

# Testing More Than ALT Text- Techniques for Testing Usability and Accessibility

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## ABSTRACT

Conducting usability studies with participants who use assistive technology requires some non-traditional techniques. The complexities of the systems, and poor accessibility on the Web today make doing these studies imperative but challenging. Based on many sessions with participants with disabilities, this paper includes insights and practical tips for managing planning, recruiting for, and facilitating these studies.

## INTRODUCTION

From May to September, 2001 I managed an intercontinental research study with a team of eight usability specialists. The study's topic was Web design for people who are blind, have low vision, or who have motor skill disabilities. (Senior citizens were also included in this study, but those findings will not be covered here.) Many organizations have produced very good information about how to code better websites for people with disabilities. However, there is less research about the how severe the usability issues are. In doing this study, in addition to previous work with users with disabilities, we learned an enormous amount about how to make sessions with assistive technology and the Web run smoothly, while collecting the most accurate data.

Adjustments need to be made in the process when doing any usability study, but there were several unexpected kinds of tweaks needed to do this study. Conducting pilot studies was extremely valuable to the process and helped us prepare for facilitating the sessions. And we learned much more during the course of the study. This was one of the most interesting, challenging, and rewarding studies I have ever done.

## THE RESEARCH

### About the Study

There are already many good references, including the W3C Guidelines and Mike Paciello's book, [Web Accessibility for People With Disabilities](#). The primary goals of our research were to learn about how big the accessibility usability issues are, where the problems lie, how to fix them, and how much more difficult the Web is for people with low vision and no vision or motor impairments than it is for people who are sighted with no other disabilities.

The research was conducted in three major parts: a qualitative study in the U.S., qualitative study in Japan, and a quantitative study in the U.S. The qualitative research was exploratory in nature, occurring in the field, employing the think-out-loud technique. Several user types were included: 1) people who are blind and use Braille assistive technology, 2) people who are blind and use screen reader technology, 3) people who have low vision and use screen magnification technology, and 4) people with different physical challenges, such as amputees or people with cerebral palsy and the symptoms that are associated with it.

The quantitative research was also conducted in the field, at the participants' homes, in New York City. Facilitators followed pilot-tested explicit scripts and rigorous criteria for timing tasks, counting click errors, and measuring task success. Users were given explicit tasks to try. Three user types were included in the quantitative research: 1) people who are blind and use screen reader technology, 2) people who have low vision and use screen magnification technology, 3) a control group of people who have no severe disabilities and use no assistive technology.

### Main Study Findings

There are many insights from the study, including 75 guidelines to help Web designers to design for usability and accessibility.<sup>1</sup> The main finding is that, the opportunity is certainly there but the Web is unfortunately very far from fulfilling its potential to serve users with disabilities. Inaccessible and unusable sites abound. Even sites that are theoretically accessible have low usability for people with disabilities. A few of the main quantitative findings include the following:

- Sighted participants (using no assistive technology) were about six times as successful at completing tasks as people using screen readers.
- Sighted participants (using no assistive technology) were about three times as successful at completing tasks as people using screen magnifiers.
- Sighted participants were significantly less frustrated, more satisfied, and more confident.
- Even with the prevalence of inaccessible design on the Web, participants in our study said they embrace the Web and find it helps them do many things they could not otherwise do.

## CONDUCTING ACCESSIBILITY STUDIES

### Consent Forms and Trust

Even topics as basic as trust, consent forms, and paying an honorarium, have their own particular challenges when usability testing for accessibility. For example, people who are blind cannot scan through long printed consent form as sighted users can. The facilitator must read them out loud when they arrive, unless they anticipate this issue before they arrive on site. Reading long consent forms is tedious for everyone. It's better to email it to the users first, but do it in such a way that it does not scare them off. Of course, the best situation would be to convince your lawyer to write a much shorter, and more simple consent form.

Initially, we were concerned about not having Braille consent forms. But, we found that only a small percentage of our participants were able to read Braille. "The estimated 85,000 Braille readers constitute fewer than 10 percent of the estimated number of persons who are legally blind in the United States and slightly fewer than 40 percent of the estimated number who are 'functionally blind' (defined as those whose ability to see is light perception or less)."<sup>2</sup>

We were surprised at how conscientious participants were about signing their name on the line designated for it. Some people had a signature stamp, a rubber stamp of their signature. Other users had a signature guide, basically two parallel metal sticks held together with two pieces of rubber. Participants asked the facilitator to place it on the signature line so that their signatures would be straight.

