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RESEARCH ARTICLE

SEQUENTIALITY OF PRODUCT REVIEW INFORMATION PROVISION: AN INFORMATION FORAGING PERSPECTIVE

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Appendix A

Design of Think-Aloud Study

The successful implementation of the think-aloud method requires addressing four main design issues (van Someren et al.1994), namely, the (1) simulated shopping website, (2) focal products for shopping, (3) think-aloud training and work environment, and (4) administration of the study.

First, consumers have various experiences when it comes to online shopping websites. These websites may differ in terms of their specific implementations (e.g., features that restrict the viewing of a product review to certain segments of the website). These differences can potentially add ambiguity to the understanding of consumer's shopping behaviors (Martin et al. 2005). To address this issue, we developed a simulated shopping website (Tan et al. 2010). Then, we used the approach of Kumar and Benbasat (2006) and studied the implementation of commercial shopping. The product content of commercial shopping websites (i.e., manufacturer-provided product description information) and product review information were considered to make the website design more realistic.

Second, prior product knowledge and type (search versus experience) of the chosen products in the shopping website can confound the results (King and Balasubramanian 1994). According to information foraging theory (IFT), consumers will forego foraging for product-related information (e.g., manufacturer-provided product information and product reviews) if they have sufficient prior knowledge of the product (Pirolli and Card 1999). Studies have reported that the information learning effect can influence the effectiveness of product information provision if consumers are not familiar with the product (Wood and Lynch 2002). Thus, a pre-test survey was conducted to negate these confounding factors. We randomly selected 10 consumers and asked them to rank their level of prior product knowledge and their willingness to purchase items using 20 product categories. The top four selected product categories had the highest willingness-to-purchase ratings and mid-level prior product knowledge of consumers. These products (i.e., mp3 player, digital camera, laptop, and cellphone) were regarded as

search products (Girard and Dion 2010). Prior product knowledge of the participants was tested during the think-aloud study. We did not obtain significant deviations from the pre-test results.

The third issue is environmental interference. To ensure that participants were able to verbalize well their thoughts with minimum interference, we meticulously designed the study room and conducted pre-study training. With respect to the study room setting, we partitioned the room into two segments. The first segment (close to the entrance) was used for the pre-study training, and the second segment was used for conducting the main study. In the training segment, we followed a rigorous and systematic approach proposed by earlier studies (e.g., van Someren et al. 1994). The training ensured the quality of the think-aloud protocol of the participants. In each session, the first half-hour was used for training, during which the participants were given several training tasks to practice thinking aloud. An example of a training task is responding to the following question: *A bottle of wine costs $5. The wine costs $4.50 more than the bottle. How much does the bottle cost?* The training enabled the participants to become accustomed to verbalizing, but not interpreting, their thoughts. After the training session, we conducted a mini-test on each participant in which they verbalized a decision task. We were confident that the participants were well equipped to proceed with the think-aloud approach. After the training session, participants proceeded to the main segment. Each participant was assigned a cubicle with a computer, webcam, and microphone. This setting minimized cross-participant interference. The webcam was equipped to capture the motions of the participants, and a screen image-capturing software was installed on the computer to capture website navigation. These two additional data inputs facilitated the triangulation of verbalized thoughts to obtain a more accurate depiction of the ideas that went through the minds of the participants.

The fourth issue involves the measure to address the concern that the administrators might reveal the actual research objectives. Thus, we hired two independent administrators who were not cognizant of the research objectives to conduct the entire experiment. The administrators were trained to implement the think-aloud study based on the approach adopted by Johnson (1988).

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Appendix B

Designing the Coding Scheme

We deployed two successive steps in designing the coding scheme (Figure B1). In Step 1, we adopted the tentative coding scheme of the information-foraging behavior based on IFT. In Step 2, we conducted a pre-analysis test to refine the coding scheme. Specifically, we used three methods to refine the coding scheme: referring phase analysis (RPA), assertion analysis (AA), and script analysis (SA).

