



Positive Effects of Disruptive Advertising on Consumer Preferences

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Abstract

Advertisers want to get consumers to love the advertised products, but they often try to do this by annoying them with unwelcome and disruptive advertising. This creates a possible contradiction between the negative feelings elicited by the advertising and the positive feelings the consumers are supposed to develop towards the advertised products. One may assume that the negative feelings towards annoying advertising are transferred to the advertised brands. This assumption was tested in a series of five experiments. Participants were disrupted by annoying pop-up ads while playing a popular computer game. In a two-alternative forced choice (2AFC) test, participants were required to choose between advertised and new brands. The advertised brands were preferred over the new brands, even though the ads were perceived as annoying. The positive effects of disruptive advertising can be attributed to the enhanced fluency of advertised brands. These findings demonstrate that disruptive advertising can be effective in increasing brand preferences, which may help to explain the widespread use of this type of advertising in practice. However, before recommending the use of disruptive advertising, it should be taken into consideration that it may also have undesirable side effects such as increasing advertising avoidance.

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Introduction

Advertisers want to get consumers to love products, but they often try to do this by annoying them with unwelcome and disruptive advertising. This creates a possible contradiction between the negative feelings elicited by the advertising and the positive feelings the consumers are supposed to develop towards the advertised products. To illustrate, we asked 24 students in a course on Consumer Psychology to rate the degree to which they perceived the ads they encounter every day as annoying. Nearly half of the students (45%) reported that they found ads “almost always” annoying, and half of the students (50%) reported that they found ads “sometimes” annoying. Upon inquiry, the one person who stated that she was “almost never” annoyed by ads admitted that she had installed an ad blocker on her computer,

and that she did not watch television at all, which suggests that she was probably just very good at avoiding ads altogether. This is of course only anecdotal evidence, but the negative view of advertising is also reflected in large-scale surveys on this issue (Cho and Cheon 2004; Edwards, Li, and Lee 2002).

Ads can be annoying in a number of ways—they can have shocking and offensive content or can be presented in an annoying way. In the present study, we are interested in disruptive advertising (e.g., pop-up ads) that distract from important or pleasant activities, or may even disrupt these activities entirely. Perceived interference with task-related goals was found to be the most important factor in explaining negative attitudes towards Internet ads (Cho and Cheon 2004). Pop-up ads that directly interfere with ongoing tasks are known to be perceived as particularly annoying (Edwards, Li, and Lee 2002). However, while it is clear that intrusive pop-up ads are perceived as annoying, it is unclear whether this annoyance is transferred to the advertised brands. If so, this would defeat the purpose of advertising because it would hurt the advertised

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brands. However, the fact that disruptive advertising is so widely used in practice may suggest that the assumption that annoyance is transferred to the advertised brands is false, and that, quite to the contrary, disruptive advertising has positive effects on consumer preferences.

From a psychological perspective, the effects of disruptive advertising on consumer preferences are unclear because two broad classes of theories lead to conflicting predictions. According to the first class, annoying advertising leads to negative effects on consumer preferences. When the association between a brand and annoying advertising is obvious to consumers (e.g., because it can still be retrieved from memory), they may show reactance (Edwards, Li, and Lee 2002) by deliberately choosing to avoid the brand. Even when the association with the negative experience can no longer be explicitly retrieved, brand preferences may be negatively affected. For instance, pop-up ads that disrupt pleasant activities such as playing a computer game or browsing the internet are evaluated very negatively by consumers (Edwards, Li, and Lee 2002). This negative evaluation may transfer to the brand via evaluative conditioning (De Houwer, Thomas, and Baeyens 2001; Hofmann et al. 2010), either due to an associative transfer of the negative affect to the brand (consumers may attribute their annoyance to the brand), or due to propositional reasoning (consumers may ascribe less desirable properties to brands associated with annoying advertising) (MacKenzie, Lutz, and Belch 1986; see also McCracken 1986). In sum, these theories imply that annoying advertising should lead to reduced preferences for the advertised products.

According to the second class of theories, in contrast, the involuntary processing of the ads should lead to an increase in brand preferences. It is well known that people prefer previously experienced over novel stimuli. One reason for this may be that previously experienced stimuli are processed more fluently than novel ones, which is experienced as affectively positive (Lee 2001; Winkielman et al. 2003). If advertised brand names are processed more fluently than novel brand names, the experience of fluency could lead to increased preferences for the advertised brands (Fang, Singh, and Ahluwalia 2007; Janiszewski 1993).

However, theoretical models differ in their prediction about how these effects should be modulated by explicit knowledge that the stimuli have been experienced before. The popular misattribution model (Bornstein and D'Agostino 1994) predicts that the effects of repeated exposure crucially depend on how the feelings of fluency are attributed. When fluency can be correctly attributed to prior exposure, it is discounted as a cue for preference. A clear implication of this model is that positive advertising effects should only be found *when fluency cannot be easily attributed to prior exposure* (Bornstein and D'Agostino 1994). In contrast, the primacy-of-affect model (Kunst-Wilson and Zajonc 1980; Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980) implies that preference judgments are generated quickly and automatically, without deliberate reflection. Therefore, fluency leads to an immediate and genuine positive affective response (Fang, Singh, and Ahluwalia 2007; Winkielman et al. 2003) that is independent of higher-order cognitive operations such as attributional inferences (Kunst-Wilson and Zajonc 1980;

Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980). This view implies that positive advertising effects should *always* be found, regardless of whether or not the stimuli are recognized as having been experienced before (Lee 2001; Stafford and Grimes 2012) because fluency leads to an immediate positive affective response that is not further scrutinized.

Knowing how annoying advertising affects brand preferences is of obvious relevance for marketing decisions. Negative effects of disruptive advertising have already been well documented. As outlined above, people show negative affective responses to disruptive advertising, which may lead to ad avoidance (Cho and Cheon 2004; Edwards, Li, and Lee 2002). However, given these well-documented negative effects on the consumers' evaluation of the ads, it seems surprising that disruptive advertising is so ubiquitous in practice. This might indicate that disruptive advertising may have positive effects on consumer preferences despite being experienced as annoying.

The present experiments were designed to test this hypothesis. As yet, there are only a few direct tests of whether people avoid or prefer products associated with annoying advertising. In most previous studies, the ads were irrelevant to the participants' tasks, but not designed to be particularly annoying (e.g., Duff and Faber 2011; Fang, Singh, and Ahluwalia 2007; Yoo 2008). A notable exception is the study of Acquisti and Spiekermann (2011). In this study, participants were required to play a Tetris-like computer game. During breaks in the game, participants were repeatedly disrupted by ads for a particular brand. Regardless of whether or not the participants could close the ads by clicking on them, the interruptive ads decreased the participants' willingness to pay for a mug with the logo of this brand relative to a mug with another logo, suggesting that the preference for the logo was negatively affected by the interruptive ads. However, it seems possible to speculate that the ads for the same brand may have caused the participants to see the branded mug as a promotional giveaway, which may have decreased their willingness to pay for it. Therefore, it is important to determine the effect of disruptive advertising on other consumer behaviors before drawing general conclusions.

