Using the Internet for personality research: What can be done, how to do it, and some concerns

R. Chris Fraley

University of Illinois at Urbana-Champaign

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During the past few years, an increasing number of psychologists have begun to use the Internet as a tool for conducting personality research. It is easy to understand the appeal of using the Web for research purposes. Just about any study that can be conducted via traditional pencil-and-paper methods can be implemented on-line, but without the hassles of data entry by hand, the scheduling of participants, and paper costs. Moreover, researchers who use computers in their experiments for manipulating visual or narrative stimuli, randomizing trials, or creating customized assessments can easily implement their protocols on-line. Most importantly, although researchers can use the Web simply as an efficient way to collect data from undergraduates in their departmental subject pools, the Web allows us to open our laboratory doors to people from across the world.

My objective in this chapter is to discuss the potential of the Internet for the way psychologists collect data in personality research. One of the themes of this chapter is that the Internet provides a valuable medium through which researchers can implement traditional methods of data collection (e.g., questionnaires) as well as more complex methods (e.g., ideographic assessment) that would be difficult to realize without the interactive features of the Internet. Moreover, because the Internet is coming to play an enduring role in the way in which people work and communicate, one of the fundamental tasks for the next generation of personality scientists is to learn how to make the most of this rapidly expanding technology for the study of personality. I begin this chapter by reviewing some of ways in which the Internet can be used in personality research. Some of the methods and techniques I discuss will be familiar to those well versed in traditional paper-and-pencil techniques. Other methods are more inventive and have the potential to

advance personality research in novel directions. Next, I provide a tutorial on how to create an on-line personality questionnaire. The tutorial describes how to obtain a web server, as well as how to create an online questionnaire that provides feedback to participants and automatically records and stores the data. The tutorial is not designed to demonstrate all of the creative things that can be done using the Internet, but it will serve as a useful stepping stone for helping to get the interested reader started in collecting personality data online. Finally, I review and address some of the concerns that psychologists have about data collected over the Internet. I attend specifically to issues concerning sampling, the thoughtfulness of Internet respondents, and some of the ethical issues that arise when conducting Internet research (e.g., how should consent be obtained? how secure are internet data?). I begin the chapter by explaining briefly how the Internet works and introducing some of the critical concepts that are relevant for understanding the role that the Internet can play in personality science.

How the Internet Works: Some Important Concepts and Definitions

Because so many researchers use the Internet on a regular basis, it is easy for them to take the process for granted. After all, the process seems relatively straight-forward: you type in a web address, click on various links, and, for the most part, sit back and enjoy the show. However, there are many complex things taking place beneath the surface that make this seemingly simple experience possible. First, when you type a *URL* (universal resource locator) or web address (e.g., http://www.psych.uiuc.edu/~rcfraley) into your computer's browser, your computer sends a request to another computer "located" at that address. This computer is often called a *server*, and its job is to receive such requests and then "serve" the requested information back to you—the user. More

often than not, the kind of information that is sent to your browser is a file that is coded in the form of *hypertext markup language* or *HTML*. HTML has become one of the most commonly used methods for sharing information over the Internet. Your web browser translates the code in the HTML file that it receives from the server into the kinds of web pages with which we are familiar. Thus, as a web user, you never see the HTML code per se, only the rendered version of the code. (If you want to see the HTML code, you can right-click on the web page in Windows and choose the "view source" option.)

In your typical day-to-day experience with the Web, you probably do little more than view your favorite web pages or link from one page to another in hopes of discovering something new or interesting. Sometimes, however, your web experience might be more complex than this. You might, for example, use the Web to order a book from an online retailer, such as Amazon.com. In this case, the server is doing something a bit more complex than simply serving you the same HTML files that it serves everyone. It might, for example, be storing your shipping address or tracking items you have purchased in the past in order to make recommendations for other products that you might enjoy. The pages you see in these cases are typically created "on the fly," just for you.

In these situations, the server is performing a number of tasks that make your web experience highly dynamic and interactive. This kind of interactivity is one reason that the Internet is such an exciting frontier for personality research. Consider, for example, an assessment paradigm in which the kinds of questions that are asked of a research subject are conditional upon the answers that the subject has given previously, much in the way that the "recommended book titles" that Amazon.com shows you are dependent

upon books you have purchased or viewed in the past. In Computerized Adaptive Testing (CAT; see Wainer, 1990) a person is administered items that are dynamically tailored to the person's evolving item response pattern—a procedure that would be extraordinarily difficult to implement via traditional paper-and-pencil methods. Researchers can use this kind of interactivity to create short, but powerful, assessment instruments, or to probe about certain constructs (e.g., marital satisfaction) only once other facts about an individual's life have been established (e.g., the person is married). This later form of interactivity allows researchers to implement the kinds of "skip patterns" that are commonly used in questionnaire research without asking the subject to literally skip from one question to the next (a process that may lead to subject errors).

What enables this level of interactivity? This interactivity is made possible by programs called *CGI scripts* that run on the server. "CGI" is an acronym for *common gateway interface*, a method or protocol by which the server interacts with other software on the server (e.g., databases), as well as with other computers on the Web. There are a number of programming languages that can be used for writing CGI scripts (e.g., ASP, C++, Cold Fusion, Perl, PHP). Each of these languages has a steep learning curve, but, there are only a few critical techniques that a researcher needs to understand in order to use each language. Once these basic techniques are mastered, it is quite easy to build complex, interactive web pages simply by combining those techniques in creative ways.

The Potential of the Internet for Research on Personality

There are many ways in which online research may benefit personality researchers. One of the most significant is that the use of the Internet allows researchers to study people using interactive-dynamic methods. This not only allows us to make the research

more interesting for our research participants, it also allows us to create and use more innovative and flexible assessment protocols. In addition, using the Internet allows us to study people in a way that is relatively independent of location. People can participate in research at home, in the lab, in Internet cafés, at libraries, or anywhere else where an Internet connection is available. In fact, as wireless technology evolves, our ability to interface with our research subjects will continue to expand, allowing for increasingly innovative research opportunities.

In this section I briefly review some of the many techniques and research designs that can be implemented via the Internet. As the reader will notice, many of these techniques are not unique to the medium; they are what Skitka and Sargis (in press) call "transitional" applications of the Internet—online realizations of traditional research paradigms. In fact, many of the techniques I will discuss can be realized via computers more generally, but implementing them online can be valuable because it provides a decentralized way to conduct research—a way that is less bounded by time and geography. Other techniques that I discuss are unique to the medium and simply cannot be done easily or in a cost-effective manner using traditional research tools. The fact that the Internet can be used for traditional and novel purposes makes it a valuable methodological tool for personality researchers.

Collecting questionnaire data. The most obvious (and basic) use of the Internet for personality research is for the collection of questionnaire data. By placing questionnaires online, it is relatively easy to obtain a large amount of data that can be used for a variety of purposes, such as questionnaire development, item analyses, collecting norms, or doing correlational research. One of the key benefits of collecting questionnaire data

online is that the responses can be automatically stored by the web server. Thus, the use of the Internet eliminates the lackluster task of data entry. By automating this part of the process, research assistants have time free to contribute to the more meaningful and intellectually challenging phases of a research project. Moreover, because the data are stored automatically, they are immediately available to the research team. This allows researchers to monitor the progress of a study quite easily—a feature that can be valuable in the early stages of a research project.