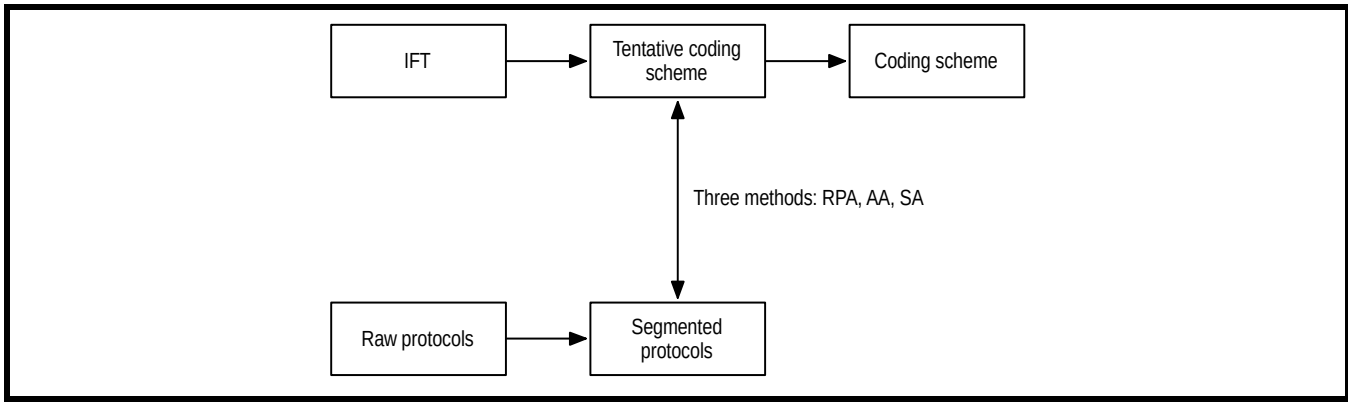

Figure B1. Designing the Coding Scheme

RPA: First, the coders examined all verbs and verbal phases in the transcribed scripts. Next, the coders coded the verbalized words based on the index of concepts (Table B1). Such coding facilitated the identification and definition of the keywords of the concepts the participants focused on during the online shopping process. After each concept was identified, the coders defined the meanings of the coded concepts (Table B2). RPA continued until all the concepts in all the transcribed scripts were coded and defined. The transcribed scripts were examined several times to ensure that undefined concepts did not remain. Eventually, all concepts in the transcribed scripts were coded.

AA: In the second method, the coder identified assertions to investigate the formation of relationships among the concepts during the shopping task. Once the purposes behind these assertions were identified, we determined the major concepts that the participants focused on during the online shopping task. This method could help in discovering the relationships among the concepts made by the participants.

SA: SA illustrated the overall thinking processes during the online shopping task. The output represented the type of information that participants intended to access, the approach with which they structured the task, the rationale for decisions, and the plan for shopping decision. RPA and AA are preliminary steps to SA.

A set of codes was identified at the beginning of SA. The codes explained the common predominant reasoning processes of the participants during the shopping task. A cyclical process was performed to ensure all codes could be reflected in the transcribed scripts. The process included re-reading the scripts several times; re-naming, merging, splitting, and re-coding parts of the data under a different code name; unlinking data from a particular code; and deleting codes entirely when they no longer seemed to be useful for describing the think-aloud protocol data.

In summary, the tentative coding scheme was modified by protocol analysis based on the pre-analysis test. New processes identified in the pre-analysis test were then added to complement the original coding scheme from IFT (Table B3).

Table B1. Examples of the Referring Phrase Analysis and Coded Concepts

Segment	Coded Concept(s)
I will look at the HP laptop first … I am *not sure* if I can find a suitable one for me …	Search, uncertainty
I will *search* for the Lenovo laptop, Y450. *How about the PE review of this laptop*. …is good for playing games …	Search, acquire knowledge
I will *look at* the Thinkpad X200, I will *look at the PA review*. … has the Centrino 2 technology …it has 60% performance advantage … the battery can be used for 3 hours …	Search, acquire knowledge
HP is fine, but the heat dissipation problem is not good. I think I *should look at the product information* … the integrated graphics card is not good. I think the independent graphics card is good. 12.1-inch screen … it is small. I think the 13-inch is more suitable.	Search, acquire knowledge
I will *check* the HP laptop and *compare* … I feel that the HP and SONY laptops are both good. I will *look at the product information and reviews* …good business card recognition system …	Differentiate, acquire knowledge
Well, this one has good performance. I think the 14.1-inch laptop *is acceptable*; I can put it in my dormitory and don't need to move it around. I think I will *look for more laptops with 14.1-inch screen size* …	Formulate, search
I will *search for more details* about it. … the Lenovo laptop, the V550 seems to be good. Its CPU is good too. The Lenovo Y450 is also good. I will *look at the product information* …	Search, acquire knowledge
I think it the (Lenovo Y450) is good. I want to *know others' opinions* …	Verification, acquire knowledge
I find this one is also good … DELL 1427 … I will *find more information from the PA reviews* …	Acquire knowledge
Yes, it is the one I want. *I will buy it* …	Execute

Table B2. Definitions of Coded Concepts

Concept(s)	Definition
Search	The willingness to search for a product in a shopping website.
Uncertainty	A feeling of loss, awareness of lack of knowledge and understanding.
Acquire knowledge	Seeking information from all available information sources, such as PA reviews, PE reviews, and product information provided by manufacturers.
Differentiate	Using known differences in information sources as a way of filtering the amount of information obtained.
Formulate	Identifying and selecting ideas in existing information from which to form a focused perspective of the topic.
Verification	Specifying the need for relevant and focused information.
Execute	Presenting the decision behavior.

