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# The Effects of Video Formats in Online News: A Study of Recall and Stickiness

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# THE EFFECTS OF VIDEO FORMATS IN ONLINE NEWS: A STUDY OF RECALL AND STICKINESS

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RUNNING HEAD: Video Formats in Online News: Recall and Stickiness

## Abstract

News organizations putting content on their websites may better engage their audience by offering a choice of raw video rather than packages. A two-by-three experiment studied the relationships among video format, time spent, and recall for online news. Test subjects viewed a traditional, broadcast-type standard news “package,” a disassembled package, and raw video with text. Results showed users spent significantly more time with the raw video format than with the other two formats. Time spent was strongly correlated with post-test recall of elements of each story, but there was no direct relationship between format and recall. A model is proposed for further research in which format predicts time spent, and time spent predicts recall, with no direct relationship between format and recall.

Most media outlets are now embracing the idea that in order to keep their audience's attention, new forms and designs of content are needed. In the years leading up to the Internet becoming a main source of news, and in order to capture a television audience, network TV news editors gravitated toward using faster-paced shots, shorter soundbites and more special effects. The "synthetic montage," as opposed to extended views of scenes, became increasingly popular in the 1970s, 80s and 90s, until it leveled off in use after 1997 (Schaefer & Martinez, 2009). Now, with the proliferation of the Internet, audience preferences and the tools to provide content have changed. The Internet offers a different set of viewing options.

Perhaps the most vital tenet to remain cognizant of is that online news is user-driven, not producer-driven (Gunther, 1995). More than a decade ago, media producers recognized that news consumers are not "interested in a site that offers them only what they could get on the air," but they want "the ability to pick and choose the information that interests them" (Potter, 2000, p. 82). The Internet offers news consumers a fusion of formats not found in traditional media encompassing video, audio, interactivity and the ability to access exterior links (Dueze, 2003).

Still, some broadcasters have not taken advantage of the opportunities online news offers. Many television stations simply post digitized versions of broadcast news "packages" and lightly edited scripts, and many newspapers (especially in smaller markets) post the same content that appears in print. Although there's a growing consensus that Internet content must be a priority for television news operations, maintaining and updating a website is difficult for stations when personnel are already

pressed to the limit (Cremedas & Lysak, 2011). Cremedas and Lysak (2011) also found that while most news directors want to use the Web to provide new content, such as raw video footage, they manage mainly to put packages and text versions of the stories on line.

Relatively few news organizations have begun to experiment with online news formats that differ significantly from those found in traditional media. A handful of online news sites have evolved from passive, non-interactive media to information outlets that celebrate immediate, richer content, and far more user control (Bucy, 2004). For example, the American News Project ([www.americannewsproject.com](http://www.americannewsproject.com)) is one of the few media outlets that uses strictly Web-conceived video clips and content (Penniman, 2009).

Many opportunities exist for new media technologies to realign journalist-audience interactions (Secko, 2009). Other areas that utilize information dissemination, such as education, are looking toward new and unconventional methods such as computer and video game design for alternative methods of interactivity (Dickey, 2005). In the process of creating these new forms of delivery, research is needed on these new formats that were once thought of as breaking boundaries. This research can assist broadcasters, Web producers and advertisers with choosing the method of presenting news that will capture the largest share of the audience. The question that needs to be answered before many media outlets can take advantage of the Internet's multiple advantages is: what format is the most effective for presenting online news?

This study attempts to answer one dimension of that question through an experiment that compared the effectiveness of three online video news formats: the traditional "broadcast" package, a disassembled package, and raw footage. Two

dependent variables were used in the experiment: recall and time spent. The following section develops the rationale for the hypotheses tested in the study.