Experiment 1

The present study examines whether, and how, disruptive advertising affects brand preferences. As in the study of Acquisti and Spiekermann (2011), participants played the popular computer game Tetris. Annoying advertising often disrupts pleasant, intrinsically motivating activities such as playing computer games, browsing the internet, or watching TV. We assumed that playing Tetris would be a pleasant activity for the majority of our student sample. To anticipate, this was confirmed by the participants' positive ratings of the game in all experiments reported here. At the same time, the game requires constant attention, which means that pop-up ads are particularly disrupting. Acquisti and Spiekermann presented the ads during breaks between the rounds of the game to spare their participants an "unnecessarily annoying experience" (p. 229). In the present study, in contrast, pop-up ads containing brand logos appeared during the game, and were therefore particularly

disruptive and annoying because they interfered directly with the game play. In Experiment 1, two additional manipulations were introduced. First, each brand logo was shown either once or five times to examine whether the advertising effects depend on brand repetition. Second, in order to make the ad disappear, one group of participants had to click on a close button (a black rectangle marked by a white X placed at the upper edge of the ad, see Fig. 1) while the other group had to click on the brand logo.

Two different dependent variables were assessed in two separate groups of participants. In a *recognition* group, the game was followed by a 2-alternative forced choice (2AFC) recognition test, which served to assess whether participants were able to explicitly *remember* the previously presented brands as having been advertised before. In a *preference* group, in contrast, a 2AFC preference test was used to assess whether people *preferred* the advertised over the novel brands.

The main purpose of Experiment 1 was to test whether annoying advertising increases or decreases preferences for the advertised brands. If the negative responses to the ads are transferred to the brands, people should avoid the advertised brands in the preference test, which translates into the statistical hypothesis that participants choose the advertised brands with a *below-chance* probability. Depending on the processes involved, it is possible to formulate two different hypotheses about how avoidance should be related to brand recognition. One possibility is that participants deliberately choose to avoid those brands that are recognized as having been associated with annoying advertising. This deliberate-reactance model predicts that conditions that lead to good recognition of brands associated with disruptive ads should also lead to a strong devaluation of the advertised brands (Moore and Hutchinson 1983). If, in contrast, brand avoidance is determined by the more automatic processes underlying evaluative conditioning (De Houwer, Thomas, and Baeyens 2001), the negative affective reaction to advertised brands may be retrieved even in the absence of explicit brand recognition. We henceforth refer to this hypothesis as the annoyance-transfer hypothesis.

However, it is also possible that annoying advertising is effective in increasing the participants' preferences for the advertised brands, which would explain the ubiquitous use of disruptive advertising in practice. This prediction is directly opposed to the annoyance-transfer hypothesis: participants should prefer the advertised brands over the new brands, which translates into the statistical hypothesis that participants choose the advertised brands with an *above-chance* probability. The misattribution model (Bornstein and D'Agostino 1994) predicts that preferences should be negatively related to explicit recognition of advertised brands. This is because fluency should be misattributed to liking only when the advertised brands are erroneously judged to be new. When participants correctly recognize brands as having been advertised before, fluency should be attributed to the advertising, and preferences for advertised brands should be corrected downward (Bornstein and D'Agostino 1994). Consequently, there should be little or no preference for correctly recognized brands. This leads to the prediction that those conditions that lead to good brand recognition should lead to the least pronounced advertising effects. In contrast, the primacy-of-affect model (Kunst-Wilson and Zajonc 1980; Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980) predicts that the preference for advertised ads should be due to a genuine positive affective response to the advertised brand logos that is independent of attributional inferences. Therefore, this model predicts above-baseline preferences for advertised brands regardless of whether or not the brands are explicitly recognized as having been presented before.

Method

Participants

Four participants did not complete the experiment because of a power failure in the lab. The remaining sample consisted of 202 German-speaking students at Heinrich Heine University Düsseldorf with good or corrected-to-normal vision, 140 of whom were female (mean age = 23 years, $SD = 6$), who were

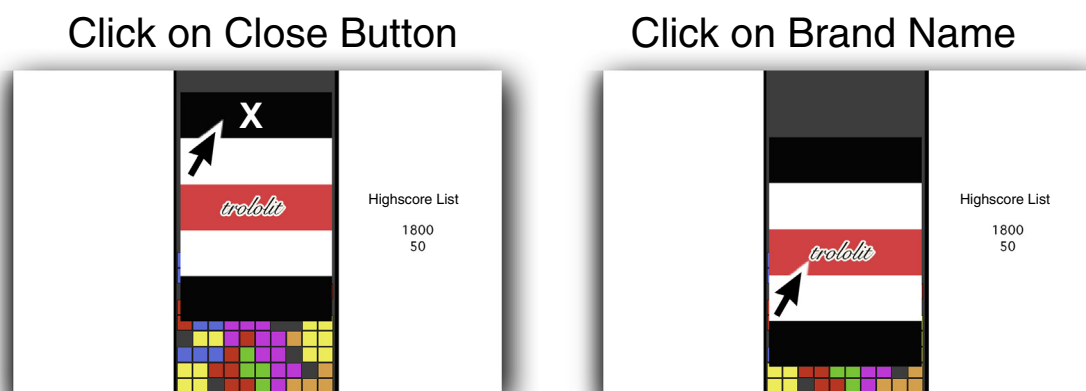


Fig. 1. Screenshots of the Tetris game. The ad for the fictitious brand of chocolate is presented as a pop-up ad and blocks the view on the game. In one group, participants were required to click on a close button to make the ad disappear (left panel). In the other group, participants were required to click on the brand logo to make the ad disappear (right panel).

recruited on campus. The students received a small monetary compensation or course credit for participating. Participants were consecutively assigned to one of four groups (see explanation below).

Materials and Procedure

Logos for 80 fictitious brands of chocolate were created using the pseudoword generator *wuggy* (Keuleers and Brysbaert 2010). We chose to use fictitious brand logos instead of existing ones because we assumed that both positive and negative advertising effects could be better assessed if the participants had no preexisting attitudes towards the brands. Text font, text color, and background color were varied to create unique logos that could be clearly distinguished from each other (see Fig. 2 for examples). For each participant, the advertised and new brands were randomly selected from this pool of brand logos. The brand logos were randomly assigned to the conditions (see description below).

Game Phase. The primary task was a Tetris game. During the game, colored geometric shapes (composed of four square blocks each) kept appearing at the top of the playing field and falling down until they accumulated at the bottom. The participants were required to press buttons on a response box to move the shapes sideways or to rotate them. The aim of the game was to eliminate rows by creating full rows without gaps, which caused the top rows to drop down to fill the gap of the eliminated row. The participants received points for all rows that they were able to eliminate. If the participants failed to eliminate the rows, the geometric shapes stacked up to the top of the playing field, which ended the game. The game then had to be restarted by pressing a “play again” button, but all points of the previous game were lost. To adjust the difficulty of the game to the abilities of the players, the falling speed of the shapes was increased when participants succeeded in eliminating rows. When the game had to be restarted, the speed was reset to the initial value. To increase the participants’ motivation, they were informed that their end scores were added to a high score list. The participants’ end scores were displayed at the right side of the screen.