Table B3. Tentative Coding Scheme

Code	Description
(o*read-question)	Used when the user is reading the question.
(o*note question *text*)	Used when the user is reading a segment of text from the question. We include as an argument the text of the question read.
(o*question-task)	Used when the user asked a question regarding the task question, general procedures, task constraints, and so on.
(o*reformulate-task)	Used then the user comprehends a change in the task, including hints given by the experimenter. This should generally be followed by goals that indicate the new formulation of the task.
(o*recall-goal)	Used when the user attempts to remember the task goal without reading from the question. Re-reading the question to recall the goal should be coded as (o*read-question) above.
(g*formulate *need-type from*)	Example: (g*formulate URL "Louisiana state university"). Indicates a goal to reformulate one kind of information-need into some other target type of need. The example indicates that a URL needs to be formulated (guessed) from the name of the university. The *need-type* is a type of information need (question, need, query, URL) and *from* is the actual content.
(o*formulate *need-type from to*)	Example: (o*formulate URL "Louisiana state university" "www.lsa.edu"). The *need-type* is the kind of thing that has been formulated, the *from* is the content that has been reformulated, and the *to* is the result of the reformulation. This indicates that the user has formulated a new kind of information-need from some other kind of information-need. In the example, a new URL has been formulated (guessed) from the name of a university.
(o*note *need-type content*)	This is the reflexive version of "formulate."
(o*note *structure-type structure content*)	Similar to the above, and is a way to indicate that some content has been added or has become the focus of attention.
(o*note *structure-type structure content*)	Similar to the above, except that a greater inferential leap exists.
(g*locate-information *info-need info-structure*)	Example 1: (g*locate-information "Second city"). Example 2: (g*locate-information "second-city" www.lsa.edu). Indicates the goal to find some information, indicated by *info-need*. Optionally, the structure on which to find the information can be specified by *info-structure*. Thus, Example 1 indicates the goal to find something about "second city" and Example 2 sets a goal to find it on a particular page.
(o*locate-information *info-need info-structure*)	Indicates the action of finding info-need on info-structure.
(g*go-to *structure-type structure*)	Indicates the goal of navigating to some particular web structure, such as a URL.
(o*go-to *structure-type structure*)	Indicates the action of navigating to some particular web structure.
(g*search *structure-type structure need*)	Indicates the goal of using a search engine to search some kind of *structure-type* (e.g., the web; a page), the particular *structure* searched, and an indication of the *need*. Note: If info-need is implicit, and not directly stated by the user, use the placeholder "null" for that info-need.
(o*search *structure-type structure need query*)	Indicates the action of using a search engine, as well as the *query* used. See note above.
(o*wait *event*)	Indicates that the user is consciously waiting for some event to terminate.
(g*follow *link*)	Indicates that the user intends to follow a link.
(o*follow *link*)	Indicate that the user followed a link.
(g*go-back-in-stack)	Indicates that the user wishes to backtrack.

Table B3. Tentative Coding Scheme (Continued)	
Code	**Description**
(g*go-forward-in-stack)	Indicates that the user wishes to go forward in the history list.
(o*go-back-in-stack)	Indicates that the user clicked the back button.
(g*go-back-to-site *site*)	Indicates that user wishes to use the history to jump back to a specific site.
(o*go-back-to-site *site*)	Indicates that the user uses the history (menus or right-click on back button) to jump back to a specific site.
(o*go-forward-in-stack)	Indicates that the user clicked the forward button.
(o*refresh)	Indicates that the user refreshed the screen.
(o*stop)	Indicates that the user clicked the stop button.
(o*eval *structure-type structure evaluation*)*	Indicates the evaluation of some information structure, such as a page or link, and the evaluation that resulted. Evaluations are optional. When a link is evaluated implicitly (i.e., most of the time this means they only mention the link and move on), use the "null" evaluation.
(o*eval *process-type process evaluation*)	This includes processes, such as strategies employed by the user, and specific web processes, such as page loading.

Appendix C

Measurements of Dependent Variables in Study 2

Table C1. The Items of the Measurements for Dependent Variables		
Constructs	**Items**	
Cognitive effort devoted to shopping	CE1	How much effort did you put into making this decision?
	CE2	I concentrated a lot while making this choice.
	CE3	I was careful about which product to choose.
	CE4	I thought very hard about which product to choose.
Decision satisfaction	DS1	I am satisfied that this is the decision I made.
	DS2	I expect to successfully carry out the decisions that I am making.
	DS3	The decisions that I am making are the best possible for me personally.

Appendix D

Screenshots of the Website

Figure D1. Screenshots of the Website Used for the Field Study

Participants had the freedom to seek any type of product review.

An example of a product review patch.

Figure D2. Screenshots of the Website Used for the Think-Aloud Study