantly, we further ask whether cross-media exposure to ads also has a positive effect on implicit measures of memory and evaluation, or whether a lack of implicit effects reveals a dissociation that defines the boundaries of cross-media advertising impact.

2. Research method

2.1. Stimuli

2.1.1. Pre-test

In the experiment, participants were presented with existing advertising messages (from English-speaking countries other than the United States, e.g., Australia and England) to increase the external validity of the messages. Because brand familiarity can affect the effectiveness of an ad (e.g., Campbell and Keller 2003), we performed a pre-test to select real but unfamiliar brands. The brands all belonged to low-involvement products. Fifty-two participants were recruited online through Amazon's Mechanical Turk (http://www.mturk.com). They were asked whether they recognized each of the depicted brands for each of the presented products (yes/maybe/no). Based on the results, we selected two unfamiliar target brands, *Pauls milk*^{TM} (no recognition by 100% of the participants) and *Lurpak*$^{®}$ *butter* (no recognition by 94% of the participants) and 14 unfamiliar brands that served as fillers ($M = 98\%$, $SD = 1.73\%$).

2.1.2. Selection

For each of the two target brands (*Lurpak*$^{®}$ *butter* and *Pauls milk*^{TM}), we selected two different TV commercials and two different web pages. As a result, the message content was different in each exposure, even when the type of medium was repeated (TV−TV or web−web). This reduces the chance of satiation effects that occur when the same content is presented repeatedly (Grass and Wallace 1969, for an example see, e.g., Lehnert, Till, and Carlson 2013), which might otherwise confound any differences between exposure across media versus within a single medium. In other words, if message content in the ad presentations had been different across media types but the same within media types, then any potential cross-media advantage could be the result of either variability in media or variability in messages. By introducing similar message variability in all conditions, the cross-media condition had only one single source of variability over the single-medium condition, being the critical difference in media types. As a result, the difference in media types is the only source of variation that could cause an advantage of the cross-media condition over the single-medium condition. Filler materials consisted of seven TV commercials and seven websites for other brands. The TV commercials were original

commercials of less than 30 seconds that were taken from YouTube; the websites were original web pages that contained detailed information about a specific product of the brand (see Appendix 1).

2.2. Participants

By recruiting participants online and presenting the experiment in an online environment, we aimed to get a heterogeneous sample. This way, (1) we would be able to generalize our findings beyond student samples, (2) the participants would less likely be aware of the experimenter hypothesis, and (3) they could perform the experiment in their own private environment to simulate a naturalistic browsing setting (as compared to a lab setting). Four-hundred-and-eighty-four participants were recruited through Amazon's Mechanical Turk (http://www.mturk.com). The sample age ranged from 18 to 69 ($M = 32.82$, $SD = 11.16$) and consisted of 233 females (48.14%). Their highest achieved education level varied from middle school to graduate degree (38.02% bachelor's degree, 30.17% college without degree, 12.40% high school, 9.92% graduate degree, 9.30% associate's degree, 0.21% middle school). The majority reported participating in a quiet environment with no (72.31%) or few (14.88%) distractions.[2] All participants were residents of the USA and were compensated with US $1.10 for their participation. Participation took approximately 22 minutes.

2.3. Design

Participants performed a task that consisted of three phases: an ad presentation phase, an implicit measurement phase, and an explicit measurement phase. For the ad presentation phase, a mixed-model mixed-level design was used with *ad exposure* (experimental/control) as a between-subjects factor and *media combination* (cross/single) as a within-subjects factor. The design was mixed-level because the factor media combination was only manipulated in the experimental condition (exposure to target ads) and not in the control condition (exposure to control ads). Given that we were only interested in the impact of ad exposure and media combination, and not in any differences between stimuli (target brands) or order of presentation (order of medium types), we adopted a fully counterbalanced design for brands and medium types across subjects.[3] This perfectly counterbalanced design allows us to only analyse the relevant factors ad exposure and media combination, and exclude any potential confounding influences with respect to stimulus assignment or presentation order (cf., Raaijmakers, Schrijnemakers, and Gremmen 1999). After being presented with the ads (phase 1), participants were asked to perform different tasks, including one of four implicit tasks (phase 2) and three explicit tasks (phase 3). This procedure was designed to minimize contamination or carryover across tasks and to minimize participants' potential awareness of experimental purposes and hypotheses. For a schematic depiction of the design, see Figure 1.

Participants were randomly assigned to one of the ad presentation counterbalance lists ($N = 80-81$ per list; see upper section of Figure 1) and one of the four implicit tasks ($N = 121$ per measure; see middle section of Figure 1), but to all three explicit tasks ($N = 484$ for each measure; see bottom section of Figure 1).

