



Do Interruptions Pay off? Effects of Interruptive Ads on Consumers' Willingness to Pay

Alessandro Acquisti ^{a,*} & Sarah Spiekermann ^b

^a Heinz College, Carnegie Mellon University, Pittsburgh, PA, USA

^b Institute for Management Information Systems, Vienna University of Economics and Business, Vienna, Austria

Abstract

We present the results of a study designed to measure the impact of interruptive advertising on consumers' willingness to pay for products bearing the advertiser's brand. Subjects participating in a controlled experiment were exposed to ads that diverted their attention from a computer game they were testing. We measured subjects' willingness to pay for a good associated with the advertised brand. We found that the ads significantly lowered the willingness to pay for goods associated with the advertising brand. We do not find conclusive evidence that providing some level of user control over the appearance of ads mitigates the negative impact of ad interruption. Our results contribute to the research on the economic impact of advertising, and introduce a method of measuring actual (as opposed to self-reported) willingness to pay in experimental marketing research.

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Keywords: Advertising; Attention; Privacy; Willingness to pay; Electronic commerce

Introduction

In markets where information abounds, attention is a scarce resource that businesses compete for with increasing fierceness. Every day, the average consumer is confronted with more than 3000 advertising messages (Speck and Elliott 1997) distributed across a variety of media channels: billboards in public spaces, printed media, television, the Internet, as well as mobile handsets and computer games. With the multiplication of media channels and the increasing sophistication of information systems, advertising messages often compete for attention by interrupting a vast array of consumers' activities. Online, interruptions of many forms (interstitials, embedded videos or flash animations, pop-up windows, and so forth) obstruct the view of a website; offline, movies are frequently interrupted by commercials; outdoors, sport events are halted to make room for a sponsor's featured presentation.

Interruptive marketing practices have been recognized as beneficial for advertisers. Ads increase consumers' brand recall, recognition, and awareness. Heightened recall and awareness, in turn, positively affect sales (Barry and Howard 1990; Yoo, Kim, and Stout 2004). On the other hand, aggressively pursuing and consuming consumers' attention can be perceived as an invasion of someone's privacy (defined, in Warren and Brandeis's 1890 seminal article, as an individual's 'right to be left alone'), and thus backfire. Advertising systems that interfere with or interrupt an individual's primary task can cause negative attitude formation and increase annoyance, leading to ad avoidance (Cho and Cheon 2004; Edwards, Li, and Lee 2002).

However, the impact that such interruptions have on consumers' actual purchase behavior – and in particular on their *willingness to pay* (WTP) for an aggressively advertised product (namely, their reservation prices) – has not yet been conclusively determined in the marketing literature. Previous scholarship on the economic impact of interruptive advertising explored numerous dependent variables (from brand equity to buying interest and click-through behavior; Chandon, Chtourou, and Fortin 2003; Cho and Cheon 2004; Lohtia, Donthu, and Hershberger 2003; Pieters, Warlop, and Wedel

* Corresponding author at: 5000 Forbes Av, HBH 2015C, Pittsburgh, PA, 15213, USA.

E-mail addresses: acquisti@andrew.cmu.edu (A. Acquisti), sarah.spiekermann@wu.ac.at (S. Spiekermann).

2002; Shapiro, MacInnis, and Heckler 1997; Yaveroglu and Donthu 2008), but not *actual* (as opposed to self-reported) reservation prices. The very impact of advertising on sales revenues (which are a function of consumers' reservation prices) is still debated (Lewis and Reiley 2009). Our manuscript attempts to fill this gap by introducing and applying methodologies from behavioral and experimental economics in order to estimate consumers' WTP for branded products as function of their exposure to the brand's advertising. In addition, we investigate whether granting consumers some level of control over the interruptive ads mediates the impact of the advertising message. One distinguishing characteristic of interactive marketing is, in fact, the higher degree of consumer's control over the ads. The balance between consumers' and managers' control of marketing messages is a major issue in new media environments (Winer 2009). Companies aim at controlling the exposure of consumers to messages, but struggle to do so as new technologies allow consumers to avoid ads (Deighton and Kornfeld 2009). In our experiment, we differentiated between the impact on WTP of ads that are controllable (such as those that can be clicked off a screen) and those that are uncontrollable (in the sense that they force consumers' attention).

In order to test the impact of interruptive ads on willingness to pay, we recruited subjects to – ostensibly – evaluate the desktop prototype version of a new computer game (their primary task). The game was interrupted by either controllable or uncontrollable advertising messages (a scenario similar to interstitials interrupting online browsing, but extendable in principle to other instances where consumers' attention is diverted from a media-rich primary task). At the beginning of the experiment, all subjects received a mug branded with an ad. The ad contained the logo and name of a (unbeknownst to the subjects, fictional) company. In some experimental conditions, this ad was identical to the ad that appeared on the subjects' screens during the game. Following the completion of the game, all subjects were offered to purchase the mug. We measured subjects' willingness to pay (WTP) for the branded mug using an incentive-compatible mechanism. Two weeks after the experiment, we also measured their recall and recognition of the advertising brand through an online survey. We found that having a brand advertised both on the mug and during the game lead to the positive memory effects recognized in the marketing literature. However, interrupting subjects' primary task with ads incurred a penalty: the willingness to pay for the mug associated with the interrupting brand was as much as 30% lower than when the same brand was not advertised during the game. We did not find conclusive evidence that providing some level of user control over the appearance of ads can mitigate the negative impact of ad interruption.

Our findings confirm that aggressive advertising may raise awareness for a company's brand, but also suggest that – especially in information dense e-commerce contexts, and whenever consumers are expected to make immediate purchase decisions – interruptive ads may negatively affect a company's bottom line.

Our manuscript therefore contributes to the marketing literature in two ways. First, we contribute to the growing

literature on new media marketing (Winer 2009) as well as privacy economics (see, for instance, Acquisti and Varian 2005) by examining the purchase effect of intrusive marketing strategies. Second, we introduce a method for measuring consumers' actual WTPs for branded products (as opposed to self-reported purchase intentions or attitudinal metrics) based on the Becker, Degroth, and Marashak (1964) method (or “BDM” hereafter) regularly employed in experimental economics (see, for instance, Plott and Zeiler 2005), and methodologies from behavioral economics (in particular, one derived from a seminal study of the endowment effect by Kahneman, Knetsch, and Thaler 1990).

Background

In principle, the goal of all advertising messages is to attract consumers' attention. To do so, some ads interfere with and interrupt their activities. Interruptions are events that lead to a “cessation and postponement of ongoing activity” (p 169 in Zijlstra et al. 1999) and break the continuity of an individual's cognitive focus (Corragio 1990). Interruptions can be created by another person, object, or event, at moments that are, in general, beyond the individual's control. Such is the case with many advertising messages, and the focus of our research.

The old saying that any publicity is good publicity illustrates the belief that, even if viewers respond negatively to forced advertising exposure, they are still being exposed to the message, which will positively impact purchases. Ads do increase consumers' brand recall (De Pelsmacker, Geuens, and Anckaert 2002; Mehta 2000; Yoo, Kim, and Stout 2004), recognition (Drèze and Hussherr 2003), and awareness (Pieters, Warlop, and Wedel (2002), and can foster positive attitudes towards brands (Burns and Lutz 2006; Cho and Cheon 2004; De Pelsmacker, Geuens, and Anckaert 2002), translating into increased sales (Barry and Howard 1990; Yoo, Kim, and Stout 2004). Deighton, Henderson, and Neslin (1994) describe this chain of cognition of an ad, attitude formation, and purchase behavior, as a hierarchy-of-effects (Aaker and Day 1974).

However, advertising interruptions can also elicit adverse reactions. Interrupting ads can cause negative attitude formation (Hong, Thong, and Tam 2004; Ha 1996; Wang and Calder 2006), evoke feelings of intrusion and irritation (Edwards, Li, and Lee 2002), and push individuals to cognitively and behaviorally avoid advertising messages (Abernethy 1991; Cho and Cheon 2004; Edwards, Li, and Lee 2002; Speck and Elliott 1997). For online environments, focus-group based research has found that consumers see Internet ads as disruptive (Rettie 2001). While pop-up advertisements are 50% more likely to be noticed than banner ads, they are twice as likely to be considered intrusive (Statistical Research 2001). Visitors to a website are less likely to return when their experience has been interrupted by a pop-up (McCoy et al. 2007).