Randomizing the order of stimuli. One of the limitations of the traditional paper-and-pencil format is that it does not allow the order of questionnaire items to be randomized across subjects. Randomization is a valuable tool because, theoretically, it eliminates any order effects that might be present in item responses. It is quite simple to create a CGI script that randomizes the order in which questions/stimuli are presented (or even to randomize the order in which different questionnaires are presented). Importantly, the questions can be presented in a different order for each participant while still having the responses saved in the same order for all participants in the main dataset.

Random assignment to conditions. One of the advantages of random assignment to conditions is that it allows hypotheses about causal processes to be tested in a relatively rigorous manner. As one might imagine, it is possible to instruct the server to randomly assign people to different conditions of an experiment. For example, if one were interested in studying the way in which item responses are affected by different instructional sets, a CGI script can be written to randomly assign participants to different instructional conditions.

Substitution and ideographic assessment. In programming, the process of substitution refers to programming language's ability to take information (e.g., information provided by a research subject) and substitute it into generic programming code, thereby producing output that is customized within certain constraints. The process of substitution can be valuable in personality research because it enables researchers to better study the idiosyncratic ways in which a person construes his or her social world. For example, Grice (2004) recently wrote a program for assessing personality structure, inspired by the repertory grids of George Kelly's personal construct theory (Kelly, 1955). In Grice's program, Ideogrid, people can nominate different selves or roles as well as different adjectives that may be used to describe themselves in these different contexts. The program then draws upon the user-supplied information to query the person about the way these roles and descriptors interface. In other words, the program uses the ideographic information provided by the subject in order to create an assessment protocol that is uniquely tailored to the subject. Although Ideogrid is currently available as a stand-alone application (i.e., one that can be installed and run on an individual computer) rather than as an Internet program, the ideas that inspired Ideogrid could be implemented online using CGI scripting.

Making the debriefing process personally meaningful to research subjects. In university settings, the use of student subject pools is often predicated upon the research experience being an educational one for students. During a typical debriefing, however, we usually have nothing to tell our subjects about *their* personalities; the best we can do is explain the purpose of the research, summarize previous findings, and provide them with contact information in case they want to learn more when the study is complete.

With Internet-based research, it is possible to provide the participant not only with an overview of the research field, but also provide the participant with feedback about his or her personality and/or the aggregated results of the study to date. Indeed, the opportunity to learn more about themselves through the use of scientifically developed tests might be one of the primary reasons why people take the time to participate in research outside of the laboratory.

If a researcher is assessing a construct for which a scoring method already exists, it is easy enough to instruct the CGI script to compute the subject's scale scores and then report those scores, along with a customized interpretation (using the substitution methods described previously), to the subject. Moreover, it is possible to instruct the server to perform simple analyses (e.g., compute means, *SD*s, correlations) on the data from the overall sample so that the results can be reported to the subject right away. The "automated data-analysis" feature can also be created so that it can be performed at a later date by the subject in case he or she wants to see how the study is progressing. In fact, this feature can be used by the researcher as a way to monitor the progress of the study as it is taking place.

Adaptive testing. One of the disadvantages of traditional personality assessment is that more questionnaire items are used than are necessary to assess a person's trait score accurately. If a person high in Neuroticism has already endorsed items such as "I tend to worry a lot" and "I sometimes feel anxious for no apparent reason," administering an item such as "I do not worry a lot" does not provide much additional information for locating the person's score on the trait continuum. One of the objectives of computerized adaptive testing is to make the assessment process more efficient. By iteratively

estimating a person's trait level and selecting items based on those estimates, it is possible to home in on a person's trait level much more efficiently than is possible in traditional paper surveys (Wainer, 1990; Waller & Reise, 1989). This enables the test to tailor itself to the person. Adaptive testing can be implemented on-line, thereby allowing researchers to assess traits using as few items as necessary. This has the benefit of allowing researchers to free up time for assessing additional constructs or to reduce the total number of questions that a person has to answer.

The measurement of response times. When a browser requests information from a web server, the web server is capable of recording the time at which the request was made. Thus, by instructing the server to track these times, it is possible to use simple subtraction to calculate the amount of time that a person spends on any one page. For example, if a person submits a response to question 14 at 3:51:23 p.m. and submits his or her response to question 15 at 3:51:28 p.m., the participant's response time for question 15 would be calculated as 5 seconds.

This method, although relatively crude, can be useful for a variety of research purposes. Imagine a research situation in which one is interested in the recall of episodic memories. The subject is asked to recall a time from his or her past in which he or she felt happy and click a button when this memory is fully retrieved. The retrieval time can be estimated as the difference in time between when the page was originally delivered to the subject and when the response was submitted. If one were interested in studying the relationship between recall times and personality traits, for example, one could examine the association between these estimated retrieval times and a variety of individual differences constructs. The assessment of response times would, of course, be subject to

more error than would be obtained in a laboratory session due to variation in connection speeds, processor speeds, and server traffic, but, theoretically, those errors would be random and uncorrelated with experimental condition or personality traits.

This particular approach, while useful for a wide variety of circumstances, is not appropriate for studying psychological processes that occur very quickly because it can take anywhere from 1 to 3 seconds for a full transaction to take place between a user's browser and the web server. If one wanted to assess response times with greater fidelity, it would be possible to do so by using *plug-ins*—programs that can be downloaded and run on your subjects' browsers. One of the most commonly used plug-ins is Macromedia's Flash. Once the plug-in is installed on the user's computer, the study can be run on the subject's computer itself; there does not need to be an active connection sustained between the subject and the server. When the session is complete, the data are transmitted back to the server for processing and storage.

Display graphics, animations, and sound. Although it is possible to display graphics in traditional paper-and-pencil questionnaires, the kind of photocopying our budgets allow for rarely allow us to reproduce high-quality images. Online, however, it is possible to present images that both look good and download quickly due to advanced image compression techniques. More importantly, it is possible to present animated images or interactive features, such as sliding rating scales.

The use of plug-ins allows for an even more sophisticated use of graphics and sound. Niedenthal and her colleagues recently developed an interesting paradigm for studying the processing of emotional stimuli (Niedenthal, Brauer, Robin, & Innes-Ker, 2002). Using a computer, Niedenthal and her colleagues asked participants to view a

movie of a person experiencing a specific emotional state. In the movie, the person begins expressing an emotional state, such as sadness, but the image gradually evolves to a neutral expression. Participants are asked to press a button to stop the movie at the point at which they believe the actor is no longer experiencing the emotional state in question. There is quite a bit of interindividual variation in the point at which people stop the movie, suggesting that people might be differentially sensitive to emotional cues. In principle, this paradigm could be implemented on-line, allowing for a wide range of individual differences to be studied easily with respect to affective processing (see Fraley, Niedenthal, Marks, Brumbaugh, & Vicary, 2005).

Sound can also be used in advantageous ways with a plug-in such as Flash. Baldwin and his colleagues have recently begun to adapt classic tone conditioning paradigms to condition specific tones to feelings of social acceptance and rejection (see Baldwin & Kay, 2003, for an example). Although there is some risk in conducting such a study on-line because it is difficult to control the ambient sounds in a person's environment, if the paradigm were to work online, it would open exciting new research avenues for personality research.