During the game, pop-up ads showing brand logos suddenly appeared. The ads were designed to cover up most of the playing field (see Fig. 1). The first ad that was presented during the game always had a logo for an existing chocolate brand (Mars or Twix) to increase the realism of the advertising experience. In addition, 40 fictitious brand logos were presented during the Tetris game, one after another. Each brand logo was

advertised in a separate pop-up ad. The pop-up ads continued appearing during the game. Twenty brand logos were presented once, and 20 were presented repeatedly (five times), resulting in 120 pop-up ads that were presented during the game. The ads were presented in a random order. To ensure that the ads interfered with the Tetris game, the game continued (i.e., the geometric shapes kept falling, and new ones kept appearing) during ad presentation. Given that the pop-up ads blocked the view on the playing field, the participants had to close the ads, using the computer mouse. There were two different ways to do this (manipulated between groups). One group of participants closed the pop-up ads by clicking on a close button at the upper edge of the ad to make the ad disappear. The other group of participants closed each ad by clicking directly on the brand logo shown at the center of the ad that had the same size as the close button (see Fig. 1). In both groups, the position of the ad relative to the playing field was varied so that participants had to move the mouse cursor before being able to close the ad. After a round of the Tetris game was lost, it had to be restarted by clicking on the “play again” button until all of the ads had been displayed.

Recognition Test. Immediately after the game phase, participants saw the instructions for the test phase. Half of the participants (the *recognition* group) completed a 2AFC brand recognition test. In each of the 40 trials of the test, participants saw two brands, an old and a new brand logo. They were required to click on the brand logo that they remembered as having been advertised during the Tetris game. The two brand logos were always presented next to each other. The location of the advertised brands on the screen (left or right) was randomly determined. The first trial of the recognition test was a training trial in which participants had to choose between the two existing brands (Mars or Twix).

Preference Test. The other half of the participants (the *preference* group) completed a 2AFC brand preference test. As in the recognition test, participants were required to choose between two brands: an advertised and a new brand logo. However, they were not required to pick the one that had been presented before. Instead, they were instructed to choose the brand of sweets they wanted to have. Participants in the preference group had been informed that their decisions would have real consequences. They knew that they would receive one of the selected brands at the end of the experiment. Unbeknownst to the participants, they always received either a Twix or a Mars that were presented as the two alternatives



Fig. 2. Examples for the brand logos of the fictitious brands of chocolate.

in the first trial of the test phase (that was not meant to be analyzed).

Post-test Assessment. After the test, participants rated (1) how much they enjoyed the Tetris game on a scale ranging from 0 (“didn’t like it at all”) to 10 (“liked it very much”), and (2) the annoyance caused by the ads on a scale ranging from 0 (“didn’t annoy me at all”) to 10 (“annoyed me very much”).

Design

The recognition group data and the preference group data were analyzed separately. The experiment thus consisted of two (recognition, preference) separate 2×2 designs, each with pop-up closing type (clicking on the close button, clicking on the brand logo) as between-subjects factor and number of presentations (one, five) as within-subjects factor. The level of α was set to .05 for all analyses. A sensitivity analysis (Faul et al. 2007) showed that the experiment had a power of $1 - \beta = .95$ to detect a between-subjects effect of size $f = 0.32$ and a within-subjects effect of size $f = 0.18$, assuming that the correlation between the two levels of the within-subjects factor was $\rho = .5$.

Results

Game Enjoyment and Ad Annoyance

As expected, the participants liked playing Tetris. The average post-test rating of game enjoyment was 7.35 ($SEM = 0.14$) on a scale ranging from 0 (“didn’t like it at all”) to 10 (“liked it very much”). Game enjoyment did not differ as a function of type of test, $F(1,198) = 0.41, p = .52, \eta_p^2 < .01$, and pop-up closing type, $F(1,198) < 0.01, p = .99, \eta_p^2 < .01$, and there was no interaction between the two variables, $F(1,198) = 0.59, p = .44, \eta_p^2 < .01$.

Furthermore, the post-test ratings indicated that the participants experienced the disruptive advertising as annoying. The average post-test annoyance rating was 7.50 ($SEM = 0.15$) on a scale ranging from 0 (“didn’t annoy me at all”) to 10 (“annoyed me very much”). Annoyance ratings did not differ between the participants who completed the recognition test and those who completed the preference test, $F(1,198) = 0.39, p = .53, \eta_p^2 < .01$. Annoyance ratings were also unaffected by whether participants had to click on the close button or on the brand logo to close the ads, $F(1,198) = 0.02, p = .88, \eta_p^2 < .01$. There was also no interaction between these two variables, $F(1,198) = 0.78, p = .38, \eta_p^2 < .01$. A one-sided rank-correlation test revealed that ad annoyance was negatively related to game enjoyment, $r = -.20, p < .01$, suggesting that ad annoyance may have interfered with game enjoyment.

Brand Recognition

Fig. 3 shows the proportion of trials in which participants correctly selected the advertised brand in the 2AFC recognition test. Participants who had to click on the brands were better at remembering these brands than those who had to click on the close button, $F(1,98) = 17.05, p < .01, \eta_p^2 = .15$. Furthermore, participants were better able to remember the brands they had

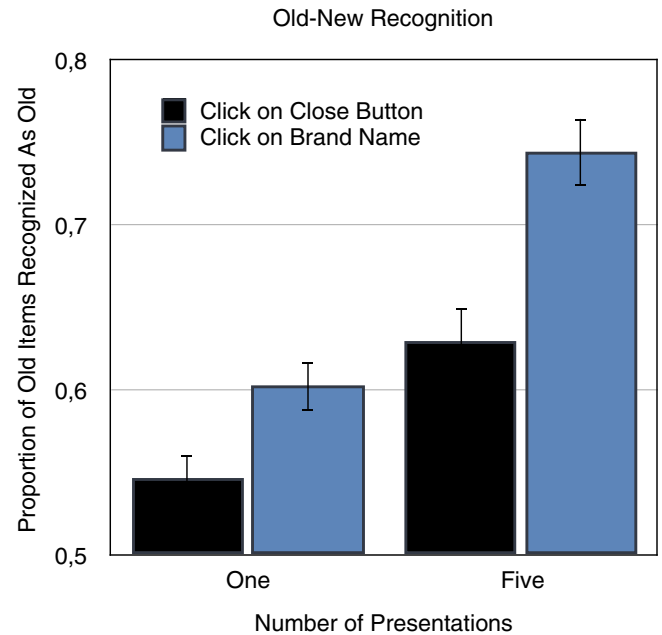


Fig. 3. Brand recognition in the recognition test in Experiment 1 as a function of pop-up closing type and number of presentations. Recognition was assessed in a 2AFC test. The error bars represent the standard errors.

seen five times than those they had seen only once, $F(1,98) = 63.84, p < .01, \eta_p^2 = .39$. There was a significant interaction between pop-up closing type and number of presentations, showing that the effect of pop-up closing type was larger for brands presented five times than for those presented only once, $F(1,98) = 4.31, p = .04, \eta_p^2 = .04$. However, recognizing that a brand had been advertised must not be confused with preference for that brand because it is possible that preference judgments are unrelated (e.g., according to the primacy-of-affect model) or even inversely related (e.g., according to the misattribution model) to explicit brand recognition. The analysis of the old-new recognition data therefore has to be complemented by an analysis of the brand preference data.