Attention research shows that, as interruptions can come in multiple forms, they can cause varying reactions among people. How an individual will react to the interruption depends on the control she has upon it (McFarlane 2002), on the content similarity between an interruption and the primary task in the

advertising literature (which is referred to as *ad congruency*; see Moore, Stammerjohan, and Coulter 2005; Yaveroglu and Donthu 2008), as well as on whether the interruption occurs while one is deeply engaged in a task goal or finds herself at natural breakpoint between tasks (Bailey and Iqbal 2008; for an overview of the literature, see Spiekermann and Dabbish 2010). In the field of marketing, reactions to advertising interruptions are typically measured through memory effects, such as recall or recognition of ads or advertised brands.

However, surprisingly little is known about the impact that advertising interruptions have on consumers' willingness to pay for the advertised products. In microeconomic theory, a consumer is believed to purchase a good only when her reservation price (the maximum amount of money she is willing to pay to purchase unit[s] of that good) is equal to or larger than the price at which the good is sold. Willingness to pay, therefore, plays a crucial role in the field of marketing, both as an indicator of customer satisfaction for a given product (Homburg, Koschate, and Hoyer 2005), and as a way to determine what price a company will be able to charge for its products. Yet, to our knowledge, no controlled experiment has uncovered the impact of consumers' attention-consuming advertising on their actual reservation prices. Marketing research often relies on self-reported purchase intentions, attitude measures, or – at best – clickstream and panel data to estimate the impact of advertising campaigns. While useful, these measures suffer from drawbacks when applied to the estimation of the impact an advertising campaign has on consumers' actual willingness to pay. Scanner panel data establish links between “eyeballs” and purchase volume (mostly at the household level), but typically cannot record the details of individual purchases. Panel data only allow researchers to observe brand choice in terms of brand switching behavior (Deighton, Henderson, and Neslin (1994) or repeat purchases (Manchanda et al. 2006; Pedrick and Zufryden 1991). Also, panel data suffer from a disadvantage common to field data, in which many covariates (such as brand loyalty – see Tellis 1988 – or multiple household decision makers) interact with purchase behavior, sometimes in an uncontrollable manner. Clickstream data (Chatterjee, Hoffman, and Novak 2003; Manchanda et al. 2006) do not necessarily predict purchases (as online purchase conversion rates are so low: Moe and Fader 2004) and therefore cannot reliably predict WTP. As for self-reported intentions to purchase, or metrics of attitudes towards a product or a brand (for instance, Nelson, Meyvis, and Galak 2008 use self-reported measures of WTP for a movie which was interrupted), they are weaker measure of ad success (and of its impact on WTP) than actual purchases, since consumers often claim an intention to purchase products that they will not actually buy (Juster 1966; Manski 1990).

In short, as Winer (2009) notes, there is “considerable uncertainty about what metrics to use to gauge the effectiveness of the new media,” and the need for new methods to measure actual WTPs in marketing research is evident. Recently, Kamins, Folkes, and Fedorikhin (2009) measured the impact of bundled promotions on actual WTPs in an eBay field experiment. The method we present in this manuscript similarly allows us to measure actual WTPs in an experimental (and

therefore highly controllable) setup, and link it to the impact of advertising. While our design consists of a controlled laboratory experiment (with the limitations associated with such controlled environments), our subjects had to spend actual money to buy a good associated with a brand whose ads attracted their attention during a primary task. Two surveys (ran before and after the experiment) qualify our findings by addressing related issues such as ad recognition and recall.

Theory and Hypotheses

Advertising that interrupts a primary task an individual is engaged in can cause cognitive load (Kahneman 1973) and irritation. Irritation is more likely when the ads have little informational value for the consumer, when they are not congruent with her ongoing primary task (Edwards, Li, and Lee 2002; Cho and Cheon 2004), and when the interruption is uncontrollable (such as interstitials and pop-ups that cannot be manually closed, as opposed to controllable interruptions such as banner ads; see McFarlane 2002). Interruptive advertising therefore can elicit avoidance strategies, such as switching TV channels or leaving a room when the ad is broadcasted (Abernethy 1991).

Since uncontrollable advertising interruptions are likely to induce a perception of loss of freedom, reactance theory would postulate that a consumer whose primary task has been interrupted by advertising may adopt an attitude that is *contrary* to what the ad intended to elicit, and become more resistant to persuasion (Brehm 1966). Hence, both ad-induced irritation (Russell 2002) and reactance may negatively affect a consumer's attitude towards the brand. Since the willingness to purchase a brand's product is a function of said attitude, uncontrollable, incongruent advertising interruptions are likely to decrease an individual's willingness to pay for a brand. Accordingly, we hypothesized (“association” effect):

H1. The willingness to pay for an item branded by, and associated with, a company whose ad causes an uncontrollable, incongruent interruption of a primary task, is lower than the willingness to pay for the same item, when the item is not associated with a company causing such interruption.

A systems-related issue – especially for online marketers – is whether consumers should be granted control over ads (for instance, by clicking them off the screen). Generally speaking, control is perceived as a positive experience (deCharms 1968; White 1959) which can increase individuals' well-being (Langer 1983), while a lack of control stimulates negative emotions (Seligman 1975). As was argued above, negative consumer reactance can cause unintended consumer backlash (Brehm 1966). Cohen's (1980) Cognitive Fatigue Model states that uncontrollable and unpredictable interruptions induce personal stress and produce information overload. Yet, interruptions that do not enforce consumer attention (such as static banner ads) have proven unsuccessful, being associated with click-through rates as low as 1% (Holahan and Hof 2007) and banner blindness (Cho and Cheon 2004). Consequently, as online marketers try to break through the advertising clutter, there

277 animated ads demanding immediate attention and leaving
 278 consumers less control and chance of avoidance are becoming
 279 more common. This would suggest that varying the subject's
 280 control over the ad's appearance may mediate the effect on a
 281 brand of its association with an interrupting ad. Specifically,
 282 more control should decrease reactance and therefore reduce the
 283 negative effect of such association ("control" effect):

284 **H2.** The willingness to pay for an item branded by and associated
 285 with a company which causes a controllable interruption of a
 286 primary task, is higher than the willingness to pay for that same
 287 item when the same company causes an uncontrollable
 288 interruption of a primary task.

289 Methodology

290 To investigate generalizable economic effects of advertising
 291 interruptions, we created a primary task of medium complexity
 292 and engagement. The task consisted in a computer game that
 293 could be fun to play but sufficiently challenging to engage
 294 subjects' attention, creating a flow experience comparable to
 295 Internet browsing or television viewing (Hoffman and Novak
 296 1996). Prior to the experiment, we created two fictional brand
 297 logos and names to be used in the primary study. Depending on
 298 the experimental condition, one of the two selected brands was
 299 advertised on the subjects' screens during the lab experiment.
 300 The logo and name of one of the brands was also advertised on
 301 mugs that all subjects could purchase after playing the game.
 302 Two weeks after the experiment, we administered a survey to
 303 measure recall and recognition of the two advertised brands.

304 The Primary Task

305 The primary task consisted of a Tetris-inspired computer
 306 game that we designed so that we could control the appearance
 307 of advertising interruptions, as well as manipulate other
 308 parameters across experimental conditions. The game consisted
 309 of blocks of different colors falling from the top of the screen,
 310 accumulating on top of each other at the bottom of the screen. A
 311 player would need to click on groups of three contiguous blocks
 312 of the same color in order to remove them from the screen and
 313 prevent them from reaching the top of the screen. Players would
 314 gain points for removing blocks from the screen and lose points
 315 when a pile of blocks reaches the top of the screen (see Fig. 1a).