Multiple Data Gathering inputs (text, rating scales, coordinates). There are many ways in which data can be collected via traditional paper-and-pencil methods. One can collect open-ended responses, narratives, rankings, and ratings. Each of these formats is possible in an Internet survey as well. In fact, one of the valuable features of collecting open-ended responses from people is that these typed responses do not need to be transcribed. In addition, subjects can use "radio buttons," a special way of collecting ratings on-line, to provide ratings for response scales. It is also possible to provide a

graphical representation of a response scale and have the coordinates of the mouse click used as the item response. This can be used to obtain more graded, continuous measurements, or to provide more creative input methods. (American corporate web sites often have users indicate their state of residence by clicking on the appropriate state on a map of the United States. The server can easily process the coordinates of the mouse click to record the appropriate state.) With the use of a plug-in, one could even implement a card-sorting procedure on-line in order to gather Q-sort data.

Longitudinal research. Because an increasing number of people have access to the Internet, either via personal computer, wireless personal data assistants (PDAs) and phones, it is possible to study people more easily across time and in different life contexts. Park, Armeli, and Tennan (2004) conducted a daily Internet study in which participants logged onto a web site and completed self-report measures of stress, coping, and affect once a day for 28 days. The use of usernames and passwords allowed the researchers to keep track of different people's data. This method provided an efficient way to study people across time. Moreover, because the web server automatically records the time at which a response is submitted in Internet diary research, there is less ambiguity about the authenticity of responses than there is when traditional diary methods are used to study people over time (see Reis & Gable, 2001).

Internet behavior. Although most of the methods I have discussed focus on using the Internet as a method, many writers have highlighted the use of the Internet as a genuine life context—one that can be revealing of social and personality processes in its own right. For example, Vazire and Gosling (2004) studied the way in which peoples' personalities might be manifested in their web sites. They found that accurate personality

judgments, particularly in the domains of Extraversion and Agreeableness, could be made about people based on nothing more than the information provided on those peoples' web sites. Other writers have highlighted the potential value of studying online behavior, as it manifests in online discussion forums, social networks, and dating (see McKenna & Bargh, 2000, and McKenna, Green, and Gleason, 2002, for reviews).

How to Collect Data over the Internet

How does one go about collecting data on the Web? In this section I will explain some of the basics of collecting data over the Internet. I will not provide a comprehensive tutorial on how to implement all of the techniques discussed previously, but I will explain how to perform some of the more basic steps in personality research, such as collecting self-report data, processing those data to provide feedback to the user, and storing the data on the server. As we move through the tutorial, I will direct the reader to additional resources for learning more about Internet methods.

In this tutorial we will be creating two kinds of files. The distinction between the two file types is critical. The first kind of file will be an HTML file—a file that contains HTML code for a web page designed to collect personality data. HTML files often end with the extension .htm. Thus, if you create a web page using HTML called "mypage," the full filename will be mypage.htm. The second kind of file we will discuss is a CGI script, written in the Perl programming language. We will use the .pl extension for CGI scripts. Thus, if you create a CGI script called "processdata," its full file name will be processdata.pl. As I will explain later, these distinct kinds of files, HTML and CGI files, will need to be stored in separate directories on your web server.

In order to collect data over the Internet, the first thing one needs is access to a web server. There are at least three ways to obtain such access. One could transform an old computer into a server by downloading and installing the appropriate software (e.g., Apache, see www.apache.org). This approach is rather advanced, and is not recommended for people who are new to Internet research. A second approach is to use the server associated with your department, university, or organization. The advantage of this approach is that it does not require server maintenance on your part. You will, however, be constrained by the rules of the organization. Some universities, for example, will supply you with ready-made CGI scripts for performing some functions (e.g., processing forms via e-mail), but will not allow you to use scripts that you create. A third approach—the one I recommend—is to use a professional web hosting service. There are many web hosting companies that will allow you to use customized CGI scripts for a trivial fee. The hosting company I use, Netfirms (www.netfirms.com) offers web space with CGI capacity for free, as long as you are willing to let them place small ads at the top of your pages. For a small fee (about $5 month) you can pay Netfirms to remove the ads. The advantage of using a professional hosting service is that the company will house and maintain the servers.

Setting up a Netfirms Server

In this section I will show you how to obtain a web server through the Netfirms service. I will show you how to obtain a free account so that we can work through the examples at no cost to you. If you find the techniques we discuss to be useful, you should consider paying for the service so that you can have the Netfirms ads removed.

The first thing you will need to do is visit the Netfirms web site at www.netfirms.com. Find a link labeled “Free Web Hosting” in the lower portion of the page and click it. After clicking the “signup now” button, you will be asked to choose a domain name. A *domain name* is like a street address—a label that allows your web site to be kept distinct from others. Amazon’s domain name, for example, is amazon.com. The domain name for the University of Illinois Department of Psychology is psych.uiuc.edu. If you would like to create a truly customized domain name, you will need to register it and pay a fee. If you would like your domain name to be a subdomain of netfirms.com (e.g., amazon.netfirms.com or psychuiuc.netfirms.com), you can choose a subdomain name for free by clicking the “I prefer a free Netfirms sub domain.” Simply select a name and, if the name is not already in use, Netfirms will take you to the next stage in which you review and place your order. Once the registration process is complete, Netfirms will e-mail you a username and password for accessing your new web site.

Transferring Files to and from your Website

Now that you have a web server, you will need a way to transfer the files (both HTML files and CGI scripts) that you create to the server and vice versa. The file transfer process is one that many people find confusing. To make it seem as intuitive as possible, you will need to conceptualize the process as one that is analogous to transferring files from your office computer to your home computer and vice versa. If you work on a file called “my_next_article.doc” on your office computer, go home, and then open the file called “my_next_article.doc” on your home computer from the night before, you will discover that the file at home does not contain the changes that you made today in the

office. In order to keep the file up-to-date, you have to transfer the revised file from your office to your home computer via e-mail, disk, thumb drive, or some other means. Similarly, the next day when you return to the office you need to ensure that you bring the most up-to-date version of the file with you from home.

The same logic applies to the file transfer process on the Internet. When you create a web page for collecting personality data, you will be creating the appropriate file on *your* computer. However, in order for that file to function as a web page, you will need to transfer it to the web server. Because the web server is not located in your home or office, you need to use a special interface in order to transfer the files correctly.

Fortunately, Netfirms provides an interface that allows you to upload files from your computer to the web server (and vice versa). To access this interface, go the to main Netfirms web site at www.netfirms.com and click on the "members" tab near the top. Doing so will take you to a log in screen where you will enter your member name and your password. (This information was e-mailed to you by Netfirms when you created your account.) If you log in successfully, you'll be taken to a new page that provides you with basic page statistics (e.g., how much bandwidth you have used, how many visitors you have had to your site). Click on the option called "File Manager" on the left-hand side of the screen. This will open a web-based file transfer interface application.

The File Manager application works in the same way that the My Computer application works in Windows. When the application in active, you will see a display of directories and files on your Netfirms server account. You can open a folder or directory by clicking on it. You can move up through a directory by clicking the "up" icon. To copy/transfer a file from your computer to the server, simply click the icon called

"upload." Use the browse "button" option to find the file on your computer and then upload it to the server. To download a file from your server to your computer, find the file, check the box next to the file's name, and click the "download" icon to the far right of the line for that file.

The structure of your Netfirms directories. When you log on to your Netfirms web server, you should notice two directories or folders: one called "www" and one called "cgi-bin." The distinction between these directories is important. The www folder will be used to hold any web pages that you create. Any file that you place in this directory can be viewed over the web. Thus, if I were to transfer a file called "researchproposal1.htm" to my www directory, anyone could view it by going to the following URL: http://fraleychapter.netfirms.com/researchproposal1.htm. The other directory, cgi-bin, will contain any CGI scripts that you write for the purposes of creating interactive web pages. If I were to create a script called "study1script.pl" I would transfer it to my cgi-bin directory and it would have the following address: http://fraleychapter.netfirms.com/cgi-bin/study1script.pl. Please note that, although the "cgi-bin" appears as part of the web address for CGI scripts, the "www" does not appear as part of the web address for the documents placed in the www folder.

