

聽過反記錯？電視劇產品置入的注意力和記憶效果

游婉雲、蔡介立、陶振超

摘要

儘管產品置入普遍出現在各種媒體情境，迄今對感官特性和情節因素「如何」及「為何」影響置入成效仍缺乏共識。本研究以情境理解和偽記憶的理論觀點為基礎，透過實驗法探討口語指涉和劇情連結兩項因素對電視劇產品置入注意力和品牌記憶的影響。結果顯示：（1）高劇情連結置入比低劇情連結置入有更優異的注意力和品牌記憶表現；（2）口語指涉對高、低劇情連結置入的品牌記憶效果產生相反作用。研究結論指出情境理解和偽記憶的學理觀點可成功解釋產品置入的認知效果，並對傳播研究和實務應用提出相關建議。

- ◎ 關鍵字：產品置入、視聽整合、理解歷程、偽記憶
- ◎ 本文第一作者游婉雲為俄亥俄州立大學傳播學院博士後研究；第二作者蔡介立為政治大學心理系副教授；第三作者陶振超為交通大學傳播與科技學系副教授。
- ◎ 通訊作者為游婉雲，聯絡方式：Email：maggiewyu@gmail.com；電話：+1-614-292-3400；通訊處：美國俄亥俄州立大學傳播學院。
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Heard but Falsely Remembered? The Attention and Memory Effect of Product Placement in TV Episodes

Wan-Yun Yu, Jie-Li Tsai, Chen-Chao Tao

Abstract

While product placement has been widely used in various media contexts, there is no consensus on how or why the perceptual modality and story plot converge to determine its effectiveness in communication. From the theoretical views of situated comprehension and false memory, the present study investigated the attention and memory effects caused by verbal mention and plot connection of product placement. An experiment using different types of product placements in TV episodes as stimuli showed that: (1) high plot connection placements gained more attention and had better brand memory performance than their low plot connection counterparts; (2) verbal mention exerted a reverse effect on brand memory performance of high or low plot connection placements. The present study concluded that the theoretical perspective of situated comprehension and false memory successfully explained the cognitive effect of product placement, thus offering a plausible approach to future media research and providing practical implications for industry.

⊙ Keywords: product placement, audio-visual integration, comprehension process, false memory.

⊙ Wan-Yun Yu is Postdoctoral research fellow, School of Communication, The Ohio State University, USA. The second author, Jie-Li Tsai, is Associate Professor, Department of Psychology, National Chengchi University, Taiwan. Associate Research Fellow, Research Center for Mind, Brain, and Learning, National Chengchi University, Taiwan. The third author, Chen-Chao Tao, is Associate Professor, Department of Communication and Technology, National Chiao Tung University, Taiwan.

⊙ E-mail: maggiewyu@gmail.com

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Background

Product placement, by definition, is the inclusion of branded products or identifiers through audio and/or visual means within mass media programming (Karrh, 1998). For example, there were 55 different brands included in the movie *Transformers: Age of Extinction* (2014) competing for viewers' attention in a frenzied manner. Marketing planners are convinced that this would increase consumers' brand familiarity and liking on the brands being placed, which should in turn promote the sales of products (Balasubramanian, Karrh, & Patwardhan, 2006; Karrh, McKee, & Pardun, 2003; Morton & Friedman, 2002). Although numerous studies have been conducted over the last two decades (Chan, 2012; Kalliny & Gentry, 2010; McCarty & Lowrey, 2012; Van Reijmersdal, Neijens, & Smit, 2009), there is still a lack of consensus on how and why the effectiveness of product placement occurs in the communication process. Taken the fictional television programs as an example, audience are expected to integrate pieces of audio-visual information into meaningful wholes while accidentally encountering certain branded information, which is shown on the screen and/or mentioned by the actor to grab their attention. Thus, the development and the consequence of audio-visual integration in communication process was crucial to determining the effectiveness of product placement in videos. The aim of the present study was therefore to revisit this issue by focusing on how two forms of integration, arising from plot connection and verbal mention, can interact to affect the cognitive effect of product placements in TV episodes.