### Lights, Camera, Video

Taping video and audio during usability sessions was invaluable for capturing the information, and for presenting it later. But when taping participants who cannot see, we learned that it is important to talk to them about videotaping before you even take out the camera. Give users the option to not be videotaped, and do not make them feel uncomfortable if they choose not to be.

When going to the home of a user who cannot see, sometimes lighting was an issue when trying to take still pictures or videotape. They sometimes did not have many lights that worked, and more often had lights but did not turn them on as it grew dark during a session. At first, facilitators did not want to disturb people, or maybe we were embarrassed to tell them that it was very dark in the room. We soon learned that people did not mind at all when we asked them if we could turn on some lights. When we left sessions, we always asked people if they wanted us to turn off any lights that we had turned on. More importantly, if we moved any furniture at all, we always moved it back to the place where we found it, and informed the participant.

### The Technology

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<sup>1</sup> *Beyond ALT Text: Making the Web Easy to Use for Users with Disabilities*, Kara Pernice Coyne and Jakob Nielsen, Nielsen Norman Group report, downloadable from <http://www.NNgroun.com/reports/accessibility> (Also available as a book on tape or CD, at the same website.)

<sup>2</sup> American Foundation for the Blind, *Estimated Number of Adult Braille Readers in the United States*, <http://www.braille.org/papers/jvib0696/vb960329.htm>

It's important to have some understanding screen readers, screen magnifiers, and Braille displays before going to a session where participants are using these assistive technologies. These technologies are very intricate and can be complicated to follow when facilitating. The participants using them are very fast and don't even realize when the facilitator is completely lost and cannot follow the reading speed (nor should they care.) While the average person reads at a speed of about 250 words per minute, some screen reader users turned the reading speed up to a much higher rate than this- even up to 550 words per minute. For the untrained listener, it is very difficult to distinguish the words in the synthesized voice at these high speeds. In qualitative sessions, facilitators did sometimes accept the participants' offers to slow down the reader speed. But in the quantitative sessions, we did not. For those sessions, facilitators needed to study the sites tested with a screen reader several times before going to the sessions.

Using a screen reader before the session will help you follow along and understand what the user is doing during the session. And, if you can get a person who uses these devices to give you a demo, do it. It is extremely helpful. We conducted a few "interview" sessions before the actual studies. These were not pilot tests of the tasks, rather they were demonstration sessions during which people used and explained the assistive technologies they use. (None of the actual test participants served as interviewees.) This proved to be invaluable.

Screen magnification software has various functions, to zoom in and out, invert color schemes, etc. It would be helpful introduce yourself to these functions before the actual sessions. When using a screen magnifier, getting a sense of context when a page is zoomed way in is very difficult, even for trained users. On the positive side, since the screen is magnified, it is a lot easier for facilitators (provided they do not have low vision themselves) to see the user's screen as she works.

Keypads and other simple physical assistive devices are much easier to understand if you are first introduced to them onsite, but it would still be helpful to see and try to use these before you facilitate a session.

The following list includes information about some assistive (or *adaptive*) devices that people used in our study. As you can see, some devices are extremely expensive, which can prohibit some people who would like to use these technologies from buying them. Even on the low end of the price spectrum, we encountered a few users who, rather than buying the screen magnification software for example, are content to increase their browser default point-size to large, and sit extremely close to the monitor to surf the Web. Others say they exploit the free accessibility features in MS Windows. Several test participants did say that some U.S. Government assistance helped them in buying devices, and some people have had computers and other devices donated to them.

#### **For Vision Assistance**

- PowerBraille 80 (Braille display), [http://www.4access.com/Refresh\\_Braille.asp](http://www.4access.com/Refresh_Braille.asp) \$10,495.
- Speech synthesizer/communication tool (can be trained and used as input device) Prentke Romich Company <http://www.prentrom.com/> \$7,995.
- Braille Lite 40 (Braille display) [http://www.4access.com/Refresh\\_Braille.asp](http://www.4access.com/Refresh_Braille.asp) \$5,495.
- JAWS Job Access with Speech (screen reader) <http://www.hj.com/JAWS/JAWS.html> Free trial software download available. Between \$795 and \$1,195.
- DECTalk Express (speech synthesizer) <http://www.gwmicro.com/catalog/> \$1,095.
- Window-Eyes (screen reader) <http://www.gwmicro.com/catalog/> Free trial software download available. \$595.
- ZoomText (screen magnification software) <http://www.aisquared.com/> Free trial software download available. Between \$395 and \$595.
- MAGic (screen magnification software) <http://www.hj.com/MAGic/MAGic1.html> Free trial software download available. \$295 and up.
- Opticon (handheld scanner and reader) <http://www.opticonusa.com> \$120 and up.

