The Impact of Online Disruptive Ads on Users' Comprehension, Evaluation of Site Credibility, and Sentiment of Intrusiveness

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ABSTRACT: This experimental study explored how online disruptive advertisements affect users' information processing, feelings of intrusiveness, and news site's credibility. Unlike earlier studies, our results did not show that disruptive ads significantly interfere with viewers' cognitive processing, measured as comprehension of news content. However, this study confirms previous findings that disruptive ads are perceived as intrusive and annoying, creating negativity on the affect level. Results also indicate an intriguing trend with respect to the impact of disruptive ads on credibility of news Web sites. If ad content is suspected to co-opt with news production, media credibility suffers.

KEYWORDS: Internet advertising, information processing, disruptive ads, credibility, comprehension of news.

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Media consumers are expected to treat interruptions as a part of everyday life. Whether at home or work, they can experience a great variety of interruptions to their primary media use from other screens (e.g., smartphones or tablets), a knock at the door, or a surprising sound from the street. Because interruptions are so common and frequent, media users can be accustomed to them, handling the interruptions effectively by either neglecting them or diverting attention to them and then refocusing on their original media activity. Even though the performance of the primary task may not necessarily be influenced, the psychological well-being of the users can be negatively impacted (Speier, et al, 2003; Zijlstra et al, 1999). This kind of interruption-reaction mechanism is most certainly at work when people seek and process information on the Web, especially on popular news sites such as the nytimes.com or cnn.com, where disruptive ads can automatically occupy the entire browser and demand viewers' immediate action if they wish to reach the sought content or the specific location of the site they originally choose.

While various software solutions could be installed or browser choice can be made to reduce Internet intrusions, content providers continue to outsmart existing protection software and advertisements continue to be ingeniously created to attract and divert viewers' attention. In addition, well-designed animation or videos can load immediately and demand either users' attention or dexterity to seek efficient exits. As more and more people are turning to the Internet for information – in effect, almost 40% of Americans reported getting news from the Internet (Olmstead, 2013) – it would be important to know how people's information seeking and processing proceed with interruptions and how they react to the disruptive ads.

Previous studies in psychology (e.g., Oulasvirta & Saariluoma, 2004) have found that interruptions can impede people's ability to process information and affect their judgments. However, our survey of the communication field indicated that limited research has been devoted to exploring the intrusiveness of disruptive ads, interruptions in an e-commerce environment, and users' avoidance to the media with disruptive designs (Chatterjee, 2008; Rejon-Guardia & Martinez-Lopez, 2014). Little research has been done on the impact of embedded disruptive mechanism on online news processing. Therefore, this experimental study seeks to explore whether disruptive ads on news sites increase the level of intrusiveness; additionally, we investigate whether disruptive ads influence viewers' abilities to process information in a news story. Lastly, we take the research further by examining whether the news sites' credibility may be negatively influenced by the unexpected, and perhaps, unwelcome intrusion of disruptive ads. These research questions are extremely important to both information-processing research and Web practice of media industry. Our findings can be instrumental in shedding new light on Web-based information processing and perceptions toward individual Web sites.

Review of Literature
Disruptive Ads
Web-based advertisements can be produced in a wide variety of innovative designs and formats, all of which are intended to attract online users' attention and action. However, these specially tailored messages may result in interrupting users' original task performance (Burns & Lutz, 2006; Moe, 2006). Disruptive ads can transmit remarkably high-quality audio and visual content constructed with such software as JavaScript and Macromedia Flash, easily exceeding the quality level of the original destination. Unlike banner or side ads, which are placed across the top, bottom or sidebar of a webpage and have little interruptive effects on Web users, pop-up and

embedded ads are ingeniously designed to automatically appear and/or linger when Web users get on, move around, or even close a Web page (Edward, Li & Lee, 2002; Shankar & Hollinger, 2007).