2.4. Procedure

The experiment was programmed and presented in the online Qualtrics survey research suite (http://qualtrics.com). For the sake of transparency, we have kept the experiments

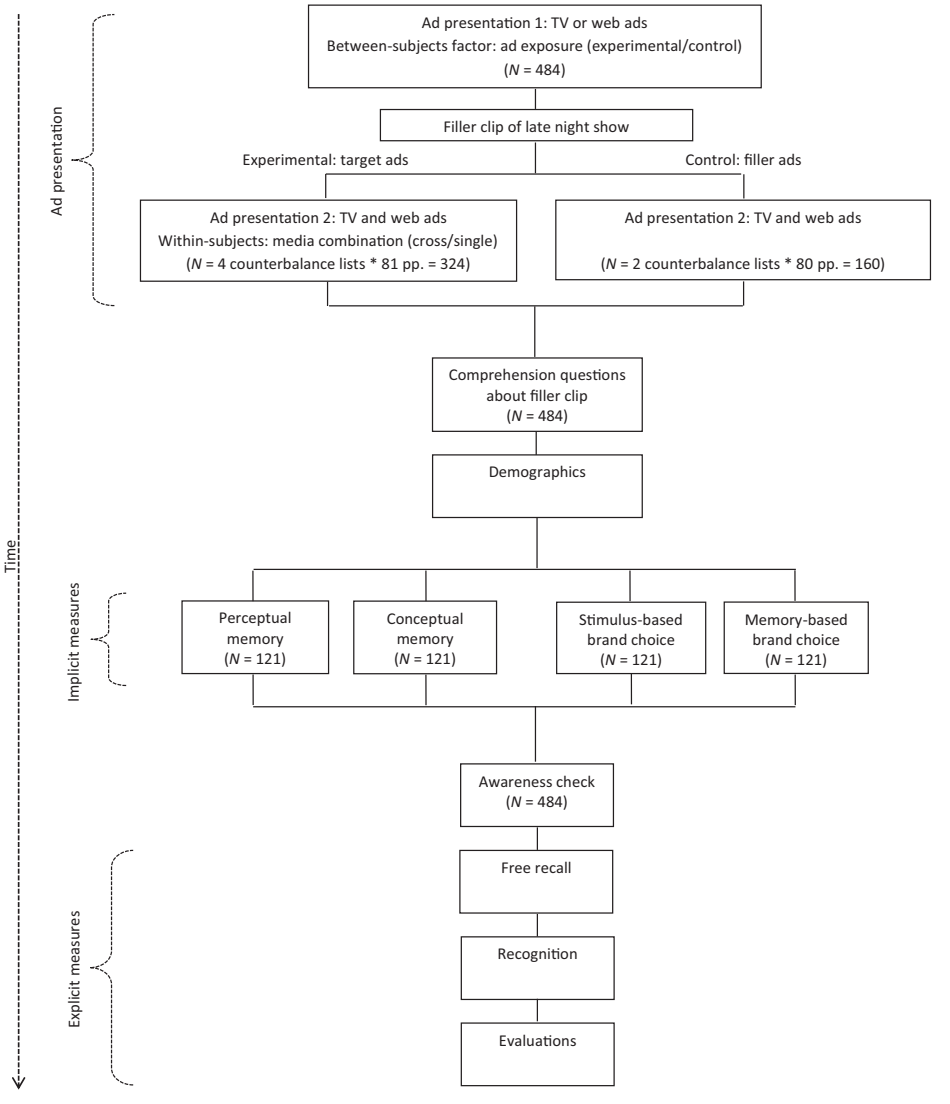

Figure 1. Experimental design.

available in Qualtrics. Click on one of the links in Appendix 1 to follow the procedure of the entire experiment as it was presented to the participants.

In the ad presentation phase, participants were informed that they would browse the internet to watch a video and look at several web pages. In this phase, participants were exposed to commercials and websites either in the experimental condition or in the control condition (factor *ad exposure*). Participants in the experimental condition were presented with target ads within a single medium (either TV−TV or web−web) as well as target ads across media (either TV−web or web−TV), reflecting the factor *media combination*. Participants in the control condition were presented with filler ads only. The first and second ad presentations were always separated by a 4.5-minute clip of a late-night show, to create a more realistic media exposure.

Presentation of the commercials and websites in the experimental condition occurred as follows. First, participants were presented with either commercials (two target ads (T) and three filler ads (F) in a fixed sequence: FTFTF) or web pages (two target ads and one filler: TFT). Second, they watched the clip of the late-night show. Third, they were presented with commercials (one target ad and two filler ads, FTF) as well as websites (the other target ad and two filler ads, FTF). The TV clip was constructed so the TV commercials immediately preceded and followed the clip of the late-night show within the same URL. The web pages were presented as individual URLs to the original websites.

For the TV clip, participants were instructed to click on play and attend to the clip from start to finish. For each of the websites, they were separately instructed to click on the link, attend to all the information on the web page, and close the window to return to the experiment once they had done so. After this ad presentation phase, participants answered questions about the clip of the late-night show. This way we aimed to divert their expectancies about the purpose of the experiment and check whether they had attended the entire clip. After that, they filled out demographic measures to keep them occupied for several minutes and separate the ad presentation phase from the implicit measurement phase.

In the implicit measurement phase, participants performed one of four implicit tasks (cf., Lee 2002), consisting of two memory measures (a perceptual word-fragment completion task and a conceptual brand name generation task) and two evaluative measures (a perceptual stimulus-based brand choice and a conceptual memory-based brand choice) which will be thoroughly explained in section 2.5.2. Afterwards, participants were asked about the perceived purpose of the of the study, after which they were asked more specifically whether they were aware of any overlap between the task they had just performed and the ad presentation phase. This was a funnel procedure in which each following question was more directive than the previous (cf., Northup and Mulligan 2013). The results of this procedure could range from no awareness of any overlap, to full awareness of the overlap between the brands in both phases and using it to complete the implicit tasks.