Presentation modality, plot connection and placement effectiveness

Since product placement can be included in the audio and/or visual modalities, the sensory integration of these two modalities has been shown to impact its effectiveness. According to the dual-coding theory (DCT) (Paivio, 1986), the placement being conveyed through audio and visual modalities should be the most effective type than either the visual- or audio-only type. The rationale behind this argument is that items being coded in two ways

can establish a referential link and hence to be better remembered than those being coded in just one way. Some studies have provided supporting evidence (Brennan & Babin, 2004; Bressoud, Lehu, & Russell, 2010; Law & Braun, 2000; Russell, 2002; Wilson & Till, 2011), while others have not (d'Astous & Chartier, 1999; Gupta & Lord, 1998). In addition, the integration between placement and story has also been claimed to determine the effectiveness of product placement. Russell (2002) defined the plot connection as how well the placement is integrated into the narrative flow. Accordingly, the low plot connection refers to the placements which are irrelevant or contribute little to the story, while those with high plot connection play a major thematic role in story and are necessary to complete the unfolding narrative events. Most previous research found the high plot connection placements would enhance audience's brand memory relative to the low plot connection ones (Russell, 2002; Yang & Roskos-Ewoldsen, 2007), but a reverse pattern was reported by d'Astous and Chartier (2000).

The present study aims to fill three gaps in the field. First, the effects of the two forms of integration resulting from the presentation modality and plot connection on the effectiveness of product placement should be further examined. Neither Russell (2002) nor Yang and RoskosEwoldsen (2007) tested the effect of verbal mention on the relationship between plot connection and brand memory performance in their studies. Thus, the present study extends past research by addressing how plot connection interacts with an additional verbal mention of the audio scripts on the cognitive effect of product placement. Second, the effectiveness of product placement should be evaluated more thoroughly by monitoring the attention paid to the placement during media exposure. Most past studies have inferred the product placement effects from the post-stimulus self-reported memory tests, which might be problematic because people who process messages with little attention are unlikely to successfully report them in a recall task (Slater, 2004). Moreover, according to the limited capacity model of motivated mediated message processing (LC4MP) (Lang, 2006), the varying level of attention for different media contents caused by different message characteristics may mediate the memory outcome. Our study intended to solve this methodological flaw by

measuring viewers' attention to placements during media exposure. Third, it is important to consider the side effect of different placement types on brand memory from the theoretical and applied point of view. Although past research has revealed that the high plot connection placement could elicit a more positive attitude toward the competing brand (Yoon, Choi, & Song, 2011), little is known about whether a similar effect was shown for the brand memory outcome. Therefore, we also aimed to explore whether the verbal mention and plot connection would cause the unwanted consequence of creating false memories for the competing brand in the practice of product placement.

Audio-visual integration during comprehension

As many media communication studies have suggested, the cognitive and behavioural impact caused by the media largely depends on how the messages are comprehended by the audience. In a related study, Lee, Roskos-Ewoldsen, and Roskos-Ewoldsen (2008) incorporated views of the Landscape Model of comprehension (Van den Broek, Risden, Fletcher, & Thurlow, 1996) and DCT in predicting viewers' memory of concepts in television news. To evaluate the relatedness of each concept in the comprehension process, they had coders rate the activation level of each concept in the news. Although this study obtained a positive relationship between the activation level and memory for concepts in videos, the audio-visual integration between verbal and visual code has not yet been tested since the activation level of each concept was independently rated in the audio or visual stream.

Recently, several psycholinguistic studies have examined how people integrate audio and visual information so as to understand the concurrent situation during comprehension. These studies have consistently reported that the amount of fixations on visual objects in the scene changes as a function of the concepts activated by the unfolding speech input (Huettig, Olivers, & Hartsuiker, 2011; Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995), which can be viewed as evidence for the existence of audio-visual integration between verbal and image code in the human comprehension process. At the word level, Cooper (1974) found that participants tend to direct more fixations toward the visual referent

(the lion picture) when hearing the object name ('lion') in comprehending a short story (e.g., a safari story). At the sentence level, listeners' fixations can reflect their anticipation of the plausible referent in the scene suggested by the preceding linguistic input before the visual item has been directly mentioned (Altmann & Kamide, 2009; Kamide, Altmann, & Haywood, 2003). The rationale for such an effect is that the incremental interpretation of audio utterance actively guides moment to moment attention to the visual referent, thereby increasing the salience of contextually related scene regions to form a coherent mental model for comprehension. Thus, the increase in fixations on the visual object reflects the co-indexed process and serves as an indicator for accessing the on-line operation of attention in comprehension (Knoeferle & Crocker, 2007).

