Bulletin of the *Transilvania* University of Braşov • Vol. 4 (53) •No. 1 - 2011
Series VII: Social Sciences • Law

THE INTERNET: A PRODUCTIVE RESEARCH ENVIRONMENT FOR SOCIAL SCIENTISTS

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Abstract: *Since the first web-studies in 1995, scientists have investigated the major issues regarding the new Internet based research methods, study designs and on-line data collection techniques. New software programs and manuals make it easy for newcomers to implement simple experimental procedures in cyberspace. Despite their limits, most researchers consider the advantages of Internet research as greater comparing with their disadvantages. The Internet has changed the major aspects of social sciences – from how researchers communicate to how they publish their studies.*

Key words: *Internet, web study, cyber research, Internet-based research methods.*

"The Internet is but the latest technological advances that have changed our world in fundamental ways." [5]

1. Introduction

Besides its most common functions (email, searching for various information), the Internet has become a dynamic tool for social scientists. Many questionnaires and experimental procedures can now be presented to everyone willing to answer them over the Internet. The data can be automatically stored at low costs. Once the study is on the web, the researcher has just to make sure that no technical problems interfere. Being available 24 hours a day, seven days a week, a large number of participants can be remotely tested. The demographic and socio-economic diversity of study participants can now embody a standard that was unattainable for the previous generation of social scientists.

2. Internet-based research methods

As a communication environment, the Internet yields to the interested researcher a wide range of possibilities that were unimaginable 20 years ago. These opportunities lay anywhere between mere observing the virtual behaviours of different online discussion group members to the educational and therapeutic interventions that address specific symptoms. Recent books and updated web pages are continuously inviting novice and experienced researchers to acquire and/or refine their web research skills. Social scientists are mainly encouraged to master the necessary algorithms to create a web page with a straight-forward questionnaire or a short study within a virtual lab (see Birnbaum, 2001; Fraley, 2004; or www.surveymonkey.com, http://www.onlinepsychresearch.co.uk, http://psych.fullerton.edu/mbirnbaum/prog

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rams/, and http://psych-iscience.unizh.ch/). New research standards were created [20], and the American Psychological Association created a Task Force to analyze the risks and benefits of Internet research [16].

In this section, we are going to address the issue of how traditional research methods were reshaped in order to be adequately used in web research. In order to present a comprehensive image of the Internet research opportunities now available for the interested social scientists we will start with an overview of web methods. As such, we will briefly describe the following Internet-based research methods: a) nonreactive Internet based methods, b) web surveys, c) web-based tests, d) web experiments and finally e) Internet-supported interventions.

a) *Nonreactive Internet based methods.* One of the most extraordinary facilities of cyberspace, that has significantly influenced our social environment, is the overwhelming variety of virtual groups and discussion forums. There are tens of thousands groups that tackle various topics (i.e. from Thai food to ancient history or bungee jumping). In this context, nonreactive-based methods refer to analyzing existing datasets and/or text collection that are available over the web. The Internet provides almost unlimited opportunities when it comes to nonreactive data collection. The increasing number of servers stores various datasets that, if properly analyzed, can reveal interesting patterns. To give just a few examples, let us think of the behavioral patterns of various discussion group members, at their availability to be supportive, to offer help, or at the coping mechanisms they use in stressful situations. Therefore, in the absence of any intervention, the researcher can *observe* the virtual behavior of all group members in a "natural context", infer regularities and eventually compare the virtual observations with similar data from face-to-face interactions.

