

# Digitizing Consumer Research

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How will the widespread diffusion of information technology change consumer research? I argue that information technology will profoundly change the way knowledge is generated and disseminated. In generating knowledge, consumer researchers will see the diminishing use of student subjects, an increase in the use of global samples, panels, secondary data, and information acquisition techniques. In disseminating knowledge, I suggest the possibility of self-organizing journals that would use the ratings of selected readers to determine the status of submitted research.

The market for predictions about the impact of information technology on commerce is clearly overcrowded. In this essay I have a different but closely related concern: How will information technology change the way that consumer research generates and disseminates knowledge?

In talking about commerce, the starting point for most analyses is the simple observation that technology has changed the costs, both economic and cognitive, of some elements of value creation. It is argued that, while the cost of producing and distributing physical goods has not appreciably changed, there has been a radical shift in the cost of producing and distributing information. To use Negroponte's (1995) oft-cited distinction, the cost of moving atoms has not decreased, but the cost of bits has. The result is a decrease in the cost of many information-based components of value creation. This has led to many predictions that Brown and Duguid (2000) label as endism. Much as advocates of nuclear electricity generation argued that electric power would be too cheap to meter, there have been many predictions that information technology will bring about the paperless office, the end of universities as we know them, and so on. Yet, as Brown and Duguid point out, these institutions are stubborn, and we still find traditional universities to be desirable places where we work in offices that are far from paperless. In this essay, I look at both the processes of generating and disseminating knowledge using this dialectic between radical changes and resisting forces of unchanged or unmet traditional functions.

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## CREATING KNOWLEDGE

In the last 20 years it has become inconceivable that a consumer researcher would use a typewriter to write a questionnaire. One could argue that in the next decade the paper questionnaire, typically given to college students, will be just as antiquated an element in the consumer researcher's toolbox. Word processing has made our research stimuli better looking and easier to revise. It has not, however, fundamentally changed (1) the kind of research that we do, (2) the kind of respondents we use, or (3) the nature of the measures that we employ. I believe that using the Web will do all these things and more for two reasons: First, information technology is producing new kinds of consumer behavior, and we will develop new methods for studying this. Second, information technology has fundamentally changed the costs, in both time and money, of activities central to consumer research.

### New Kinds of Research

*Increased Validity.* We have all been impressed by the clever field study that uses the cooperation of a retailer, a college bookstore, or grocer to test hypotheses. With the Web, the retail environment is the experiment, and studies have the ability to attain high levels of face and ecological validity. Shopping on the Web was a \$44.8 billion reality last year, and building research sites that mimic real world shopping environments is relatively easy. An interesting theoretical question—such as, what is the best number of alternatives to present to consumers?—is easily and realistically examined using Web-based environments, and the answer has significant practical importance. Enterprising researchers are running studies that use actual purchases using on-line environments. For example, Lynch and Ariely (2000) used actual purchases of wine and an interesting follow-up dependent measure, namely, whether the purchaser would pick the same or a different wine on a subsequent occasion. In some cases, the experiment and the

store become one. Häubel and Popkowski-Leszczyc (2000) conducted a field experiment using a large existing on-line auction (such as EBay) manipulating factors such as the seller's reservation price.

*Globalizing Research.* We are already at the cusp of a time when the United States no longer dominates the Internet. At the end of the year 2000, English speakers were thought to be a minority of Internet users (Silberman 2000). Moreover, people from the United States constitute just 44 percent of the global on-line population at present (Nau Internet Surveys 2000), and according to Forrester Research they will be less than one-third of the Internet population by 2002. By 2004, more than 50 percent of all on-line sales (\$3.3 trillion of goods and services) will occur outside the United States (Sanders et al. 2000).

Although users of the Internet represent an Internet culture, they also represent their home environments. Using the Web does not solve problems of language, translation, and so on. Contacting international respondents, however, becomes increasingly easy. For example, we have used an on-line panel to reach respondents in countries such as Oman, Slovakia, Zimbabwe, and Uruguay (Bellman, Lohse, and Johnson 1999).

*More Use of Panels.* Having a reliable e-mail address allows one to contact participants for future studies. While it is important to respect respondents' preferences for privacy, it is also possible, with sufficient incentives, to build panels of respondents who are willing to participate in future studies. This has a number of advantages: (1) it reduces recruiting (customer acquisition) costs; and (2) it allows us to select respondents based on prior responses, including demographics and other individual difference measures. One could, for example, contact at-risk populations for studies of the effectiveness of persuasive messages concerning health.

## Different Kinds of Participants

*The End of Student Subjects.* Why does much consumer research depend on our students as respondents? Seldom are there theoretical reasons for this choice. The answer is often one of costs, both in terms of time and money. The logic, and I have used it many times myself, is that for tests of theory, students are more than adequate.

