Rapid Communication

Searching Versus Surfing: How Different Ways of Acquiring Content Online Affect Cognitive Processing

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ABSTRACT

An experiment tested whether people orient to and encode pictures selected from a Web site differently, depending on whether the pictures were selected by searching or surfing. Participants in the search condition spent more time selecting pictures than the participants in the surf condition spent. The pictures chosen in the search condition elicited cardiac orienting, while pictures chosen in the surf condition did not. Participants recognized pictures acquired by searching more accurately than they recognized those acquired by surfing, indicating that searching led to better encoding than surfing.

INTRODUCTION

People have different ways of finding information online. Sometimes they search the World Wide Web for specific content: Did my team win last night? What is the weather going to be like this weekend? Other times, people surf the Web without any prior content need in mind. Previous research has suggested that different ways of acquiring content online affect how that content is processed once it has been acquired. Such research distinguishes between “getting there,” or the process acquiring content, and “being there,” or the period of exposure to content once it has been acquired.1,2

On the basis of this idea, we suggest that searching and surfing, as two different ways of getting there, will lead to different cognitive responses while being there. To explore this suggestion, we looked at how orienting responses to similar content acquired by searching or surfing compare to one another. The orienting response (OR) is an indicator of automatic resources being allocated to encoding. The OR lasts from 4 to 10 seconds after stimulus onset and is characterized by phasic heart-rate deceleration.3 In terms of information processing, the OR plays an important role in both attention to and memory for media content.3,4 Because the OR represents the allocation of processing resources to encoding,3 the method of acquiring content that leads to the largest orienting response should also lead to the most accurate recognition.

Differences between searching and surfing were explored through an experiment in which people selected (by pointing and clicking) pictures from an online photo gallery. One group of people selected their pictures according to whether or not the pictures fit a target description (searching). The other group selected their pictures with no criteria, simply choosing the pictures in the gallery that they wanted to look at (surfing). When someone selected a particular picture, he or she was exposed to the
picture for 6 seconds. We recorded heart rate during this phase to assess differences in the orienting response as a function of the different ways of acquiring content. Later, we tested people on how well they could remember each picture.

METHOD

Fifty undergraduates from an introductory journalism class at a large Midwestern university received extra credit for participating in this study. This study used a 2 × 3 (task × repetition) mixed design. Task was a between-participants factor that referred to the manner in which participants selected pictures. The two levels for search type were surf, in which participants chose pictures freely, and search, in which participants searched for pictures from a list of descriptions that we provided. Participants were randomly assigned to one of these conditions. Each participant looked at three pictures, which comprised the within-participants repetition factor. Our stimuli consisted of 24 pictures selected from the International Affective Picture System (IAPS). We chose mildly unpleasant and arousing to avoid confounding valence with arousal.

Dependent variables

Heart rate. We recorded heart rate by placing 8mm In Vivo Metric Ag/AgCl electrodes on each participant’s forearm. The computer initially collected data in interbeat intervals, which were later converted to beats per minute. We computed change scores by subtracting the baseline heart rate at the moment before picture onset from the heart rate at each second after onset. We then plotted these change scores, yielding a second-by-second waveform representing participants’ heart rate during stimulus exposure.

Recognition. We scored recognition for each picture as either a 1 (hit) or 0 (miss), then combined these scores across all repetitions and divided by 3 to give a percentage accuracy recognition score. We analyzed all recognition data using a 2 × 3 (task × repetition) repeated-measures ANOVA.

Participants were randomly assigned to either the search or the surf condition upon entering the laboratory. Each participant sat down in a comfortable chair and provided informed consent. The experimenter prepared the participant’s skin, attached the necessary sensors, and ensured that the computer was capturing a clear physiological signal. In the surf condition, we gave no criteria for participants to use when choosing pictures. In the search condition, participants saw a list that provided short descriptions of each of the pictures. We told them to choose a particular description that interested them, then select the picture that matched the description. This was the primary manipulation of interest: participants in the search condition had a predetermined goal (based on the chosen description) to meet by finding a particular type of content. Participants in the surf condition did not. Data collection began when participants indicated that they understood the procedure and had no further questions.

After a baseline period, a gallery of 24 thumbnail (miniature) pictures appeared on the screen. Participants used a mouse to point and click on the thumbnail picture of their choosing. When a participant pointed and clicked on a picture, the array of thumbnail pictures disappeared and was replaced by the individual picture that the participant

FIG. 1. Change in heart rate over time when looking at pictures found by surfing and searching.
had just selected. This process is identical to choosing a photo from an online photo gallery. The chosen picture now took up the entire screen, remaining there for 6 seconds, which is the exposure period used in previous IAPS research. After 6 seconds, the picture disappeared and the group of thumbnail pictures reappeared, with the previously chosen picture grayed out so that participants couldn’t click the same picture twice.

Participants repeated this selection and viewing two more times, then took part in a distracter. Upon completion of the distraction task, the experimenter administered a forced choice recognition test. The three pictures that participants had viewed earlier served as targets, while three pictures unseen to this point served as foils. The foils had comparable arousal and valence ratings to the targets. During the recognition test, each picture appeared on the screen for 1 second and then disappeared. Once the picture disappeared, the participant clicked one of two boxes on the computer screen corresponding to whether or not the participant thought he or she had seen the picture earlier in the experiment. This process was repeated for all six pictures, which were randomized by the computer. At the end of the recognition test, the participant was debriefed, thanked, and dismissed. The experiment lasted approximately 50 minutes.

RESULTS

The main effect for task on time spent looking was significant, \( F(1, 48) = 4.09, p < 0.05 \), partial- \( \eta^2 = 0.08 \). Participants in the search condition spent more time looking for pictures (\( M = 10.37 \) seconds, \( SD = 4.69 \) seconds) than participants in the surf condition spent (\( M = 7.69, SD = 4.69 \)). Figure 1 shows the cardiac response curve for participants in both the search and surf conditions. The cardiac response curve for participants in the search condition showed a significant main effect for time \( F(6, 144) = 3.55, p < 0.02 \), partial- \( \eta^2 = 0.09 \). As Figure 1 shows, this cardiac response resembled monophasic orienting. Furthermore, the cubic trend of the time factor was significant \( F(1, 24) = 7.30, p < 0.02 \), partial- \( \eta^2 = 0.23 \), indicating that participants in the search condition oriented to pictures selected. The time component of the cardiac response for participants in the surf condition was not significant \( F(6, 144) = 1.39, ns \). Pictures acquired by searching elicited orienting; pictures acquired by surfing did not. The main effect for task on recognition accuracy was significant, \( F(1, 48) = 3.90, p < 0.05 \), partial- \( \eta^2 = 0.07 \). Participants in the search condition (\( M = 0.93\% \) correct, \( SD = 0.17 \)) recognized pictures more accurately than did participants in the surf condition (\( M = 0.79, SD = 0.17 \)).

DISCUSSION

This study was designed to see whether cognitive processing of online media content varies depending on whether that content was acquired by searching or by surfing. These results demonstrated that it does. Participants spent more time searching for pictures than they spent surfing for pictures. They also oriented to pictures that they acquired by searching but didn’t orient to pictures that they acquired by surfing. Finally, participants recognized the pictures they’d acquired from searching more accurately than they recognized the pictures they’d acquired from surfing. When people go online specifically to find something, they are more effortful in finding it, and they encode it better than they do when they’re just surfing. These results further demonstrate the importance of distinguishing between “getting there” and “being there.” It appears that not all ways of acquiring content online are equal.

REFERENCES


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