### **A case for more choice and change**

The first consideration in studying the role that format plays is a review of research that addresses how users process visual and multimedia information. Some prior literature found that pictures and audio are powerful psychological cues, but multimedia can hinder memory for story content, which leads to negative feelings towards the site and its subsequent content (Sundar, 2000). However, a subsequent study by the same researcher found online interactive ads enhanced user involvement with the product, increasing the power of persuasion. (Sundar, 2005). Use of interactive features is positively associated with perceived satisfaction (Chung & Nah, 2009). In an experimental study with the intention to engage undergraduate students in general education courses, Ulbig (2010) found that the use of simple visual images enhances the students' experience in the classroom and creates a greater overall impression of the course. As opposed to just text, pictures closely linked to spoken or written words can increase attention and health information recall (Houts et al., 2006). In a biometric study of broadcast advertisements viewed at significantly higher speeds through a digital video recorder (Siefert et al., 2008), subjects who viewed the "fast forwarded" advertisements compared to subjects who viewed the advertisements in real time, had significantly higher recall of the advertisements, spent more time looking at the screen, most notably the center of the screen, and displayed more visual processing activity. Internet users were more likely to believe a site was targeting them. They would rate the site and

product more favorably if the site contained audio/video testimonials rather than text/picture or no testimonials (Appiah, 2006).

Research also indicates that the amount of information may not be as important as how the information is presented. For example, omitting a key element in an advertisement can lead to higher recall (Sengupta & Gorn, 2002). Creative advertising in non-traditional media, such as airport or cinema advertising, leads to increased recall and recognition over time (Baack et al., 2008). Wicks (1992) found that the effect of hypermnesia, which is improvement in recall with repeated testing, with respect to intervening thinking time, was found among media users. Taken as a whole, these studies suggest that both format and message play critical roles in recall of media messages.

There is a significant body of research on traditional media and recall. DeFleur et al. (1992) found that the recall of facts from news stories is significantly stronger from a newspaper or computer screen than those from broadcast. They also found that patterns of recall from computer screens are more closely related to newspapers than television (DeFleur et al., 1992). Pullout quotes in newspapers were found to have more recall than graphics for readers (Wanta & Remy, 1995).

Price (et al, 1996) found that television stories receiving heavier coverage lead to higher recall and recognition, and stories that focused on personalities and domestic news items are recognized and recalled more than standard types of political news. Neuman (1976) found that television has a low impact for the recall of news items. Television provides visuals such as graphics that may help a viewer recall a story's topics, but not the details, while non-redundant crawls with newscasters yielded greater recall than videotex stories (Edwardson, Kent, & McConnell, 1985). Results from a 2002 study

revealed that recall of news was stronger with television and print newspapers compared to their online versions, and the medium used has different effects depending on the type of learning measured (Eveland et al., 2002). The most exhaustive investigation in terms of print and Web, with more than 500 test subjects, is the Poynter Institute Eye Track study of 2007. It showed that online, readers tend to follow a story closer to its completion than do print readers. The study also showed that alternative story forms such as time lines, fact boxes and question/answer options help readers recall facts (Adam, Quinn & Edmonds, 2007).

The majority of research addressing content formats uses measures of recall as the primary dependent variable (e.g., Sundar, 2000; Houts et al., 2006; Seifert, 2007), but variables other than format may be implicated in the recall process, including time. Lang's "Limited Capacity Model of Mediated Messaging" states that a person has a finite amount of cognition to use to "perceive stimuli, turn them into mental representations, do mental work on those representations, and reproduce them in the same or in an altered form" (Lang, 2000, p.47). Time is a critical variable to help people process new information in the context of previously stored knowledge (Wicks, 1995) News outlets that devote more time to any topic allow more opportunity for readers and viewers to relate new information to existing information. How that time is divided also makes a difference; educational studies have found the use of the "spacing effect," or dividing study time across a number of brief sessions, yields better performance than an aggregate amount in one session (Miller, 2009). Hacker's 1992 study called for more alternative significations from which to draw when formulating semiotic narratives about news events (Hacker, 1992). In a content analysis of commercial and non-commercial

websites, Bucy and Lang (1999), found that a site's information packaging is vital in gaining users' attention and keeping their interest.

In sum, different methods of presentation yield different levels of recall when researching online versus traditional or linear formats. Visual cues and orientation are vital when communicating the most effective message with the prospect of eliciting recall.

Based on the literature reviewed, it is expected that there will be a significant relationship between time and recall:

**H1: The amount of time a user spends on a story will be positively related to recall.**

In order to understand the interrelationships among format, recall, and time spent with a story, it is necessary to select formats that may differ in recall and other dependent variables. The Internet offers both benefits and detriments that have left media outlets to ponder the most effective tool to enhance recall and disseminate information.