Psycholinguistic studies on the audio-visual integration in human comprehension processes have provided two important points for product placement. First, both the object name that referred to and the preceding linguistic context that suggested the placement can rapidly enhance its attention level during comprehension. Second, the attention of visually-presented placements can be manifested by recording viewers' eye fixations on the screen at media exposure. Several hypotheses about the attention of different placement types could be made. First, high plot connection placements would receive more attention than low plot connection placements during comprehension. Second, the mentioned placements could attract more attention than the unmentioned ones. Third, the plot connection might modulate the verbal mention effect on the attention of placements. On one hand, the facilitation of verbal mention on attention was greater for the high plot connection placements since these items could be predicted from the preceding context. On the other hand, the enhancement of verbal mention for the low plot connection condition might be limited as they were hardly being integrated into the story. Three hypotheses are listed as follows:

H1a: The attention on placements in the high plot connection condition is more than that on those in the low plot connection condition.

H1b: The attention to placements in the mentioned condition is more than that on those in the unmentioned condition.

H1c: For high plot connection placements, the mentioned placements will receive more attention than the unmentioned ones; for the low plot connection placements, a null effect of verbal mention on attention is expected.

The false memory effect of product placement

Most studies on product placement have examined the relationship between placement types and memory performance for the placed brands, while little is known about whether the product placement would cause an unintentional promotion for the competing brand. In fact, past studies on false memory have revealed that human memory can be distorted by the conceptual association among words and verbal mention conveyed through the messages. For instance, Roediger and McDermott (1995) had the first group of participants view a series of associated words (e.g., butter, food, eat) organized in thematically constructed list, all of which were tightly linked to one unrepresented thematic concept (e.g., bread). The second group of participants viewed the same materials in randomly constructed list, where the inter-word association was removed. A false memory effect (40% participants reported that they had seen the unrepresented thematic concept) was observed only for the first group, suggesting that the contextual relatedness among presented items could elicit more false memories for related items. Recently, a burgeoning research line aimed at investigating consumers' false memory on brands provided more relevant evidence for our study (Falkowski, Olszewska, & Ulatowska, 2015; Sherman, Follows, Mushore, Hampson-Jones, & Wright-Bevans, 2015; Sherman & Moran, 2011). Using the similar experiment paradigm as in the study of Roediger and McDermott (1995), Sherman and her colleagues reported a reliable false memory effect on the unrepresented competing brand (e.g., TESCO) after viewing a series of brands (e.g., Morrisons, Sainsbury's, Waitrose) from the same product category (e.g., supermarket) in printed (Sherman & Moran, 2011) and in video (Sherman et al., 2015) formats.

At least two theories account for the false memory effect. First, the activation/monitoring account (Roediger & McDermott, 1995) posits that the activation spreads from the processing of the presented items to its related item in a semantic network. Thus, false

memory occurs because the activation level of the unrepresented but related item was high at encoding, which in turn cause source monitoring difficulties at retrieval. The second is the fuzzy trace theory (Reyna & Brainerd, 1995), purporting that humans create two parallel memory traces at encoding: the verbatim traces represent the perceptual details of stimuli, whereas the gist traces represent the abstract meaning of the stimuli. Thus, the false memory occurs when the conceptual association between presented and unrepresented item is confirmed by the gist traces and insufficient perceptual details is provided by the verbatim traces at retrieval.

Moreover, the verbal mention conveyed through the audio modality have reported to pose an additional influence on human memory. Using TV adverts as stimuli, compared with the visual-only presentation type, the audio-visual type not only decreased the correct memories for the presented brand (Sherman et al., 2015) but also led to more false memories for the competing brand (Braun-LaTour & LaTour, 2004). These results could be explained by the Label-Feedback Hypothesis (Lupyan, 2012). It argues that the verbal mention (e.g., car) referring to the visual entities in the concurrent environment is essentially the categorical label for the presented item (e.g., truck), which may activate other related items (e.g., sports car, MPV) in mind and hence to reduce the ability to discriminate individual items at retrieval. Thus, a lower correct memory rate for the presented item and a higher false memory rate for the unseen item should be expected for the mentioned placements than the unmentioned ones.

Accordingly, several predictions for the brand memory of product placement were derived. First, the plot connection factor was expected to have differential influences on brand memory. As to the correct true memory for placed brands, on one hand, since the plot connection would cause more mental resources in comprehension, a higher correct recognition rate for the placed brand should be expected for the high plot connection condition. For the false memory for competing brands, on the other hand, high plot connection placements should increase incorrect recognition from activating related items at encoding than the low plot connection placements.