To review, there are three key ideas you need to keep in mind as you work with files on your server. First, your web server has two folders, the www directory and the cgi-bin directory. Web pages that you create with the *.htm extension should be transferred to the www directory of your web server to be viewed or used by other people over the Internet. CGI scripts that you write should be transferred to the cgi-bin directory so that they can be run on the server. Second, when you create HTML and CGI files on

your computer, you will need to transfer them to the server before they can be used by others. Finally, the files you transfer to your server will automatically be given web addresses. Any HTML file, such as mypage.htm, that you send to your www directory will have a URL of the following form: http://myaccount.netfirms.com/mypage.htm. Any CGI script, such as myscript.pl, that you send to the cgi-bin directory will have a URL of the following form: http://myaccount.netfirms.com/cgi-bin/myscript.pl.

Creating a Basic Personality Questionnaire using HTML

Figure 1 shows a web page for a simple four-item questionnaire designed to assess individual differences in attachment security. You can explore the questionnaire on-line at the following URL: http://fraleychapter.netfirms.com/study1.htm.There are a few things to note about this questionnaire. First, there are several distinct ways of obtaining input from the user. One kind of input is text-based and is called a *text box*. Using a text box, users freely type information into the space provided. The second kind of input is a *pull-down menu*. For this input option, the user clicks on the menu to see the available response options and then chooses the most appropriate option. The third kind of input option is called a *radio button*, an input option commonly used in Likert-type rating scales. For this kind of input, the user simply clicks a button corresponding to his or her response. Importantly, if the user changes his or her mind and chooses another option, the previous choice disappears; only one radio button within a set of buttons can be selected at once.

Box 1 shows the HTML code used to generate this questionnaire. If you do not have any programming experience, some of this code may look intimidating, but I assure you that it is quite intuitive once you begin to study it. The actual HTML commands are

given within the "<" and ">" signs and are called *tags*. For example, the first tag, <HTML>, instructs the user's browser to interpret the code to follow as if it is HTML code (which it is). Many HTML tags allow you to modify the appearance of text and images on a web page. For example, the <B> tag allows you to set the text in bold. Some tags, such as the <B> tag, have what are called "closing tags," such as </B>. Closing tags are used when a command is only relevant to a certain portion of the page, as may be the case when only certain parts of the text should be printed in bold.

The tag for creating a radio button follows this generic form:

```
<INPUT TYPE = 'radio' NAME = 'v01' value='1'>
```

The TYPE attribute inside the Input tag instructs the browser as to which kind of response option to create (a radio button, in this case), the NAME attribute provides a name for the response option, and the VALUE attribute provides a numeric assignment for the option. Notice that for our first questionnaire item, we have several of these tags:

```
<INPUT TYPE = 'radio' NAME = 'v01' value='1'>
<INPUT TYPE = 'radio' NAME = 'v01' value='2'>
<INPUT TYPE = 'radio' NAME = 'v01' value='3'>
<INPUT TYPE = 'radio' NAME = 'v01' value='4'>
<INPUT TYPE = 'radio' NAME = 'v01' value='5'>
```

This set of commands crates five radio button options, each one corresponding to a different numeric value (which represents the subject's item response). Notice that each response option within a set, however, is assigned the same name (i.e., "v01"). This ensures that the variable v01 can only assume one value, despite the fact that five possible response options exist.

Notes on use and customization. To use this file, all you need to do is enter the HTML text into a blank document in a word processor and save it as "study1.htm." (I

have made the code available at http://fraleychapter.netfirms.com/ so that you can copy-and-paste it instead of typing it verbatim.) Unfortunately, Microsoft Word is not an ideal choice for this purpose because it often renders HTML code automatically (i.e., it displays the code as a web page rather than an HTML file per se). Instead of using Microsoft Word, you may want to consider using Notepad—a free application that is installed with Windows. Notepad, however, has a nasty habit of adding ".txt" to all of your file extensions, so when you save the file, make sure it is saved with the appropriate extension.

The example HTML code shown in Box 1 is designed to be a template to help you build web pages that will meet your needs. It is not designed to illustrate all of the things that can be accomplished with HTML; you will need to refer to additional sources for such purposes (see Box 2). These resources discuss in more depth which HTML tags exist and how they can be used.

If you want to customize this file, you will need to consider the following:

1. You can easily copy-and-paste your items into this basic template. You will probably want to change the anchor labels, the questionnaire items, and the instructions. To add text to the web page, you do not need to do anything more complicated than paste the text into the appropriate place in the file.

2. If you want to add a line break or a carriage return, you must insert special code. Simply pressing the "return" key won't work. The code for a line break is
. You can use as many line breaks as you wish. In addition, if you want to insert more than one space (e.g., for the purposes of formatting your text), you will need to use a special piece

of code, ` `, which stands for “non-breaking space.” You can string several of these together to create a series of empty spaces.

3. When adding additional questionnaire items, be sure that the various radio buttons for a given item all have the same name.

4. When you save your file, remember that you need to use Netfirm’s File Manager application to transfer it to the www directory of your web server. If you do not transfer the file, the revised file will not be available to users on the Internet; the file will be on your personal computer only.

5. If the name of your HTML file is “study1.htm,” you should be able to access it on-line by going to the following address: http://yourdomain.netfirms.com/study1.htm. If you submit your data at this point, however, you will get an error because we have yet to create a CGI script for processing those data. We will do this next. The line, `<FORM ACTION = '/cgi-bin/study1results.pl' METHOD = post>`, instructs the server which CGI script to run when the data are submitted, and that filename will need to be altered if you use a name different than “study1results.pl” in your own applications.

Creating a CGI Script to Process the Questionnaire Data

Now that we have an Internet questionnaire for collecting data, we need a way to process and save those data when they are submitted by the user. This processing can be accomplished with a CGI script. As mentioned before, it is possible to write CGI scripts in a number of languages; the script that I will explain below is written in a language called Perl—a programming language that is quite flexible and relatively easy to use. Box 3 shows the code for a CGI script called study1results.pl that will process our data. I have broken the script into distinct segments so that I can discuss the various tasks that

the script will perform. The first few lines of code will be present in any CGI script that you write; they simply tell the server what kind of program the current file is and how to acquire the data submitted by the user. The next block of commands is designed to extract the data that were submitted by the participant and assign those data to variables that can be used within the CGI script itself. In English, the first of these Perl commands, `$age= $query->param('age');`, translates to "take the quantity submitted by the user labeled 'age' and call it '$age' within this CGI script." Notice that the name of the variables we used in the HTML file (e.g., age, country, v01) are used here too. Notice also that we have placed a dollar sign in front of the variable names that will be used in the CGI script itself. Thus, the age variable will be represented as $age. The use of the dollar sign allows Perl to distinguish easily between variables and non-variables. It is also important to note that each line of commands ends with a semi-colon.