Yet this choice has implicit costs. From a theoretical perspective, student subjects possess reduced variation on individual constructs of interest. Consider product familiarity. Our students are fairly similar in their knowledge of the classic stimuli such as cars and cameras. Now imagine the variation that is provided by a broader nonstudent sample. Increased variation on the independent variables provides stronger tests of our hypotheses. For example, Birnbaum (1999) wondered whether education affects the frequency of certain decision errors, including failures of stochastic dominance. Contrast the range in education: the student sam-

ple was, well, the usual students; the Internet sample's education ranged from grammar school to Ph.D.'s.

Another implicit cost of using student subjects is decreased credibility of our work for some audiences. Whether warranted or not, managers and policy makers are skeptical of results generated from student subjects. It is debatable whether part of this skepticism may be due to the limited range of our independent variables. What is not debatable is the cost of student subjects in terms of impact on important audiences. In fact, the Marketing Science Institute has offered grants for the express purpose of funding studies that use nonstudent subjects.

*Increases in Sample Size.* Because the Web lowers the cost of reaching large sets of potential respondents, it is possible to employ larger samples for experiments. Naomi Mandel and I have conducted on-line experimentation recruiting samples of over 400 respondents from the Virtual Test Market, all of whom participated within two weeks (Mandel and Johnson 2001). Birnbaum (1999) reports using samples of over 1,200 for his studies examining stochastic dominance and other decision principles. These larger numbers of respondents provide more convincing tests of moderation and more precise tests of mediation, not only because the increased sample size leads to increased power, but also because variation in the independent variables is increased. For example, Birnbaum found that one decision error, violations of stochastic dominance, was moderated by education, decreasing as education increased. However, these errors persisted even among respondents with doctoral degrees who had read a scientific work on decision making. This seems much more convincing than reporting that although seniors commit fewer errors than freshman, the number is still significant. With large Web-based samples, questions of statistical significance will give way to questions of substantive significance.

*Greater Use of Secondary Data.* Just as supermarket scanner data produced significant changes in understanding aspects of consumer behavior in supermarkets, secondary data will produce changes in understanding on-line behavior. Firms such as MediaMetrix, Nielsen//NetRatings, and Comscore currently gather very large data sets of on-line behavior. For example, MediaMetrix gathers every click from panels of tens of thousands of home, business, and college users. Each panel generates multiple gigabytes of data every month. I believe that in using these data it is useful theory and models, and not computer resources, that will be scarce.

## Better Measures

*Increased Use of Chronometric and Information Acquisition Measures.* The Web can be superbly suited to the measurement of the time and order of information acquisition. After all, Web servers can produce log files of the time at which every file leaves the server in response to a request from the user. This interest would seem particularly gratifying to those of us who have been using time and

order of acquisition data for theoretical reasons for many years and faced the criticism that these measures have no practical application. Suddenly "clickstream" data might be useful in the real world. Mouse clicks reveal actual purchases made for real dollars.<sup>1</sup>

However, while log files may be useful for site-specific and aggregate analysis, technical factors introduce many sources of time variation between the server and the user. These include network delays, different connection speeds, and the loading time of a page, all of which conspire to add unobserved variation to our measures of information acquisition, making true reaction-time analysis problematic. However, such problems can and are being overcome by preloading programs on users machines using tools such as Java and JavaScript. Using such tools makes it possible to obtain resolutions of .01 seconds for within-subject designs and .5 seconds for between-subject designs for Web-based reaction times (McGraw, Tew, and Williams 2000). Similar techniques have been used to implement systems that record fine-grained information acquisition data, much like the MouseLab system (Baron and Siepmann 2000; Fasolo and McClelland 2000).

Another concern is that the experimental environment is far less controlled over the Web. Instead of the quiet computer lab, our respondents may well be sitting in their living room with the TV on or in a dorm room drinking adult beverages. In response, on-line researchers argue that numbers swamp noise (Birnbaum 1999, 2000; McGraw et al. 2000). Because the Web provides larger samples, such sources of variation are averaged out, providing the kind of high-resolution data that we have described above.

## Challenges

In the sections below, I outline some of the changes and challenges presented by the Web-based research, drawing on quickly growing existing literature on Web-based research and my own experiences building the Virtual Test Market (Bellman et al. 1999; Lohse, Bellman, and Johnson 2000), an on-line panel of Internet users and on-line subject pool with membership running in the tens of thousands.