Moreover, whether the additional verbal mention for the placement would facilitate or interfere the brand memory performance was contingent on the plot connection factor. For the high plot connection condition, the high conceptual association between placement and story would cause higher activation level for the concept denoted to the placement and its related item. Therefore, as predicted by the Label-Feedback Hypothesis, the additional verbal mention at encoding would decrease the ability to discriminate the placed brand from the competing brand at retrieval. For the low plot connection condition, however, the conceptual association between placement and story was weak, the activation level for the placement was limited and much weaker for its competing brand. Thus, as predicted by DCT, the additional verbal mention referring to the placement at encoding would enhance the true memory for the placed brand but have little effect for the competing brand through processing two distinct codes. The two hypotheses are as follows:

H2a: Placements in the high plot connection condition lead to a higher correct recognition rate for the placed brands and a higher incorrect recognition rate for the competing brands than those in the low plot connection condition.

H2b: For placements in the high plot connection condition, the mentioned placements lead to worse brand memory performance than the unmentioned ones; for placements in the low plot connection condition, the mentioned placements lead to better brand memory performance than the unmentioned ones.

Methods

Participants and design

A total of thirty university students (12 males, 18 females; aged 18-24; $M = 20.71$ years old, $SD = 1.60$) were paid to participate in the experiment. All were native Mandarin Chinese speakers with normal or corrected-to-normal visual acuity and normal color vision based on self-report. The study employed a 2×2 within-subject experiment with plot connection (P+: high vs. P-: low) and mention type (M+: mentioned vs. M-: unmentioned) as the independent variables.

Materials

All clips were selected from 16 TV episodes in Taiwan. Product placement in every clip had a slightly different structural feature in terms of camera movement, which is obviously an idiosyncratic factor affecting the viewers' attention and memory that we observed. Hence, 16 sets of media stimuli were reproduced to ensure the consistency in film viewing for all studied items. Each set consisted of three elements: a key frame including a product placement in the scene, four frames without the placement that supported the development of the story, and an audio soundtrack that was extracted from its original film clip. For each trial, the five scenes were displayed in sequence while the original soundtrack was playing. The display timing of each scene varied according to the duration of the audio scripts occurring within the scene. An additional 20 sets of fillers were selected and reproduced in a similar way except that they did not include any placement.

To ensure the manipulation of plot connection, a total of eleven raters (5 females; all university students) were invited to watch 20 video clips and to evaluate '*How well the specific placement is integrated with the story?*' on a 7-point Likert scale (1 = *completely unrelated*, 7 = *completely related*). For example, a secretary asked her manager to sign an electronic document with the 'ASUS' notebook in the scene. In this case, the 'notebook' was used to complete a required action that was necessary to proceed the story, which should be deemed as a high plot connection placement. A low plot connection case was, for instance, a female actor wearing an 'Adidas' t-shirt watching a boxing match with her friend discussing who would be the winner. In this case, the t-shirt worn by the female actor had little to do with the narrative flow, thus it should be deemed as a placement with low plot connection level. Table 1 displays 16 placements for each condition used in the main study. As expected, the ANOVA showed a significant main effect of plot connection ($F(1,10) = 36.87, p < .001$; $P+ : M = 5.56, SD = 0.79$ vs. $P- : M = 3.02, SD = 1.08$); no other effects were found (all $F_s < 0.20, p_s > .36$).

The brand familiarity scores of placed and competing brands were evaluated by another

pretest. Forty university students (20 females; all undergraduate students) were randomly assigned to the placed brand group or the competing brand group and asked to evaluate the brand familiarity of each on a 7-point Likert scale (ranged 1~7, 1 = *extremely unfamiliar*, 7 = *extremely familiar*). The brand familiarity did not differ between two brand groups (Placed: $M = 4.78$, $SD = 1.57$; Competitor: $M = 4.75$, $SD = 1.76$; $p > .16$). To rule out the potential confounding of brand familiarity with brand recognition, we included this factor in the later analysis to control its impact on brand memory as Brennan and Babin (2004) suggested.

For the 16 key frames containing a placement for each, several perceptual attributes were carefully controlled. The mean display time of 16 key frames was 11.61 seconds ($SD = 1.36$) and did not differ across the four conditions (all $ps > .38$). The object area in pixels (all $ps > .29$) and the distance (in pixels) from the screen center to the placement (all $ps > .54$) did not differ between the two variables. The low-level visual salience of placements was controlled using the MATLAB Saliency Toolbox (Itti & Koch, 2000) to estimate the fixation rank based on the pixel-based calculations of brightness, orientation and contrast. The mean fixation rank of all placements was 13.69, indicating that viewers were expected to fixate on the placements no later than the 14th fixation on average as estimated by the saliency map model. The fixation rank was not significant across conditions (all $ps > .20$).