#### **For Physical Assistance**

- Infrared Headpointer (input device for people with better head control than hand control) Prentke Romich Company <http://www.prentrom.com/> \$580 and up.
- Raku Raku Mouse (intended for people who cannot use a standard mouse because of hand tremors) Fukushi Media Station <http://www.fukusi.softopia.pref.gifu.jp/eng/sub/kk/kiki02.htm> About \$250.00. (29,800 Japanese Yen)
- Keypad (a plate fits over the keyboard so users with hand tremors can press one key at a time) <http://web.ukonline.co.uk/specialaccess/whatis.html> Between \$20 and \$100.

The above list is far from exhaustive. There are many more assistive devices, both low tech and high tech. In our study, some people used magnifying glasses to read Web pages. Several people with low vision had 19-inch monitors, so they could see

more of the screen at a time.

## **Testing at the User's Site**

We combined some of the lessons learned from field studies and traditional lab testing to best conduct these studies. For accessibility studies, going on site is better than using a lab (even though these are not true contextual inquiry sessions since explicit tasks were given.) The main reason going on site is important is that assistive technology is very personal and there are many preferences and settings. It's not like giving a person a different mouse or keyboard in a lab. Going on site allows you to eliminate the probable issues that will arise when the participant is asked to use a device they are not familiar with or that they have not customized. Of course, other issues arise when conducting a usability evaluation onsite, including the following:

- User has broken or slow internet connection.
- There are major and minor interruptions.
- The user has old or broken computer monitor. People using screen readers don't have a need for computer monitors, except when sighted people help them install/ troubleshoot.
- Poor lighting and uncomfortable or obstructed observation.
- Many pets, and some are very protective. (Take medicine if you have allergies.)

When confirming the day and time of the session, be sure to also confirm that the monitor, computer, and internet connection are working.

Letting a stranger into your home is unnerving for most people. Be sure to thoroughly describe the session and the point of the session, and refer them to your company website for credibility. Answer questions the participant has before you arrive on site, so they feel at ease. As for your own safety, consider bringing a second (silent) facilitator on visits. Inform the user before the session how many people will be arriving at their home, and who the people are. If you are at all nervous about a particular session, cancel it, giving the user adequate notice.

## **Tasks and Questionnaire Instruments**

Writing tasks and questionnaire instruments can also present some new challenges. For example, they need to be read out loud, and done so consistently across sessions. Tasks need to be short, memorable, and realistic. People who are blind or with low vision cannot refer back to them as easily as sighted participants. (We did consider recording the tasks on a tape recorder and allowing users to play them back. Though the user would have been more in control of referring to the tasks, we decided it would be too difficult because the tape recorder might add unnecessary complexities.) At the beginning of the sessions, the facilitators told users they could repeat tasks as many times as they would like. This was a very important step that seemed to help the sessions run smoothly.

Plan to test fewer tasks than you do with sighted users. In our sessions, people tested about four tasks, as opposed to the typical eight to twelve. The people using assistive technology took longer to complete the tasks, and did become fatigued at the end of the session.

When reading any Likert scales in your questionnaires, it's very important to repeat what the numbers at each end of the scale indicate every time you read the question. For example, say, "with one being strongly agree and seven being strongly disagree," after each question.

When doing a quantitative study, it is extremely important to discuss and clarify with facilitators what you are looking for, how to read questions, what questions (if any) they can answer, and how to answer them. When measuring task timings, success, and errors, all facilitators must run the sessions exactly the same way. Discuss when to start and stop the clock, and how to deal with interruptions. Pilot testing scripts is invaluable.

## **Facilitation**

Many usability facilitators have their own tricks for running sessions well. But, some of the cues that experienced specialists give users to get them to talk or give reinforcement without leading them will not work when testing for accessibility. For example, you cannot rely in the typical visual cues you might use during sessions. In typical sessions when I am sitting in the room with a user who is talking to me a lot (not thinking aloud, rather trying to engage in conversation) I sometimes will look down at my notepad and take notes. This usually indicates to the person that I am busy, am not going to talk, but that I am listening and getting something from what they are saying. If I do not make eye contact with them and I continue to take notes, they usually stop trying to get answers from me and they become engrossed in thinking out loud. While this “looking down” method has proven effective many times, in these accessibility sessions with users who are blind, I quickly learned that this method does not work. Instead, I tried gently repeating some of the comments I had made at the beginning of the session, such as, “I am going to try not to talk much to you and instead learn by watching what you do and listening to your comments. Okay?” Once they started working or talking I would make sure to make some noise, like scratch my pen on my pad, or when I was taking notes on the computer allowing my keyboard make the clicking noise that I usually try to muffle. This worked pretty effectively.