In the explicit measurement phase, participants performed three explicit tasks: two memory measures (recall and recognition) and one evaluation measure (brand attitude). Finally, they filled out several control questions (e.g., on whether they were familiar with the presented brands before the study).

2.5. *Measures*

2.5.1. Independent variables

2.5.1.1. Ad exposure. Ad exposure (experimental/control) was a between-subjects factor. This factor was added to validate whether the implicit measures were indeed sensitive to ad exposure. All measures were designed to test participants' memory and evaluation of the brands in the target ads. Any increase in performance of the experimental group who saw the target ads compared to the control group who saw the filler ads would show that the implicit measures are sensitive to exposure of the selected ads in the selected media types. This would validate the implicit measures and allow for a further assessment of implicit cross-media effectiveness.

2.5.1.2. Media combination. Media combination (cross/single) was a within-subjects factor that existed within the experimental condition. Participants who were exposed to the target ads saw certain ads within a single medium (TV−TV or web−web) and other

ads across media (TV−web or web−TV). We designed media combination as a within-subjects factor to decrease the need to run more participants (i.e., increase the power) and to optimize the probability of finding effects of media combination, because error estimation could account for within-subjects variability (see, e.g., Gonzalez-Marquez, Mittleberg, Coulson, and Spivey 2007, 69−70, for an explanation of the advantages of within subjects designs).

2.5.2. *Dependent variables*

Different types of implicit measures are affected by different types of psychological processes (see Roediger, Srinivas, and Weldon 1989 for an overview; see, e.g., Smit, Neijens, and Heath 2013 for an explanation of these different processes in advertising). Bottom-up measures reveal processes that are driven by information available in the physical environment, whereas top-down measures reveal processes that are driven by conceptual information available from memory. Because both types of processes differently contribute to advertising effectiveness (for an important demonstration of this, see Lee 2002), it was necessary to include both types of measures in our cross-media assessment of advertising effectiveness. This way, we would not neglect any type of advantage of cross-media ad exposure over single-medium ad exposure, which would leave us with an incomplete view of implicit ad effectiveness. Furthermore, inclusion of both types of measures would allow us to pinpoint what type of mechanism would be responsible for a cross-media advantage if it occurred. We selected a bottom-up and a top-down measure of memory (perceptual and conceptual memory, respectively), as well as a bottom-up and a top-down evaluative measure (stimulus-based and memory-based brand choice, respectively), inspired by the measures used in Lee (2002). For comparison to the existing cross-media literature, we also included several explicit measures of memory (free recall and recognition) and preference (brand attitude) that have been proven to be affected by cross-media exposure in earlier research.

2.5.2.1. Perceptual memory (word fragment completion task, see, e.g., Srinivas and Roediger 1990). Participants were instructed to complete 19 word fragments that could spell a brand, product, or brand claim. The word fragments were presented on one page, and participants were asked to click on the 'next' button once they had completed as many word fragments as possible. Seven[4] target word fragments could be related to the target brands (L_RP__ for Lurpak, BU___R for butter, etc), whereas the remaining 12 word fragments could not be related to any of the presented brands (e.g., A_PL_ for apple). If participants completed a target word in terms of the presented brand advertisements, their response was scored as 1; otherwise it was scored as 0, after which the average score per brand was calculated.

2.5.2.2. Conceptual memory (brand name generation task, top of mind procedure, cf., Srinivas and Roediger 1990). Participants were instructed to come up with as many brands as possible for each of five product types during 45 seconds (cf., Lee 2002). Each product type was presented on one page, and the test auto-advanced to the next page once the 45 seconds had passed. The order of the product types was randomized across participants. Two product types (butter and milk) could contain target brands, whereas the remaining three product types were filler brands that were unrelated to any of the products or brands that were presented in the ad presentation phase. For each target product type,

the response was scored as 1 if participants had entered the target brand name; otherwise it was scored as 0.

2.5.2.3. Stimulus-based brand choice. Participants were asked to organize brand names for each of five different product categories in their preferred order, comparable to sequentially selecting brands in their preferred order in a supermarket (cf., Lee 2002). On each page, they were presented with images of five different brands of a product type in a horizontal fashion, like on a supermarket shelve. Underneath this row, a column of the corresponding five brand names was presented. Participants could drag and drop these names into their preferred order, with the top being most preferred (position 1) and the bottom being least preferred (position 5). They were instructed to click on the 'next' button once they were finished on a page, to continue to the next product type. The order of the product types was randomized across participants. Two of the products (butter and milk) contained a target brand. For each target product type, the target brand was scored according to its position in the list (1−5).

2.5.2.4. Memory-based brand choice. Participants were asked to list brand names in their preferred order for each of five different products, similar to making a shopping list from memory (cf., Lee 2002). Each of the product type names was displayed on one page. The order was randomized across participants. Two product types could contain target brands (butter and milk). For each target product type, the response was scored as 1 if participants had entered the target brand name; otherwise it was scored as 0.

2.5.2.5. Free recall. Participants were instructed to recall as many brand names as possible from all of the presented commercials and websites. Each target brand was scored as 1 if it was recalled by the participants; otherwise it was scored as 0.

2.5.2.6. Recognition. Participants were asked to select out of 10 brand names the ones that had previously been presented. Two of the displayed brand names were the target brands, two were filler brands that had been presented during the ad presentation phase, and the remaining six were novel brands. For each of the target brand names, the response was scored as 1 if participants had selected it; otherwise it was scored as 0.