Web users' experience of uninvited ads can differ greatly from person to person and is definitely worth examining. In a study focusing on users' perception of web credibility (Fogg et al., 2002B), around 14% of the comments were about online ads and the majority of which were negative. In 2013, a study about consumer opinion on online advertising and audience targeting (Choicestream, 2013) reported that more than 60% of the surveyed online users ignored online ads, while merely 2.5% clicked through and purchased the advertised product. When asked about the underlined factor leading to their ignorance of online ads, 60% of the consumers said online ads annoyed them. This finding concurred with the result of a previous study by Benitez (2002), who reported that 41% of the online users would not return to a website due to the annoying effects of disruptive ads. As a result, some websites and search engines began to replace disruptive ads with such promotions as coupons or music to demand attention of Web users (Benitez, 2002) and others even resorted to "highly targeted plain text ads" (Goldfarb & Tucker, 2011, p389).

While some disruptive ads can be blocked by browsers, other specially designed ads are created to surpass existing blocking devices. Web users may have no choice but to allow a certain number of disruptive ads to appear on their computer screens. A national study (Matsuo, 2006) suggested that Web users can tolerate disruptive ads to appear on their browsers at a rate of several ads per hour. Therefore, many Web sites, especially the most popular ones, continue the practice of placing creative ads on their most visited sites. To media firms – especially for those free news sites that always seek financial balance and self-sustainability, disruptive ads on the Web are an effective means to generate revenue (Miller, 2010). Given these, studying disruptive ads as a form of information interruption in information seeking and processing remains relevant and needed for both communication field and media industry.

Intrusiveness of Media Environment
Intrusiveness is an indispensable part of adverting, which is to make people aware and fond of products and services that they may otherwise not be. But the feeling of intrusiveness can result in avoidance to ads (Bauer & Greyser, 1968), which is the ironical consequence advertisers strive to avoid. Li, Edward and Lee (2002) defined intrusiveness as "a perception or psychological consequence that occurs when an audience's cognitive processes are interrupted" (p.39). In other words, intrusiveness is a psychological reaction to frustration elicited by stimuli or actions that arise beyond users' expectations – in this particular case, online-ad's interference with online users' ongoing cognitive process. In hopes of gaining Web users' attention, disruptive ads are usually designed in such a way that they are pushed on their audiences (Xia & Sudharshan, 2002). Website viewers, with few alternatives, either have to pay attention to the uninvited message or take action to discontinue the disruptive ads (Dodd & Stevens, 2003). Nevertheless, with the advent of new media that prioritize personal choice and interactivity (Rust & Varki, 1996), the feeling of intrusiveness is supposed to abate. But to web users' disappointment, new technologies these days are craftier in delivering tailored marketing message to users and also they appear more relentless in reaching out to users who may feel annoyed. Moreover, consumers sometimes even cannot remove disruptive ads, and this forced exposure easily generates negative feeling

toward online ads (Wang, Chen & Chang, 2008). The experience of forced exposure is regarded as most intrusive when website users are particularly goal oriented (Li et al., 2002).

According to Kalyanaraman and his colleagues (2005), interruptions often fall into two categories of characteristics: cognitive and social. Cognitive characteristics refer to such physical traits of interruptions as the frequency and complexity of interruptions, the specific time the interruptions occur, the duration an average viewer needs to respond to the interruptions, and the actual interruptive content. Social characteristics are related to the manner in which viewers respond to the interruptions: the generator of the interruptions, different formats with which the interruptions showcase, and social expectations that are relevant to the occurrence of the interruptions. The feeling of intrusiveness is determined by both the social and cognitive characteristics (Kalyanaraman et al., 2005; Xia & Sudharshan, 2002).

As mentioned earlier, intrusiveness can be deemed as a psychological reaction that hinders people's cognitive processing mechanism (Li et al., 2002). Disruptive ads are not annoying themselves; they are only considered intrusive if they actually interfere with users' information-seeking tasks at an unwanted time (Edward et al., 2002). Edward and colleagues (2002) further indicated that the more contradictory an ad was to a consumer's main goal, the more intrusive the consumer would feel. Constantin's study (2007) demonstrated that disruptive ads such as pop-ups could easily attract Web users' attention and interfered with online users' primary tasks, therefore eliciting the feeling of frustration. Compared to websites without disruptive ads, websites with disruptive ads may yield more negative feeling and reduce the returning rate of Web users. Moreover, Web users may subsequently feel reluctant to recommend the disruptive websites to others (McCoy et al., 2004), resulting in more loss for Websites. The feeling of intrusiveness, however, can be determined by other contextual factors – for example, the more the Internet users are committed to fulfilling an information-searching task, the more intrusive they will feel when their search process is interrupted (Xia & Sudharshan, 2002). Since Internet users are often goal-driven and Internet free-ownership structure has been in place for Web users to take full control of their online activities (Shapiro, 1999), users may feel even more intrusive when their Web activities are interrupted by forced ad exposures (Li et al., 2002). Based on the above literature, our first hypothesis was formed:

H1: The feeling of intrusiveness will be greater for the Web users who are interrupted by disruptive advertisements than those who are not.

Cognitive Processing

Empirically, people regard interruption as peripheral or additional tasks that demand attention originally reserved for main tasks (Xia & Sudharshan, 2002). This split of consumers' efforts for peripheral tasks is detrimental to primary task fulfillment, leading to both performance deterioration and affective difference (McCoy et al., 2004). A person's information-processing resources are limited. When there are more than one tasks competing for the limited resources, the user's performance becomes degraded (Norman & Bobrow, 1975). Pop-up ads are a kind of message designed to kidnap Web users' attention. As a result, the resources available for completing the major tasks become less and less (Diao & Sundar, 2004; Edwards et al., 2002). Therefore, Web users deem disruptive ads as more intrusive. Object-based theory of visual attention (Diao & Sundar, 2004) suggests that an object file needs to be created whenever a new

stimulus is accepted in the visual domain of the brain and thereafter attention will be channeled to the newly created object. Pop-up ads are one of such objects that can easily hold Web users' attention by imposing new visual representation on web users' brain (Diao & Sundar, 2004).

The limited-capacity model (Lang, 2000) of mediated message processing also helps illustrate the intrusive phenomenon of pop-up ads. This theory suggests that three sub-steps are needed for consumers to complete information processing: encoding, storage, and retrieval – the entire process of which requires mental resources. Unfortunately, human mental resources are not unlimited. Therefore, selective process steps in to determine which information would be represented mentally. On the one hand, viewers' personal goals would oversee this selective information-seeking process; on the other hand, the information that is novel, unexpected, or extremely contrary to the working environment may attract users' attention, even though it is irrelevant to viewers' personal goals (Lang, 2000). Pop-up ads, which are often designed to create an unforeseen change in visual domain, are more likely to elicit automatic orientation or response (Diao & Sundar, 2004).

There are merely a few studies that directly target the relationship between advertising and information comprehension. In a study focusing on long-term working memory and online interrupting message, Oulasvirta and Saariluoma (2004) indicated that interruptive message had a detrimental effect on "building meaningful within-chunk associations" (p.60), resulting in a 16% decrease in recall accuracy. Even though little information is available to directly guide our investigation on the relationship between pop-up ads and information comprehension, the studies on the relationship between advertising and recall/memory may shed light on this experimental research. This group of studies found that comprehension has a huge impact on information recall (Hastie & Park, 1986; Pulido, 2004; Schallert, 1976).

The interruption effect research on information recalls have produced mixed results. Zijlstra et al. (1999) found that interruption improves attendants' main task performance at the expense of their psychological cost. McDoy et al. (2004) investigated the relationship between memory performance and disruptive ads. They found that pop-up ads with irrelevant information actually improved attendants' recall of both the website and the ads. As early as 1908, Yerkes and Dodson indicated that an inverted U-shape relationship existed between interruption and attendants' performance. But Xia and Sudharshan (2002) argued that a decreasing linear trend exists between interruption frequency and performance. Traditional media message has been proven to stimulate involuntary attention, especially when the message is original and unforeseen. This phenomenon also was found to be applicable to the new Web environment (Diao & Sundar, 2004). Kalyanaraman et al. (2005), however, argued that different types of online ads may create different results. For example, *pop-up* ads are more likely to lead to attendants' decrease in memory of news story than *pop-under* ads. Based on this body of information-processing literature reviewed above, the following hypothesis is posited:

> H2: Comprehension of news story will be greater for the participants who are not interrupted by disruptive advertisements.