When the now-ubiquitous graphic user interface was in its earliest stages, it was influenced heavily by psychological research that took the human-computer interface into great consideration (Johnson et al., 1989). In a study by Choi, Watt, and Lynch (2006), those not in the majority view had found the Internet as a more credible medium than neutrals or supporters citing the diversity of information and views about the information on the subject. Another study focusing on agenda setting in online media found that participants had a higher recall rate on media-selected top stories in traditional newscasts as compared to online news (Conway, 2008). The study also reported that the lack of salience cues on an index-style website lets users explore more information on the site as



opposed to the more traditional linear format of television (Conway, 2008). In their creation of information-foraging theory, a study by Pirolli and Card (1999) explored why humans stop using one source or search string on the Internet and move to another. They borrowed a theory from biology that addresses the process by which animals jump from one food source to another, in this case information serving as the “food,” but there must be some element of control present to move to other sources rather than a forced-content diet.

The same variable of control and access to options can empower users to seek more information. "Locus of control" is an important variable in the study. This personality trait is a measure of a person's need to be in control (Rotter, 1966), and of a person's ability to influence media effects (Gunter, 1985; Rubin, 1993). People who watched more television than those who didn't believed that forces out of their control (ex. fate, luck) determined events in their lives (Wober & Gunter, 1982). Wober and Gunter (1982) also found those same heavy television viewers had a more apprehensive outlook on society in general than those who believed that they had greater control of their lives.

Another relevant body of literature with regards to this study and the user's goal of having constant control of media content may be related to remote control devices. The device empowers users with a greater number of content options and therefore gives the users more control over their media experience. Some users will examine all of their program choices before choosing their selection (Heeter, 1985), a strategy that allows users to see what is available and then make a personal decision from that spectrum. Previous studies (Cornwell et al., 1993; Kaye & Sapolsky, 1997) indicate that users with

remote control devices will watch a greater variety of channels than those who do not have them. This finding suggests that given more control, a user will consume a wider range of content. Even if users do have more choice, that does not mean they will be regular users of all the content they consume. Ferguson (1992) found that remote control use does not lead to an increased number of channels used consistently. He cited boredom, curiosity and avoiding advertising as reasons why people changed the channels often. Perse et al. (1994) found that channel changing or more control was linked to a less attentive use of television. Perse et al. (1994) also concluded that since almost widespread adoption of the remote control, television content is less likely to be uniform and the viewing of that content is less likely to be habitual because it allows people to construct their own media environment.

Locus of control has also been studied in other contexts that are applicable to this study. In a study of orienting activity and locus of control in an instructional setting, Tovar and Coldevin (1992) found that subjects that received an orienting activity spent significantly more time than those who did not receive the same treatment. Dickey (2005) found that engagement strategies in video games, including point of view, the role of the narrative, and methods of interactive design, should be integrated into more effective engaged learning. In a focus group and talk-aloud protocol study of young adults, participants showed a clear desire for control in variety of news-type content and length of time spent on a topic. The participants preferred pictures and slideshows over videos (Sturgil, Pierce & Wang, 2010).

The focus of this study is on video; therefore a set of treatments must be identified that offer different levels of user control over content. The most logical choice for the

first treatment is the traditional video package because it is the most ubiquitous format used to present video content on news-oriented websites. The package is constructed in traditional linear format and offers the least amount of control. The findings reported above concerning the importance of user control suggest that a second treatment that maximizes user control could offer an alternative. This treatment was named the “jigsaw” treatment because it consists of pieces that the user assembles in the process of viewing the story, much like assembling a puzzle for the complete picture. Finally, these two treatments can be compared with the raw video that was used to create the first two treatments.