2.5.2.7. Evaluation. Participants were instructed to evaluate the two previously presented target brands along a four-item, 5-point semantic differential scale identical to that of Chang and Thorson (2004), being very likable/not very likable, interesting/not interesting, good/bad, and appealing/not appealing (Cronbach's alpha = 0.92). Both brands were presented on one page. The scores per brand were averaged over items, with a higher score indicating a better attitude towards the brand.

3. Results

3.1. Control measures

Participants who did not watch the entire video clip (as measured by viewing time in seconds and/or self-report, $N = 42$) or who did not show any overall memory for the presented ads ($N = 9$) were excluded from the data analysis, because they did not follow the instructions. Also, participants who were already familiar with the target brands before

exposure ($N = 9$) were excluded because their data could contaminate the exposure and cross-media effects.[5]

Next, we checked participants' awareness of the overlap between the brands in the ad presentation phase and those in the implicit tasks (assessed by the funnel procedure), and their awareness of our cross-media manipulation (assessed by an open ended question about the perceived purpose of the experiment). Responses to the open-ended question showed that none of the participants reported being aware of any link between cross-media (versus single-medium) exposure and the constructs we aimed to measure. Despite our efforts to minimize participants' awareness, responses to the funnel procedure showed that 10.61% of the participants reported being aware of the link between the brands in the ads and those in the implicit measures and using it to complete the implicit tasks. We did not exclude these participants from the sample because we could not exclude the possibility that they made this link in retrospect rather than during the task (i.e., this test is very conservative, cf., Northup and Mulligan 2013), because they performed the tasks as instructed (unlike the excluded participants discussed above), and because they did not significantly alter the outcomes of the implicit measures.

3.2. *Validation: effects of ad exposure*

To validate the measures, we tested whether participants performed better on each of the seven measures after exposure to the target commercials in the experimental condition than after being exposed to the control condition. The battery of tests we used consisted of four measurements at a nominal level (with values being either 0 – no target brands selected, 0.5 – one target brand selected, or 1 – both target brands selected in the measures of conceptual memory, memory-based decisions, recall, and recognition) and three measurements at an interval level (with values ranging between 0 and 1 for perceptual memory and between 1 and 5 for stimulus-based decisions and attitude, averaged across the two brands). The nominal dependent variables were analysed with Chi-square tests over crosstabs, and the interval dependent variables were analysed with two-tailed independent-samples *t*-tests with exposure (experimental/control) as a between-subjects factor.[6] Each of the analyses below presents mean scores which have a straightforward meaning for the interval variables, but not for the nominal variables. The displayed means per condition of the nominal variables (conceptual memory, memory-based decisions, free recall, and recognition) reflect the percentage of participants that entered at least one of the two target brands in that condition.

The results showed that participants performed significantly better on each of the seven measures after exposure to the target commercials than after no exposure. For a clear depiction of the results in Figure 2, we rescaled the raw scores into the proportion of correct responses to the target brands. The analyses, however, were performed on the actual scores.

Participants' awareness of the target brands was better after exposure to the target brands (experimental condition) than after exposure to only filler brands (control condition). That is, participants completed more word fragments in terms of the target brands (perceptual memory: $M_{exp} = 0.29$, $M_{no\text{-}exp} = 0.15$, $t\ (99.12) = 3.69$, $p < 0.001$, $\eta^2 = 0.10$), they included more target brands in the top-of-mind procedure (conceptual memory: $M_{exp} = 59.38$, $M_{no\text{-}exp} = 2.33$, $X^2\ (2) = 36.19$, $p < 0.0001$, $\varphi = 0.58$), they had a better recollection of the target brands (recall: $M_{exp} = 75.10$, $M_{no\text{-}exp} = 2.40$, $X^2\ (2) = 215.37$, $p < 0.0001$, $\varphi = 0.71$), and they were more likely to recognize these brands (recognition: $M_{exp} = 98.05$, $M_{no\text{-}exp} = 11.38$, $X^2\ (2) = 335.90$, $p < 0.0001$, $\varphi = 0.89$). Though