Table 1. The product category, placed and competing brand for each film stimulus used in the experiment by plot connection (P+: high vs. P-: low) and mention type (M+: mentioned vs. M-: unmentioned)

Plot connection	Mention type	Product category	Placed brand	Competing Brand	TV episode		
P+	M+	Notebook	ASUS	DELL	Miss No Good (不良笑花)		
		Vitamin	Stresstabs	Nature Made	Fall in Love with Me (愛上兩個我)		
		Car	Hyundai	VOLVO	Aim High (22K夢想高飛)		
		sports drink	AQUARIUS	LAOHUYATZI	Mr. Right Wanted (徵婚啓事)		
	M-	beer	Budweiser	Asahi	Black & White (痞子英雄)		
		water	FIN	Taiwan Yes	First Kiss (真愛配方)		
		cookies	Kuai Kuai	Wang Wang	Fall in Love with Me (愛上兩個我)		
		ice cream	meiji	Duroyal	Fall in Love with Me (愛上兩個我)		
		P-	M+	fast food	TKK	KFC	The Way We Were (16個夏天)
				smart phone	SAMSUNG	SONY	The Queen (女王的誕生)
life insurance	Mercuries Life			CARDIF	Aim High (22K夢想高飛)		
alcohol	BAILEYS			Ballantines	Miss Rose (螺絲小姐要出嫁)		
M-	milk tea		Assam	Mine shine	Prince William (威廉王子)		
	soft drink		DemiSoda	Fanta	Black & White (痞子英雄)		
	motorbike		YAMAHA	KYMCO	The Way We Were (16個夏天)		
		sportswear	Adidas	Nike	Wanted (徵婚啓事)		

Apparatus

Participants' eye movements were recorded using an SR Research Eyelink 1000 Desktop Mount system, tracking at 1,000 Hz. The fixations, saccades and blinks were determined using the default definition of the system. Although viewing was binocular, eye movements were recorded from the dominant eye. Participants leaned on a chin-rest, with their eyes 75 cm from a 21.5-inch iMac screen (resolution: 1024×768 pixels). Stimulus presentation and response recording were controlled by Matlab 2014b with the Psychtoolbox 3.0.1 (Kleiner et al., 2007). Participants viewed visual scenes on the screen, and listened to audio stimuli using headphones.

Procedure

In the media exposure phase, the participants were instructed to try to comprehend the story shown in the 36 clips and to report how well they enjoy watching these TV episodes. A nine-point calibration was performed before the experiment began and after every 8 trials. The average error of the 9-point calibration was set to less than 0.8 degrees of visual angle or the subject needed to perform another recalibration. One practice trial before the main experimental block was provided. For each trial, if participants fixated on the centered cross accurately, the experimenter pressed a button to initiate a new trial. If their fixation on the cross was deemed as inaccurate, the experimenter performed a recalibration. Once a trial started, the audio soundtrack and a series of key frames were presented. The trial was terminated when the soundtrack ended. Eye movements were recorded during the presentation of the key frame with a placement. Half of the trials were followed by a true-or-false comprehension question to ensure the participants understood the story. The mean accuracy was 98% ($SD = 4\%$), indicating that all participants were concentrating on the clips during the media exposure phase.

After viewing all clips, participants had a 5-minute break and were then asked to complete a media entertainment questionnaire based on their experiences from the last

session. This questionnaire was used by Nabi, Stitt, Halford, and Finnerty (2006) to measure the Enjoyment of TV programs on a 7-point Likert scale including four items (enjoyable, entertaining, pleasurable, captivating). These data will not be analysed since this section was used for fulfilling the cover story. Then, the participants were informed that the video viewing study was fully completed. Later, an unexpected brand recognition test was given. The participants were asked to indicate whether they remembered the brand in film clips by clicking 'old' or 'new' as fast as possible. They had to recognize 16 placed brands among 16 non-presented competitor brands. All brand logos were randomly presented one at a time on the screen until response. Finally, the participants were debriefed and dismissed. The entire experiment lasted approximately one hour.

Data analysis

The data were analyzed using the linear mixed effects regression (LMM) model for attention (i.e., fixation duration), and the generalized linear mixed effects regression (GLMM) models with a logit link function and binomial distribution for brand memory in the fixed effect. For the random effect, we included the random intercepts for participants and items in the model by assuming a different response baseline for each person and stimuli which would be estimated in the analyses. In addition, we used the brand familiarity score as a covariate to address its possible influence on attention and memory. The `lmer/glmer` function is included in the `lme4` package (Bates, Maechler, Bolker, & Walker, 2014), running in the R environment for statistical computing and graphics (version 3.1.2, R Development Core Team, 2014).