Brand Preference

Fig. 4 shows the proportion of trials in which participants preferred the advertised brand over the new brand in the 2AFC preference test. Again, we started by testing whether brand preference differed as a function of pop-up closing type and number of presentations. However, it is also interesting to test whether preference for advertised brands was significantly above or below chance. If the participants chose the advertised brands above chance (i.e., with a probability larger than .50), then this would indicate that participants preferred the advertised brands over the new brands. If, in contrast, participants chose the advertised brands with a probability below the chance level (i.e., smaller than .50), then this would indicate that participants avoided the advertised brands, and preferred the new brands over the old brands. Preference for the advertised brands was not affected by pop-up closing type, $F(1,100) = 0.02, p = .90, \eta_p^2 < .01$, or number of presentations, $F(1,100) = 0.44, p = .51, \eta_p^2 < .01$, and there was also no interaction, $F(1,100) =$

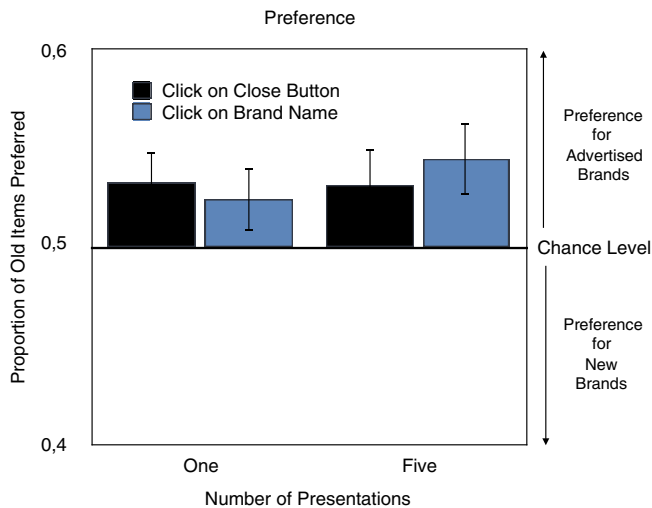


Fig. 4. Brand preference in the preference test in Experiment 1 as a function of pop-up closing type and number of presentations. Preference was assessed in a 2AFC test. Values above .50 indicate that the participants preferred the advertised over the new brand logos while values below this level indicate that participants avoided the advertised brands (and preferred the new brands). The error bars represent the standard errors.

0.52, $p = .47$, $\eta_p^2 < .01$. However, preference for advertised brands was significantly above chance, $F(1,100) = 12.87$, $p < .01$, $\eta_p^2 = .11$, showing that participants preferred advertised brands over new brands (see Fig. 4).

Discussion

Negative effects of disruptive advertising are well documented (Cho and Cheon 2004; Edwards, Li, and Lee 2002). The present results confirm the negative evaluation of intrusive pop-up ads in that the pop-up ads were rated as being annoying. Furthermore, ad annoyance may have interfered with the enjoyment of the Tetris game, as evidenced by a negative relationship between ad annoyance and game enjoyment.

However, the main question was how disruptive advertising would influence the evaluation of the advertised brands. The results suggest that the effects of disruptive advertising may not be uniformly negative. The results of the recognition group already suggest that brands advertised by pop-up ads are well remembered. However, it seems even more important to determine whether the pop-up ads have positive or negative effects on brand preferences in the preference group. Therefore, the most important finding of Experiment 1 is that disruptive advertising had a positive effect on brand preferences, which was confirmed by the fact that the advertised brands were selected in the 2AFC preference test with an above-chance probability (see Fig. 4).

The findings suggest that better brand recognition is not to be equated with higher advertising effectiveness because differences in brand recognition were not paralleled by differences in brand preference. First, repetition had a pronounced effect on brand recognition, but no effect on preference. Second, participants who had clicked on the brand logos were better able to recognize the brands than those who had clicked on the

close buttons, but the groups did not differ in their preference for advertised brands. We will return to this issue when discussing Experiments 4 and 5.

Experiment 1 seems to provide clear evidence against the hypothesis that the negative response to the ads is transferred to the brands via evaluative conditioning because this hypothesis predicts that new brands are preferred over advertised brands, which is the opposite of what we have found. However, the results of Experiment 1 are still consistent with a weaker version of this hypothesis, according to which annoying advertising leads to both positive effects (increased liking of the advertised brands due to their prior presentation) and negative effects (decreased liking of the advertised brands due to their association with an annoying experience). Overall, annoying advertising may lead to a positive effect on consumer preferences (when the positive effect outweighs the negative one), but it may be much less effective than other, less annoying types of advertising. This question is of obvious applied relevance because readers may (prematurely) conclude that advertisers should present ads in an annoying way because it seems to be effective in increasing brand preferences when this form of advertising may be the least effective in achieving this relative to other, less annoying, forms of advertising. Therefore, it is necessary to test whether less annoying advertising is more effective in increasing brand preferences. This hypothesis is tested in Experiments 2 and 3.

Experiment 2

To test the weaker version of the annoyance-transfer hypothesis explicated in the previous paragraph, we need to compare the effectiveness of two forms of advertising that differ in how annoying they are. In Experiment 1, the pop-up ads interfered directly with the game play because the Tetris game continued during ad presentation. In Experiment 2, we compared two common types of advertising. For example, when playing a mobile game, the ads may either be shown during the game (while the game continues) or during breaks of the game (while the game is interrupted). Similarly, TV ads are usually presented during ad breaks, but some TV channels show pop-up ads during TV shows or movies (while the TV show or movie is continuing). We expected that ads should be experienced as more annoying when presented during a continuing primary task (in which case they have a greater potential for interference) than when presented during breaks (cf. Acquisti and Spiekermann 2011). To anticipate, the pop-up ads were indeed experienced as more annoying when the game continued during ad presentation than when the game was paused. Therefore, this manipulation allowed us to examine whether brand preferences may be affected by the degree to which ads are perceived as annoying. The annoyance-transfer hypothesis predicts that less annoying advertising should be more effective in increasing brand preferences. Therefore, presenting the ads during breaks should lead to more positive advertising effects than presenting them while the game continues.

Method

Participants

Participants were 139 German-speaking students at Heinrich Heine University Düsseldorf with good or corrected-to-normal vision, 93 of whom were female (mean age = 24 years, $SD = 4$), who were recruited on campus. Participants were consecutively assigned to one of two groups (see explanation below).

Materials and Procedure

Materials and procedure were very similar to Experiment 1, with the following exceptions.

Game Phase. Forty fictitious brand logos were presented in a randomized order. Half (20) of the brand logos were presented once, and half (20) were presented 5 times. In one group, the Tetris game continued (i.e., the geometric shapes kept falling, and new ones kept appearing) during ad presentation (i.e., the ads were presented during the game). In the other group, the game was stopped during ad presentation (i.e., the ads were presented during breaks). All of the participants had to click on the brand logos to close the ads.

Distractor Task. Between the Tetris game and the preference test, participants performed a social evaluation task. They saw 100 highly variable color pictures of the Helen Facial Feature Dataset (Le et al. 2012) that contains diverse portrait images from Flickr showing men, women, and children in different poses with different emotional expressions (including grimaces). Participants were required to evaluate the likability of the people shown in these pictures. Each of the 100 pictures was shown for 6 s. This rating phase was included to see whether the advertising effects would still be significant after a short distractor task.

Preference Test. Only brand preferences were assessed. All participants had to choose the brands of sweets they wanted to have in a 2AFC preference test.

Design

The design was a mixed 2×2 design with type of advertising (presented during the game, presented during breaks) as between subjects factor and number of presentations (one, five) as within-subjects factor. A sensitivity analysis showed that the experiment had a power of $1 - \beta = .95$ to detect a between-subjects effect of size $f = 0.27$ and a within-subjects effect of size $f = 0.15$, assuming that the correlation between the two levels of the within-subjects factor was $\rho = .5$.