Credibility and Relevance

Past research has demonstrated that people dislike and discredit commercials, and are reluctant to purchase advertised commodities, especially when they detect the persuasive intent in

commercials (Robertson & Rossiter, 1974). On-line advertising may arouse similar feeling of distrust, which may result in avoidance due to its disruptive nature. The past literature has also established that forced exposure to persuasive messages may lead to intrusive feeling, and negative effects on information recall and comprehension. In the same vein, do interruptions that occur during an information-processing task generate a negative effect on the credibility of news websites? In addition, is the credibility of the news website swayed by the commercial content (relevant or irrelevant to the news content)? These issues could generate a huge impact on a user's perception of the products advocated in online ads and the Web sites in which they are advertised.

The study by Bruner and Kumar (2000) found that there is a positive relationship between people's attitudes toward a website and their attitudes toward an ad that the website sponsors. In other words, if Web users do not bear positive attitudes toward an online ad, their attitudes toward the website could also be negative. Kalyanaraman et al. (2005) argued that when online users are engaged in a primary task on the Internet and their major task is interrupted by pop-up ads, negative affection immediately builds up. This negative feeling soon will spill over to the website, since online users usually automatically infer that the website is the generator of the commercial. Even worse, the website's credibility can be damaged if the users believe that the particular website is somewhat connected to the commercial or intends to sell something to them (Fogg et al., 2002B).

Dood and Stevens' study (2003) provided further evidence that pop-up ads are detrimental to the reputation of a brand name. All 36 participants in their study complained about their poor online experience and no one gave any positive comment about pop-up ads. The extent of complaint was more serious in pop-up condition than in pop-under condition though (Kalyanaraman et al., 2005). Fogg and his colleagues (2002A) found that two practices would damage the credibility of a website seriously: placing a pop-up ad on the website and no clear detachment between editorial content and commercials. They concluded that pop-up ads are "widely disliked and seemed always to reduce perceptions of site credibility" (Fogg et al., 2002B, p.39). Based on these findings, we formed the following hypothesis:

H3: The credibility of a news site will be perceived better by those participants who are not interrupted by disruptive advertisements.

Even though online users generally dislike disruptive ads, but content-relevant persuasive messages are not perceived by users as annoying as content-irrelevant disruptive messages. Kalyanaraman and Sundar (2003) found that the disruptive ads that specifically targeted niche consumers were perceived much less annoying than other ads that had nothing to do with users' goals or interests. In general, the more relevant to consumers' principal task the disruptive ads' content becomes, the more positive attitudes the Internet users would have for the websites or the news portals. Pasadeos's study (1990) also supported this negative relationship between perceived informativeness and disruptive feeling with local ads. "Users are particularly irritated by pop-ups which are not related to the sites, as there is no real or useful reason for them to be there," concluded Dodd and Stevens (2004, p.1). Pop-up ads might be successful in grabbing the attention of online users and instilling more information in users' memory, but the disruptive characteristic of the device would damage brand reputation and drive users away over time

(Chatterjee, 2008). However, if disruptive ads offered useful information that users actually seek, they can help increase a website's credibility (Fogg et al., 2002B). Based on these studies, the following hypothesis was formed.

H4: The credibility of a news site will be perceived better by the participants who receive relevant disruptive ads.

Methodology
Stimuli
Since people may have prior experience with existing media Web sites – such as the *New York Times* or Fox News – we decided not to use the known media brands. Instead we created a seemingly ordinary, impartial news Web site that carries "The Daily News" as the medium name. Under the main site, four news stories relevant to health and diet were listed. The texts of the news stories were all derived from the *New York Times* and edited to fit the needs of the stimulus Web site. The titles of the stories were "Eating well: The post-Atkins low carb diet," "Exposure to pesticides is lowered when young children go organic," "Personal health: The color of nutrition: fruits and vegetables," and "Body and image: Don't sweat the reasons, just go on and sweat." Each of the news stories runs about 700 words with identical layout.