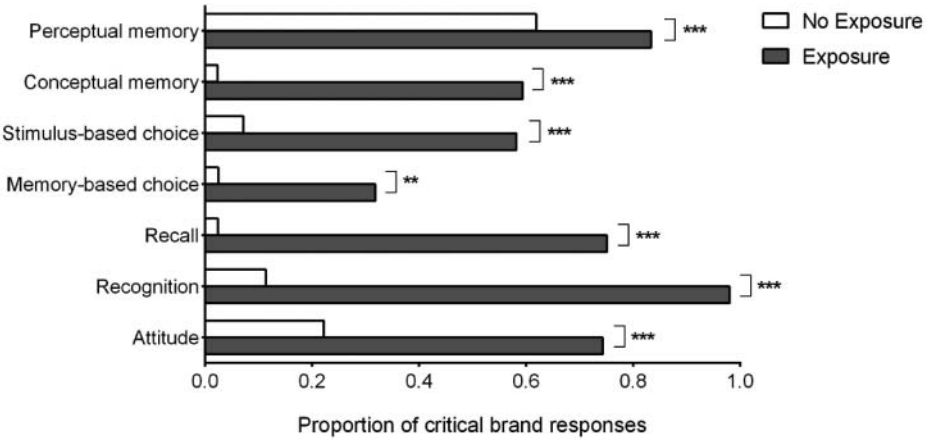

Figure 2. Mean proportions after exposure to target ads (exposure) versus control ads (no exposure). Note: The x-axis indicates the percentage of correct responses; the y-axis indicates the dependent variables. Asterisks indicate significant differences between ad exposure conditions (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$). For all the (rescaled) variables the rule is: the greater the percentage, the better the performance. For the nominal dependent variables (conceptual memory, memory-based decisions, free recall, and recognition), the figure depicts the percentage of participants who correctly recalled one or both target brands; for the interval dependent variables perceptual memory and attitude, it displays the percentage of participants within a condition who scored equal to or above the median score; for the interval variable stimulus-based decisions, it displays the percentage of participants within a condition who scored *below* the median score, because this scale is reversed as a result of participants organizing brands from position 1 (most preferred) to position 5 (least preferred).

it may be obvious that people can only explicitly recall and recognize brands that they were previously exposed to, these findings show that even the implicit (perceptual and conceptual) memory measures were sensitive to prior ad exposure. Furthermore, participants' evaluation of brands was better after exposure to the target brands than after exposure to only filler brands. They placed the target brands higher in their preferred rank order ($M_{exp} = 2.16$, $M_{no\text{-}exp} = 3.56$, t (99.81) $= 7.48$, $p < 0.0001$, $\eta^2 = 0.32$), were more likely to include them in their consideration set (memory-based brand choice: $M_{exp} = 31.82$, $M_{no\text{-}exp} = 2.50$, X^2 (2) $= 12.70$, $p < 0.005$, $\varphi = 0.35$), and reported a higher attitude towards these brands ($M_{exp} = 3.78$, $M_{no\text{-}exp} = 2.94$, t (356.22) $= 11.55$, $p < 0.0001$, $\eta^2 = 0.24$).

In all, the results show that participants had a significantly better memory and a higher preference for the brand after exposure, measured both explicitly and implicitly. Importantly, these results validate the adopted implicit measures of memory (perceptual and conceptual) and evaluation (stimulus-based and memory-based brand choice) for exposure to the current advertising campaigns.

3.3. Effects of media combination: cross- versus single-media exposure

To examine how cross-media exposure affects explicit and implicit measures of brand awareness and brand preference, we assessed whether participants performed each of the tasks better after exposure to cross-media ads than after exposure to single-medium ads. Because the analyses included the within-subjects factor media combination, the nominal variables were analysed with McNemar's Chi-square tests over crosstabs, and the interval

variables were analysed with two-tailed paired-samples *t*-tests. The displayed means per condition of the nominal variables (conceptual memory, memory-based decisions, free recall, and recognition) reflect the percentage of participants that entered the target brand in that condition.

The results of these analyses showed that the participants performed significantly better on each of the explicit measures for the cross-media brand compared to the single medium brand (see Figure 3). However, differences between cross-media and single-medium exposure for the implicit measures were not significant.

Specifically, participants' explicitly tested memory of the target brands was better after cross-media exposure than after single-medium exposure, but this was not the case for the implicitly assessed memory. Whereas participants had a better recollection of the cross-media brands (recall: $M_{cross} = 59.53$, $M_{single} = 50.19$, X^2 (1) = 5.54, $p < 0.05$, $\varphi = 0.19$), and were more likely to recognize these brands (recognition: $M_{cross} = 87.16$, $M_{single} = 78.99$, X^2 (1) = 5.73, $p < 0.05$, $\varphi = 0.06$), they did not complete significantly more word fragments in terms of the target brands (perceptual memory: $M_{cross} = 0.30$, $M_{single} = 0.28$, t (59) = 0.54, $p > 0.58$), nor did they include significantly more cross-media brands in the top-of-mind procedure (conceptual memory: $M_{cross} = 40.63$, $M_{single} = 39.06$, X^2 (1) = 0.04, $p > 0.99$). Furthermore, participants' explicitly assessed evaluation of brands was better after cross-media exposure than after single-medium exposure, but this was not the case for implicitly assessed brand evaluations in terms of brand choice. Though participants reported a higher attitude towards cross-media brands (attitude: $M_{cross} = 3.85$, $M_{single} = 3.71$, t (256) = 2.75, $p < 0.01$, $\eta^2 = 0.03$), they did not place these brands significantly higher in their preferred rank order ($M_{cross} = 2.06$,