The jigsaw treatment offers users the most engagement and control since they are able to choose whether the individual video clips are seen and in what order they are seen. Users are expected to have more engagement with the jigsaw treatment, and the increased engagement may, in turn, lead to greater recall. A third video treatment is the raw video used to construct the other two formats. The raw video offers less control than the “jigsaw” version but more control than the traditional package, as the raw treatment dissects the video into four navigable segments, but the user is unaware of when the video will end and he or she may leave early. This is akin to “flipping channels” in television viewing. We propose the following hypotheses:

**H2: Users will spend significantly more time on the jigsaw treatment than the package treatment.**

**H3: Users will spend significantly more time on the raw treatment than the package treatment.**

**H4: Users' recall of the jigsaw treatment will be significantly greater than the recall of the package treatment.**

**H5: Users' recall of the raw treatment will be significantly greater than the recall of the package treatment.**

Since both the jigsaw and raw treatments display interactivity and varying control, their relationships also need to be investigated:

**R1: What is the relationship between time spent on the raw treatment and the jigsaw treatment?**

**R2: What is the relationship between recall of the raw treatment and the jigsaw treatment?**

### **Methodology**

This study replicated the method used by Sundar (2000), using three treatments instead of five, with the addition of time as a dependent variable. The study was conducted over four days in November 2010, and it used (N=83) undergraduate students from two schools, a large southeastern university and a large west coast university, in order to reduce regional and cultural bias in the subject pools. Subjects were recruited from large undergraduate psychology and public health classes at the southeastern site and were randomly recruited at the west coast site. Subjects were offered food on site as an incentive. The original number of subjects receiving the treatment was 109, but students majoring in mass communication (n=20) were removed from the original sample (because of the likelihood that they could display bias on the knowledge of media formatting, although no test for bias was conducted). Incomplete responses (n=6) (where

subjects did not answer any of the post-test questions) were also removed. A pretest was conducted in September 2010 to test for internal validity.

This study's three treatments were broken into three categories: package, raw, and jigsaw. The package treatment was played by clicking on a screen capture of a video frame consistent with the industry format of producing broadcast news footage, complete with identification graphics and edited footage for a total time of 1:45. Just a headline appeared above the screen capture. The "jigsaw" treatment used the same footage as the package, complete with name graphics and edited footage for a total cumulative time of 1:45, but the footage was divided into four segments that are interlaced throughout the page in a text story. The text story used the exact same script as the package's narration. The concept of "jigsaw" was based on the concept that the story was like a jigsaw puzzle that users constructed their own story by putting together elements they chose to complete their story in the order they wish to use and create the finished "puzzle." The raw treatment consisted of seven minutes of unedited footage that was used to create the refined 1:45 video package linked from a screen grab of a video frame combined with a text display of the content (transcript) of the narration in the package treatment. There was not any visual identification information of interview subjects on the raw footage video other than what appeared in the text block next to the video frame.

Subjects were asked to seat themselves at a laptop randomly selected by the research team from a group of six laptops that were equally spaced apart. Subjects were instructed to explore a faux news website that was "produced for students, by students" and were told they would be asked for their opinion of the website. No time constraint was offered, and subjects were free to spend as little time or as much time exploring the

website as they pleased. Headphones were provided so subjects could listen to the audio portion of the videos without outside noise. Subjects' actions on the site were recorded with screen capture software; the videos of the screen captures were later viewed to measure the total number of seconds spent on each treatment component. After exploring the site, students were asked to complete an online questionnaire with that contained four multiple-choice questions for each story along with demographic questions and a set of seven masking questions.

Each of the three treatments (package, raw, and jigsaw) was created for two different stories: a story on the legalization of marijuana and a story on political correctness protests regarding a donut shop that used diagnosed mental disorders as names for its donuts. (A third story about college students and the ramifications of credit card debt that contained only text and did not have video or pictures was included in the website as a masking story.) Six laptop computers were used to provide all combinations of the three treatments for the two stories. Students were randomly assigned one of six treatments: treatment 1 (marijuana story was package, the donut story was jigsaw), treatment 2 (marijuana-jigsaw, donut-package), treatment 3 (marijuana-raw, donut-package), treatment 4 (marijuana-package, donut-raw), treatment 5 (marijuana-jigsaw, donut-raw), or treatment six (marijuana-raw, donut-jigsaw).

Recall for each story was measured using an online questionnaire at the completion of the experiment. Each subject was asked four questions each on the marijuana and donut stories. To mask the purpose of the study, subjects were also asked three questions on the credit story as well as four questions on the design and layout of the website. All online sessions were captured using video capture software that recorded

screen content and mouse activity in real time. Time was then measured from the video of the screen captures both cumulatively and in segments. Total time spent on each page, time spent with each video frame, and time spent on text on each page were recorded. The total amount of time spent on video, text, and each individual video segment (1, 2, 3, or 4) across each treatment was computed as well.