The Web currently is a bit like word processing in the late 1970s. All the essential features and benefits exist, but these features still require a certain level of technical expertise to master, which represents a barrier to use. However just as what you see is what you get (WYSIWIG) editors have made word processing universal, WYSIWIG HTML editors are putting Web page creation within easy reach. Relatively simple programming languages such as JavaScript, Perl, and so on, provide the glue that is needed to

make such tools conform to usual practice, taking care of tasks like randomization and counterbalancing.<sup>2</sup>

However, some problems are not so easily solved. How does one recruit on-line subjects? Are they representative? Can one incentivize them easily? How do we make sure that respondents are who they say they are? Can we make sure that they only participate in a study once? The partial answers that we developed building the Virtual Test Market may be instructive. We have recruited respondents using relatively inexpensive on-line banner advertising. This form of advertising can also help recruit desired participants. For example, we have contracted with an Internet advertising network to only pay for completed responses originating from the desired countries.

The questions of identity and incentives go hand-in-hand. To receive payments, respondents need to give us a valid mailing address, and to find out if they have won one of the lotteries used as incentives, they need to specify a valid e-mail address. To prevent the same individual from participating in a study more than once, we use "cookies" (a cookie is a small file, usually containing an identification code, stored on the user's machine) to identify the person and record prior participation. None of these mechanisms are foolproof, but we have found that they do a reasonably good job of controlling for error from repeated usage, false identities, and so on.

A final barrier is the representativeness of samples. One occasionally hears that one cannot trust Internet samples. In response I would argue that they dominate the study of consumer behavior based on student participants. With care, Internet samples can be representative of Internet users. For example, the demographics of the first year of the Virtual Test Market closely matched those of the U.S. Internet population as documented by the census (Bellman et al. 1999; Lohse et al. 2000).

Much more serious questions surround availability of Web technology to various member of the world community. In a world where half the world's population has never answered the telephone, we should not let our use of technology exclude them from our attention.

Closing this discussion of knowledge generation, I return to the opening mention of opposing forces. There are clear benefits to doing research on the Web. But we should also ask what traditional functions of knowledge generation are unmet and what barriers exist that will slow the adoption of these methods. Clearly a major barrier is the investment in software-development costs, which would be burdensome for individual faculty. A solution to this, of course, would be the sharing of such tools. There is already an ethos of sharing on the Web (in sharp contrast to the "dot.com" mania of competition), and I would argue that sharing software that represents a theoretical viewpoint

<sup>1</sup>One interesting example of using clickstream data in on-line retailing is Amazon's "Page You Made" feature that suggests products that you might consider based upon your recent "pageviews."

<sup>2</sup>Michael Birnbaum provides a nice introduction to how such tools can be constructed at <http://psych.fullerton.edu/mbirnbaum/web/preface.htm> and in *Introduction to Behavioral Research on the Internet* (Birnbaum 2001).

is an effective way of influencing a field.<sup>3</sup> The Web site mentioned in the author's note will contain updated links to these resources.

## DISSEMINATING KNOWLEDGE: A MODEST PROPOSAL

### What Do Journals Do? Do They Do It Well?

Journals and the dissemination of knowledge are, to an academic, synonymous. We are what we publish. Yet the journal as mediator and identifier of wisdom is an imperfect channel at best. Journals have a number of functions. Working backward, these include physical printing and distribution, the typesetting and copyediting of articles, and the selection and reviewing of manuscripts. Clearly, printing, distribution, and typesetting costs are markedly different because of information technology. Because others have explored the impact of these functions, I would like to focus on the last of these functions, the review and selection of research.

Peer review produces a noisy signal at best about research quality. A large literature documents low levels of inter-reviewer reliability and the occasional rejection of manuscripts that subsequently had major impact (Lynch 1998). Given the importance of journal publication for knowledge aggregation and as a measure of career success, this is quite disturbing. Is there anything that changes in information technology can do to improve the situation?

One suggestion is that the evaluation process itself can change. At the extreme, this may involve redesigning the entire process of selecting and improving research. For example, an electronically published version of a journal can collect feedback in the form of clickstreams. Which manuscripts are the most often accessed? Are there patterns of common access among the different communities of scholars? In fact, it would be interesting for a reader to see the consumer research equivalent of Amazon's tactic, namely, "People who liked this article also liked. . ." recommendations. However, such clickstream data can be noisy. Moreover, if they were used to evaluate the quality or popularity of the article, such data could be gamed. One could easily organize collusive teams (termed "click circles") to boost the popularity of someone approaching tenure.

A more viable idea is a more selective community of evaluators. Depending on one's taste, this group could be selected for expertise (the equivalent of the current editorial board) or inclusion (all readers of a journal). While I will leave it to my more game-theoretic colleagues to specify an incentive-compatible and collusion-proof mechanism, one could easily imagine that all readers could rate each article

that they read. A budget of points provided to each reader could provide constraints on these evaluations, and a differential budget (perhaps based on their prior publishing activity, editorial board status, etc.) might differentially weight opinions.