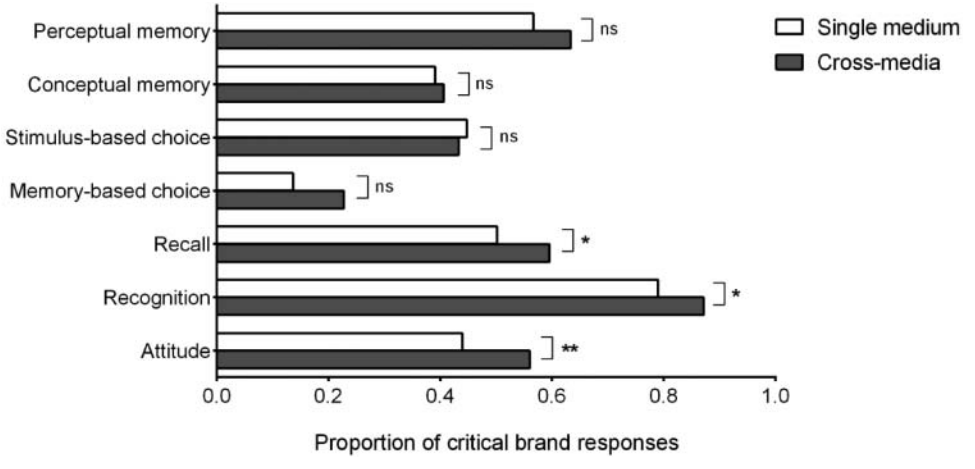

Figure 3. Mean proportions after cross-media versus single medium exposure to target ads.
Note: The x-axis indicates the percentage of correct responses; the y-axis indicates the dependent variables. Asterisks indicate significant differences between exposure conditions (ns = non-significant, * $p < 0.05$, ** $p < 0.01$). For all the (rescaled) variables the rule is: the greater the percentage, the better the performance. For the nominal dependent variables (conceptual memory, memory-based decisions, free recall, and recognition), the figure depicts the percentage of participants who correctly recalled the target brand; for the interval dependent variables perceptual memory and attitude, it displays the percentage of participants within a condition who scored equal to or above the median score; for the interval variable stimulus-based decisions, it displays the percentage of participants within a condition who scored *below* the median score, because this scale is reversed.

$M_{single} = 2.25$, $t\,(66) = 1.05$, $p > 0.29$), nor were they significantly more likely to include them in their consideration set (memory-based brand choice: $M_{cross} = 22.72$, $M_{single} = 13.64$, $X^2\ (1) = 2.00$, $p > 0.23$). These results indicate that cross-media effects only occurred on the explicit tasks, in which participants were explicitly reminded of prior exposure.[7].

4. Discussion

In this exploratory study, we were, to our knowledge, the first to combine implicit and explicit measures to assess cross-media advertising impact on consumers. The results were based on a fairly heterogeneous (non-student) sample that watched ad campaigns in a private (non-lab) environment. Furthermore, the repeated exposures (either within or across medium types) were separated in time by unrelated program content, and the subsequent tasks were separated in time from the exposures. These measures were taken to create an exposure setting that was as realistic as possible, to reduce the likelihood of participants being aware of the link between (cross-media) exposure and the implicit tasks, and to generalize the findings beyond a student sample.

The findings demonstrated that the adopted range of implicit measures was suitable for examining effects of media exposure, because participants performed significantly better on each of the measures after exposure to the target commercials than after exposure to a control condition. However, the implicit measures did not discriminate between cross-media and single-medium ad exposure, whereas the explicit measures did. Thus, implicit and explicit measures showed different effects of cross-media exposure, but this dissociation reflected cross-media advantages on explicit measures only, not on implicit measures. We first discuss the relevant implications of these findings for theory and practice, after which we discuss the limitations of the current study and interesting avenues for future research.

4.1. Implications

The finding that cross-media advertising resulted in advantages on explicit measures replicates earlier findings and supports the widely held view that cross-media messages facilitate explicit retrieval processes. The additional use of implicit measures allows us to speculate about how cross-media messages implicitly affect the impact of ads on consumers. The results show no cross-media advantages for implicit measurements. For example, the conceptual memory task showed that people did not include more cross-media brands when listing brands for a certain product type, and the stimulus-based decision task showed that people did not place cross-media brands higher into their consideration set – even though the explicit measures showed a better memory and liking of the cross-media brands. One conclusion that can be drawn from this is that cross-media advertising did not (measurably) affect implicit memory processes in a way other than single-medium advertising did.

Unlike explicit memory, implicit memory processes do not rely on the *creation and retrieval* of novel memory structures, but rely on the *strengthening* of existing memory structures through re-activation (cf., Graf and Schacter's amnesia study [1985], see e.g., Anderson et al. [1998]; Bower [1996], for theoretical frameworks). Our results suggest that exposure (versus no exposure) to target ads affects implicit memory and evaluation processes, but that the type of exposure (cross-media versus single-medium) does not. In other words, mere exposure to advertisements seems capable of activating unfamiliar

brands and subsequently strengthening their memory traces, which characterizes implicit memory. However, subtle differences in the way in which the unfamiliar brand is subsequently advertised (in another versus the same medium) do not affect the previously laid down memory pathway for the brands, but result in the creation of new pathways through encoding variability. Thus, cross-media exposure facilitates explicit retrieval processes by laying down multiple memory pathways for a brand, but does not affect the strengthening of brand information that has been laid down during earlier experiences. This allows us to speculate that implicit effects of advertising will likely not be achieved through subtle context manipulations such as the combination of media formats (cross/single, tested in this study, or, e.g., the prominence with which a brand is displayed, as tested by van Reijmersdal, Rozendaal, and Buijzen 2012; Yang and Roskos-Ewoldsen 2007), but rather require more drastic ad presentation manipulations such as exposure (yes/no, tested in this study, or repetition, as tested by, e.g., Bornstein 1989). However, conclusive support for this claim would require further research.