316 The Interruption

317 The interrupting ad consisted of an image appearing at the
 318 center of the screen and including a brand's name and logo
 319 (hereafter simply called 'ad'; see Fig. 1b) during breaks in-
 320 between rounds of game playing. The displayed ads can be
 321 classified as interruptions, because they were externally
 322 generated, occurred randomly (from the perspective of the
 323 player), and appeared as discrete events that broke the players
 324 cognitive focus on the game. Due to their size (the brand image
 325 almost covered the entire game screen) they inevitably captured
 326 the players' attention. As with many ads (from interstitials to

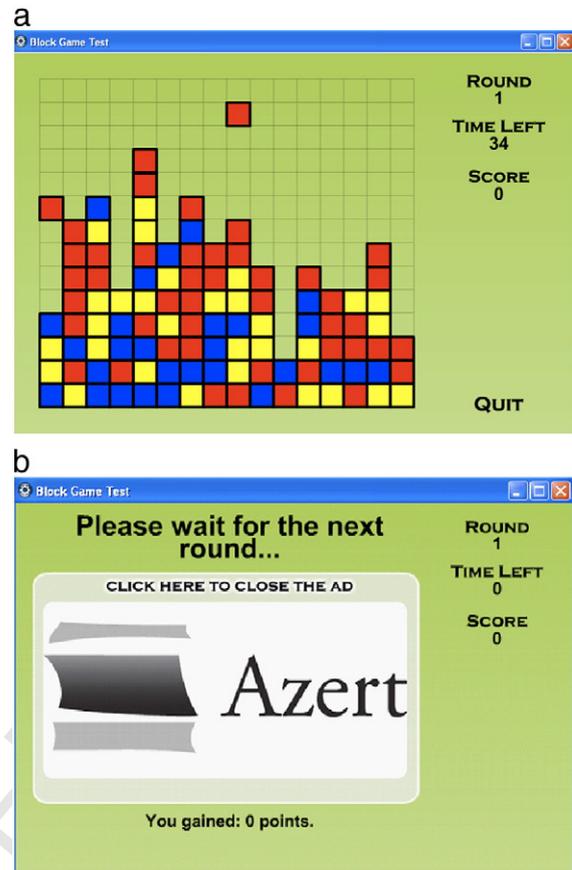


Fig. 1. a: The game. Players gained points for removing blocks from the screen and lost points when a pile of blocks reached the top of the screen. b: The advertising interrupts: a fictional brand logo with a fictional name.

TV commercials), the interrupting ad had nothing in common 327
 with the game itself — it was, in marketing parlance, 328
 incongruent with the primary task it interrupted. However, we 329
 chose to have ads appear during breaks between rounds of the 330
 game (a phase of relatively low cognitive load, arguably causing 331
 lower annoyance: Edwards, Li, and Lee 2002; Wang and Calder 332
 2006), instead of during the game play itself, in order to avoid 333
 an unrealistically and unnecessarily annoying experience. For 334
 the same reason, we steered away from flashy, irritating 335
 designs. 336

Depending on the experimental conditions (as further 337
 discussed below), participants either had no control over the ad 338
 (which remained on their screens for a few seconds before 339
 disappearing), or could control its disappearance by clicking on it. 340

341 Brand Selection Study

Before the lab experiment, we designed 12 fictional brand 342
 logos and 12 fictional brand names, ensuring that none would 343
 resemble any well-known brand. Logos and names were then 344
 screened through an online survey administered to 56 graduate 345
 students. Survey participants were invited to rate their degree of 346
 appreciation (from *strongly dislike* to *strongly like*) of brand 347
 logos and names along a seven-point Likert scale. The order in 348
 which each participant was presented logos and names was 349

randomized. We used three criteria to identify two brand logos and names to be used in the subsequent lab experiment. First, the participants' mean appreciation should be as close as possible to the median Likert value (that is, 4). Second, there should be no statistically significant difference in the two brands' mean appreciations. Third, the standard deviation of appreciations across participants should be as low as possible. The two resulting brands were "Colar" and "Azert" (mean appreciation: 4.12 and 4.49, respectively; s.d.: 0.22 and 0.22; $t = -1.2616$, $p = 0.215$; see Figs. 2a and b).

The reason for choosing two brands for our experiment (even though we actually tested the WTP for only one of them) was our need to isolate the impact of an interrupting ad on the WTP for an interrupting brand, relative to the conditions where the same brand did *not* cause the interruptions, yet comparable interruptions (by an unrelated brand) nevertheless occurred. This would put subjects across different conditions in similar states of arousal and tension by the end of the game, allowing us to isolate the impact of the *association* between the brand advertised on the screen and the one advertised on the mug. This design also allowed us to isolate the effect of such association from issues related to the quality of the ad: all subjects, across different conditions, could see the same ad printed on the mug they were offered to purchase, and as a further, conservative precaution, the two brands were chosen to elicit similar, moderate degrees of appreciation.

Experimental Set-up

Preparation

Subjects for the laboratory experiment were recruited through a mailing list at a North-American college. The recruitment message invited participants to test a "desktop prototype of a new mobile phone game." Participants were offered \$7 to show-up, with the possibility of an additional payment depending on their performance in the game.

Individuals who responded to our solicitation were invited to come to a university lab that accommodated around 40 participants per session. We scheduled multiple 30-minute sessions over the course of 4 weeks. Each experimental session followed the same structure. After signing consent forms, participants would sit in front of available cluster computers. In front of each computer, participants found a briefing document explaining the game (see Appendix A) and an envelope with the show-up payment in cash. The envelope was placed on their desks below a large black mug adorned with the Colar ad, ensuring that each participant would notice the mug and the Colar brand printed on it.

The briefing document informed participants that they would test a desktop prototype version of a mobile game produced by a company called "GameIsIt," and that they could keep the money contained in the envelope. The document also alerted participants that advertising interruptions would appear during the game: "Some advertisement may appear for some time on the screen during the breaks in-between rounds of the game."

To engage subjects in the primary task and ensure incentive compatibility between the experiment and real-world behavior, the briefing also informed the subjects that they could make more money depending on their performance in the game. Subjects were told that their final payment would be based on their game scores, and were given a high-level description of the scoring algorithm. Our instructions omitted an explicit conversion table from game scores to cash, so that subjects' WTPs would not be primed by monetary amounts associated with the subjects' scores.¹ The experimenters used a script to explain the game to the subjects and allowed them to ask questions about aspects of the game that may have been unclear.

The game was pre-installed on lab computers. Subjects were invited to play three test rounds as practice, before starting the actual game, which consisted of six 60-second rounds of increasing difficulty and speed, split by short (10 s) breaks. As depicted in Fig. 1a, subjects could see which round of the game they were playing, how many seconds were left in that round, and their current score (though they had no reference point to use to judge their performance). During the breaks between rounds, one of the two ads – Colar or Azert, depending, as explained below, on the experimental conditions – appeared on the screen; this temporarily diverted subjects' attention away from the flow of the game. The ads remained on the screen for 6 s during each break.

Eliciting WTP: The Mug Experiment

After all subjects in a session had completed six rounds of the game, but before they received the additional performance-based payment, subjects were informed that the mug they had found on their desks at the start of the experiment could actually be purchased. Subjects were also informed that the mug's price would be determined by an auction mechanism.

While the advertising that interrupted the game was either for Colar or Azert, all subjects, regardless of experimental condition, had been given a mug advertising the Colar brand. The practice of endowing subjects with mugs in a study of willingness to pay has a long tradition in the literature (see, for instance, Kahneman, Knetsch, and Thaler 1990, and a vast stream of subsequent studies; for a recent replication of Kahneman, Knetsch, and Thaler's (1990) results, see Plott and Zeiler 2005). Typically, these are laboratory experiments in which subjects are presented with simple products – such as mugs – and asked to indicate at what prices they would buy (or sell) them. Other than because of tradition, mugs are often employed in these studies because they

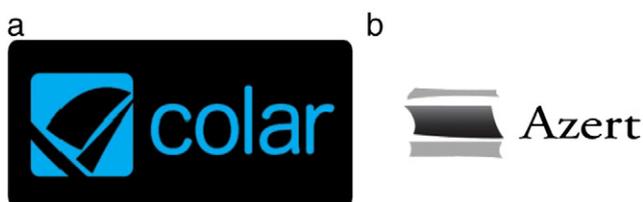


Fig. 2. a: The Colar ad. b: The Azert ad.

¹ We tested whether a subject's score influenced his or her willingness to pay after the game, and found no correlation between the two measures.

are affordable for the subjects, allow for sufficient variance of valuations across subjects, and can be used by most subjects. Furthermore, in our case, mugs offered a large enough surface to display a brand, and – being very common, standard products – helped us to more precisely disentangle the effect of the *brand* printed on them from the effect of the *product* valuation itself.