The next set of commands will compute scale scores for the participant based on his or her item responses. The first two questionnaire items are measures of attachment-related anxiety. Because both items are keyed in the direction of anxiety, we can estimate the person's score simply by averaging his or her responses to these items. The command, `$anxiousAttachment = ($v01 + $v02)/2;`, instructs the web server to create a new variable called $attachmentAnxiety and let it equal the sum of the values for items 1 and 2 (i.e., $v01 and $v02), divided by 2. The next line computes a score for attachment-related avoidance based on items 3 and 4 (i.e., $v03 and $v04). Because item 3 is keyed in the low anxiety or secure direction, we reverse-key it when we compute the average by subtracting 6 (one value higher than the highest value possible) from the actual response.

The next set of commands is designed to extract the date and time that the data were submitted, as well as the user's IP address. I will not explain these commands in depth because they are the kinds of commands you will use in any script you write. The only important—and quirky—things you need to know are that the variable "$year" represents the number of years since 1900. Thus, the value 102 stands in for 2002. Also, because Perl begins counting at 0 instead of 1, the value 2 for the month corresponds to March, not February.

The next block of commands is responsible for three things. First, it opens a text file called "study1data.txt" that is located on the server. (If the file does not exist, it will be created automatically.) Next, the data are printed to the file, with each piece of information separated by commas. The date (in month/day/year) form is entered first, followed by the time (hour:minute:second), followed by the user's IP address. Next, the response to each of the six questions is entered, along with the total scores for anxiety and avoidance that we created. Finally, we insert a line break ("\n") and close the data file. By inserting a line break at the end of the line, we ensure that the next time a subject submits data, the data will be placed on the line underneath that of the current subject.

The final section of code is quite simple. This section instructs the server to send some HTML code back to the user. In short, the CGI script will create a customized web page for the subject to view. The text, which is placed within quotes of the `print ""` command, explains the study and, importantly, uses the process of substitution to tell the subject what his or her attachment scores were. Because the variable $anxiousAttachment contains the subject's attachment-related anxiety score, we can simply insert this variable into the text and the CGI script will automatically substitute the appropriate value. Thus,

the user will see something like ". . . your attachment-related anxiety score is 2.25, on a scale . . ." instead literally seeing ". . . your attachment-related anxiety score is $attachmentAnxiety, on a scale . . ."

Notes on use and customization. To use this script, you will need to copy it into a blank file and save it as study1results.pl. (If your word processor does not allow you to use the .pl extension, save the file as a text file with the .txt extension and then manually change the extension by "renaming" the file using your My Computer application in Windows.) Once you have saved the file to your personal computer, you will need to transfer it to your Netfirms server. When you do so, be sure to transfer it to the cgi-directory and not the www directory.

There are many ways to customize this script. For example, you can modify the debriefing text in any way that is appropriate for your own research. If you change the names of the variables, simply make sure you have used those names consistently throughout the script (and the corresponding HTML file).

Here are a few additional points to keep in mind:

1. You will need to "read in" each piece of data submitted by your subject. Thus, if you have 20 questionnaire items with names such as v01 to v20, you will need 20 lines of the "`$v01= $query->param('v01');`" variety to read in those responses.

2. You can create as many (or as few) subscales as you wish. For example, if we wanted to create a scale for security (which, theoretically, is defined as the negatively weighted composite of the anxiety and avoidance items), we could use the following line of code: `$security = ((6- $v01) + (6 - $v02) + $v03 + (6 - $v04))/4;`.

3. Any data you wish to save to the data file should be included within the `print INFO "";` commands. Use a comma to separate each variable.

Downloading Your Data Files and Importing Those Files into SPSS

Once your questionnaire has been on-line for a while, you will want to download your data. The CGI script has been written to save the data in a "comma delimited" format—in a format in which each piece of data for a single subject is separated by a comma. Comma delimited files are easily imported into programs such as Excel and SPSS.

The CGI script we created earlier was written to save your data in a file called "study1data.txt," located in your www directory. Thus, to download your data, you can log in to your Netfirms account and open the File Manager. Locate the data file in your www directory, and transfer it to your personal computer by clicking the icon labeled "download." To import the file into SPSS (version 12), follow these steps:

1. Open SPSS.

2. Open a new data file: File > Open > Data.

3. In the pull-down menu labeled "Files of Type," choose "Text (*.txt)."

4. Select the study1data.txt file.

5. Once you select a file, a new window called the "Text Import Wizard" should appear. Follow the instructions and go with all the defaults. The only exception is when the following question is asked: "Which delimiters appear between variables?" In this case, choose only "comma" since we are using commas to separate different values of the variables within a person.

Using metaForm—a Webpage that Creates Webpages

There are several software packages that can be used to generate web-based questionnaires for researchers who do not want to learn about coding HTML and CGI scripts first hand. Unfortunately, these packages are proprietary, thereby making them costly for researchers and students. To facilitate research, I have been developing a free software program, metaForm2, that can be used for collecting basic questionnaire data, scoring responses, and providing feedback to users. metaForm2 is an Internet-based application that can be used to create questionnaires on-line and is available at http://www.web-research-design.net/metaform2/metaForm2.htm. The program runs online (i.e., you do not have to download the program and run it on your computer) and is designed to create the CGI code that is needed to implement a questionnaire over the Internet. All the researcher needs to do is supply the questions, instructions, and debriefing information and then transfer the automatically generated CGI code to his or her own server. In addition to creating the CGI code, metaForm2 allows the user to edit existing questionnaires that were generated by metaForm2. I encourage you to explore metaForm2 if you are looking for a quick and simple way to create an online survey.

Making Your Research Study Known

If you want to recruit participants over the Internet, there are several cost-free ways to make your site known. First, you should create a home page for your lab that has an up-to-date list of the various online studies that are currently available at your web lab. By having a stable page (i.e., one that will be around even as individual studies come and go), it is more likely that people will find your site and participate in your research. Second, you should register the URL for the home page of your website with popular search engines. Yahoo!, for example, organizes its searches by subject areas. You will

want to register the URL for your site under the area that is most relevant to your research (see http://docs.yahoo.com/info/suggest/). Third, you will want to make sure the title of your home page closely matches the kinds of keywords someone might use if they were interested in participating in online research. A good title might contain the phrase "free online research in psychology."

Many scientific organizations in psychology have web pages that list URLs to online research. For example, the American Psychological Society has a page maintained by John Krantz that keeps an up-to-date listing of online studies (http://psych.hanover.edu/Research/exponent.html). You might want to visit this site and submit the URL for your page. You should also visit the Web Experimental Psychology Lab (http://www.psychologie.unizh.ch/genpsy/Ulf/Lab/WebExpPsyLab.html), run by Ulf-Dietrich Reips, one of the pioneers in online psychological research.

Summary

This tutorial should provide you with enough information to get you started with collecting basic, self-report questionnaire data online. I have attempted to make the presentation as simple as possible and, as a consequence, I have not emphasized the many advanced techniques that can be used (e.g., skip patterns, randomization, hyperlinks). To learn more about these techniques, please consult the sources listed in Box 4.

Concerns about Data Collected over the Internet

One of my goals in this chapter has been to highlight some of the ways in which collecting data over the Internet can be facilitate personality research. Despite some of advantages of using the Internet, there are many psychologists who are suspicious of Internet data. In a recent paper, Gosling, Vazire, Srivastava, and John (2004) outlined six

preconceptions about Internet data and addressed each of them by comparing data collected over the Internet with data collected and reported in the 2002 volume of the premier journal in our field, the *Journal of Personality and Social Psychology* (*JPSP*). I summarize some of their key findings in the sections that follow.

Are Internet Participants Representative of the Population?