Now that we have theorized about the different *processes* responsible for the absence of implicit cross-media effects and the presence of explicit effects, we will discuss how the different *measures* can inform us about the explicit retrieval strategies at work. The adopted implicit measures did not force participants to use explicit retrieval strategies that they might not normally use in a naturalistic setting. However, when participants were explicitly reminded of the ads and asked to report about them, cross-media campaigns resulted in significant benefits compared to single-medium campaigns for brand memory and evaluation. When this explicit link between prior exposure and the task at hand was not made, there were no such benefits. This suggests that positive findings of cross-media effectiveness may depend on an explicit instruction to recollect exposure to the ad campaign. This casts doubts upon the ecological validity of explicit cross-media effects, which has important consequences for the advertising industry. People often do not explicitly recollect exposure to ad campaigns, because they do not use this strategy in a natural shopping environment and/or because they do not sufficiently attend to advertising campaigns. Our findings can be taken to suggest that, in order for explicit cross-media effects to translate to a natural purchase situation, consumers may have to explicitly recall exposure to ads in different media types. Thus, to achieve an optimal impact of their cross-media campaigns, advertisers could develop advertising strategies that evoke explicit recall of the consumers' exposure to the campaign. They could do this, for example, by including different features in their ads for different medium types and incorporating explicit retrieval cues for these features in the purchasing environment. However, this needs to be examined in more detail.

These two discussions (one on a process level and one on a measurement level) are not mutually exclusive, but are part of the same supposed mechanism in which cross-media exposure does not result in the strengthening of existing memory traces, but does facilitate explicit retrieval processes by the creation of novel memory traces. Future lines of research should test both the measurement and process level of this explanation in more detail. Future experiments on the measurement interpretation of the results might examine whether an explicit instruction to recall the brands versus no such instruction in an otherwise identical task would lead to cross-media advantages, or whether the proposed explicit cross-media retrieval cues (versus single-medium cues) indeed benefit the success of cross-media advertising. The results of such examinations would be directly relevant for advertising practice. Further examination of the underlying mechanisms, on the other hand, is more of scientific and theoretical interest, and is therefore described in the following section.

4.2. Limitations and future research

The lack of implicit cross-media effects cannot fully exclude the possibility that cross-media campaigns did affect implicit (subconscious) psychological processes. Further examinations should consider the possibility that other implicit measures, for example, might be more sensitive and therefore better able to capture implicit cross-media effects. Take the word fragment completion task we adopted to assess perceptual memory. Performance on this task relied on memory of the name of the brand, which is quite difficult for unfamiliar brands and names. Perceptual priming tasks such as picture fragment identification (cf., Snodgrass et al. 1987; Warrington and Weiskrantz 1968; see Owen et al. 2012; van Reijmersdal, Rozendaal, and Buijzen 2012 for applications in advertising) would possibly better suit our purpose, because they are more oriented on physical product features (such as the brand logos or packages that were displayed in the ads) rather than mere lexical (brand name) information. Nonetheless, the range of implicit measures we used has shown to be able to detect implicit effects of ad exposure in the current study, and, in other studies, they have proven to be well capable of detecting different types of psychological processes (bottom-up or top-down, e.g., Lee 2002; Roediger, Guynn, and Jones 1994).

Other explanations for the lack of implicit cross-media effects are that a significant change in implicit consumer memory and preferences can be established only by, for example, more frequent (repeated) exposure to cross-media campaigns, a more shallow processing of these campaigns, different combinations of modalities and medium types, a shorter time interval between exposure and task, for ads in which people are more involved or more familiar with the products, and/or a combination of these factors. For example, given that implicit memory systems largely rely on the re-activation of existing memory traces, it is conceivable that cross-media exposure to familiar brands – which likely have a rather rich associative network – would benefit implicit memory, whereas the unfamiliar brands in this study did not. Such possibilities would have to be explored in future research.

In this paper, we have argued that the sole use of explicit measurements cannot provide a full understanding of advertising impact. Based on explicit measures only, science informs the advertising industry based on tests that do not always match consumer processes, which limits the ecological validity of the findings (or might even give an incorrect view). This issue does not merely apply to cross-media research, but applies to any field that examines advertising effects on memory and aims to generalize these effects to valid real-life situations. However, the cross-media literature provides an excellent example of how our comprehension of ad effectiveness is restricted by limitations in research methods. Cross-media theory has so far relied on explicit memory mechanisms because research has solely used explicit measures of memory (see section 1.1), even though it is very unlikely that consumers use explicit retrieval strategies when making a brand choice in real life (see section 1.2). With this study, we have aimed to fill in this gap in the cross-media advertising literature, so we can approach a more valid and complete account of the effectiveness of cross-media advertising.

Furthermore, cross-media advertising has proven to be an especially interesting subfield for examining potential implicit advertising effects, because it represents more subtle context differences in advertising than the often-examined coarse advertising differences that have been shown to have implicit effects on consumer memory (such as mere exposure versus no exposure to a brand, or presenting multiple repetitions versus no repetitions of a brand). This provides relevant novel insights into the circumstances in which implicit effects of advertising may take place.

In all, our findings provide novel insights into the impact of advertising on consumer memory and preference by suggesting that cross-media advantages are driven by explicit

rather than implicit memory mechanisms. Furthermore, these results can be taken to suggest that implicit advertising effects require more drastic manipulations for unfamiliar brands than mere context changes. These are important contributions to the discussion that could not have been made without the addition of implicit memory measures to study the impact of advertising.