Results

Game Enjoyment and Ad Annoyance

Again, the post-test ratings confirmed that the participants liked playing Tetris. The average rating of game enjoyment was 7.55 ($SEM = 0.16$) on a scale ranging from 0 (“didn’t like it at all”) to 10 (“liked it very much”). Game enjoyment did not differ as a function of type of advertising, $F(1,137) = 1.26$, $p = .26$, $\eta_p^2 = .01$. As in Experiment 1, the disruptive advertising

was experienced as annoying. The average annoyance rating was 7.14 ($SEM = 0.22$) on a scale ranging from 0 (“didn’t annoy me at all”) to 10 (“annoyed me very much”). A one-sided test showed that ad annoyance was negatively correlated with game enjoyment, $r = -.14$, $p = .05$, suggesting that ad annoyance may have interfered with game enjoyment. Importantly, the ads were indeed less annoying when they were presented during breaks ($M = 6.59$, $SEM = 0.32$) than when they were presented during the game ($M = 7.70$, $SEM = 0.31$), $F(1,137) = 6.36$, $p = .01$, $\eta_p^2 = .04$. This allowed us to test whether less annoying forms of advertising are more effective in increasing brand preferences.

Brand Preferences

Again, we were interested in whether (a) brand preference differed as a function of type of advertising and number of presentations, and (b) whether preference for old brands was above or below chance level (.50), which would provide evidence for a positive or negative advertising effect, respectively. Preference for old brands (Fig. 5) was not affected by type of advertising, $F(1,137) < 0.01$, $p = .96$, $\eta_p^2 < .01$, or number of presentations, $F(1,137) = 1.23$, $p = .27$, $\eta_p^2 < .01$, and there was no interaction, $F(1,137) = 1.04$, $p = .31$, $\eta_p^2 < .01$. As in Experiment 1, advertised brands were preferred over new brands with an above-chance probability in the 2AFC preference test, $F(1,137) = 15.46$, $p < .01$, $\eta_p^2 = .10$, providing evidence of a positive advertising effect on brand preferences.

Discussion

Overall, the results of Experiment 2 are very similar to those obtained in Experiment 1. The ratings suggest that the pop-up ads were perceived as annoying. As in Experiment 1, there was a negative relationship between ad annoyance and game

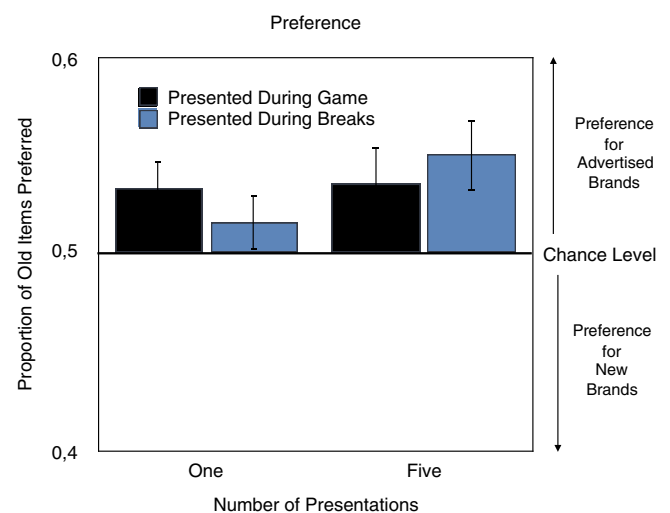


Fig. 5. Brand preference in Experiment 2 as a function of type of advertising and number of presentations. Preference was assessed in a 2AFC test. Values above .50 indicate that the participants preferred the advertised over the new brand logos while values below this level indicate that participants avoided the advertised brands (and preferred the new brands). The error bars represent the standard errors.

enjoyment, suggesting that ad annoyance may have reduced game enjoyment. Furthermore, participants in Experiment 2 preferred the advertised brands in the 2AFC preference test with an above-chance probability, just like the participants in the preference group in Experiment 1. Numerically, the results are very similar (for comparison, please compare the results displayed in Fig. 5 with those displayed in Fig. 4). Furthermore, brand preferences did not differ as a function of type of advertising even though the two types of advertising differed in how annoying they were. This finding suggests that preference for advertised brands does not differ as a function of ad annoyance, and provides additional evidence against the hypothesis that the negative response to the ads is transferred to the brands.

Experiment 3

However, it could be argued that the difference between the two conditions realized in Experiment 2 was too small to lead to differential effects on brand preferences. Experiment 3 further extends these results by comparing the non-disruptive advertising via banner ads to the disruptive advertising via pop-up ads. We expected that the banner ads would be perceived as being much less annoying than the pop-up ads because the banner ads should interfere only minimally, if at all, with the game play. There are two reasons why banner ads should be much less disruptive than pop-up ads: (1) Pop-up ads blocked the view on the game while banner ads left the view on the game unimpaired. (2) Accordingly, pop-up ads had to be closed using the computer mouse while the banner ads afforded no response that could interfere with the game play. We expected that banner ads would be experienced as much less disruptive, and would be rated as much less annoying, than pop-up ads. Therefore, banner ads provide an interesting non-disruptive control condition against which the effects of disruptive pop-up ads can be compared.

Method

Participants

Participants were 111 German-speaking students at Heinrich Heine University Düsseldorf with good or corrected-to-normal vision, 80 of whom were female (mean age = 26 years, $SD = 7$), who were recruited on campus. Participants were consecutively assigned to two groups (see explanation below).

Materials and Procedure

The method was similar to that of Experiment 2 with the following exceptions.

Game Phase. At the start of the game, two ads for existing brands (Snickers, Mars, or Twix) were presented in a random order, one after another. One was a pop-up ad that blocked the view on the game and one was a banner ad that was presented in the empty area on the left of the playing field. Then the ads for 52 fictitious brands were presented. Each brand logo was only presented once. Participants saw both pop-up ads

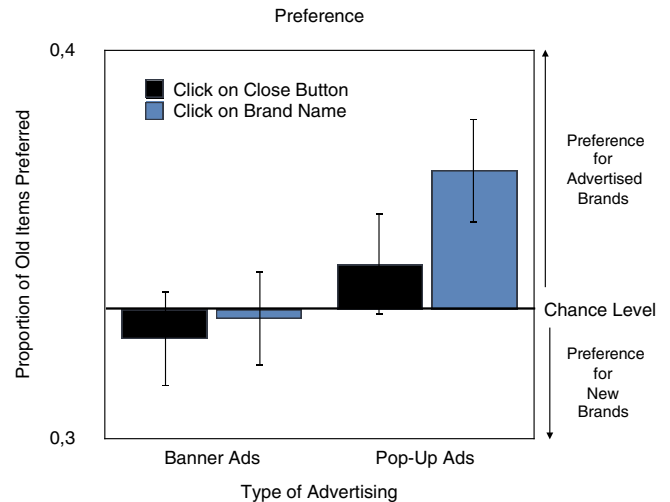


Fig. 6. Brand preference in Experiment 3 as a function of pop-up closing type and type of advertising. Given that participants had to choose one of three brands in each trial of Experiment 3, values above .33 indicate that the participants preferred the advertised over the new brand logos while values below this level indicate an avoidance of advertised brands (or a preference for new brands). The error bars represent the standard errors.

and banner ads. Half (26) of the brand logos were presented as pop-up ads that blocked the view on the game (as in Experiments 1 and 2), and half (26) were presented as banner ads in the empty area to the left of the playing field. The Tetris game continued during ad presentation. Half of the participants clicked on the close button to make the ad disappear while the other half clicked on the (equally large) brand logo of each pop-up ad (as in Experiment 1). The banner ads disappeared autonomously after a certain time interval. To equate the time the participants were exposed to banner and pop-up ads, each banner ad was presented for as long as the participant took to close the last pop-up ad.¹

Preference Test. In the test phase, brand preferences were assessed in a 3AFC preference test. In each trial, participants saw three different brands: A brand that had been advertised with a pop-up ad, a brand that had been advertised with a banner ad, and a new brand. The positions of the brands on the screen were randomly determined. The participants were required to select the brand they wanted to have (knowing that they would receive one of the selected brands at the end of the experiment), as in the previous experiments.