b) *Web surveys.* Undoubtedly, the most popular research methods used over the Internet are web surveys. Responsible for their popularity among social scientists is their apparent ease of usage. Nevertheless, this impression of facility is not entirely justified. In his recent book „Mail & Internet Surveys", Dillman [11] argues that many web-surveys are hindered by sampling, coverage, measurement, and/or noneresponse errors. The sampling error refers to the fact that, by using a web survey, one can get answers from only a subgroup of the targeted population. When the members of a certain population do not have the same chance (or a known chance) to be selected for a certain study, we have a coverage error. The measurement error arises from the inaccurate phrasing and/or presenting the question content, which eventually leads to un-interpretable results. Finally, when the results of people who answered the survey are significantly different form sampled individuals who did not answer, in a way relevant to the study, a nonresponse error is present. As mentioned earlier, a web survey is threatened by one or more of these problems at the same time. In his book, Dillman suggests a wide variety of solutions to reduce, or at least to control, the above-mentioned errors [11]. Despite these common problems, a number of studies convincingly demonstrate that web survey and traditionally-recruited data are comparable [11, 13, 15, 16, 24].

c) *Web-based tests.* On-line psychological testing became popular about 15 years ago. At that time, free on-line tests were mainly assessing intelligence and personality traits. Many of these measures were posted in a magazine-like fashion. As technology advanced and more people gained access to the Internet, professional psychologists recognized the advantages of on-line

assessment. Initial skepticism and suspicions were gradually replaced with scientific proofs that supported the idea of web-based tests as a legitimate form of psychological assessment, with indubitable advantages [2 - 4].

The simplest on-line assessment method is to post an interactive test on the web where participants can select or fill in their answers. After the last click, the data is transferred to a server, where a special software program processes them, and a tailored feed-back is displayed to respondents in real time. There are many variations of this procedure: the final score could be provided to a licensed psychologist or to an assessment center; or the score is transformed into (or accompanied by) a written interpretation and/or recommendations. Although most of the sites containing on-line tests are not password-protected, there are a few sites where professional psychologists conduct their rigorous assessment. The access to these web pages is permitted only to the authorized person.

The *on-line test* represents just a generic name for a larger variety of measurement techniques and procedures. In this category, we can include not only achievement and ability tests, but also personality, attitude, value and interest tests. The main idea is to replace the paper and pencil tests with their electronic versions that, on the Internet, can be filled in at any time and in almost any context, the resulting data being centralized and stored by professionals. Incorporating the computer technology, on-line tests are more dynamic compared with their classical counterparts. Barak & Hen [4] review the active features of web-based tests and found that: a) they are easily edited and reviewed; b) the multimedia components facilitate the involvement of more than one sensory system; c) the direct interaction of the respondents is stimulated by the tests' interactive components; d) participants' reaction time (RT) can be recorded; e) stimuli and response options can be easily stored; f) the scores are rapidly obtained by using correct algorithms, and g) the emerging data are easily used in research.

d) *Web experiments* have begun to be popular research methods in social sciences. Many web sites (including those affiliated with European and American research universities) display links or invitations to participate in various on-line studies. For example, as a way to make the Positive Psychology paradigm accessible for the public, Martin Seligman launched on the web his *Positive Psychology Center* (http://www.ppc.sas.upenn.edu/). Interested participants are discreetly invited to find out their level of happiness by taking an on-line test, to participate in a well-being research or simply to go through one or more web-studies if they wish. Thousands of curious surfers daily access the site motivated by the benefit of an interesting experience, to find more about themselves or about the new discoveries of Positive psychology.

Web experiments constitute the latest innovation in experimental psychology. The traditional laboratory, visited by a limited number of participants each year, is now open for the public. The experimental procedures, from simply pre-testing stimuli to the most complex methods, are now accessible at every computer with a network connection.

High speed, low costs, ecological validity, automatization and the access to a large number of participants in a relatively short amount of time are just a few of the motives that animate researchers for web studies. Seventy percent of those who conducted at least one web experiment wish to continue doing so, the remaining 30% stating that it is only possible to do another web-study [18]. Among other

things, this might be another argument to sustain the idea that it is worth making the effort to learn and use the new technology.