The main manipulation of the experiment was the three different editions of the news site the subjects viewed. The first edition of the site did not include any disruptive ads – subjects read each of the four stories without any distraction. Therefore, the subjects that viewed this edition were treated as the control group. The second edition included disruptive ads that were not related to health or diet. For example, one of the ads was for Expedia.com and another ad was for a financial service. The third edition of the site also included disruptive ads. But the subjects of these ads were all health-or diet-related, such as the South Beach Diet, the Atkins Diet, and other weight loss programs. The different disruptive ads were randomly rotated and appeared every three minutes in the latter two experiment conditions. However, it should be noted that as authentic as the ads appear, none of the ads actually provided direct links to the featured products or services. Our intention was to discourage them from drifting away to these commercial sites and to assist them to focus on the news site.

Sample
A total of 182 subjects participated in this study – the control group had 61 subjects (who viewed the first edition); the second group exposed to irrelevant disruptive online ads had 65 subjects, while the group with relevant disruptive ads had 56 subjects. All of the subjects were volunteers from the subject pool of the psychology department at a large public university in the South of the United States. They are typical undergraduate students who took psychological courses and are not expected to be as media-savvy as students who major in journalism or mass communication. About 30% of the subjects were male and 20% of them were ethnic minorities, which is close to the makeup of the undergraduate student body in that university.

Procedure
In a large campus computer lab, the participants were randomly assigned to one of the three groups that viewed different editions of the stimulus. First, they were given a brief pre-test in

which 9 questions regarding their exercise habits and level of interest in diet- and health-related information were evaluated. Then they were given approximately 15 minutes to browse the designated Web sites in the health section of "*The Daily News*." They were told that the site they were about to view was directly downloaded from a known news site. Again, the participants did not have access to other Web sites – the browsers' access to the Internet was disconnected. In the post-test, the participants were given four tests to measure comprehension of the news stories they are exposed. The participants then evaluated the credibility level of the entire site and each of the four stories. Also included were 7 categories of negative feelings toward the site: distracted, disturbed, forced, interfered with, intrusive, invasive, and obtrusive. Finally, demographic items were included in the post-test. Each lab session lasted about 25-45 minutes.

Results

A factor analysis was conducted to extract potential dimensions of these negative feelings. The results indicate that there appear to be two dimensions generated from the users: the first factor is heavily represented by intrusive, invasive and obtrusive feelings while the second factor is represented by the four sentiments: distracted, disturbed, forced, and interfered with (See Table 1). Our first research hypothesis centers on the perception of intrusiveness among Web viewers who were assigned into different groups. The treatments, as expected, created varied moods when the subjects read the online stories ($F = 12.183$, $df = 2, 179$, $p < .001$). The news Web site without any disruptive ads (control group) is perceived as the least intrusive. Also, based on results generated from post-hoc tests, the reaction from the control group is statistically different from those derived from the other two groups who read the news Web sites with disruptive ads ($M_{control} = -.423$ vs. $M_{irrelevant\ ad} = .269$ vs. $M_{relevant\ ad} = .165$). Therefore H1 is supported. Our additional findings show the difference of intrusiveness factor between the groups that were exposed to relevant and irrelevant ads is not statistically significant. Similarly, the difference of perceived distraction factor between the two kinds of disruptive ads is not significant either ($M_{control} = -.217$ vs. $M_{irrelevant\ ad} = .094$ vs. $M_{relevant\ ad} = .139$).

Table 1.
Extracted Components from Participants' Feelings

Feeling	Component	
	1 intrusive	2 distractive
Distractive	.201	.801
Disturbed	.325	.664
Forced	-.081	.592
Interfered with	.372	.723
Intrusive	.869	.208
Invasive	.903	.152
Obtrusive	.897	.145

Our second research hypothesis pertains to viewers' comprehension level of news stories under different ads treatments. The statistical results showed that the subjects' comprehension levels are not statistically different among the three groups ($F = 1.6$, $df = 2, 179$, $p = .205$). H2,

therefore, is rejected. Since this result seems counter-intuitive, we explored the potential impact of spurious factors. Even after the factors of interest and concern toward health and diet are controlled for, comprehension still did not seem to be affected by the different treatments.

