Conducting Remote Studies of Web Users Using WebLab UX

Jan H. Spyridakis, Ph.D.
Professor

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Overview

- Introduction
- Approach
- Applications
- Example
- Going Forward
- Discussion
Introduction

- Why Internet based research?
  - Ecologically valid approach
  - Can study real users of a Web site in their own space and time
  - Can study users who are difficult to bring into a lab or difficult to visit
  - Can study large samples of users with no additional cost
  - Can study users over time—longitudinal studies
Our Approach: Overview

- Doesn’t require user to install special software
- Write survey questions in text files
- Tag DVs in Web site
- Tag IVs (PHP) or use CSS styles to create conditions
- Add call to WebLab UX (the toolkit we have been developing) to each experimental Web page
- Use control panel to set up experiment
- WebLab UX:
  - Assigns participants unique ID when they arrive at Web site
  - Inserts surveys into experiment sequence
  - Assigns participants to conditions and displays condition for each page request
  - Tracks behavior for unique users moving through Web site
  - Links users’ survey responses to their behaviors
Approach: User Experience

Structure of the Web Study: What the User Experiences in One of the Conditions

- Consent Form
- Instructions
- Demographics
- Browse Website
- Perceptions
- Comprehension

Data from user's session stored on server
Approach: WebLab UX Technology

- Based on PHP
  - Transforms plain-text surveys into Web pages
  - Web pages instrumented using PHP to vary content
  - Manages study
    - Silently assigns users to conditions
    - Tracks each user’s survey responses, page requests, and links clicked

- Experiment log can be imported into Excel, SPSS, R, or other analysis programs
Approach: Surveys

- Instructions, consent forms, scenarios, and surveys are very easy to create and update!
- Survey in plain text with simple syntax
- Multiple “pre” and “post” pages can be created, with order specified
Approach: Surveys in Final Form

7) What is your gender?
   - Male.
   - Female.

8) What is your age?
   - Under 18.
   - 18-25.
   - 26-35.
   - 36-45.
   - Over 45.

9) Are you a native English speaker?
   - Yes.
   - No.

10) If you are not a native English speaker, how many year(s) of education have you had in an English-speaking country?

   [Input field] years (Please enter a numeral.)

Move to next section
Approach: Instrumented Pages

- PHP calls inserted into page for behavior tracking, displaying conditions

- Includes WebLab UX functionality in this Web page

- Uses style sheet to define look of different conditions

- If user clicks this link, records kind of link clicked
Approach: Conditions

- One Web page, multiple variations
  - CSS can be used to conditionally display or modify page contents
  - PHP scripts can randomize elements

- WebLab UX’s \textit{conditionswitch.php} script easily modified to handle automatic generation of variants
## WebLab UX Control Panel

<table>
<thead>
<tr>
<th>Study Variable</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>siteid</td>
<td>Big Bend</td>
<td>The long name of the study / site</td>
</tr>
<tr>
<td>siteid_short</td>
<td></td>
<td>The short ID used when the long name would be too long (i.e., in ongoing data); this value is limited to no more than 8 characters</td>
</tr>
<tr>
<td>sitindex</td>
<td>wmo.php</td>
<td>The first instrumented study page</td>
</tr>
<tr>
<td>assign_type</td>
<td>Sequential</td>
<td>The type of assignment (either probabilistic or sequential)</td>
</tr>
<tr>
<td>num_conditions</td>
<td>6</td>
<td>The number of conditions</td>
</tr>
<tr>
<td>probabilities</td>
<td></td>
<td>The probabilities of each condition being assigned (only used with probabilistic assignment)</td>
</tr>
<tr>
<td>surveys</td>
<td>Both Pre- and Post-Surveys</td>
<td>When surveys occur (either preonly, postonly, or pre_and_post)</td>
</tr>
<tr>
<td>presurveytitle</td>
<td>Preliminary Survey</td>
<td>The &lt;title&gt; used for the pre-survey, if applicable</td>
</tr>
<tr>
<td>postsurveytitle</td>
<td>Final Survey</td>
<td>The &lt;title&gt; used for the post-survey, if applicable</td>
</tr>
<tr>
<td>admin_email</td>
<td><a href="mailto:galore@uw.edu">galore@uw.edu</a></td>
<td>The email address shown if the study has some sort of serious error</td>
</tr>
<tr>
<td>incentive_form</td>
<td>Yes</td>
<td>Whether an incentive form is to be used or not (yes or no)</td>
</tr>
<tr>
<td>header_study_text</td>
<td></td>
<td>Anything to be displayed in the header div of header-study and header-internal</td>
</tr>
<tr>
<td>header_survey_text</td>
<td></td>
<td>Anything to be displayed in the header div of header-survey</td>
</tr>
</tbody>
</table>
Approach: Managing Study

- As users enter study, WebLab UX:
  - Generates conditions as specified in CSS stylesheets or in separate PHP code
    - Could include randomization of menu items
  - Turns off page caching in user’s browser
  - Records each page request with time stamp
  - Records specific links clicked and kind of link (as specified by experimenter)
Welcome to Data Request

This tool exports data from ongoing data files to .xls format. The reports have varying information, but will always include participant ID, the ID of the study they were in, their Web browser, and their operating system, as well as the date/time they started the study and their initial referring page.

Current Reports

- Export survey data
- Export time on page data
- Export path data
- Export short path data
- Export path data (list normal form)
- Export da data

(Includes all path data. May get truncated by Excel)
(Includes only date/time and page data. May get truncated by Excel)
(Provides list of path data one page request at a time)
(Includes most DQ codes; does not currently find session errors or multiple windows)
Approach: Logging

- Logs can be imported into Excel/SPSS
- One row per user, tracked by unique ID:
  - Survey answers
  - Behavior log
## Approach: Logging cont.