## **Results**

Hypothesis 1, which predicted a positive relationship between recall and time, was supported for both treatments (marijuana— $r=.369$ ,  $p=.000$ ,  $N=83$ ; donut— $r=.353$ ,  $p=.001$ ,  $N=83$ ).

Hypothesis 2, which predicted that users would spend more time on the jigsaw treatment than on the package treatment, was not supported; there was no significant difference in the amount of time spent on these two treatments.

Hypothesis 3, which predicted that users would spend more time on the raw treatment than on the package treatment, was supported (marijuana—mean time for package=170 seconds; mean time for raw=297 seconds;  $T=-4.2$ ,  $df=54$ ,  $p=.000$ ; donut—mean time for package=105 seconds; mean time for raw=264 seconds;  $T=-3.96$ ,  $df=51$ ,  $p=.000$ ).

Hypothesis 4, which predicted that users would have greater recall for the jigsaw treatment than for the package treatment, was not supported; there was no difference in recall between the two treatments.

Hypothesis 5, which predicted that users would have greater recall for the raw treatment than for the package treatment, was not supported; there was no difference in recall between the two treatments.

In a related finding pertaining to Research Question 1, users also spent more time on the raw video than the jigsaw for both the marijuana story (raw mean=297 seconds; jigsaw mean=151 seconds;  $T=3.47$ ,  $df=48$ ,  $p=.001$ ) and the donut story (raw mean=264 seconds; jigsaw mean=105 seconds;  $T=4.29$ ,  $df=57$ ,  $p=.000$ ).

Research question 2 was answered with independent samples T-tests; results indicated no significant difference between recall for the jigsaw and the raw treatments for either story.

Given the strong, positive correlation observed between time spent viewing a story and recall of the story in the test of Hypothesis 1, but the lack of any direct relationship between format and recall, post-hoc analysis was conducted to simultaneously test the relationships among format, time spent, and recall. An ANOVA test of the impact of format upon recall, with time spent as a covariate, found a significant effect for the covariate (marijuana time spent;  $F(3,82)=10.6$ ,  $p=.002$ ; donut time spent;  $F(3,82)=16.5$ ,  $p=.000$ ), but no significant main effect of format upon recall for either story.

## **Discussion**

The results of the hypotheses are combined into a model illustrated in Figure 1 that indicates that format is a direct predictor of time spent, and time spent is correlated with recall, but there is no direct relationship between time spent and recall. These results have interesting and applicable implications for both journalists and academics seeking to understand online journalism.

INSERT FIGURE 1 HERE

### **Implications for journalists and publishers**



These findings suggest that the opportunity to directly access raw video gives online news consumers a better understanding of the recall of news stories than they would develop by watching the same stories on television. These findings will likely frustrate every diligent television news reporter and editor who carefully crafts tightly woven packages with pops of natural sound and snippets of soundbites to keep their stories moving. They would expect the same results when those stories are viewed online. With the findings of this study, it can be concluded their stories may not be as valued online as they are on television. The findings of this study suggest those editing techniques are not what keep online viewers most engaged on the Internet. Nor does it appear viewers appreciate the effort it takes for editors to single out soundbites and video so those features are a clear, clickable commodity.

This study's results suggest that if television websites offer visitors the raw, unadulterated story, they may linger longer. Although this study did not give test subjects the opportunity to fast-forward through the soundbites, providing viewers with the tools to navigate through the pictures and sound independently would motivate them to explore the site further, and in the online publishing business, time is money. The ability to attract users for an extended period of time, known as "stickiness" is of advertising importance; the longer visitors stay on, the more they may be exposed to ads such as interstitials, pop-ups and banners, the latter of which can generate revenue for their "click-through" options. With or without this immediate advertising response, publishers of online content can present potential sponsors with the "sticky" user statistics to raise rates in future contracts.

Advertising aside, what is paramount to many journalists is to have their story remembered. "If readers remember a story I wrote, that's better than money," said Ken Fuson, reporter for *The Des Moines (Iowa) Register* (Rich, 2010, p. 161). Yet, in this study, recall was greatest when the reporter's identity and creativity were stripped from the story. Raw video produced the most impressive post-experiment test results.