Our third test aims at examining the potential influence of disruptive ads on news site's perceived credibility. We found that the influence of disruptive ads on viewers' perception is only marginal ($F = 2.828$, $df = 2, 175$, $p = .062$). Thus, despite the statistical result's proximity to significance, the third hypothesis is rejected.

The fourth hypothesis testing examined the relationship between perceived credibility and relevance of ads to news content. It is worth noting that the group that was exposed to relevant disruptive ads indicated the lowest level of credibility ($M = 13.61$), which is particularly lower than the control group ($M = 14.80$) ($p = .061$). Again, despite its proximity to statistical significance, H4 is also rejected. Interestingly, the difference of perceived credibility of the news site between the control group and the group that viewed irrelevant disruptive ads ($M = 14.54$) was statistically insignificant ($p = .859$).

Discussion

It is clear disruptive ads are not welcome. Based on our experimental results, the participants are indeed annoyed and feel interrupted by the pop-up ads. But then why do many popular Web sites continue to run disruptive ads given the risk of irritating viewers and decreasing credibility? Our empirical inspection indicates that the impact of placing disruptive messages upon the sites' credibility seems limited. Also, perhaps due to the commonality and frequency of animated ads today, Web users are accustomed to coping with them and not affected by their existence.

We examined whether comprehension of a news story can be influenced by the presence of disruptive advertisements. The finding shows it is not the case. It is surprising that the participants' cognitive performance was not impacted by the interruptive advertisements. One explanation could be that humans are able to block interruptions when they focus their attention on the main task and the interruption can be easily dismissed. Interruptions in every aspect of life are quite common and therefore people may be accustomed to successfully shifting and refocusing their attention successfully. This finding seems to contradict with an earlier study that found interruptions can influence cognitive processing (Xia & Sudharshan, 2002). Different levels and types of disruption could have contributed to this discrepancy. It is now apparent that the interruptions used in this study -- which were frequent, yet easy to deal with -- do not affect comprehension of online news content.

The computer screen showing an Internet page usually contains innumerable banners, disruptive ads, hyperlinks, pictures, videos, animation, and so on. Those who want to reach audiences with particular pictures or messages face "information saturation" (Bakos & Brynjolfsson, 2000, p. 63). Nevertheless, our findings suggest that at least young audiences have an overriding mechanism to shift tasks quickly and to deal with the attentional interruption without affecting information processing. This might be related to the environment where they grow up, which often situates them to multitask, like texting their friends while watching TV. However, older generations may lack such kind of training and habit and therefore dedicate to completing only one task at a time.

In this study, participants were forced into non-linear information acquisition via disruptive ads while accessing Web sites that contain health-related information. The disruption included in

this study's manipulation was relatively easy to solve, but today's ads can take much longer to discontinue especially if the ads involve videos and animations; sometimes, it is impossible for users to skip ads at all. Therefore, the time factor and the level of disruption should be considered by future researchers – is an interruption every three minutes disruptive enough for Web users? Low, moderate, and high levels of interruptions have not been clearly defined in the literature. Xia and Sudharshan (2002) used interruption frequency of length 1, 2, 4, and 6.5 minutes respectively, with each interruption lasting 30 seconds. Because they did not find any difference between 4-minute and 6.5-minute frequencies, they simply combined them as low level of interruption. Therefore, the next needed step for researchers to take is to test the varying intervals of the interruption. This information would be quite useful to media practitioners as well as to information processing research. The participants dismissed the interruptions easily – it did not affect their comprehension of the Web content but it did affect their mood and perception of the news outlet. This study showed that the interruptions appear to be more of an annoyance than a cognitive obstacle.