An often employed mechanism to elicit truthful revelations of the subjects' WTP in comparable studies is the Becker–DeGroot–Marschak (BDM) method. The BDM method is used to ensure incentive-compatibility, as it is in the best interest of the subjects to express their real valuations for the good. This is the mechanism we employed in our study. By indicating non-zero prices during the BDM phase of our experiment, our subjects were committing to using actual money to purchase real mugs; in other words, their decisions had real consequences. Hence, our approach represents an alternative to self-reported purchase intentions to establish consumers' reservation prices for advertised goods.

Our goal was to measure the difference between subjects' maximum willingness to pay for a Colar-advertised branded product right after their cognitive focus on the primary task had been interrupted by that brand, and their willingness to pay after they had been interrupted by an unrelated brand (Azert), but under the same advertising pattern. Subjects read a printed instruction page about the auction mechanism, which invited them to state whether they would buy the mug or keep their money if the mug was sold at 50-cent intervals between \$0 and \$10 (Appendix B). Subjects were informed that the experimenter would randomly draw a group price between 50 cents and 10 dollars. The instructions made it clear that the mug would *not* be sold at the maximum price stated by a subject, but rather at a group price determined via the lottery, possibly lower than the maximum price reported by the subject. Therefore, it would be rational for subjects to reveal their true valuation of the mug. If a subject had indicated in her answer sheet that she would purchase the mug only at a price lower than the one drawn by the experimenters (or a price of zero), the mug would not be sold to her, and the subject could keep all of the payment she had received for showing up. If a subject had indicated that she would purchase the mug at a price equal to or higher than the one drawn by the experimenters, the mug would be sold to her, and the subject had to use her own cash to pay the price randomly drawn by the experimenters.

During each session, the experimenters verified that the subjects understood the protocol and the fact that they were committing to purchase the mug with actual money when stating their willingness to pay. After the subjects filled out the page, disclosing the maximum price they were willing to pay for the mug, the experimenters drew the random price for the session and verified, based on the answers provided, which subjects (if any) would be purchasing the mug.

Exit Questionnaire

After the mug purchase stage, subjects completed an online questionnaire. The questionnaire was designed to elicit their attitudes towards the interrupting brand, Colar, their reaction to the interrupted game, and their opinion of GameIsIt, the

fictional company that, they were told, was producing the game (therefore, the *channel* transmitting the interruption). The questionnaire included demographics questions. After answering the exit questionnaire, subjects left the lab, received their performance pay, and returned the mugs if they had not purchased them. Subjects who had stated a willingness to pay for the mug equal to or higher than the randomly selected purchase price, paid for it in cash, and were allowed to bring the mug home.

Recall and Recognition Questionnaire

Two weeks after their respective sessions, participants were contacted by email and invited to participate in an online questionnaire about the study. The survey was designed to measure their recall and recognition of the brand logos and names they had encountered during the study. In line with traditional marketing studies on memory effects, we first asked participants to freely recall the brands they had seen advertised on the mug and on the screen. Thereafter, we tested participants' recognition of the Azert or Colar brand names and logos amongst 12 brand names and logos that had also been designed as part of the study.

Experimental Conditions

We tested Hypotheses H1 and H2 during the lab experiment using a 2 × 2 between-subjects design. The experiment consisted of two “associated” conditions and two “control” conditions.

Associated conditions:

- In the *mug-associated* conditions, the company whose advertising appeared during the game (Colar) was the same company whose logo and name were advertised on the mugs.
- In the *mug-not-associated* condition, the company whose advertising appeared during the game (Azert) was a different company than the one whose logo and name were advertised on the mugs (Colar).²

Control conditions:

- In the *control* conditions, a subject could remove the ad from the screen by clicking on it.
- In the *no control* conditions, the ad could not be clicked away.

Across all conditions, ads appeared during between-round breaks and for the same amount of times. We summarize the four conditions in the following matrix (Table 1):

We tested Hypothesis H1 (the association effect) by contrasting subjects' WTP for the mug in Condition 1 against

² As noted, the conditions where the brand appearing during the game was different from the one advertised on the mug allowed us to isolate the impact on WTP for an interrupting brand, while putting subjects across conditions in similar states of arousal and tension by the end of the game.

t1.1 Table 1
t1.2 Experimental conditions.

	Mug-not-associated	Mug-associated
		
No Control	Condition 1	Condition 2
Control	Condition 3	Condition 4

547 their WTP in Condition 2. In Conditions 1 and 2, every subject
548 saw ads during between-round breaks and could not control the
549 length of time it remained on the screen; however, subjects
550 assigned to different conditions saw different ads (either Azert
551 or Colar). We expected that subjects exposed to the ad during
552 the game (with no control over the ad) would assign the mug a
553 lower value than subjects who had not been interrupted by the
554 ad: $WTP\ Condition\ 1 > WTP\ Condition\ 2$.

555 We tested Hypothesis H2 (the control effect) by contrasting
556 the subjects' WTP for the mug in Condition 2 against their WTP
557 in Condition 4. In these conditions, all subjects encountered the
558 Colar advertising interruption, which appeared during the break
559 between rounds of the game. However, subjects in Condition 2
560 could control the length of time the ad remained on the screen,
561 while subjects in Condition 4 could not. We expected that
562 subjects who were interrupted by the brand but had control
563 over the advertising would tend to value the associated mug
564 more than those with no control: $WTP\ Condition\ 4 > WTP$
565 $Condition\ 2$.

566 Contrasting Conditions 3 and 4 offers a way to test the
567 interaction between brand association and user control. In those
568 conditions, all subjects were informed that they could close the
569 advertising interruption by clicking on the image, although
570 some subjects were exposed to Colar and some to Azert screen
571 ads. Since control generally promotes positive attitudes, we
572 expected that subjects exposed to the ad during the game would
573 still assign the mug a lower value than participants who had
574 not been interrupted by the ad, but the magnitude of the
575 negative effect would be lower than under the conditions where
576 participants lacked control: $WTP\ Condition\ 3 \geq WTP$
577 $Condition\ 4$.

578 Clearly, the presence or absence of control over the Azert
579 advertising interruption should not have had any impact at all on
580 the valuation of the Colar mug. Therefore, a corollary of the
581 above hypotheses suggests that for the two unassociated
582 conditions – one with and one without control – it should
583 simply be: $WTP\ Condition\ 1 = WTP\ Condition\ 3$.

584 **Results**

585 One hundred and forty-three subjects participated in the
586 laboratory experiment. The subjects were recruited through
587 Carnegie Mellon University's CBDR website, which advertises
588 experiments to a large pool of potential participants in the

Table 2
Demographics by condition. t2.1 t2.2

Condition	Description	Number of participants	Percentage of females	Mean age	t2.3 t2.4
1	Brand on mug different than brand in interrupts; no control over interrupts	40	50%	23	t2.4
2	Brand on mug same as brand in interrupts; no control over interrupts	34	59%	22	t2.5
3	Brand on mug different than brand in interrupts; control over interrupts	32	47%	22	t2.6
4	Brand on mug same as brand in interrupts; control over interrupts	37	46%	23	t2.7

Pittsburgh area. The overwhelming majority of subjects were
589 college students. Across conditions, 51% of subjects were
590 females and 49% were males. Participants were randomly
591 assigned to one of the four experimental conditions. Females
592 were slightly over-represented in Condition 2, though the
593 difference across conditions was not statistically significant.
594 The age of participants ranged from 18 to 56 years old (mean:
595 23.5), with 90% of participants being younger than 30 years and
596 only one participant being older than 43. The distribution of
597 ages varied slightly across the conditions, with Conditions 1 and
598 4 reporting slightly higher mean ages (Table 2).³ We did not
599 find any statistically significant effects of the day of the session,
600 the time of the session, the size of the participants' group, or the
601 identity of the experimenter who conducted the session on the
602 main variable of interest, the willingness to pay for the mug at
603 the end of the game. 604

605 *The Effect of Interruptions on Willingness to Pay*

606 The vast majority of our participants (100 participants out of
607 143, or roughly 70%) tried to purchase the mug by committing
608 to non-zero reservation prices. Of them, roughly 80% indicated
609 reservation prices equal to or lower than \$2. These valuations
610 are comparable to those found by Plott and Zeiler (2005) (in
611 their replication of Kahneman et al.'s 1990 study, they report a
612 mean WTP for a mug branded with a University logo of \$1.74).
613 Because most subjects' reservation prices were lower than \$2,
614 the mug was actually sold to only two participants (since only
615 subjects who had indicated reservation prices equal to or larger
616 than the session price – randomly drawn between 50 cents and
617 \$10 at the end of each session – were sold the mug).