<table>
<thead>
<tr>
<th>Short ID</th>
<th>Participant ID</th>
<th>Site ID</th>
<th>Cond</th>
<th>E Browser</th>
<th>Platform</th>
<th>Page Request</th>
<th>Date Started Study</th>
<th>Time Started Study</th>
<th>Initial Referrer</th>
<th>Initial Link Type</th>
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</tbody>
</table>
Applications for WebLab UX

- Controlled experiments that investigate effects of specific Web design elements on user behavior, comprehension, and perceptions
- Remote usability studies, using naturalistic behavior to measure success of a design
- A/B testing of different Web designs
Our Most Recent Study

Effect of:

- Text Previews
  - List only
  - Preview w/ list
  - Preview w/ embedded links

- Navigation Tab Menus
  - Presence/absence

... on users’ comprehension, perceptions of use, and behavior
Study Protocol

- Participants must be at least 18 years old
- Only one web browser window may display our study
- Participants must visit more than one of the experimental pages (i.e., more than just the home page)
- Participants cannot return to the experimental pages once they begin the post-study surveys
- Participants must respond to the post-study surveys in good faith (e.g., answer most or all of the questions, not select one answer slot repeatedly)
# Study Protocol cont.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Enforcing Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must be 18 years old</td>
<td>Determined through survey question</td>
</tr>
<tr>
<td>Only one web browser window may display our study</td>
<td>Cookie and PHP session variable track attempts to open multiple browser windows</td>
</tr>
<tr>
<td>Must visit more than one of the experimental pages</td>
<td>Page visits tracked for each user; we can determine number of pages visited</td>
</tr>
<tr>
<td>Cannot return to the experimental pages once they begin the post-study surveys</td>
<td>Order of page visits recorded and page caching disabled; we can determine when participant leaves experimental pages to enter surveys. Back button will not use cached pages but instead requests pages from server</td>
</tr>
<tr>
<td>Respond to the post-study surveys in good faith</td>
<td>Toolkit can look for suspicious patterns such as answering “111111.” It also times how long a person stays in the survey pages</td>
</tr>
</tbody>
</table>
Contacted: The number of people who were invited to take part in the study.

Responded: The number of people who responded to the invitation, visited the study Web site, and proceeded to take the study.

Followed Protocol: The number of people who met the study requirements and correctly followed the study protocol as described in the instructions.

Analyzed: The number of people who were kept for analysis (i.e. native English speakers only; in study website for greater than the minimum allowed time).
Followed Protocol: The number of people who met the study requirements and correctly followed the study protocol as described in the instructions.

Analyzed: The number of people who were kept for analysis (i.e. native English speakers only; in study website for greater than the minimum allowed time).
Going Forward: Improvements

- **Problem** - Integrating WebLab UX into production servers is difficult
  - Requires PHP
  - Requires WebLab UX (PHP scripts) live on the server’s published directories
  - Requires instrumentation of individual Web pages

- **Solution** - Decoupling WebLab UX from a specific technology
  - Use same approach as Web Metrics companies - Javascript page tags refer to remote server running a next version WebLab UX
  - Instrumentation via common XHTML “ID” tags; more friendly to Web Designers (non-programmers) & technology-neutral
Going Forward: Improvements

- Problem - We want to record more behaviors
  - What people are typing into text boxes
  - How people are using drop down menus, etc.
  - What people are clicking on besides links (including “non-clickable” things)

- Solution - Javascript + Document Object Model (DOM)
  - Javascript+DOM support looking at how people interact with each element of the page as they interact with it
  - Technology is supported across all modern browsers, requires no special support on the Web server
  - Web developer can specify (by XHTML ID tagging) which page elements to monitor
Going Forward: Improvements cont.

- **Problem** - Participants self-monitor behavior; facilitator not there to enforce study protocol
  - Current solution - PHP scripts look for telltale patterns of unwanted behaviors in log files

- **Solutions**
  - Storing data in database allows for researcher to create custom queries for detecting disingenuous or non-compliant user behavior
  - Improving technological support for reducing unwanted behaviors and for enforcing study protocol
Going Forward: Open Questions

- How do we convince people that unanswered questions about internal validity are more than compensated by gains in external & ecological validity?
- How do we interpret information from navigation path and UI event behavior?
- How does this method inform usability testing?
  - Comparative studies needed
For More Information

http://depts.washington.edu/intres

INTERNET-BASED RESEARCH
@ The University of Washington

Using the Internet to Study Users Interacting with Web Sites in Natural Settings

Welcome to the home page of the Internet-Based Research group, a Directed Research Group in the Department of Technical Communication. The group, directed by Professor Jan Sparck Jones, has been studying how various features of the design of online information affect user behavior, comprehension, and perceptions. The research has focused on using online, remote methods to identify how people are using Web sites in order to optimize the user experience and on refining a software toolkit (WebLab-UX) that will dynamically generate alternative Web sites, deliver them randomly to participants through the Internet, generate surveys, and collect survey results as well as server log files and structured log data. Our goal has been to study users interacting with Web sites using their own computing environment at a time of their own choosing.

We welcome your interest in our work, whether that is in taking a look at our past and current studies, looking at the results of some of our published studies, or seeking our support in helping you assess online information and its design. We are seeking funds and cooperative projects. We hope to be able to spend more time developing tools to integrate with host Web sites of stakeholders who want answers about their site designs. Our goal is to refine our WebLab-UX so that researchers, usability specialists, and other stakeholders can use it to assess samples of subjects remotely through the Internet. If you are interested in talking to us about such uses of our WebLab-UX or funding opportunities, or about using a specific Web site as a testbed, please email Dr. Sparck Jones at spjones@u.washington.edu.