The internet …
A possible r esear ch tool?

THE internet is now in such widespread use that it is time to assess its potential and limitations as a psychological research tool. We argue that the internet is a useful tool for all areas of psychological research, and that it is possible to investigate issues that take advantage of the internet's unique aspects.

Psychologists are beginning to explore the possibility of online research, and a considerable body of literature already exists (see e.g. Allie, 1995; Buchanan & Smith, 1999; Gackenbach, 1998). The internet can be used in parallel with traditional research methods, as well as by exploiting features that are unique to it (e.g. the potentially massive participant population).

This article reviews the current internet research literature, outlines some new internet features and discusses their potential as research tools. Broadly, internet research falls into three categories: 1) resource locators, 2) demographic surveys, and 3) empirical investigations.

Resource locators

A majority of the internet-based research publications aim to inform specialist groups about available online resources. The scope covered within this type of publication group is large, covering many areas from neurosurgery (Phillips, 1996) to psychiatry (Senior *et al.*,1997).

Another example of this kind of report refers teachers of research methods to internet sites relevant to psychologists (Rosen & Petty, 1997). These sites include the Computers in Teaching Initiative (CTI) psychology centre in the UK (www.york.ac.uk/inst/ctipsych) and the homesite of the American Psychological Society (www.psychologicalscience.org).

An important development from the internet is the increasing availability of online academic journals, although this has been met with controversy (LaPorte & Hibbitts, 1996). Further, universities are offering online search engines that allow students to search for abstracts and full articles on the internet (e.g. Bath Information and Data Service (BIDS: www.bids.ac.uk/).

However, the expense of maintaining

CARL SENIOR *and* MICHAEL SMITH *look at how the development of the internet opens up new possibilities for psychological research.*

electronic journals often results in a charge having to be levied (see e.g.Walker, 1998). Also, certain search engines are more proficient than others.

Research on how people naturally search for information, given varying levels of expertise, would provide important clues as to which search engines will succeed. Such research could reveal any discontinuities between the structure of the internet and how people use it to perform useful activities in their everyday lives.

The internet as a survey tool

An example of demographic survey studies can be seen with Georgia University Visualisation Unit's (GVU) series of worldwide web surveys. These surveys attempt to identify the demographic characteristics of the internet population (Kehoe & Pitkow, 1996). Originally, these surveys used a basic hypertext markup language (HTML) on a website, but this was quickly upgraded.

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In the second such survey, Pitkow and Recker (1994) redesigned the existing survey format to incorporate new features such as adaptive questioning, survey completion enforcement and user-selected identification log-ins.

Adaptive questioning employs a common gateway interface (CGI) script. This feature presents users with a second set of questions. These are 'tailored' to follow on from their initial responses, thereby creating a survey that reflected ideal demographics — for example, questions that the user did not complete in the first batch were returned with the follow-up set. This process continued until all of the questions in the survey had been answered; incomplete surveys were not accepted.

Later surveys used Java and Java script languages to incorporate an even more advanced 'adaptive questioning engine'. This engine allows follow-up questions to be presented in a more naturalistic manner, in contrast to earlier batch presentation of follow-up questions. The implementation of user-selected identification log-ins also allowed the researchers to identify users that responded to later versions of the survey, permitting longitudinal investigations (see also O'Reilly & Associates, 1995).

Another example of a demographic survey is that of Schiano (1997), who passively solicited responses on aspects such as user identity and sociality. This was done by placing a request alongside the log-in message in a multi-user domain (MUD) called LamdaMOO. Over the week-long testing period, 550 participants submitted viable responses.

MUDs are text-based virtual worlds which evolved from role-playing games in the 1960s. The ability of users to assume any identity or gender is one of MUDs'

unique features that is worth investigating. Further, the communication conventions and rules among inhabitants of this MUD (LamdaMOO) that developed over the course of its five-year existence (see Bruckman (1994) and Turkle (1995) for reviews) also provide useful information about interpersonal communication.

Both the GVU and the Schiano (1997) surveys used passive participant recruitment techniques, the most successful recruitment technique available to date on the internet. However, these techniques have weaknesses and limitations and alternatives are clearly needed. Internet-based surveys have the obvious advantage of a potentially large population, although responses may reflect a selection bias. Furthermore, the surveys discussed above explored only demographic variables of online populations; they did not test experimental hypotheses.

Experimental studies

Studies using experimental paradigms on the internet have been sparse. This could be due to a number of factors associated with electronic media, such as a high drop-out rate (Tse *et al.*, 1996; and see Schmidt, 1997). Alternatively, researchers may be worried that there could be a lack of experimental validity associated with the internet as a research medium. A number of contemporary studies explore this aspect.

For instance, Krantz *et al.* (1997) investigated the response rates of two different participant groups: one recruited from a university environment and the other from the web. Both participant groups were presented with a number of different-sized schematic images that represented the female body form and asked to rate the attractiveness of each image. The correlation between the two data sets approached 1.0, leading to the conclusion that participants' responses were due to the same psychological variables and that there was no effect of experimental medium.