One of the common preconceptions about Internet research is that Internet samples represent only a narrow portion of the population—a group of people who are predominantly young, affluent, North American, and male. To determine whether this preconception is warranted, Gosling and his colleagues analyzed a sample of over 361,000 people that had completed measures of the Big Five traits at their research site, outofservice.com. Approximately 43% of the outofservice.com sample was male, suggesting that research collected over the Internet is unlikely to be composed almost exclusively of men. It is worth noting that the 43% rate is relatively close to the desirable 50-50 split. As a point of comparison, Gosling and his colleagues also analyzed the nature of the samples reported in the 2002 volume of *JPSP*. Only 23% of participants in research published in *JPSP* were male. In other words, there is a strong female bias in traditional modern personality research, one that appears to be less severe in Internet research. With respect to race, the majority (77%) of respondents in the outofservice.com sample were white. This result, however, was comparable to that of *JPSP* samples (80%). The average age among participants aged 18 years or older was 27.6 in the outofservice.com sample, whereas it was estimated to be 23 in *JPSP* samples.

Questions about socio-economic status were administered to 116,800 of the participants in the outofservice.com sample. Of these people, 1,323 (1.1 %) reported

being poor; 17,981 (15.4%) reported being working class; 6,405 (5.5%) reported being lower middle class; 53,669 (46%) reported being middle class; 34,105 (29.2%) reported being upper middle class; and 3,314 (2.8%) reported being upper middle class. These findings suggest that, on average, Internet participants are relatively well off, but it is noteworthy that there is still a wide range of socio-economic groups represented. How does this compare to the samples typically used in *JPSP*? It is difficult to know for sure because, of the studies Gosling and his colleagues surveyed, socio-economic information was only reported for 5% to 10% of them. However, 85% of the samples were composed of university students, indicating that *JPSP* samples, on average, are more highly educated than the general population, of which only 27% are college graduates (Gosling et al., 2004, p. 98).

In summary, it is clear from these statistics that Internet samples are not representative of the population, even when that population is restricted to North Americans. However, perhaps the more important question is whether Internet samples are less representative than those composed of college students—a group that comprises approximately 85% of the research reported in our premier journal (Gosling et al., 2004). The analyses reported by Gosling and his colleagues is a resounding “no.” In fact, Internet samples are generally more diverse than college samples, targeting more men and a more diverse range of ages and socio-economic strata. Moreover, because of the large number of participants that can be recruited over the Internet, large absolute numbers of people from across the world can be studied, even when the relative proportion of people from other countries is low. For example, although the proportion of people from Albania was relatively small (less than one-tenth of a percent) in the

outofservice.com sample, there were nonetheless 368 Albanians in the sample—a number that exceeds the sample size of a typical study published in *JPSP*.

Despite the fact that Internet samples are more diverse than college subject pools, one should not view Internet samples as representing anything more than a modest improvement over traditional sampling methods. As Skikta and Sargis (in press) recently noted, "sampling from a biased portion of the population yields a biased sample, no matter how large of a sample one draws." Psychologists, in general, have paid insufficient attention to the nature of their sampling procedures and, as a result, it is not clear that the kinds of phenomena that have been studied are as pervasive as we tend to assume. Skikta and Sargis (in press) report, for example, that the fundamental attribution error—dispositional inferences made in circumstances in which situational factors are exclusively responsible for behavioral variation—is only made by white, wealthy, conservative men.

Careless Data

Another preconception about data collected over the Internet is that it is of poor quality. It is generally assumed that research participants will not take web-based research seriously—that they will submit multiple responses or that they will be unmotivated to read the questions and instructions carefully.

These assumptions beg the question of why people would want to participate in research in the first place. In the case of the Internet, where participation is fully voluntary, the primary reason would seem to be that people hope to learn something interesting about themselves—to gain some degree of self-insight, to allow their opinions to be known, or, perhaps, just to have a bit of fun. If this is true, then participants will be

motivated to provide honest responses in order to receive useful feedback about themselves. It is hard to imagine any other reason to voluntarily participate in a research study, but, to the best of my knowledge, the question has not been systematically investigated.

If we assume that participants are, in fact, intrinsically interested in participating, this may resolve one issue, but raise another. Namely, participants may submit responses multiple times in order to see how their feedback is affected. There are several ways to deal with this potential problem. One method is to record the user's IP address upon the submission of data. An *IP* (or *Internet Protocol*) address is a number that is unique to each computer and is used to identify that computer on the network. In many organizations (e.g., Universities), those IP addresses are "static" (i.e., permanent), but for many home users those IP addresses are "dynamic" and reassigned each time the person logs onto the Internet. In either case, if someone submits his or her responses twice and within the same general period of time (i.e., within an hour), it is possible to note this and remove those cases. (In the example questionnaire we created in the previous section, we saved the IP address of the user's computer for this purpose.) This method, like any solution, will have some non-zero Type I error rate (i.e., cases will be deleted that were not from the same user, as might happen if someone invites his or her roommate to participate in the research), but, given the large number of participants that can be recruited, this conservative option should have no pragmatic disadvantages.

Another possible solution discussed by Gosling et al. (2004) is to provide links on the feedback page to a separate web site where participants can "try again." These links lead to the same questionnaire (with the user's previous response pre-selected), but this

time the data are not saved when the user presses the submit button. (If they are saved, they are saved to a different data file.) It is also possible to add a variable, unbeknownst to the user, that denotes the fact that the user has submitted data already and that the newly submitted data represent explorations on the part of the subject.

A third solution is to include a question that explicitly asks the subject whether he or she has participated in the research before. In the data our lab collects on-line, we include this question and have it set to "yes" by default so that the user has to actively choose the "no" option if he or she has not participated before. Thus, if the user were to go back and re-answer some of the questions, he or she should have to explicitly change this question to "no" again, which would be an unnecessary step for someone who is simply changing a few responses here and there.

Of course, it is always possible that someone might take the time to participate in your research for malevolent reasons—to provide you with bad data. I should note, however, that there is no reason to assume that this is more likely to happen in Internet research than in traditional laboratory research. In fact, if subjects are recruited through the human subjects pool, they may feel some resentment at having to participate in your research for course credit in their psychology classes. This may lead them to answer questions in either a careless manner or even provide responses in a deliberately misleading way. It has yet to be empirically demonstrated that people are more malicious in an Internet context than in a traditional one.

It is possible to screen out careless response by using techniques that are already widely used in traditional paper-and-pencil scales. As Gosling et al. (2004) discuss, one can easily study a subject's item response pattern to see if someone is simply endorsing

all the items in the same manner or whether the person's responses are sensitive to items that are reverse keyed.

Ethical Concerns in Internet Research

Despite the opportunities provided by the use of the Internet in personality research, there are a number of ethical issues that need to be considered. For example, how should informed consent be obtained? How can we debrief participants effectively? How can we ensure the confidentiality of data collected on-line? Kraut, Olson, Banaji, Bruckman, Cohen, and Couper (2004) recently provided a thoughtful discussion on some of these matters. I summarize some of the key issues they raise below, but I direct the reader to their paper for a more in-depth consideration of these issues.