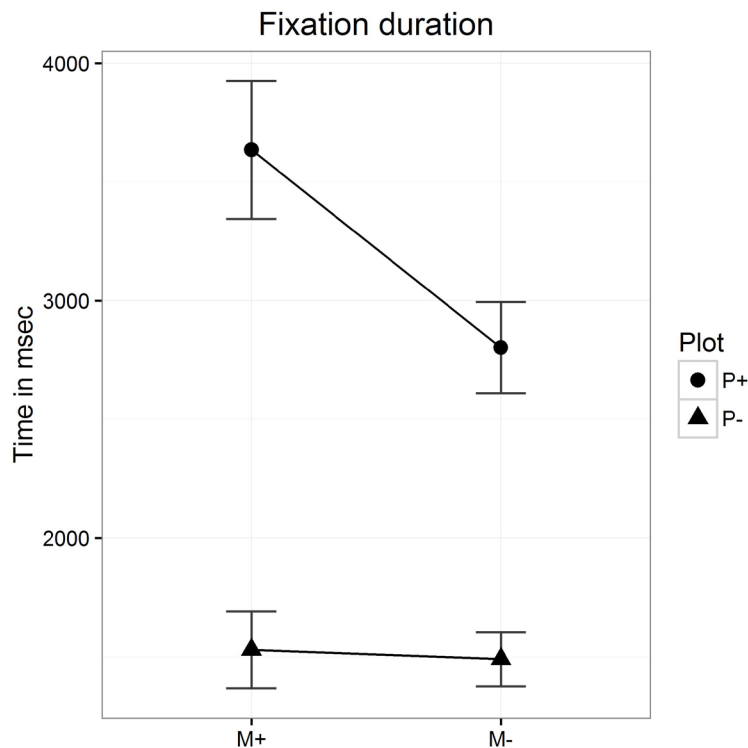
Results

Attention

The fixation duration was used to reflect the amount of attention to each placement during media exposure, the data for each participant and item was averaged by condition and

plotted in Figure 1. For the covariate, the brand familiarity did not reach significance ($b = 95.278, SE = 308.174, t = 0.309, p > .76$). Neither the main effect of mention type (M+ vs. M-: $b = 500.126, SE = 825.926, t = 0.606, p > .54$) nor the interaction of plot connection and mention type ($b = 303.845, SE = 824.727, t = 0.368, p > .71$) were significant. However, the main effect of plot connection was significant (P+ vs. P-: $b = 1884.510, SE = 865.758, t = 2.177, p < .05$), suggesting that the high plot connection placements gained greater attention than the low plot connection placements during media exposure. In sum, only H1a was supported by the fixation data.

Figure 1. The mean(points) and ± 1 standard errors (bars) of fixation duration as a function of plot connection (P+: high vs. P-: low) and mention type (M+: mentioned vs. M-: unmentioned)