Finally, we must admit that among the many investigations undertaken weekly by social scientists, web studies are not always the most pertinent choice. For example, if one wants to measure physiology or if the situational factors play a significant role within the study (ex: manipulating participants' anxiety level by bringing a spider into the room) then the lab experiment seems to be more appropriate. Moreover, studies that involve deception or any form of delusion for the participants are not suitable for the web (because of ethical considerations). In the lab, the discussion between experimenter and participant at the debriefing stage of the study can clarify the eventual misunderstandings for the participant (and this can hardly be done over the Internet).

e) *Internet-supported Interventions.* In a recent book Marks et al. [17] (p. 6) defines the computer-aided psychotherapy as „any computing system that aids talking treatment by using patient input to make at least some computations and treatment decisions." This definition incorporates all forms of computer-aided therapy, including Internet-supported interventions. Marks et al. [17] also states that the term computer-aided therapy covers diverse systems, just as drugs or medication covers a vast way of compounds and ways of getting them into the body. So, as Marks et al. argues, just as a drug might be delivered as a pill, a powder, drops on the skin, eyes or ears, inhaled as a spray, put under the tongue, injected into the body or inserted as an anal suppository, so computer-aided psychotherapy might be delivered on a range of computer devices. More precisely, it can be delivered via the Internet, on a computer or laptop that is not connected to the web, on a DVD or CD-ROM, on the telephone or email, or within a Virtual Reality system.

Because this paper's aim is not to review all forms of computer-aided psychotherapy, we will focus next on Internet-supported Interventions. They were defined as "treatments, typically behaviorally based, that are operationalized and transformed for delivering via the Internet. They are usually highly structured; self-guided or partly self-guided; based on effective face-to-face interventions; personalized to the user; interactive; enhanced by graphics, animations, audio, and video; and tailored to provide follow-up and feedback" [25].

Among the specific advantages of Internet-supported Interventions, we can mention just a few: a) early access to treatment; b) inhibition reduction (because "computers have no eyebrows patients found it easier to tell them about sensitive issues like high alcohol consumption, impotence, being fired, or past criminal record." [17] p. 11); c) therapist expertise (i.e. computers can address all the appropriate questions when suitable, and they do not forget anything due to boredom, fatigue or irritation); d) computers can quickly and automatically report the patient's progress; e) research progress (i.e. computers record every keystroke and make the data available for subsequent analysis); e) therapy content can be easily updated.

Before closing this section, we should mention that, in spite of the increasing number of studies that support Internet interventions effectiveness, they are not (and will never be) a cure-all strategy. It is not unrealistic to expect that one or more computer-aided program or system could solve all possible problems. Because of the large area of psychological disorders, a virtual clinic that addresses some of them is going to be helpful. However, the human therapist is finally responsible for

combining appropriately the old and new techniques, moving back and forth between Internet-supported interventions and face-to-face meetings.

3. The Internet and social scientists' research practices

As the manufacturing of computers in 1970's deeply altered the research practices, also the invention of Internet changed the face of social sciences. In addition, as computers allowed the development of new research methods (i.e. tests that use participants' RT instead of verbal report), so the Internet provides new and exciting possibilities for scientists. In this final section, we tackle how this flexible and generous communication environment influences the many dimensions of social sciences.

In a recent paper Reips [24] stated that "science and the Internet beautifully function together because the latter was launched in a research institution". Tim Bearners-Lee [6] linked several computers in a network for the physicists in Geneva, for the first time during the summer of 1991. Burners-Lee's idea was to create a common information environment that could reflect "the way people play, work and socialize" [6]. This simple idea had (and still has) a success than his author could not even imagined.

Considering the main activities of a researcher, Reips [24] wondered how were they affected by the Internet era. Is there a new way to do science because the virtual space so flexibly and effectively mediates communication? Does the daily life of researchers change because they are now connected to the network? If we were to name the daily activities of researchers, we should mention that they look for new information, they communicate with colleagues, design experiments, then publish their results and, finally yet importantly, look for further grants. Now all these activities could be conducted on-line.

Once researchers are (wired or wireless) connected to the Internet, the communication among them is faster and wider. We know that email represents the most frequently used web facility. Furthermore, the virtual discussion groups now enable beginners and experts alike to be in touch with each other despite geographical distances. Because the Internet allows a fast information transfer among scientists, the existent contacts are stronger and new contacts could be easily created.