Obtaining Informed Consent

According to federal guidelines (Title 45, Part 46 of the Code of Federal Regulations for the Protection of Human Subjects [45 CFR 46]; available online at http://ohsr.od.nih.gov/guidelines/45cfr46.html), the following kind of research on human subjects is "exempt:"

> research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. (Title 45 Code of Federal Regulations § 46.101(b)(2))

By these standards, the vast majority of personality research that might be conducted over the Internet would be classified as exempt by IRBs. (Please note, however, that the IRB, not the investigator, is charged with determining whether the proposed research is exempt.) The primary reason is that most research projects would not require the recording of information that would allow subjects to be identified. Unless a researcher intends to follow people longitudinally, there is little need for obtaining identifying information. One potential exception to this rule concerns the use of IP addresses. As mentioned before, some IP addresses are static, which means that the address is specific to a given machine. As such, it is possible to trace that IP address to a specific user, potentially compromising his or her anonymity. Many IP addresses, however, are dynamically assigned and, thus, cannot be used to identify a specific user, only a broader pool of machines (e.g., those of Ameritech/SBC customers in the Champaign-Urbana area). The best way to ensure confidentiality is by not recording the user's IP address. Tracking IP addresses is, of course, a useful way to determine whether a user has recently resubmitted the same data twice, but there are other ways to address this problem (see the section titled *Careless Data* above).

If the research is not deemed "exempt" by the IRB, it might be necessary to obtain informed consent. However, the traditional methods of obtaining written informed consent have the potential to violate the anonymity that would otherwise be assured to a research participant online. According to § 46.117(c) of the federal guidelines, consent can be waived if the research involves no more than minimal risk to subjects, where minimal risk is defined such that "the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily

encountered in daily life or during the performance of routine physical or psychological examinations or tests" (§ 46.102(i)). The probability of harm or discomfort is likely to be remarkably small in most forms of personality research. Moreover, the "risk" portion of the risk/benefit ratio is considerably reduced when that research is conducted online because online research subjects are free to withdraw from the study at any time with no consequences whatsoever. Although this is technically true in research conducted in the laboratory, social norms are likely to discourage a research subject from withdrawing from a study even when that subject is uncomfortable with the procedures (e.g., Milgram, 1963).

An IRB may waive the requirement for written consent if "the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality" (§ 46.117(c)(1)). In the case of online research, obtaining a standard written document of consent (e.g., a signature) would clearly compromise the confidentiality of the research. As Kraut and his colleagues state, "we recommend that IRBs should waive the [written] document and allow a procedure in which subjects click a button on an online form to indicate they have read and understood the consent form" (Kraut et al., 2004, p. 113). In light of this recommendation, it is probably wise to include, at the beginning of the study and with as little legalese as possible, a web page that explains to the research participant what will be expected of him or her; how the data will be used; and that, by clicking a button, he or she is consenting to participate. An example consent form that I use in one of my studies is available at http://fraleychapter.netfirms.com/.

The Use of Deception in Online Research.

Is deception advisable in an online study? I would argue that using deception online is unwise for several reasons. First, some social science disciplines already have a bad reputation for misleading research participants. Although some research suggests that participants do not mind mild forms of deception in laboratory experiments (Epley & Huff, 1998), it is easier to explain the nature of the deceptive technique in face-to-face debriefing sessions than it is online. Moreover, in an educational institution, where a lot of behavioral research is conducted, it is probably easier for participants to appreciate the benefits of research and the necessity of deception in certain contexts. It is not clear whether a non-student visiting your web site is going to appreciate the fact that mild deception is sometimes necessary in order to get more truthful answers to certain questions. Finally, without a face-to-face debriefing, it can be difficult to ascertain how the deception has affected the subjects.

Debriefing

The purpose of debriefing is to explain the nature of the research to participants. In most traditional psychological research, the debriefing takes place at the end of a study, and usually involves a brief verbal summary of the aims of the study, the purpose of the methods, and the expected findings. The on-line version of debriefing should follow a similar structure. Moreover, the medium of the Internet allows you to make the debriefing process more educational for research subjects. For example, you can include links to additional online resources that are relevant to your research. You can provide the participant with an automated analysis of the data to date, thereby allowing the participant to see how the study has been progressing. Finally, you can also allow for interactivity by providing an e-mail address in case the person has additional questions

about the research. The debriefing context provides an opportunity for us to “give away” psychology (Miller, 1969). Given the large number of people we have access to in Internet research, this opportunity is not something that should be taken lightly. A thoughtful debriefing provides an important means for educating the public about psychological science.

Summary

The Internet offers many opportunities for students of personality. Not only can it be used as a new means for collecting data using tried-and-true methods in personality (e.g., self-report questionnaires), it can be used in innovative ways—ways that allow us to bring computerized assessment to the homes, offices, and PDAs of our participants. Moreover, as wireless technology continues to advance, the potential for studying people in their natural contexts will develop as well. It is my hope that personality scientists will take advantage of these developments and play a role in finding innovative uses for Internet-based technologies in psychological science.

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Box 1

HTML code for the basic questionnaire illustrated in Figure 1

```
<HTML>
<FORM ACTION = '/cgi-bin/study1results.pl' METHOD = post>

1. How old are you?
<INPUT TYPE = 'textbox' SIZE = '3' MAXSIZE = '3' NAME = 'age'> years
old
<BR><BR>

2. My country of origin is: <BR>
<SELECT NAME = 'country' SIZE = '1'>
<OPTION VALUE = '0' SELECTED>--- Please select an option---</OPTION>
<OPTION VALUE = '1'>USA</OPTION>
<OPTION VALUE = '2'>CANADA</OPTION>
<OPTION VALUE = '3'>MEXICO</OPTION>
<OPTION VALUE = '4'>OTHER</OPTION>
</SELECT>
<BR><BR>

<B>Please answer the next few questions with respect to the way you
typically experience your romantic relationships (i.e., relationships
with boyfriends or girlfriends).</B>
<BR><BR>

1. I am afraid that my partner doesn't love me as much as I love him or
her. <BR>
Strongly Disagree
<INPUT TYPE = 'radio' NAME = 'v01' value='1'>
<INPUT TYPE = 'radio' NAME = 'v01' value='2'>
<INPUT TYPE = 'radio' NAME = 'v01' value='3'>
<INPUT TYPE = 'radio' NAME = 'v01' value='4'>
<INPUT TYPE = 'radio' NAME = 'v01' value='5'>
Strongly Agree
<BR><BR>

2. I often worry that my partner will not want to stay with me. <BR>
Strongly Disagree
<INPUT TYPE = 'radio' NAME = 'v02' value='1'>
<INPUT TYPE = 'radio' NAME = 'v02' value='2'>
<INPUT TYPE = 'radio' NAME = 'v02' value='3'>
<INPUT TYPE = 'radio' NAME = 'v02' value='4'>
<INPUT TYPE = 'radio' NAME = 'v02' value='5'>
Strongly Agree
<BR><BR>

3. I find it relatively easy to get close to my partner. <BR>
Strongly Disagree
<INPUT TYPE = 'radio' NAME = 'v03' value='1'>
<INPUT TYPE = 'radio' NAME = 'v03' value='2'>
<INPUT TYPE = 'radio' NAME = 'v03' value='3'>
<INPUT TYPE = 'radio' NAME = 'v03' value='4'>
<INPUT TYPE = 'radio' NAME = 'v03' value='5'>
Strongly Agree
```

```
<BR><BR>

4. I have a difficult time allowing myself to depend on romantic
partners. <BR>
Strongly Disagree
<INPUT TYPE = 'radio' NAME = 'v04' value='1'>
<INPUT TYPE = 'radio' NAME = 'v04' value='2'>
<INPUT TYPE = 'radio' NAME = 'v04' value='3'>
<INPUT TYPE = 'radio' NAME = 'v04' value='4'>
<INPUT TYPE = 'radio' NAME = 'v04' value='5'>
Strongly Agree
<BR><BR>


<INPUT TYPE = 'submit' VALUE = 'submit'>
<BR>Please click this button when you are finished.

</FORM>
</HTML>
```

Box 2

Useful Sources on creating web pages in HTML

Birnbaum, M. H. (2001). Introduction to behavioral research on the Internet. New Jersey, Prentice Hall.