Design

The design was a mixed 2×2 design with pop-up closing type (click on close button, click on brand name) as between

¹ To determine the presentation time of the first banner ad, we made use of the fact that the preference for the two existing brands was not meant to be analyzed. The presentation time for the banner ad for the existing brand (the preference for which was not analyzed) was set to 2 s. The time the participants took to close the pop-up ad for the other existing brand could then be used to determine the time for the first fictitious banner ad. In this way, the presentation time for all relevant (fictitious) brands (the preference for which was analyzed) was determined by the participant's individual response time.

subjects factor and type of advertising (banner ad, popup ad) as within-subjects factor. A sensitivity analysis showed that the experiment had a power of $1 - \beta = .95$ to detect a between-subjects effect of size $f = 0.30$ and a within-subjects effect of size $f = 0.17$, assuming that the correlation between the two levels of the within-subjects factor was $\rho = .5$.

Results

Game Enjoyment and Ad Annoyance

The average rating of game enjoyment was 7.42 ($SEM = 0.18$) on a scale ranging from 0 (“didn’t like it at all”) to 10 (“liked it very much”), confirming that participants found that playing Tetris was a pleasant activity. Game enjoyment did not differ as a function of pop-up closing type, $F(1,109) = 2.01$, $p = .16$, $\eta_p^2 = .02$.

As in Experiment 1, annoyance ratings were not affected by whether participants had to click on the close button or the brand logo to close the ads, $F(1,109) = 1.13$, $p = .29$, $\eta_p^2 = .01$. However, in line with our expectations, banner ads were not perceived as annoying at all; they received a mean annoyance rating of $M = 0.92$ ($SEM = 0.12$), on a scale ranging from 0 (“didn’t annoy me at all”) to 10 (“annoyed me very much”). Pop-up ads, in contrast, received comparatively high annoyance ratings ($M = 6.39$, $SEM = 0.25$). The difference between the two types of ads was significant, $F(1,109) = 475.24$, $p < .01$, $\eta_p^2 = .81$. There was no interaction between pop-up closing type and type of advertising, $F(1,109) = 0.40$, $p = .53$, $\eta_p^2 < .01$. Annoyance did not correlate significantly with game enjoyment, possibly because presenting two differentially evaluated types of advertising diluted the negative relationship between ad annoyance and game enjoyment.

Brand Preferences

Again we were interested in (a) whether brand preference differed as a function of pop-up closing type and type of advertising, and (b) whether brand preference was above or below chance (Fig. 6). Given that three brand logos were presented in each trial of the test phase, the chance level in Experiment 3 corresponded to .33 instead of .50. As in Experiment 1, there was no effect of pop-up closing type on brand preference, $F(1,109) = 2.55$, $p = .11$, $\eta_p^2 = .02$. There was also no interaction of pop-up closing type and type of advertising, $F(1,109) = 0.34$, $p = .56$, $\eta_p^2 < .01$. The main effect of type of advertising just missed the conventional level of statistical significance, $F(1,109) = 3.53$, $p = .06$, $\eta_p^2 = .03$, but there was a tendency in the direction of pop-up ads being more effective than banner ads in increasing consumer preferences. As in Experiments 1 and 2, advertised brands were preferred over new brands, $F(1,109) = 4.36$, $p = .04$, $\eta_p^2 = .04$. Although this finding should only be cautiously interpreted because the main effect of type of advertising missed the conventional level of statistical significance, it seems noticeable that only brands that were advertised by pop-up ads were preferred above chance, $t(110) = 2.54$, $p = .01$, $\eta_p^2 = .06$, while preference for brands that were advertised by banner ads was at chance, $t(110) = -0.62$, $p = .54$, $\eta_p^2 < .01$. This finding

clearly disconfirms the hypothesis that banner ads are more effective in influencing consumer preferences than pop-up ads.

Discussion

As expected, pop-up ads that blocked the view on the game were perceived as highly annoying while peripherally presented banner ads were not perceived as annoying, presumably because they did not directly interfere with the game play. This allowed us to examine whether non-annoying banner ads are more effective in increasing brand preferences than the highly annoying pop-up ads. The results clearly disconfirm this hypothesis. There was even a tendency in the opposite direction: although banner ads were hardly annoying at all, they were not more effective than the disruptive pop-up ads. In fact, banner ads had no positive effects on brand preferences at all. Possibly, peripherally presented banner ads are not only less annoying because they are easy to ignore, they are also less-well processed and thus have little, if any, effect on brand preferences. In sum, the results confirm once more that disruptive advertising is effective in increasing preferences for the advertised brands, and provide evidence against the hypothesis that annoyance at disruptive advertising decreases the preferences for the advertised brands.

Experiment 4

The results of Experiments 1–3 confirm the hypothesis that people prefer advertised over novel brands. However, the results of Experiment 1 are inconsistent with the misattribution model (Bornstein and D’Agostino 1994), according to which explicit knowledge that a brand has been advertised should diminish the advertising effect. The model consists of two basic claims. First, it assumes that previously experienced stimuli are processed more fluently than new stimuli. Second, it assumes that participants misattribute processing fluency to liking if they fail to correctly attribute fluency to the prior exposure. This implies that correctly identifying a stimulus as old should interfere with the misattribution process, and should diminish the size of the advertising effect. This prediction is seemingly supported by the observation that effects of previous exposure are larger when the stimuli are subliminally presented (Bornstein 1989), but this evidence is based on a small number of studies, and conflicting findings have been obtained (De Zilva et al. 2013; Lee 2001; Stafford and Grimes 2012). The results of Experiment 1 are inconsistent with this prediction because the positive advertising effect on brand preferences did not differ between conditions that led to good and poor explicit brand recognition. This aspect of the present results fits better with the primacy-of-affect model (Kunst-Wilson and Zajonc 1980; Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980), according to which fluency leads to a genuine positive affective response that is unaffected by attributional inferences.

Experiment 4 provides a more direct test of the prediction of the misattribution model that the positive advertising effect on brand preferences should disappear when misattribution is prevented. Knowing that a brand has been advertised should

abolish the advertising effect because in this case processing fluency can be correctly attributed to the advertising. In a classical study, Bornstein and D'Agostino (1994) required their participants to evaluate stimuli that had either been presented before or were new. Some of the participants were informed that the stimuli were "old," and some were informed that they were "new". The findings provide support for both increased liking of previously presented stimuli and for the devaluation of stimuli that were labeled as "old". Importantly, liking of previously presented stimuli that were correctly labeled as "old" did not differ from that of new stimuli that were correctly labeled as "new". This seemingly provides clear support for the prediction of the misattribution model that positive effects of advertising on consumer preferences should only occur when fluency can be misattributed to liking, and disappears when it can be correctly ascribed to the advertising. However, this finding is in direct opposition to a growing number of studies showing that positive effects of previous exposure often persist, and are even stronger for, stimuli that can be correctly recognized as old (Brooks and Watkins 1989; Lee 2001; Stafford and Grimes 2012).