618 Table 3 summarizes the mean WTP for the Colar mug across
619 conditions. Subjects were willing to pay higher amounts for a
620 Colar mug if they had not been interrupted by the associated
621 Colar ads (but by the unassociated Azert ad instead). This was
622 true regardless of whether or not subjects were given control
623 over the ad, as the mean WTP for the Colar mug in the

³ We control for gender and age using regressions. Gender and age effects in reactions to interruptions and perceived privacy invasions have been reported in the literature: previous studies have shown that age and gender correlate with sensitivity to advertising practices (Monk, Boehm-Davis, and Traflet 2004).

t3.1 Table 3
t3.2 Mean WTPs by condition.

	Mug-not-associated  Azert	Mug-associated  colar
No Control	Condition 1: \$1.33	Condition 2: \$0.72
Control	Condition 3: \$1.27	Condition 4: \$0.97

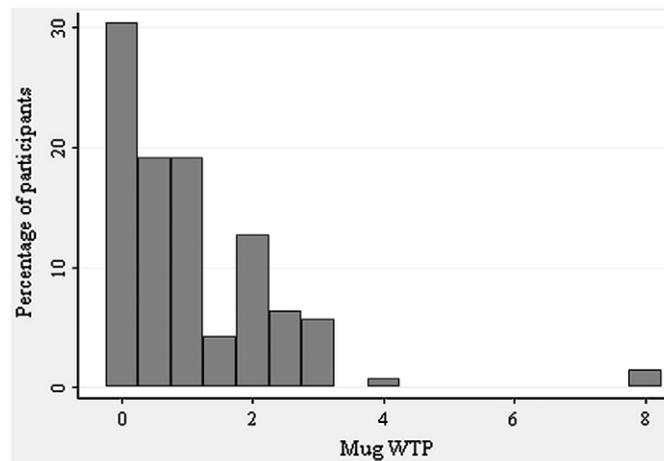


Fig. 3. Distribution of WTP (from \$0 to \$8) across the four experimental conditions.

conditions interrupted by Azert ads was either \$1.33 or \$1.27 (in the No Control and Control conditions respectively). In contrast, the corresponding mean WTPs in the conditions interrupted by Colar ads were \$0.72 and \$0.97.

As in Plott and Zeiler (2005), mug valuations were not normally distributed. Fig. 3 shows the distribution of WTPs (conflating, for simplicity, the four conditions): valuations are clustered around zero, with higher valuations corresponding to progressively fewer participants, and a long tail including two outlier participants who valued the mug \$8. Because of the non-normality of the distribution, to test the significance of our manipulations we employed a non-parametric test (a two-sample Wilcoxon rank-sum of the WTP across conditions) and the censored regression Tobit model. The Tobit model can be applied to the analysis of price data when consumers may hold valuations for a good lower than zero (Tobin 1958). In such cases, the price distribution may appear to be inflated to the \$0 level, indicating that values lower than \$0 are theoretically possible, but practically unobservable. The distribution of WTP we observe in our data mirrors this condition, as values are inflated around zero. This could be due to scarce interest or even dislike for the mug (possibly due to reactance — see Hypothesis H1 and the discussion further below).

Our primary research question focused on whether advertising interruptions can actually harm the advertising brand by lowering consumers' WTP for products associated with that brand (Hypothesis H1). Across participants who did not have control over the ads, the mean WTP in the mug-not-associated condition (Condition 1) was \$1.33 (s.d.: 1.54, with a minimum of \$0 and a maximum of \$8). In the mug-associated condition (Condition 2), it was \$0.72 (s.d. 0.81, min \$0, and max \$2.5). One outlier in the mug-not-associated condition offered to pay up to \$8. Even after eliminating that outlier, the mean WTP in the mug-not-associated condition remains higher than in the associated condition: \$1.16 (s.d.: 1.10, min \$0, and max \$3).⁴ We ran a two-sample Wilcoxon rank-sum (Mann–Whitney) test of differences across the two conditions: while the two-sided test only approaches statistical significance ($z=1.786$, $p=0.074$), the one-sided test is significant at $p=0.037$. Table 4 (second column: “No control”) presents the significant results of a censored Tobit regression on the participants in Conditions 1 and 2. The model includes a dummy variable for the

associated conditions (0=mug-not-associated and 1=mug-associated). Age is a discrete variable, while Male is a dummy. The model shows that the effect of the association between the brand in the ad and the brand in the mug is negative (as hypothesized) and significant at the 5% level. Age is negative but not significant. The results show that participants' WTP for the mug decreases when the mug is associated with an advertising interruption, which is compatible with Hypothesis H1.⁵

In two experimental conditions (Conditions 3 and 4), participants could click away the interrupting ad, thus exercising control over its time on the screen. We hypothesized that participants given control over the advertising interruptions would tend to assign the mug advertising the same brand a greater value than those with no control (Hypothesis H2). The mean WTP for the associated mug with control (Condition 4) was \$0.97 — indeed higher than the mean WTP for the associated mug without control (Condition 2), \$0.72. However, this difference is not significant under both a two-sample Wilcoxon rank-sum ($z=-1.272$, $p=0.2035$) and the Tobit model (the fourth column of Table 4 does show a large and positive coefficient for the control treatment, but not significant: $p=0.168$). Therefore, our data do not support Hypothesis H2. The effect of control may be too subtle to be teased out with our sample size.

The negative effect of the interruptions would appear to be diminished when participants are given some control over the appearance of the ad. When contrasting the WTP for the Colar

⁵ The model and the coefficient for the dummy variable for the associated condition remain significant (at the 10%) after eliminating the outlier subject (who offered to buy the mug at \$8). To control for possible heteroskedasticity, we also ran a robust version of the Tobit model which confirmed the results presented above: the associated control coefficient remained negative and significant at the 5% level. Other alternative semi-parametric censored model tests (see Chay and Powell 2001) confirmed the sign and overall magnitude of the Tobit regressions. We employed a STATA package for the SCLS estimator made available at <http://elsa.berkeley.edu/~kenchay>.

⁴ The two outliers who offered significantly higher amounts for the mug than all other participants were both subjects in a mug-not-associated condition.

t4.1 Table 4

t4.2 Results from censored regressions, various model specifications.

t4.3	No control	Control	Associated	Not associated	Combined model	
t4.4	Constant	1.110905 (0.856)	2.190324 (0.764)	0.7604096 (0.544)	1.721833 (0.940)	1.708149 *** (0.597)
t4.5	Associated	−0.8906184 ** (0.428)	−0.3945122 (0.390)			−0.9320825 ** (0.406)
t4.6	Control			0.4155856 (0.298)	−0.043861 (0.480)	−0.0505077 (0.404)
t4.7	Control * Associated					0.5379146 (0.577)
t4.8	Age	−0.0512568 (0.043)	−0.1026002 ** (0.048)	−0.0513216 (0.034)	−0.0907067 * (0.048)	−0.0756259 ** (0.031)
t4.9	Male	0.2189775 (0.436)	−0.2536379 (0.390)	−0.024648 (0.299)	−0.0228076 (0.488)	−0.043001 (0.292)
t4.10	N	73	68	71	68	141
t4.11	Prob> χ^2	0.0261	0.0824	0.2369	0.1593	0.0370

t4.12 Note: standard errors in parentheses.

t4.13 * p<0.10.

t4.14 ** p<0.05.

t4.15 *** p<0.01.

693 mug in the associated and non-associated conditions *with*
694 *control*, the mean WTP in Condition 3 (not-associated mug with
695 control) was \$1.27,⁶ whereas the mean WTP in Condition 4
696 (associated mug with control) was \$0.97. However, two-sample
697 Wilcoxon rank-sum (Mann–Whitney) test shows the difference
698 between the two distributions to be not significant, and the
699 censored regression (see Table 4, fourth column) confirms that
700 the dummy for the mug-associated conditions is positive, as
701 expected, but not significant (at the 10% level).