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Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. On an affective level, processing information across different medium types is thought to affect peoples' attitude towards the advertised brand by appealing to different cosmetic and aesthetic characteristics (see, e.g., the review provided by Stammerjohan et al. 2005).
2. The remaining 8.47% reported some background noise and no distractions; 3.10% reported background noise and some distractions; 1.24% reported noise and/or many distractions. None of these participants would be removed from the sample as long as they satisfied the control conditions described in the result section.
3. This resulted in six counterbalance versions of the ad presentation phase: two in the control condition (two medium orders) and four in the experimental condition (2 target brands × 2 medium orders). We randomly presented the different versions of this phase to different participants. As a result, half of the participants in the experimental condition were exposed to the butter brand across media (and milk within a single medium condition) whereas the other half was exposed to the milk brand across media (and butter within a single medium condition). Of these groups, half of the people were presented with the ads in one medium order (starting with TV: TV−TV for single and TV−web for cross), whereas the other half was presented with the ads in another order (starting with web: web−web for single and web−TV for cross). With this design, any potential stimulus effects or order effects remained present for each individual subject, but were fully counterbalanced across the subjects.
4. A pilot study showed that, for the target milk brand, people used *Pauls*^{TM} (brand name) and *Parmalat*^{TM} (company name) interchangeably. We therefore included *Parmalat* in the task and scored *Pauls* and *Parmalat* as being one and the same item.
5. Inclusion of all these participants did not alter the pattern and significance of the results reported below.
6. The variances in all the reported *t*-tests are not equal across exposure conditions, as was shown by Levene's tests for equality of variances (all Fs > 4.86, all ps < 0.05). The reported degrees of freedom and statistics are corrected for this inequality of variances.
7. One possible alternative explanation for these findings is that we had a higher statistical power to find significant effects in the explicit measures (all participants) compared to the implicit measures (one fourth of the participants per measure; see the design in Figure 1). To exclude this alternative hypothesis, we drew a random sample of one fourth of the participants to analyse their data on the explicit tests (N = 112, equally divided over counterbalancing and implicit measurement lists). These data showed similar result patterns, with a better recall X^2 (1) = 8.40, $p < 0.01$, $\varphi = 0.26$, better recognition X^2 (1) = 4.33, $p = 0.053$, $\varphi = 0.15$, and higher attitude ratings (t (111) = 3.20, $p < 0.005$, $\eta^2 = 0.09$) for cross-media versus single-

medium brands. This excludes the alternative hypothesis that the higher power for the explicit measures caused the significant *p*-values.

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Appendix 1. Stimulus materials.

To follow the procedure of the entire experiment as it was presented to the participants in the Qualtrics Research Suite, click on one of the two links below. The first link redirects to the experiment with one of the implicit memory tasks; the second link includes one of the implicit evaluation tasks.
https://uvacommscience.qualtrics.com/SE/?SID=SV_79GCsUrAGJKBUQl
https://uvacommscience.qualtrics.com/SE/?SID=SV_57T9O82yFBmd1qZ

Target commercials and websites

Lurpak butter

The individual stimuli were retrieved from the following websites on 1 March 2013.
http://www.youtube.com/watch?v=XvurKAnpj3I
http://www.youtube.com/watch?v=xbCxzuDQikQ
http://www.lurpak.com/us/our-products/#lurpak-lighter-speadable-slightly-salted
http://www.lurpak.com/us/home/

Pauls milk

http://www.youtube.com/watch?v=4OtsNWXeCfE
http://www.youtube.com/watch?v=-uoDEYnlib4
http://parmalat.com.au/index.php?option=com_content&view=article&id=73&Itemid=81
http://parmalat.com.au/index.php?option=com_content&view=article&id=49&Itemid=77

Filler commercials

- Chokito candy bar: http://www.youtube.com/watch?v = Wy5n3RfCBq8
- Chio chips: http://www.youtube.com/watch?v = FtSBdRsvmOE
- Zewa toilet paper: http://www.youtube.com/watch?v = 9ICAYcFj1DE
- Stimorol chewing gum: http://www.youtube.com/watch?v = 5LxtLSV8Zmw
- Black Cat peanut butter: http://www.youtube.com/watch?v = x9wA_UFcWqw
- VLCC sunscreen: http://www.youtube.com/watch?v = WRZ9kp8W05g
- Duvel beer: http://www.youtube.com/watch?v = PeL5rBA5D1Y

Filler websites

- Berri multi vitamin drink: http://www.berrijuice.com.au/berri-multi-v.aspx
- Kicking Horse coffee: http://www.kickinghorsecoffee.com/en/story
- Corsodyl toothpaste: http://www.corsodyl.co.uk/maintenance/toothpaste.shtml
- Bio-Attack washing powder: http://www.biozet.com.au/range.php
- Eneloop batteries: http://www.eneloop.info/eneloop-products/eneloop-batteries/eneloop-lite.html
- Faith dishwashing liquid: http://www.faithinnature.co.uk/Powerful-Natural-Anti-bacterial-Washing-Up-Liquid/PID/135
- Osmo hair spray: http://www.osmo.uk.com/styling/volumise/extreme-extra-firm-hairspray.aspx

Filler clip – Graham Norton

http://www.youtube.com/watch?v=gsSqfAKBOF8&list=PL4CCBF9C1452CBC3F