The primacy-of-affect model (Kunst-Wilson and Zajonc 1980; Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980), in contrast, assumes that fluency is associated with a genuine positive affective response (Fang, Singh, and Ahluwalia 2007; Winkielman et al. 2003) that is unaffected by attributional inferences. According to Lee (2001), people do not feel the need to search for explanations for their affective preferences. Therefore, they do not see the need to correct their preferences when fluency can be attributed to prior exposure. Lee has provided direct evidence for this hypothesis by showing that people correct cognitive-perceptual judgments when it seems plausible that they have been influenced by prior exposure, but they do not correct affective-evaluative judgments. This finding is consistent with the assumption of the primacy-of-affect model (Kunst-Wilson and Zajonc 1980; Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980) that fluency leads to an immediate positive response that is not further scrutinized. This view predicts that participants should prefer advertised brands over new brands even when they *know* that the brands have been advertised.

Method

Participants

Two data files were excluded from analysis because the students had participated twice. The remaining sample consisted of 128 German-speaking students at Heinrich Heine University Düsseldorf with good or corrected-to-normal vision, 98 of whom were female (mean age = 22 years, $SD = 4$), who were recruited on campus.

Materials and Procedure

The method was similar to that used in the preference group of Experiment 1, with the following exceptions.

Game Phase. Twenty brand logos were presented in a randomized order. Each brand logo was presented 5 times. The Tetris game continued during ad presentation. The participants had to click on the brand logos to close the ads.

Preference Test. Brand preferences were assessed using a 2AFC preference test. The main difference to the preference test used in Experiments 1–3 was that participants were truthfully informed about which of the brands were previously advertised with pop-up ads and which were new. The labels "advertised brand" and "new brand" were presented directly above the brand logos in plain 28 pt. Arial font. The meaning of these labels was explained in the test instructions.

Design

The design was a one-sample design. We tested whether the preference for advertised brands in the 2AFC task differed from chance (.50). A sensitivity analysis showed that the experiment had a power of $1 - \beta = .95$ to detect a preference effect of size $d = .32$ in a two-sided t test.

Results

Game Enjoyment and Ad Annoyance

As in the previous experiments, participants liked playing Tetris. The average rating of game enjoyment was 7.31 ($SEM = .18$) on a scale ranging from 0 ("didn't like it at all") to 10 ("liked it very much"). Furthermore, they found the pop-up ads annoying. The average annoyance rating was 7.29 ($SEM = .20$) on a scale ranging from 0 ("didn't annoy me at all") to 10 ("annoyed me very much"). A one-sided test revealed that ad annoyance correlated negatively with game enjoyment, $r = -.22$, $p = .01$, suggesting that ad annoyance may have interfered with game enjoyment.

Brand Preferences

The mean proportion of trials in which participants preferred the advertised brand over the new brand in the 2AFC preference test was .54 ($SEM = .01$). Preference for advertised brands was significantly above chance, $t(127) = 2.92$, $p < .01$, $\eta_p^2 = .06$.

Discussion

Experiment 4 served to test the prediction of the misattribution model that the positive advertising effect should be abolished when the participants are truthfully informed about which brand has been advertised. This prediction was disconfirmed. The participants still preferred advertised brands over new brands with about the same probability as the participants in the preference group in Experiment 1. This result is in line with the idea that fluency elicits a genuine positive affective response that is unaffected by attributional inferences.

Experiment 5

Experiment 5 served to test whether the number of pop-up ads presented during the Tetris game may have influenced the direction of the advertising effect obtained in Experiments 1–4. Specifically, presenting a large number of pop-up ads (e.g., 120 pop-up ads in Experiment 1) during the Tetris game for a large number of different brands (e.g., 40 different brands in Experiment 1) may have created an ad-hoc norm that using disruptive pop-up ads is normal within the context of the game. The fact that the ad annoyance was directed not only to a few, but to a large number of brands (e.g., 40 brands in Experiment 1) may have diluted the negative effect of ad annoyance on the evaluation of each advertised brand. The possibility arises that a negative effect of disruptive advertising on brand preferences emerges when only a small number of brands is advertised in a disruptive way because (1) the negative experiences with the pop-up ads are more unique and, therefore, more salient than when a large number of pop-up ads are presented, and (2) the negative response to the individual brand is less diluted than when the annoyance is directed at pop-up ads for a large number of different brands.² This line of reasoning leads to the hypothesis that negative effects of ad annoyance on brand preferences emerge when only a small number of pop-up ads for a few brands are encountered. In Experiment 5, participants were therefore exposed to a small number of pop-up ads for only two fictitious brands (one brand once versus another brand five times) to examine whether the inclusion of a larger number of brands in Experiments 1–4 may have influenced the direction of the advertising effect.

It is important to realize that examining the preference for only two advertised brands dramatically reduces the number of observations in each cell of the design relative to Experiments 1–4, which will have negative effects on the reliability of the data, reducing the chances of finding an effect of advertising on brand preference of whatever direction. It was therefore clear from the outset that we would need a much larger sample size compared to Experiments 1–4 to compensate for the loss of observations per participant. However, the opportunity arose to run this experiment alongside an unrelated experiment on eyewitness testimony with a large sample size. We decided to jump at this opportunity to perform the additional experiment, ending up with a total sample size of $N = 333$. To anticipate, we were able to replicate the finding of a (numerically small, but significant) preference for advertised brands even when only two brands were presented (one brand once versus another brand five times).

Method

Participants

Participants were 333 students at Heinrich Heine University Düsseldorf with good or corrected-to-normal vision, 257 of whom were female (mean age = 23, $SD = 4$), who had agreed to participate in an unrelated experiment on eyewitness testimony.

Materials and Procedure

The method was identical to that used in the preference group of Experiment 1, with the following exceptions.

Game Phase. Only two different fictitious brand logos were advertised via pop-up ads. One brand logo was presented once, and the other brand logo was presented five times.

Preference Test. In each trial of the 2AFC preference test, one of the two fictitious brand logos was presented together with a control brand logo (that had not been advertised), and participants were required to select the brand they preferred.

Results

Game Enjoyment and Ad Annoyance

The average rating of game enjoyment was 5.78 ($SEM = .13$) ranging from 0 (“didn’t like it at all”) to 10 (“liked it very much”). Mean annoyance caused by the pop-up ads was 6.62 ($SEM = .15$). A one-sided test showed that ad annoyance was negatively correlated with game enjoyment ($r = -.11, p < .02$), suggesting that ad annoyance may have interfered with game enjoyment.