702 As a robustness check, we hypothesized that the presence or
703 absence of control over an ad by Azert should not influence at
704 all the valuation of the Colar mug. Indeed, the mean WTP in
705 Condition 3 (not-associated mug with control) was \$1.27 —
706 undistinguishable, in statistical terms, from the WTP for the not-
707 associated mug in the condition without control (Condition 1),
708 which was \$1.33 (Wilcoxon rank-sum $z=0.217$, $p>0.8$). A
709 censored regression (Table 4, fifth column) confirms the
710 absence of a control effect for the mug-not-associated
711 conditions ($p>0.9$). Even once the two outliers in the respective
712 conditions are removed, the mean WTPs remain very close
713 (\$1.05 in the control, unassociated condition and \$1.16 in the no
714 control, unassociated condition).

715 Finally, the last column in Table 4 presents the results of a
716 censored Tobit regression on the complete dataset, which
717 includes participants in all conditions. The combined model
718 includes dummy variables for the control conditions (0=no
719 control and 1=control), the associated conditions (0=mug-not-
720 associated and 1=mug-associated), and the interaction between
721 the control and the branding effects. The model confirms that
722 the effect of the association between the brand in the ad and the
723 brand in the mug is negative and significant at the 5% level.⁷

⁶ After removing one outlier (who reported a WTP of \$8), the mean WTP decreases to \$1.05.

⁷ Also when removing two outlier observations (in terms of WTP), the associated treatment dummy remains significant at the 5% level. Furthermore, the associated treatment dummy remains significant also when removing the interaction term (at the 5% level in the original dataset and at the 10% after removing the outliers).

The interaction between control and mug-associated treatments
is positive, as hypothesized, albeit not significant. The control
dummy (which represents the impact of control when the mug is
not associated with the ad) is, as hypothesized, not significant.

Recall and Recognition

After the experiment, we tested participants' recall and
recognition of the brand logos and names they had seen on the
mugs and on the screens during the game. Each participant was
contacted by email 2 weeks after his or her session, and 45% of
the original participants in the four experimental conditions
completed the online memory questionnaire. Our main variable
of interest was the recall and recognition of the brand that
appeared during the game (Colar or Azert), as opposed to the
one advertised on the mug (Colar).⁸ Because of the smaller
sample size in the memory test, we conflated the results across
control and no control conditions; this allowed us to focus on
the differences in recall and recognition between participants in
the mug-associated and mug-not-associated conditions.

Obviously, subjects in the associated conditions had been
more exposed to a brand (Colar) than subjects in the non-
associated conditions. In the associated conditions, subjects saw
the Colar brand both in the ads on the screen and on the mug,
and were then asked to purchase the latter; in the non-associated
conditions, subjects were separately exposed to Azert (in the
onscreen ads) and Colar (on the mug). Accordingly, we were
just interested in measuring the memory impact of the
combination of an interruptive ad and the presence (and
subsequent sale offer) of an item sporting the advertising brand,
over the interruptive ad alone.

First, we investigated whether the participants recalled
seeing an ad on the screen during the mobile game test. More

⁸ Bringing home the mug after the experiment could also have enhanced a subject's recall of Colar. As we noted above, even though 100 of our subjects tried to purchase the mug, the mug was sold to only two of them.

755 participants remembered seeing an ad appearing on the screen
 756 in the mug-associated conditions (80.65%) than in the mug-
 757 not-associated conditions (60.61%), but the difference only
 758 approaches, without achieving, statistical significance (Pearson
 759 $\chi^2(1)=3.07$, $p=0.08$). We then ran a free recall test. We asked:
 760 “If you remember seeing an ad [appearing on the screen during
 761 the game], please enter the name of the brand advertised.” We
 762 coded each participant’s answer as 0 if the participant did not
 763 write anything or wrote a completely wrong answer, and 1 if the
 764 participant recalled at least the first letter of the brand (since we
 765 found several answers that included statements like: “started
 766 with a C,” “something starting with a C,” and so forth). Only 3%
 767 of respondents in the mug-not-associated conditions versus
 768 32% in the mug-associated conditions were able to correctly
 769 recall either the complete name or at least its first letter (Fisher’s
 770 exact $p=0.002$).

771 After the free recall test, we tested survey participants’
 772 recognition of the brands’ logos and names among a list of 12
 773 alternatives (which included Colar and Azert). We first tested
 774 participants’ recognition of the interrupting ad’s brand name
 775 and logo, and then their recognition of the name and logo of the
 776 brand advertised on the mug. The order in which names and
 777 logos were presented was randomized for each survey
 778 participant. We found high recognition rates for the brand
 779 advertised during the game in the mug-associated conditions
 780 (77.42% of participants correctly recognized the brand logo and
 781 74.19% correctly recognized the brand name). In contrast, a
 782 much smaller proportion of participants in the mug-not-
 783 associated conditions ended up correctly recognizing the
 784 Azert brand logo (24.24%) and name (30.30%) in the ad
 785 (both for brand names and logos, the differences across
 786 conditions are significant at $p<0.0005$). In fact, a large number
 787 of participants in those conditions wrongly identified the screen
 788 ad brand (Azert) as the mug ad brand (Colar) — a sort of
 789 spillover effect likely caused by the prominence of the mug
 790 during the study. We found no difference across the conditions
 791 in terms of recognition of the logo on the mug (81.82% of
 792 participants in the mug-not-associated conditions and 83.87% in
 793 the mug-associated conditions recognized the Colar logo;
 794 Pearson $\chi^2(4)=1.49$, $p>0.8$).

795 In other words, we found that subjects in the mug-associated
 796 condition were more likely to correctly recall the Colar brand.
 797 Apart from the possibility that the brand Colar may have been
 798 inherently more memorable of the brand Azert (a possibility
 799 which may be discounted due to our brand screening process,
 800 which was based on the pre-experiment survey results), it seems
 801 that the combination of ads during the game and ads on a
 802 physical mug, subsequently offered for sale, reinforced the
 803 recall and recognition effects, making almost 8 out of 10
 804 participants able to recognize the logo 2 weeks after the study.
 805 This, per se, is not surprising: one way to read these results is
 806 that, quite simply, the interruptions by themselves were not very
 807 memorable (see Azert recollection in the non-associated
 808 conditions), when compared to the same type of interruptions
 809 coupled by the presence of a mug sporting the same brand
 810 (Colar). On the other hand, and more interestingly, these results
 811 suggest that the interruptions, when accompanied by an

immediate sale offer of the branded product, decrease its 812
 WTP but do not harm its later recollection. In other words, what 813
 is noteworthy is the comparison between such memory effects 814
 and the WTP effect: The marketing literature on advertising 815
 interruptions traditionally focuses on immediate but self- 816
 reported consequences of the interruption (such as brand 817
 appreciation immediately following a study); *or*, on more 818
 objective but longer-term effects (such as brand recall after a 819
 study). While we confirm the traditional wisdom that ads may 820
 enhance long-term recognition (in our case, when they 821
 interrupting ads are combined with a branded mug), we find 822
 that this positive effect comes with the cost of an objective, 823
 negative short-term effect. The reduction in customers’ willing- 824
 ness to pay for a product bearing the brand name — a factor of 825
 particular importance to brands which advertise online or 826
 interruptive messages. 827

828 Discussion

829 All subjects in our study were exposed to an advertising
 830 brand (Colar) through the logo and name printed on the mug
 831 they received at the start of the study. However, some subjects
 832 also encountered the same brand in the form of ads that occurred
 833 during the game they were playing. This was sufficient to
 834 generate different reactions to, and valuations for, the branded
 835 mug.

836 We care to note that all subjects in our experiment –
 837 regardless of experimental condition – received the same
 838 information about the brands advertised on the screen and the
 839 brand advertised on the mug. Before the game, all subjects
 840 were informed that “[some *advertisement* may appear on the
 841 screen for some time during the breaks in-between rounds of
 842 the game” (emphasis added). Immediately after the game, the
 843 instructions that subjects read in preparation for the BDM
 844 experiment informed them that “[...] the company Colar would
 845 like to offer you to purchase one of its mugs.” This implies
 846 that participants in both the mug-associated and mug-not-
 847 associated conditions could infer that “Colar” was some type
 848 of firm engaged in a promotional advertising campaign (the
 849 branding and discounted offer of the mug), and that subjects
 850 across all conditions were exposed to Colar advertising (on the
 851 mug, or during the game). However, only subjects in the mug-
 852 associated conditions also linked Colar to the ads interrupting
 853 their game. Subjects also knew that Colar was not directly
 854 associated with the game; participants across conditions were
 855 told that the study was “[...] testing a prototype desktop version
 856 of a mobile phone game produced by a company called
 857 “GameIsIt.” Furthermore, the negative effect of the Colar ad
 858 appearing during the game cannot be explained by dislike for
 859 its brand name and logo, both in absolute terms and relative
 860 to Azert, or simple ad execution; brand names and logos for
 861 both brands were selected so that their ads would elicit similar,
 862 and moderate appreciation — and, more importantly, all sub-
 863 jects, regardless of their experimental condition, faced mugs
 864 adorned with exactly the same ad design as that one that
 865 appeared on the screen.