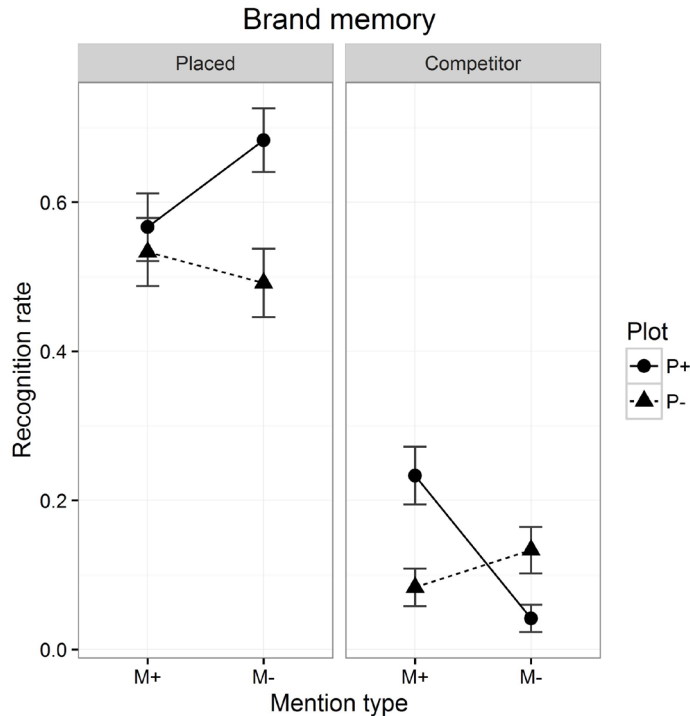


Brand memory

Data of the brand recognition task is binary, where one indicates an 'old' response for the placed brand (hit) or for the competitor brand (false alarm), while zero represents a 'new' response for the placed brand (miss) or for the competitor brand (correct rejection). A signal detection analysis was performed for the recognition data, in which the memory sensitivity (d-prime) was calculated by combining the number of hits, misses, false alarms and correct rejections for all participants in each condition. The d' was significant on the main effect of plot connection ($F(1, 29) = 5.93, p < .05$) and the interaction effect ($F(1, 29) = 5.58, p < .05$), indicating that the manipulated variables affected the brand recognition accuracy. To correct the random guessing probability, we included the random intercept for memory sensitivity in the model by assuming that the random guessing part for each participant in each condition would be estimated in the analyses of the hit rate for the placed brands and the false alarm rate for the competitor brands, respectively.

As displayed in Figure 2, the average hit rate of the placed brands (57%) was higher than the average false alarm rate of the competitor brands (12%) (Placed vs. Competitor: $b = 2.719, SE = 0.215, z = 12.649, p < .001$). The asymmetry in the brand memory data clearly demonstrated a mere exposure effect. That is, the audience can successfully discriminate the placed and the competitor brands in the recognition test.

Figure 2. The mean (points) and ± 1 standard errors (bars) of brand recognition on correct recognition rate of placed brands(left) and incorrect recognition rate of competitor brands (right) as a function of plot connection (P+: high vs. P-: low) and mention type (M+: mentioned vs. M-: unmentioned)



To address the differential influences of plot connection and verbal mention on brand memory performance, we conducted two separate analyses of the hit rate of the placed brands and the false alarm rate of the competitor brands. For the placed brands, the brand familiarity was not significant ($b = 0.038$, $SE = 0.090$, $z = 0.421$, $p > .67$), and neither did the main effect of mention type reach significance (M+ vs. M-: $b = -0.023$, $SE = 0.351$, $z = -0.065$, $p > .94$). The main effect of plot connection was significant (P+ vs. P-: $b = 0.814$, $SE = 0.370$, $z = 2.196$, $p < .05$), meaning that the high plot connection placements were better recognized than the low plot connection placements with marginally significant interaction ($b = -0.588$, $SE = 0.354$, $z = -1.664$, $p < .10$). As predicted, the post-hoc analysis revealed that

the additional verbal mention caused a negative effect for the high plot connection condition (P+M+ vs. P+M-: $b = -0.524$, $SE = 0.507$, $z = -1.033$, $p > .30$), whereas the reverse pattern was found for the low plot connection condition (P-M+ vs. P-M-: $b = 0.588$, $SE = 0.530$, $z = 1.111$, $p > .26$).

For the competitor brands, the brand familiarity ($b = -0.111$, $SE = 0.167$, $z = -0.664$, $p > .50$) had no significant effect on the recognition performance. No significant effect was found for the main effect of plot connection (P+ vs. P-: $b = -0.167$, $SE = 0.520$, $z = -0.321$, $p > .74$) or for mention type (M+ vs. M-: $b = 0.695$, $SE = 0.516$, $z = 1.347$, $p > .17$), but their interaction was significant ($b = 1.365$, $SE = 0.487$, $z = 2.802$, $p < .01$). The post-hoc analysis showed that the additional verbal mention significantly increased the false alarm rate for the high plot connection condition (P+M+ vs. P+M-: $b = 2.059$, $SE = 0.727$, $z = 2.831$, $p < .01$), but had no effect on the low plot connection condition (P-M+ vs. P-M-: $b = -0.670$, $SE = 0.691$, $z = -0.970$, $p > .33$).

The hypothesis of H2a was partially supported by the data of placed brands, while a null effect was observed for the competitor brands. In addition, the predicted crossover effects of the placed and competitor brands in H2b were confirmed.

General discussion

Product placement is a popular marketing tactic in media industry, but its effectiveness is still uncertain. To further examine the influence of plot connection and verbal mention on product placement, the present study demonstrates three main findings. First, different types of product placements not only affected the brand memory for placements but also induced the false memory for competing brands. Second, the facilitation of high plot connection on visual attention and brand memory were obtained. Third, the plot connection between placement and story could modulate the direction of verbal mention effect on brand memory. That is, the verbal mention negatively affect the brand memory for high plot connection placements, while it slightly enhanced brand memory for low plot connection placements.