Brand Preferences

More participants chose the advertised over the new brand in the 2AFC preference test than vice versa (Table 1). Descriptively, the difference between the advertised and the new brand appears somewhat larger for brands that were advertised five times than for brands that were advertised once. The response frequencies displayed in Table 1 were analyzed using a log-linear model analysis. The saturated model that fits the data perfectly comprises the main effect of number of presentations (once, five times) and item status (advertised, new) as well as the interaction between these two variables. In a first step, the term representing the interaction between the number of presentations and item status was removed. The resulting restricted model still fits the data, $\chi^2(1) = 1.96, p = .16$, suggesting that the preference for advertised over new brands was independent of the number of presentations. Next, the main effect of item status was removed from the model. The resulting restricted model implements the assumption that participants’ responses are not affected by advertising. That restricted model no longer fits the data, $\chi^2(2) = 7.00, p = .03$. Thus, the assumption that participants’ responses were unaffected by advertising had to be rejected. In other words, participants’ preferences for advertised over new brands was statistically significant.

Table 1

Brand preferences in Experiment 5 as a function of item status and number of presentations. Preference was assessed in a 2AFC test.

Number of presentations	Item status	
	Advertised	New
One	172	161
Five	190	143
All	362	304

² We thank a reviewer for proposing this hypothesis.

Discussion

Even though only two fictitious brands were advertised during the Tetris game (one brand presented once and one presented five times), the results were very similar to those obtained in the previous experiments. The pop-up ads were perceived as annoying. There was a negative relationship between ad annoyance and game enjoyment, suggesting that ad annoyance may have interfered with game enjoyment. Furthermore, there was a numerically small, but statistically significant preference for advertised brands in the preference test: participants preferred the advertised brands over new brands. Furthermore, brand preferences did not differ as a function of times of presentation, although there was a non-significant tendency towards a more pronounced preference effect for the brand that was advertised five times in comparison to the brand that was advertised once. These findings provide additional evidence that disruptive advertising can be effective although the effects are numerically small.

General Discussion

The experiments of the present series show a highly consistent pattern of results. (1) The results confirm the negative evaluation of disruptive advertising via pop-up ads that is also reflected in large-scale surveys on this issue (Cho and Cheon 2004; Edwards, Li, and Lee 2002). In all experiments, the pop-up ads were rated as annoying. (2) In most experiments, ad annoyance was negatively correlated with the participants' ratings of how much they liked playing the Tetris game, suggesting that the annoyance caused by the disruption of the game may have interfered with the enjoyment of the primary task. (3) Most importantly, the present study served to test the question of whether the disruptive and annoying presentation of the pop-up ads during the Tetris game would subsequently lead to positive or negative advertising effects. Experiment 1 shows that the brands that were advertised via pop-up ads were well remembered, which suggests that disruptive advertising can increase brand recognition. This finding is to be expected given that the pop-up ads blocked the view on the game and required participants to interact with the ads, which resulted in the processing of the ad, and, thereby, of the brand name. An even more interesting finding is that disruptive advertising has a beneficial effect on brand preferences when participants are required to choose between advertised and non-advertised brands.

The present results therefore indicate that disruptive advertising can increase the consumers' preferences for the advertised brands even when being perceived as annoying. This conclusion is supported by the findings that (a) annoying pop-up ads had a positive, not a negative, effect on brand preferences (Experiments 1–5) and (b) presenting ads in a less or non-annoying way was not more effective in increasing consumer preferences than presenting ads in a highly annoying way (Experiments 2 and 3). Overall, the findings suggest that annoyance of the ads had no measurable influence on the participants' preferences for the advertised brands. The positive

effects of disruptive advertising on brand preference via pop-up ads were numerically small, but they were highly consistent and robustly obtained in all five experiments. Therefore, it seems possible to conclude that disruptive advertising might pay off if it has a large-enough audience.

The positive effects of disruptive advertising on brand preferences can be explained by assuming that the previously encountered brands were processed more fluently, which is experienced as affectively positive. This mechanism is implemented in the primacy-of-affect model (Kunst-Wilson and Zajonc 1980; Winkielman, Zajonc, and Schwarz 1997; Zajonc 1980), according to which fluency leads to a genuine positive affective response (Fang, Singh, and Ahluwalia 2007; Winkielman et al. 2003) that is independent of attributional inferences. Consistent with this model's predictions, knowledge that a brand had been advertised had no effect on brand preferences. This result is also consistent with Lee's (2001) claim that people do not feel the need to search for alternative explanations of their affective responses, and, therefore, do not correct a positive response elicited by an advertised stimulus, even when they know that the stimulus has been presented before.

At a pragmatic level, the present study represents a step towards understanding the effects of disruptive advertising on consumer preferences. The situation realized in the present study (i.e., incidental processing of the ads, involvement in a demanding task, and a high degree of exposure to advertising) is common for many advertising environments outside of the laboratory. However, further research is needed to test the effects of annoying advertising in other situations, although the present Experiment 5 indicates that the same effects can also be obtained in less cluttered advertising environments, and Experiments 1 and 4 suggest that explicit knowledge of which brands have been advertised does not modulate the preference effect. Future studies should also examine the long-term effects of annoying advertising. The present Experiment 2 shows that the positive effect of annoying advertising on consumer preferences can be robustly obtained after a 10-minute distractor interval filled with an unrelated activity, but in real life the delay between ad exposure and product choice is often much longer.

Furthermore, we only used brands that were novel to the participants. Consistent with our results, Berger, Sorensen, and Rasmussen (2010) found that negative reviews can lead to increased sales, but this result was only obtained when the negative publicity led to a significant increase in familiarity of a previously unknown product. The negative reviews had no positive effects on products that were well known beforehand, probably because these products could not benefit as much from a boost in familiarity. Campbell and Keller (2003), however, suggested that ads for unknown brands may "wear out" (lose effectiveness) more quickly with repetition than ads for familiar brands. It therefore remains to be tested to what degree well-known brands can benefit from disruptive and annoying advertising. Furthermore, we deliberately exposed participants to very simple ads (only the brand logos) to be able to isolate the effects of disruptive advertising by testing

whether, and how, a disruptive presentation of these brand logos would affect preference judgments later on. This simple form of advertising is similar to some types of advertising that are used in practice, but ads often contain more information (e.g., positive phrases or pictures) that might increase the effectiveness of disruptive ads even more.

However, before recommending the use of disruptive advertising in practice, it should be taken into consideration that annoying advertising may have unwanted side effects that have not yet been discussed. Annoying ads often disrupt pleasant activities, and it is possible that the presence of these ads makes these activities less attractive. In the present study, this idea is supported by a negative relationship between ad annoyance and game enjoyment. One may suspect that disruptive ads have a similar negative effect on the evaluation of web sites and TV contents, which could be examined in future research. Ultimately, annoyance of disruptive advertising may motivate customers to avoid activities associated with disruptive advertising altogether, or to take other measures for reducing ad exposure, such as choosing ad-free platforms or installing ad-filtering software (Cho and Cheon 2004; Hussain and Lasage 2014).

This may result in a social dilemma-like situation in which each advertiser can use disruptive advertising to exploit the positive advertising effects, but at the risk of scaring away the target audience altogether. The dilemma arises because disruptive advertising is effective in influencing consumer preferences (and is, therefore, associated with a short-term benefit for the advertising companies), but may have unwanted and negative side effects for the recipients of the ads and, ultimately, for the advertising companies that may suffer from ad avoidance in the long run. If disruptive advertising had no or even negative effects on consumer preferences, there would be no dilemma: advertisers would stop using it when learning that it is ineffective. However, given that the present results indicate that disruptive advertising increases preferences for the advertised brands, it turns into a moral question whether advertisers should take advantage of this socially undesirable, but effective advertising technique.

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