866 The resulting differences in WTP for the mug across
867 conditions are both statistically and economically significant.
868 The mean price that subjects in the mug-associated condition
869 were willing to pay was as much as 30% lower than in the mug-
870 not-associated condition (for participants who had no control
871 over the ads).

872 It seems, therefore, that the association between the brand's
873 ad on the screen and its ad on the mug lowered subjects'
874 reservation prices for the mug. As noted above, a likely
875 explanation for the observed purchase behavior is the formation
876 of *reactance* against the interrupting brand (Brehm 1966;
877 Edwards, Li, and Lee 2002). To further investigate this
878 possibility, we analyzed participants' answers to a debriefing
879 questionnaire conducted right after the BDM experiment. We
880 asked participants to indicate their appreciation of Colar (the
881 advertising company) on a 9-point Likert scale (ranging from
882 "Do not appreciate Colar at all" to "Appreciate Colar very
883 much"). We also asked them to freely describe the reasons for
884 their judgment of the Colar brand ("Please comment on your
885 judgment on Colar"). While we did not observe statistically
886 significant differences across conditions along the Likert-scale
887 values (the median valuations were close to 5 across the four
888 conditions), we found remarkable differences in participants'
889 comments. Open-ended comments in the mug-associated
890 conditions often expressed annoyance with statements like:
891 "It is your advertising, so you need give it (the mug) to me
892 for free to advertise", or "It made me mad also that the pop-up
893 kept happening during the game." No similar statements
894 were expressed in the not-associated conditions. We assessed
895 these qualitative comments with the help of three inde-
896 pendent coders, who ranked the comments as either positive,
897 negative, or neutral towards Colar (intercoder **reliability**
898 according to Cohen's Kappa was 0,61, which represents a
899 substantial agreement according to Landis and Koch 1977).
900 Participants in the associated conditions were more likely to
901 provide negative comments about Colar (9% of the comments
902 made in the conditions where participants were interrupted by
903 Colar were negative, versus 3% in the non-associated – Azert –
904 conditions).

905 We were also interested in whether participants' perceptions
906 of the channel transmitting the interruption would be impacted
907 by the practice. Using an approach similar to the one we
908 employed when evaluating participants' reactions to Colar, we
909 measured participants' assessments of GamelsIt (the fictional
910 company that ostensibly produced the game). We did not find
911 any statistically significant differences across the four condi-
912 tions in terms of appreciation for GamelsIt. Hence, no evidence
913 from the study suggests that interrupting ads have a negative
914 effect on the channel that transmits them.

915 Conclusion and Limitations

916 We have presented evidence that certain types of advertising
917 interruptions may reduce individuals' willingness to pay for
918 advertising brands. Participants in a controlled experiment had
919 significantly lower willingness to pay for an item branded by a
920 company that interrupted them during a game. We did not find

conclusive evidence that this negative effect could be reduced
921 when participants were given some form of control over the
922 interruption itself. Our qualitative analysis of debriefing
923 comments suggests that these findings may be attributable to
924 participants' reactance towards the advertising interruption.
925 Therefore, these results suggest that aggressive advertising may
926 raise awareness for a company's brand, but reduce its bottom
927 line. 928

929 The implications of these results are significant for marketing
930 practices. Consumers' attention is a scarce resource — one that
931 marketers fight for fiercely to secure for their products. In this
932 fight, the temptation is strong to exploit new technologies to
933 create ever more unavoidable advertising messages. This
934 approach though comes with a risk. The marketing literature
935 has already highlighted cases in which advertising messages
936 deemed as intrusive have caused consumers to react negatively
937 to the advertising brand. However, to our knowledge, the impact
938 of intrusive advertising on consumers' willingness to pay for
939 products associated with the advertising brand has not been
940 precisely estimated before. Our results suggest that there are
941 conditions under which aggressive advertising can simulta-
942 neously raise awareness for a company's brand while decreasing
943 consumers' WTP — thus potentially negatively affecting
944 the brand's bottom line. Particularly in information dense
945 e-commerce contexts, or in context where consumers can make
946 immediate purchase decisions (such as online shopping), our
947 findings suggest caution in devising advertising strategies
948 that try too hard to capture consumers' attention: intrusive ad-
949 vertising in computer games or interstitials on a web page, may
950 not just create annoyance, but in fact decrease consumers'
951 willingness to pay for the advertised goods — suggesting that
952 not always any publicity *is* really good publicity.

953 Clearly, there exists a fine line between an aggressive
954 strategy that commands attention but does not annoy the
955 consumer, and a strategy that goes too far and loses the
956 consumer. This line may be a function of the quality and amount
957 of interruptions, their congruence with the primary task the
958 consumer is involved in at the time of the interruption, and the
959 pre-existing level of attention towards the primary task by the
960 consumer. As part of our research agenda, we plan to further
961 scrutinize our results to see how consumers' WTP for the
962 interrupting brand will change as function of these, and other,
963 factors.

964 Various aspects of our experimental design should be
965 highlighted in order to properly delimit the scope and
966 applicability of our results. First, using the terminology
967 introduced by Mc Farlane (2002), our interruptions can be
968 interpreted as 'immediate' (that is, not negotiated). They are
969 also incongruent (that is, not providing information about or
970 related to the primary task they interrupted). Consequently, the
971 kind of ad we investigated is relatively more annoying than, for
972 example, personalized banner ads or ads delivered on demand.
973 On the other hand, the ads used in our experiment were
974 designed to not be unnecessarily annoying. They took place in
975 phases of relatively low cognitive load (during breaks between
976 rounds of play), adding realism and practical validity to our
977 scenarios. 978

978 Second, our experimental set-up led us to measure im-
 979 mediate economic reactions to interruption. This set-up is
 980 transferable to many and frequent sales situations where ads
 981 attract someone’s attention while they shop and give them the
 982 chance to immediately react (such as on the Internet, TV
 983 shopping, or at the point of sale). Many other interrupting
 984 advertisements and purchase decisions are, however, disjointed
 985 in time. Involuntary attention consumption often occurs long
 986 before a purchase decision must be made. Therefore, a further
 987 step in our research will consist of investigating whether the
 988 negative economic reaction towards the interrupter holds over
 989 time.

990 Furthermore, the nature of our sample (mainly college
 991 students, with some outliers of older age) and the specific nature
 992 of the interruption may limit the transferability of our
 993 conclusions to different populations. On the other hand, the
 994 controlled nature of our lab experiment allowed us to investigate
 995 the impact of advertising interruptions from a novel angle and
 996 isolate an effect of interruptions on willingness to pay.

997 In addition, our design consisted in a laboratory experiment
 998 with bland products (mugs) branded with unknown companies’
 999 logos. This approach offers some advantages. It relies on a
 1000 design well-tested in behavioral economics; it disentangles (and
 1001 highlights) the effect of an heretofore unknown advertising
 1002 *brand* over the effect of the *product* itself (and its character-
 1003 istics, as well as its possible associations with any previously
 1004 known brand) on consumers’ valuations; and it allows a precise
 1005 estimation of actual, as opposed to self-reported, WTPs. On the
 1006 other hand, its drawbacks include the fact that the lab
 1007 experiment differed from real world purchases in various
 1008 ways: subjects were not asked to purchase a ‘feature’ product of
 1009 the brand, and they may have been, in fact, surprised by having
 1010 been asked to purchase the mug after finding it on their desks at
 1011 the start of the study.

1012 Similarly, our recall and recognition survey was not meant to
 1013 measure the impact of advertising interruption per se, but rather
 1014 to contrast the impact of the combination of advertising
 1015 interruptions and the branded mug on WTP over the impact
 1016 on recall and recollection. Future work should further
 1017 investigate this aspect, as well as the role of control in soothing
 1018 the negative impact of interruptive ads on WTP.