Our first hypothesis verified whether the feeling of intrusiveness will be greater for the participants who are interrupted by disruptive advertisements. The study confirmed the hypothesis of perceived annoyance of disruptive message. The pop-up ads interfered with media users' processing of health and diet information and subsequently aroused feeling of intrusiveness. Research has shown advertisements that evoke positive and negative feelings can lead to different effects on information processing and judgment formation (Faseur & Geuens, 2006). The study by Kamins, Marks and Skinner (1992) showed that the mood induced by a television program could affect the evaluation of television commercials. This study showed similar results despise the primary information was the news story and the mood was induced by the interruption of advertisements. In this study, mood did not affect information processing. However, it did lead to a shift in affect toward the Web site. Despite the lack of impact on comprehension of news content, web designers may need to take this factor into account when incorporating disruptive ads into any Web sites. Ads may very well present potent challengers for people to attend to less interesting content. In this study, participants were required to read four news stories on health or diet, but no prior questions or indicators were gauged on participants' interest about the topic. In future research, devices distinguishing interesting and uninteresting news topics need to be incorporated into the study, which may also help to measure participants' comprehension of news stories and feeling of intrusiveness.

Our study also examined the relations between disruptive ads and news site's perceived credibility and between relevance of the ads to the news content and the site's perceived credibility. The results also showed an intriguing trend. Overall, disruptive ads do not appear to affect users' perception of the credibility level of the news site; however, if the content of the disruptive ads is suspected to be co-opted with that of news, then media credibility suffers. The disruptive ads that presented material concerning health and diet - directly related to the news story topic - negatively affected the credibility of the media outlet in this study, though not significantly. Participants parsed out the information and were aware of the relevant contexts to which the data were encountered (Sperber & Wilson, 1986). Previous research has found that if disruptive ads cannot be distinguished from a Web site's content, the damage to the credibility of the site is greatest (Fogg et al., 2002A). Perhaps the "relevance" of disruptive ads and the featured content was perceived to be intentionally created between the advertiser and editorial staff – thus

decreasing the content autonomy on the part of the news organization. Again, this finding supplements an earlier study that found in general, when the interruption was perceived as relevant to the news content, it led to greater attention to the ad and also more positive attitudes toward the ad. Another explanation for our finding is that users may feel their intelligence is being insulted because of the suggestion that they cannot find what they are looking for (Fogg et al., 2002B). While more research is necessary in this area, the implication of our finding is particularly worthwhile for media practitioners who often struggle between journalists' ethics and corporate revenue.

Given the modest finding of pop-up ads' impact, future research should examine more deeply on the frequency and magnitude of disruption together. Studies have shown that a number of interruptions during an information-processing task can have a significant influence on viewers' decision-making process (Speier et al., 1999; Xia & Sudharshan, 2002); additionally, Internet users indicated several ads an hour are acceptable (Matsuo, 2006). Yet, Wegert (2002) argued even though pop-up ads are annoying, it is the volume of those ads that actually irritates consumers. He reported that half of the Web users accept as much disruptive ads as two to six per hour.

Also worth examining for future study is that there are different levels of difficulty for Web viewers to solve interruptions – for example one mouse click verse three or it is challenging to locate the "close" box. The level of complexity to finding solution may also have an impact on information processing as well as feeling of intrusiveness. Additionally, the conflicting results between this study and previous studies regarding the impact of disruption on comprehension level merit further investigation. Specifically, the operationalization of disruption may include the time spent on tasks, the amount of information needed, and also the level of memorization and recall.

Disruptive ads are considered to be more irritating than other types of ads because they are more demanding of users' involvement in information processing (McCoy et al., 2004). This study suggests disruptive ads are more of an annoyance than an obstacle to efficient information processing. And this annoyance appears to be reflected, in some degree, in the users' perception of credibility of the Web sites. Because of conflicting research into both information processing and credibility effects of disruptive ads, the variables in this study demand further research.

Conclusion

This research explored how disruptive advertisements affect users' information processing, feelings of intrusiveness, and the news site's credibility when viewers' must navigate an information path via web-based information. Disruptive ads are still widely used in the advertising industry for Web media in particular, and they may present a considerable challenger for sophisticated Internet users. Popular Web sites use a great variety of new techniques to design and present sponsored message that sometimes demands users' immediate attention and action, but at other times can simply appear and then fade away. These sophisticated techniques still interrupt and seize viewers' attention, away from their original media use goal. As "rich media" advertising, or ads that contain both audio and video elements increases, so too will the interruptions to information seeking and the level of user annoyance. These issues merit more systematic and further examination for future research.

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