This is not an ego-gratifying result for reporters, and it may be disheartening to station management. As Cremedas & Lysak found (2011), many television news directors do not have the personnel to re-work the content presented in the news broadcast. Yet, the findings of our study point to the importance of allocating editors to creating specific online content. Television news websites may optimize public interest by encouraging contribution of raw video supplied by citizen journalists. However, any raw video would require editing for legal and aesthetic purposes, and that would require personnel in already-strapped newsrooms.

The laborious, expensive step of packaging the news and editing it in bite-sized chunks is not necessarily wasted, since the television content can be presented on the Web as an additional feature. However, this study suggests that online raw video may rule; let the viewer pick through the action, becoming part of the process as the story unfolded originally. In the long run, it may be more memorable for the visitor, and for stations that can devote the manpower, more financially rewarding from an increase in online traffic.

Alternatively, the lack of a significant difference in both time spent and recall for the traditional package versus the "jigsaw" treatment suggests that the amount of content presented may be a good predictor of time spent. Options for increasing the amount of

content displayed should be investigated to explore this relationship further. Ironically, raw video may provide the optimum balance of amount of content and editing effort.

**Implications for theory**

The most surprising result was the lack of a difference in either time spent or recall between the jigsaw treatment and the package treatment. Although the raw video treatment did give the user control in relation to clip selection, these results suggest that user control may not be as critical in predicting recall and time spent as amount of content presented in designing Web delivery of video news and information. Rather, the results clearly indicate the treatment that provided the most information, the raw video, was most effective in maximizing the time spent.

Theoretically, the relationship between time spent with a story and recall of that story is a logical and intuitive relationship. Future research needs to address reasons that users would choose to spend more time with specific stories than with others. Media system dependency theory, for example, might posit that initial exposure to a story must activate a dependency relationship in the user in order for exposure to continue, and that continued consumption of the content is related to the degree to which the content helps the user attain his or her goals of understanding, orientation, and play (DeFleur & Ball-Rokeach, 1989). Similar theoretical approaches addressing salience and gratifications might also prove fruitful in understanding the relationships among format, time spent, and recall.

This finding is not surprising, but it does introduce an interesting set of questions that could be addressed in future research, including:

- a) If format is the best predictor of time spent viewing a story, and time spent is the best predictor of recall, are there differences in the effectiveness of different formats upon time spent?
- b) How much of the difference between formats is due to the amount of information provided and how much is due to the format itself; i.e., are there any formats that are better or worse than others in maximizing time spent (when controlling for the amount of information provided)?
- c) Traditional broadcast packages are limited to less than two minutes, with the majority shorter than 90 seconds. Does this time limitation preclude the use of broadcast packages on websites, or can the limitation be overcome by simply producing longer packages?
- d) What are the differences between presenting a news story using a multimedia package and using plain text or a combination of text and images? The next step in this study will address these questions.

There are a number of limitations that must be considered when interpreting these results. First, only two stories were tested, and both stories were “feature” stories that were not time dependent. Although use of this type of feature story allowed the experimental data collection to take place over a three-week period, it is possible that results could be different for breaking news. The use of a student sample provided a homogeneous population of subjects, but it is possible that individuals who have different news consumption habits (or who make less frequent use of online news sources) might exhibit different patterns of behavior. Finally, the two stories chosen were selected for the interest level among the student population, but they were embedded in a website that

included only a handful of stories (making it more likely that subjects would choose these stories during the experiment). In a “real” news website, the number of stories is much larger, making the process of selection and the salience of stories a much more important factor in the news consumption process.

### **Conclusions**

This research project has tested the interrelationship among online news format, time spent with a news story, and recall. The results clearly indicate that recall is a direct function of the amount of time spent with a story, and that time spent differs significantly by format. The study has potential significance for broadcast news operations seeking to enhance the online component of their operations. Much more research is needed addressing the impact of different formats upon both time spent and recall; the three treatments included in this study are only a fraction of the number of formats available to journalists who are seeking to define the most effective formats for the presentation of online news.

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### Figure 1

Observed Model