1019 The negative impact on WTP that we measured should
 1020 be considered as just one factor among other objectives that
 1021 aggressive promotional campaigns may satisfy. In our lab-
 1022 oratory experiment, brand awareness and recall were not an
 1023 issue: all brands were equally *unknown* (and therefore, by
 1024 the end of the experiment, equally *known*), and recall was
 1025 obvious, since participants’ WTP for the branded item was
 1026 elicited right after their exposure to the brand’s ad. Outside the
 1027 lab, a seller’s bottom line depends on the combined effect of
 1028 the buyers’ ability to recall the brand and their appreciation
 1029 for it. The net effect of advertising interruptions may well
 1030 be an increase in awareness that mediates the decrease in
 1031 appreciation.

1032 In sum, our results offer only a partial, but nevertheless
 1033 cautionary tale: when marketers design ads, they must fine tune
 1034 how aggressively to pursue customers’ attention by considering

the potential negative impact that interrupting ads will have on 1035
 consumers’ willingness to pay. 1036

Appendix A. Briefing Document for Experiment 1037 Participants (“No Control” Condition) 1038

Mobile Phone Game Test 1039

Hello. Thank you for coming to this mobile phone game 1040
 testing session. We are testing a prototype desktop version of a 1041
 mobile phone game produced by a company called “GameIt.” 1042

The game is simple and fun. If you play it well, today you 1043
 will be able to gain additional money on top of the \$7 show-up 1044
 payment that you have already received. 1045

Please read the instructions below to understand what the 1046
 game is about and how you can play it well to reach a high 1047
 score. Remember that after you have finished playing the game, 1048
 we will ask you a few questions about your experience. 1049

In this game, blocks of different colors fall from the top 1050
 of the screen and accumulate on top of each other at the bottom 1051
 of the screen, rapidly filling the game window. Your goal is 1052
 to prevent the blocks from reaching the top of the screen, 1053
 by clicking on them and removing them from the game. 1054
 Specifically, you can remove groups of blocks by clicking 1055
 on any block that is adjacent to at least two other blocks of 1056
 the same color. The more blocks you remove, the more points 1057
 you gain. However, if the blocks reach the top of the screen, or 1058
 if you click on blocks that are *not* adjacent to at least two 1059
 other blocks of the same color, you are going to lose points! 1060
 Specifically: 1061

1. You will get 10 points per block removed and bonus points if 1062
 you remove larger groups of blocks (e.g. more than three 1063
 blocks adjacent to each other). 1064
2. You will lose 1000 points if the blocks reach the top of the 1065
 screen and you will lose 100 points whenever you click a 1066
 block that is not adjacent to at least 2 other blocks. 1067
3. Remember: the more points you make during the game, the 1068
 larger payment you will receive at the end of the test — 1069
 every point is important! 1070
 1071

Sounds clear? Good. You will first play 3 rounds of 60 s 1072
 each to simply test the game. Your score will not matter during 1073
 these rounds — you will play them just to get a sense of the 1074
 game controls and the game dynamics. After that, you will play 1075
 the actual game: 6 rounds of increasing difficulty, 60 s each, in 1076
 which you will try to gain as more points as possible. After you 1077
 finish a round, the next round will automatically start after a few 1078
 seconds. 1079

One last note: Some advertisement may appear on the screen 1080
 for some time during the breaks in-between rounds of the game. 1081

[In other conditions, the text read: “One last note: Some 1082
 advertisements may appear on the screen for some time 1083
 during the breaks in-between rounds of the game. You can 1084
 make it disappear by clicking on the designated area of the 1085
 advertisement.”.] 1086

Appendix B. Mug Valuation Sheet (Sheet Appeared as a Single Page for Subjects)



Before we delve into your feelings towards the game, the company Colar would like to offer you to purchase one of its mugs. You will only purchase the mug if you indicate on this sheet that a particular price here is acceptable to you.

For each of the prices listed here, please indicate whether you wish to: (1) buy the mug for the particular price or (2) not buy the mug at this price. For each price indicate your decision by marking the appropriate column with an X.

At the end of today's experiment, the final mug purchase price will be randomly drawn from a hat. All mug purchases will then take place at the price that is drawn. You only have to pay the price that is drawn even if you have indicated that you would be willing to pay more for the mug. If you have indicated that you are only willing to pay less for the mug than the price that is drawn, then you will not be able to buy the mug. If you have indicated that you will buy the mug at the exact price that is drawn you will buy the mug at this very amount.

Notice the following two things:

- (1) The price you select has no effect on the price that is drawn from the hat.
- (2) It is in your best interest to indicate your true preferences at each of the possible prices listed below.

For each price indicate your decision by marking an X in the appropriate column.

	I Will Buy The Mug	I Will Not Buy The Mug
If the price is \$0.00	_____	_____
If the price is \$0.50	_____	_____
If the price is \$1.00	_____	_____
If the price is \$1.50	_____	_____
If the price is \$2.00	_____	_____
If the price is \$2.50	_____	_____
If the price is \$3.00	_____	_____
If the price is \$3.50	_____	_____
If the price is \$4.00	_____	_____
If the price is \$4.50	_____	_____
If the price is \$5.00	_____	_____
If the price is \$5.50	_____	_____
If the price is \$6.00	_____	_____
If the price is \$6.50	_____	_____
If the price is \$7.00	_____	_____
If the price is \$7.50	_____	_____
If the price is \$8.00	_____	_____
If the price is \$8.50	_____	_____
If the price is \$9.00	_____	_____
If the price is \$9.50	_____	_____
If the price is \$10	_____	_____

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1249 **Alessandro Acquisti** is an Associate Professor of Information Systems and
1250 Public Policy at the Heinz College, Carnegie Mellon University, a member of
1251 Carnegie Mellon CyLab and CUPS, and a fellow of the Ponemon Institute. His
1252 research investigates the economics and behavioral economics of privacy and
1253 information security, as well as privacy in online social networks. Alessandro
1254 has been the recipient of the PET Award for Outstanding Research in Privacy
1255 Enhancing Technologies and the IBM Best Academic Privacy Faculty Award,
1256 and of research grants from the National Science Foundation, Transcoop
1257 Foundation, Google, and Microsoft. Alessandro's research has been dissemi-
1258 nated through journals (including the Proceedings of the National Academy of
1259 Science, Information Systems Research, Marketing Science, Marketing Letters,
1260 IEEE Security & Privacy, and Journal of Comparative Economics); edited
1261 books and book chapters; and leading international conference proceedings and
1262 keynotes. Several of his findings have been featured in media outlets such as
1263 NPR, the New York Times, the Wall Street Journal, the Washington Post,
1264 CNN, and others. His 2009 study of the predictability of Social Security
1265 numbers was featured in the "Year in Ideas" issue of the New York Times
1266 Magazine. Alessandro holds a PhD from UC Berkeley and Masters from UC
1267 Berkeley, the London School of Economics, and Trinity College Dublin.

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1269
1290

Sarah Spiekermann is Chair of the Institute for Management Information 1270
Systems Vienna University of Economics and Business (WU Wien) and Adjunct 1271
Professor at the Heinz College of Public Policy and Management, Carnegie Mellon 1272
University (Pittsburgh, USA). Before starting her career in Vienna in the fall of 1273
2009, she completed her Habilitation at the Institute of Information Systems at 1274
Humboldt University Berlin (Germany) and held an Adjunct Professor position 1275
with the European Business School (EBS). Sarah has published over 50 articles and 1276
2 books in the area of IS and Ubiquitous Computing, in particular on electronic 1277
privacy, RFID, personalization/CRM, user interaction behavior in E-Commerce 1278
and M-Commerce environments as well as knowledge management. From 2004 to 1279
2008 Sarah headed the Berlin Research Centre on Internet Economics (InterVal) at 1280
Humboldt University. A key goal of her work is to investigate the importance of 1281
behavioral constructs and social values for IT design and to refine the concept of 1282
ethical computing in an E-Society. Sarah received her Ph.D. in Information 1283
Systems from Humboldt University, a Master of Business from the European 1284
School of Management (ESCP-EAP) and a Master of Science from Aston 1285
University (Birmingham, UK). Before starting her academic career she worked as a 1286
strategy consultant for A.T. Kearney and led the EMEA Business Intelligence for 1287
Openwave Systems. 1288
1289