Castro, E. (2001). HTML for the World Wide Web with XHTML and CSS: Visual Quickstart Guide (5th ed.). Berkeley, CA: Peachpit Press.

Fraley, R. C. (2004). *How to conduct behavioral research over the Internet: A beginner's guide to HTML and CGI/Perl*. New York: Guilford.

Box 3

Perl/CGI code for a file that will process the questionnaire data

```
#!C:/perl/bin/perl.exe
use CGI;
$query = new CGI;

# Import the submitted data into this script

$age= $query->param('age');
$country= $query->param('country');
$v01= $query->param('v01');
$v02= $query->param('v02');
$v03= $query->param('v03');
$v04= $query->param('v04');

# Compute the subject's scale scores for the two attachment dimensions

$anxiousAttachment = ($v01 + $v02)/2;
$avoidantAttachment = ((6-$v03) + $v04)/2;

# Obtain the date and time of the submission, as well as the user's IP
address

($sec,$min,$hour,$mday,$mon,$year,$wday,$yday,$isdst) =
localtime(time);
$ip= $query->remote_addr();

# Open a text file and save the user's data as a new row within the
file

open(INFO, ">>$ENV{'DOCUMENT_ROOT'}/www/study1data.txt");
 print INFO "$mon/$mday/$year,";
 print INFO "$hour:$min:$sec,";
 print INFO "$ip,";
 print INFO "$age,$country,$v01,$v02,$v03,$v04,";
 print INFO "$anxiousAttachment,$avoidantAttachment";
 print INFO "\n";
close (INFO);

# Prepare to send HTML code to the browser

print $query->header;
print $query->start_html(-title=>'Thank You');

# Send the text within quotes as HTML code to the user's browser

print "<B>Results Page</B>
<BR><BR>
Thank you for completing this questionnaire. It is designed to measure
your attachment style--the way you relate to others in the context of
intimate relationships. As you might suspect, people differ greatly in
the ways in which they approach close relationships. For example, some
people are comfortable opening up to others emotionally, whereas others
are reluctant to allow themselves to depend on others.
```

```
According to attachment theory and research, there are two fundamental
ways in which people differ from one another in the way they think
about relationships. First, some people are more anxious than others.
People who are high in <B>attachment-related anxiety</B> tend to worry
about whether their partners really love them and often fear rejection.
People low on this dimension are much less worried about such matters.
Second, some people are more avoidant that others. People who are high
in <B>attachment-related avoidance</B> are less comfortable depending
on others and opening up to others.

According to your questionnaire responses, your attachment-related
anxiety score is $anxiousAttachment, on a scale ranging from 1 (low
anxiety) to 5 (high anxiety). Your attachment-related avoidance score
is $avoidantAttachment, on a scale ranging from 1 (low avoidance) to 5
(high avoidance).

Please click <A HREF =
'http://www.psych.uiuc.edu/~rcfraley/attachment.htm'>here</A> to learn
more about adult attachment theory.";

# End of HTML code to be sent

print $query->end_html;
```

Box 4

Further Reading on CGI scripting

Castro, E. (2001). Perl and CGI for the World Wide Web (2nd ed.). Berkeley, CA: Peachpit Press.

Fraley, R. C. (2004). *How to conduct behavioral research over the Internet: A beginner's guide to HTML and CGI/Perl*. New York: Guilford.

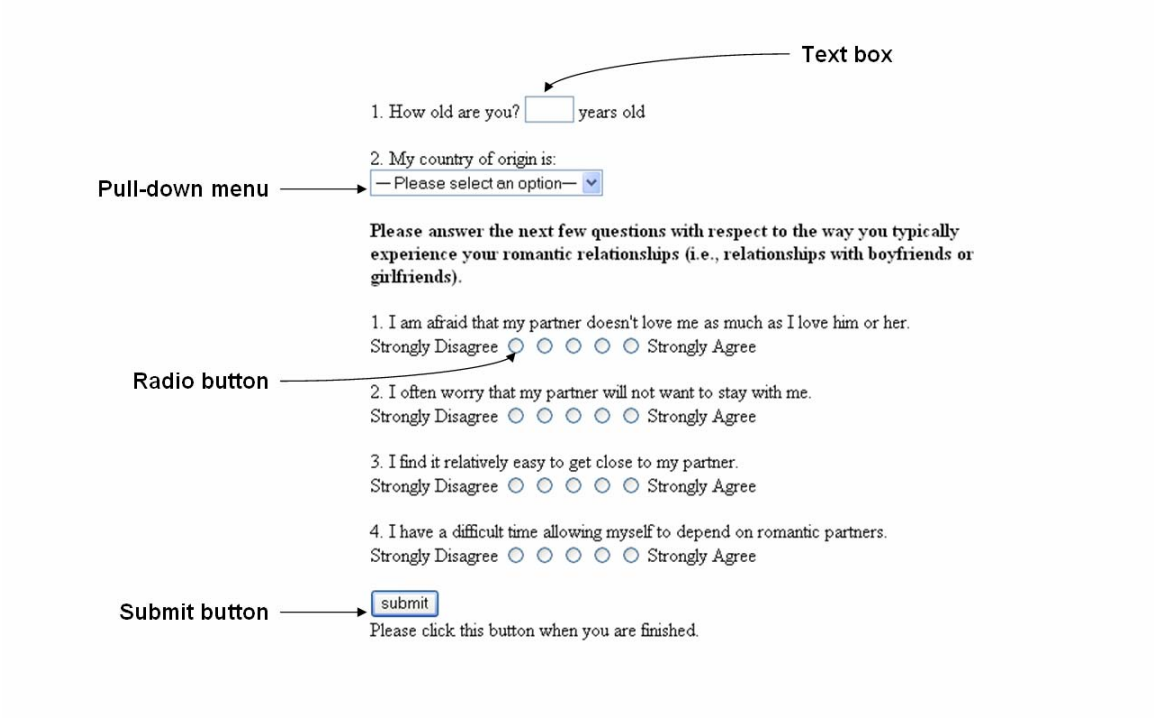
Box 5

Further Reading on Ethics and the Internet

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., & Couper, M. (2004). Psychological research online: Report of board of scientific affairs' advisory group on the conduct of research on the Internet. *American Psychologist, 59*, 105-117.

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). E-research: Ethics, security, design, and control in psychological research on the Internet. Journal of Social Issues, 58, 161-176.

Figure 1


Text box
1. How old are you? years old
2. My country of origin is:
Pull-down menu
— Please select an option—
Please answer the next few questions with respect to the way you typically experience your romantic relationships (i.e., relationships with boyfriends or girlfriends).
1. I am afraid that my partner doesn't love me as much as I love him or her.
Strongly Disagree Strongly Agree
Radio button
2. I often worry that my partner will not want to stay with me.
Strongly Disagree Strongly Agree
3. I find it relatively easy to get close to my partner.
Strongly Disagree Strongly Agree
4. I have a difficult time allowing myself to depend on romantic partners.
Strongly Disagree Strongly Agree
Submit button
submit
Please click this button when you are finished.