The results of visual attention on placements can be partially explained by the situated comprehension account from psycholinguistic studies. Previous research predicts that both verbal mention and high plot connection will cause more fixations on the visual referent during comprehension. However, neither the main effect of verbal mention nor the interaction effect was confirmed. Two possible explanations have been given. First, the influence of a single word in the script is too short-lived to cause a reliable effect on increasing the overall amount of fixation duration in certain conditions. Andersson, Ferreira, and Henderson (2011) found that visual objects that are more slowly mentioned or more isolated in the speech stream are more likely to be fixated on after having been mentioned. Thus, the speech speed or the relative position of the verbal mention in the audio script may contaminate the fixations we observed. Second, the null effect of verbal mention may possibly be due to the interference of perceptual prominence. In our study, the surface area of the mentioned placements ($M = 18011$, $SD = 18490$) was smaller than the unmentioned ones ($M = 27862$, $SD = 17627$), so participants might have fewer fixations in the mentioned condition. Recently, Cavicchio, Melcher, and Poesio (2014) found that the fixation probability on the visual referent during comprehension was affected by the area of objects. This idea was aligned with Gupta and Lord (1998), who argued that the visual prominence of product placement in videos might reduce the advantage of audio-visual type on brand memory performance.

The theoretical accounts of false memory studies and DCT provided a solid explanation for how plot connection and verbal mention interact to determine the brand memory effect of product placement. On one hand, since high plot connection placements could be well integrated into the story and had more mental resources, hearing an additional verbal mention referring to the placement would activate more associated items within the same categorical label at encoding, and hence to reduce the ability to discriminate related brands at retrieval. Thus, the additional verbal mention exerted a negative impact on brand memory for the high plot connection placements. On the other hand, since the spreading activation of related items were reduced for the unrelated concept of low plot connection placements, an advantage

on brand memory occurred through processing verbal and image codes of the placement at encoding. Thus, verbal mention enhanced the brand memory for low plot connection placements. This mechanism was generally supported by our data.

Two implications for how to assess the effectiveness of product placement were discussed. First, eye-movement tracking can be used to monitor the allocation of attention caused by audio and visual stimuli in naturalistic contexts, which has been proved to be a more objective and sensitive indicator for evaluating the effectiveness of media messages (Drèze & Hussherr, 2003; Lohse, 1997; Rayner, Rotello, Stewart, Keir, & Duffy, 2001; Simola, Kivikangas, Kuisma, & Krause, 2013). Second, studies on the false memory phenomenon provided a new perspective to reconsider the effectiveness of product placement. Similar effects of false memory were also found in other media messages such as print (Braun-LaTour, LaTour, Pickrell, & Loftus, 2004; Braun, Ellis, & Loftus, 2002; LaTour, LaTour, & Brainerd, 2014) or television (Sherman et al., 2015), showing the generalizing power of this research framework in explaining the media effects among different types of media messages.

It should be noted that there are, however, at least four limitations to this study. First, the viewing session of our experiment was conducted in a relatively restricted situation to record viewers' gaze patterns. Future studies can track viewers' eye movements in a more naturalistic context that allows for free head movement to nicely mimic the TV watching experience in daily life. Second, other factors related to the degree of integration between placement and media content should be controlled or examined in future studies. For example, according to the balance model of sitcom product placement effects proposed by Russell and Stern (2006), the strength of association between the character and placement might have a positive effect on attention and memory that needs to be tested experimentally. Third, the emotional aspect of the media message should be taken into consideration since it has been proved to alter the dynamic allocation and demand of attention by LC4MP and related studies (Lang, Park, Sanders-Jackson, Wilson, & Wang, 2007; Sparks & Lang, 2015; Wang & Lang, 2012). Fourth, despite the present study provided a clear evidence for

answering how and why the effectiveness of product placement occurs in communication process, other methods, such as content analysis on product placements in TV episodes and quantitative survey on viewers of fictional programs, should be conducted to increase the external validity for future experimental research.

Finally, several managerial implications can be derived from the above research findings. In the communication process, the plot connection between placement and story plays a major role in determining the cognitive effects of product placement, whereas the additional verbal mention referring to the placement exerts a more subtle influence on viewers' memory. The most effective type is the high plot connection placements without verbal mention, which has the overall superiority of gaining a relatively high level of attention and achieving the best brand memory performance for the placed brands while avoiding false memories for the competing brands. For placements unrelated to the story, an additional verbal mention of placement during media exposure will slightly facilitate the correct memory for the placed brands while not eliciting false memories for the competing brands.

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