Another approach to establishing the validity of the internet as a research medium would be to replicate previously published research. Smith and Leigh (1997) replicated an existing 'pen and paper' study on sexual fantasies (Ellis & Symons, 1990). Online respondents were recruited by posting a message on the Usenet newsgroup 'sci.psychology.research'. Offline participants were recruited from the psychology student population at a small Canadian college (University College of the Cariboo).

The researchers compared the demographic variables of the two groups

Psychology can provide answers to questions on the development of online interpersonal attitudes

and found that all variables except gender were similar. Males were overrepresented (74 per cent) in the online population, whilst the university population was primarily female (80 per cent). Furthermore, results from Smith and Leigh (1997) and Ellis and Symons (1990) were comparable, supporting the notion that the internet is a viable research medium.

Smith and Leigh (1997) also addressed another methodological concern, that of participant anonymity and data validity from the internet. They asked respondents to 'telnet' to a captive account. (Telnet is a procedure that is used to access a remote computer terminal which can be in another part of the world.) This meant that the recruitment notice in the newsgroup gave instructions on how to access a secure account monitored by the researchers.

This captive account technique allowed the researchers to gather information on participants and ensured that each volunteer only participated once. While this procedure was complex, 72 participants volunteered, suggesting that this technique is also useful for conducting internet research.

Senior *et al.* (in press) investigated the validity of internet research a third way.

They replicated a subtest of an experiment by Keating *et al.* (1977) using the worldwide web. Keating *et al.*, using schematic faces, examined what cues lead to the perception of social dominance and found that lowered eyebrows were important.

Schematic faces are excellent stimuli to use on the web as they are less vulnerable to the cultural variability that may be present in an international participant pool. They are also less prone to distortions that may occur with a lack of computer monitor standardisation across the internet, and they use little computer memory. Therefore, participants with slow modems could load the images relatively quickly.

Senior *et al.* (in press) employed a technique to recruit participants different from those described earlier. They established a website containing the schematic faces. The site was placed online for a month with a large number of 'catch words' (e.g. 'online research', 'face perception' and 'face expression research') in the 'meta' section of the HTML code.

The meta header is a section of HTML code that is not seen by the user, but is used to index the website by search engines such as Yahoo or Altavista (e.g. www.altavista.com/). This allowed internet search engines to

present the site link when any of these key words were used in a search. Because they did not actively solicit participants, unlike the studies described earlier, this technique was termed 'passive net sampling'.

The study recorded a hit rate of 726, of which 185 (25 per cent) remained to complete the it. No differences were found with the data collected in the 1977 study, providing a third line of evidence to support the contention that the internet is a viable medium to carry out scientific investigations.

The studies described above all provide evidence that data collected using the internet have validity. However, other research does not place an emphasis on data validation, but tests actual hypotheses. Stern and Faber (1997) conducted an electronic version of Stanley Milgram's (1977) 'lost letter' study. That study had involved dropping envelopes addressed to different classes of organisations over a geographical area and measuring the return rate. This served as a measure of attitude towards these organisations.

Stern and Faber investigated the attitudes of a college online population using e-mail. The experiments involved sending two types of message: one relevant to a college population, the other to an American political party leader (Ross Perot). Unlike in Milgram's study, no significant difference was found between experimental and control e-mail groups in either experiment.

Analysis of the content of returned e-mails in the political leader experiment revealed that the majority of returned e-mails contained messages that expressed negative attitudes toward the political candidate. These results were concomitant with opinion polls at the time.

Psychophysical investigations have also started on the internet. Jan Van Veen *et al.* (1998) report five psychophysical experiments that were carried out online. They conclude that the internet is a valid medium for certain forms of psychophysical research. Studies that require few data for each participant or demand participant diversity are ideally suited for internet research. However, they argue that studies requiring precise control of timing, contrast or resolution should not be carried out on the internet.

Investigators have started to explore the possibilities of conducting clinical research on the internet. Indeed, the existence of online discussion groups (e.g. the depersonalisation discussion board: www.users.globalnet.co.uk/~nogin/indexx.htm) suggests that access to individuals who suffer from certain disorders is relatively easy. Initial investigations have suggested that the internet will prove to be a productive research medium in this area (Stones & Perry, 1997, 1998).

Clearly, it benefits psychologists to consider the internet as a research medium. The advantages over traditional experimentation are considerable (e.g. the potentially large participant pool). However, traditional experimentation is not the only possibility for development: it also provides several unique research opportunities (e.g. relatively cost-effective cross-cultural research). Psychology can provide answers to questions that may evolve in the future, such as the development of online interpersonal attitudes.

Conclusion

As the influence of the internet continues to grow both inside and outside the discipline of psychology, there is no shortage of issues that need to be addressed. This brief review was designed to highlight certain areas that will aid the psychologist to address some of these issues. It will hopefully provoke thought in those who, at the moment, consider the internet to be irrelevant to their area of study.

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