Searching for new information (trivial or scientific) is also supported by general or specific search engine. Huge data sets are now easily (and sometimes freely) accessible from every computer with a network connection. If one is not affiliated with an institution that pays for professional databases that require an ID and a password, there is always Google Scholar, Web of Science, ERIC or other open-sources. Furthermore, many university professors and researchers are now publishing their work on their web pages, facilitating the free circulation of information. Being up-to-date with the latest developments in the field requires just a few starting points. The other information is on the web.

Another main research activity – namely data collection – is unprecedented affected by the Internet. High speed, low costs, ecological validity, automatization and access to a large number of participants are just a few of the motives that animates social scientists willing to collect data via the Internet. A classical lab experiment requests several months to gather data from a small number of participants. On the web, the traffic is different. For example, three months of hard work was necessary to collect data from 58 spider fearful participants (i.e. an analog sample).

However, in less than three weeks 400 participants completed the on-line study posted on a research web site.

Publishing is the field where the Internet had the greatest impact. The relationship between scientists and publishers is now different. From the social scientists' perspective, the endless delays or even the refusal of printing certain ideas, now have a diminished impact. Once collected and interpreted, the data can be published in no other place but on the Internet. Lately, the open access sources have been frequently mentioned in the public discourse. We have already mentioned that some scientists publish their work on the Internet. Anyone accessing that particular page can download or request a full text paper. Because most authors have already received their money from grant funds, they publish their papers on the web at no expense. Research grants reversed the traditional cycle where an author first wrote his book and only then the publisher was able to pay him for his efforts.

Financing a research project is also different in the Internet era. The public or private agencies publish their priorities, conditions and fill in forms on the web. The research proposals and projects can be submitted on-line or via email, and the feed-beck is taking the same route. The Internet has had a profound impact on all the stages and cycles of this complex activity – namely scientific research. And now everything is conducted on-line.

4. Final thoughts

In a short time after the first Internet studies were conducted, social scientists investigated some aspects of the new research methods and techniques. The new software programs and manuals available make it easy for newcomers to implement simple experimental procedures in cyberspace. Researchers who conducted at least one web study intend to further use them because they proved to be efficient [20]. The range of the new web methods successfully compete the more traditional research methods. In spite of their limits (mainly due to the lack of control over the participant's environment) most scientists consider the advantages of Internet research as greater comparing with its disadvantages. The Internet has changed all major aspects of science – from the way researchers communicate to the way they publish their study results.

Before closing, we would like to present one last comment. Throughout this paper, we argued that the Internet had a major impact on social sciences, and that on-line studies represented an effective tool for a broad range of investigations. Discovering this opportunity, many social scientists could *fall in love with the method* and *embrace it with great enthusiasm*. In our opinion, a potential pitfall here lies. Namely the danger of being overly fascinated by the new instrument and to overvalue it (as a child who has recently received a new polyphonic watch). Beyond the fervour and excitement generated by the cyberspace research, scientists should better consider its advantages and limits. Nowadays, nobody is fascinated with the fact that a computer can measure someone's reaction time (RT) in milliseconds. Moreover, a social scientist who uses the computer technology in his research does not investigate RT per se, but possibly the strength of memory associations measured through the agency of a RT test. An important research usually focuses on the theoretical aspects (which usually represents an end in itself) and do not pay excessive attentions on the instruments or methods involved. The only exceptions are the methodological studies that are designed to either refine or to present a new set of research methods. Our plea is that Internet research represents just a *new method* in social sciences, a flexible

and efficient instrument that allows scientists to reach their goals faster and easier. Therefore, those who intend to incorporate the web research in their repertoire should be focused on the theoretical aspects, rather then on the methods and instruments used. Although it is interesting, dynamic and attractive for many, the Internet research should not be overestimated and should not be treated as an end in itself. Only by elaborating new theories or discovering the underlying mechanisms, social scientists can have a significant impact on how our field develops. Because any serious research project aims at both identifying and answering important questions, we strongly encourage the appropriate combination of the on- and off-line methods, such that the disadvantages of one are counterbalanced by the advantages of the other.

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