Such self-organizing systems are already used broadly on the Web (Hafner 2001). Amazon ranks books by number of sales and then uses this data to identify communities with similar interests and books that have been considered by people who have bought this book. The search engine Google uses the number of links to a site in order to rank sites in terms of relevance. Some sites determine the placement of submitted articles based on the ratings and pageviews of its members. For example slashdot.com and plastic.com use open-source code to collect and rank submitted stories. In addition, if comments are made on these sites about the submissions, these comments are then rated by the readership. The availability of articles and comments is determined by the average rating received. At the extreme, some of these sites then use the most highly ranked commentators as editors who determine which articles are admitted to the pool. The parallel to academic journals is readily apparent: All articles submitted would be available to readers. However, as the readers rate articles, the most worthy of them (as determined by the closed community) would rise to the top in availability. Readers would construct a journal's table of contents dynamically. Logically, these ratings of articles could be used to determine rating points, editorial board status, and so on.

As I suggest these ideas, I recall Brown and Duguid's warning about endism. Obviously, there are traditional functions that are not well served by such a self-organizing journal. In particular, there is little provision for the helpful suggestions provided by reviewers, and not much motivation for readers to rate articles or provide commentaries. However, from the perspective of the French sociologist Pierre Bourdieu (1988), publication is an important source of intellectual capital that determines the success of an academic career, and it seems imperative that we explore some of these alternative arrangements that might improve the efficiency and impact of academic publishing.

### Who Owns (Our) Research?

Have you ever had to answer the embarrassing (and apparently stupid) question from a well-meaning friend: "How much did you get paid for that article you are so proud to have published?" The answer should produce embarrassment, not the question. While the emphasis on payment may be wrong, the premise, I would argue, is wise. Consider the value chain for academic articles. They are generated by the hard work of faculty and students, time-consuming input from colleagues in the form of reviewers and editors, and then given to the publisher via the copyright. These publishers then charge our institutions hundreds of dollars a

<sup>3</sup>The MouseLab information acquisition system (Payne, Bettman, and Johnson 1993), e.g., has been requested by over 200 researcher and has been part of research published in journals ranging from *Auditing to Econometrica*.

year for one copy of this work to be stored in a library.<sup>4</sup> There is something odd about a system where neither authors nor reviewers are paid, yet they are billed to see the result that they do not own. At least consumer researchers—unlike our colleagues in economics and finance—do not have to pay for the privilege of having our manuscripts reviewed.

There are those who think things are about to change. Some analyses suggest that digital publishing could cut the cost of journals by 80 percent, and others suggest electronic publication will eliminate paper-based journals (although this smacks of endism again). However, the point made by advocates of the Open Archive Initiative and Open Citation Project is that authors and their institutions should own their work, that it should be stored in formats that can be searched by anyone, and that the publication process should be more timely, less constrained than the current peer review system, and less expensive (see [www.eprints.org](http://www.eprints.org)). Such a new channel may not meet all the functions of traditional academic publishing, but some of these premises are hard to deny.

### Replication, Data Sharing

A final possible outcome of the digitization of consumer research would be a potential increase in the ability to share stimuli and data. Novak, Huffman, and Yung (2000) provide an excellent example of this by providing their data, coding scheme, and the Web pages used to gather their data. The dynamics of data sharing become interesting and are another example of opposing forces. Making experimental materials available, such as the code for a Web site used to run a study, is likely to increase the impact of the original research. However, making one's stimuli or data freely available opens one up to criticism and reanalysis. Less controversial, perhaps, is the Web's ability to make supplementary materials, such as coding schemes, available. In the long run, sharing helps the knowledge-generation business, but again, as Brown and Duguid (2000) would note, it is not without its unintended consequences.

### CONCLUSION

Fortunately, the innovations that we discuss do not depend on the vagaries of the stock market, dot.com mania, or other trends. I have intentionally avoided speculating about the "real soon now" technologies such as wireless, broadband, and so on, because I wanted to concentrate on what can be done now.

The basic driver of change, the widespread adoption of information technology, is old news. Yet the story is not complete. Often, when we talk about changes made possible by technology, they seem inevitable, as if they were predestined to happen without human actors. The reality, though, is that people with vision and belief make these innovations happen. If we believe that consumer research

is useful, and that the changes that I have discussed will lead to improvements in the production and dissemination of knowledge, then these are worthwhile activities. They depend, however, on us to make them happen.

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<sup>4</sup>This applies mostly to those journals not published by professional organizations. The *Journal of Consumer Research*, e.g., is an exception in terms of cost, if not in copyright.

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