Like in any usability study, it is very important to monitor the participant’s fatigue level during a session. These studies are no different. For users with low vision or who have cerebral palsy, an hour to and hour and a half of actual testing time is the longest I would recommend. People who have low vision, we found, get very tired eyes after about an hour on the computer. People with cerebral palsy also got very fatigued after about an hour. Each group could probably take a 30-minute break and come back to it, but intense working for two hours seems to cause so much fatigue that it will impact their work.

As for people using a screen reader, most could work for two hours but definitely had ear strain at that point. People who use both Braille and a screen reader could test for the longest time, since they could take a break from either device whenever they wanted. They tested for two hours pretty easily.

## **Recruiting Participants**

Recruiting can be very difficult and more time-consuming than usual. Partnering with some organizations for the disabled can be effective. However, we found that the administrators and managers at these organizations were very protective of their constituents. Plan to take some time, months even, building a relationship before you can actually talk to the real users.

Look for any open meetings you can go to, and try to talk directly to the people using the assistive technology. This was the most fruitful recruiting method. One of our interns actually found a street fair for the blind in New York City, and he began the initial recruiting there.

The assistive technology users are a close-knit group. We got many referrals from people after they participated and had a positive test experience. I highly recommend you ask every participant to think of a friend or colleague who might want to be involved in your study, and ask the participant to give them your email address and telephone number.

If you are looking for users who are employed, it will make recruiting more difficult. Of course, paying users an honorarium will help. In the U.S., only one in three people of employment age who are visually impaired is employed.<sup>3</sup> The unemployment rate for people between the ages of 21 and 64 with severe disabilities is 73.9%. And, for people with less severe disabilities, the rate is 47.7%.<sup>4</sup>

Finding people with low vision who use screen magnification technology and people who are blind who use Braille technology were the most difficult people to recruit. Statistics about the use of these devices was very difficult to find, but we suspect there are fewer users, which contributed to our recruiting difficulty.

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<sup>3</sup> Braille Institute, <http://www.brailleinstitute.org/Education-Statistics.html>

<sup>4</sup> “President’s Committee on Employment of People with Disabilities, Basic Facts,” 1994 figures, <http://www.pcepd.gov/pubs/ek97/facts.htm>

# Testing More Than ALT Text

Techniques for Testing  
Usability and Accessibility

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# The Product Life Cycle and Testing for Accessibility and Usability

- ▶ Employ iterative testing and design.
- ▶ Include users of assistive technology in your user profiles.
- ▶ Plan to test with prototypes and finished code.
- ▶ If you have a lab, modify it for conducting accessibility studies.
- ▶ Encourage relationships between members of your development team and users of assistive technology.

# Trust, Consent Forms, Pictures, and Video

- ▶ Ask all users to sign a consent form.
- ▶ Read consent forms to users who cannot see.
- ▶ Offer users a copy of the consent form. Before the study, e-mail it to users who cannot see.
- ▶ Offer Braille consent forms if you can, but they are not mandatory.
- ▶ Give users an honorarium, pay it in cash, and deliberately state what bills you are handing them.
- ▶ Leave your business card with people, even if it is not printed in Braille.



# Using Video and Still Cameras

- ▶ When taking pictures or video, tell participants what you will use them for.
- ▶ Let users know when you are taping them.

# Conducting Studies at the User's Home or Office

- ▶ Conduct studies on site.
  - Let people use the technology they are familiar with.
- ▶ When scheduling, verify working monitors.
- ▶ When scheduling, verify Internet access.
- ▶ Predetermine roles if multiple facilitators attend.
- ▶ Predetermine protocol for interruptions.
- ▶ Allow time for and prepare for travel.
- ▶ When possible, take control of of the lighting.
- ▶ Tell participants if you move anything.
- ▶ Expect more animals than usual on site.

# Tips for Screen Reader and Braille Sessions

- ▶ Before sessions, study the websites you are testing.
- ▶ Get familiar with the technology before going on any sessions.
- ▶ Sit as close to the speech synthesizer or computer speakers as possible.
- ▶ Don't be overly sensitive.
- ▶ Reevaluate your methods for responding to and encouraging users during sessions.

# Tips for Physical Disability Sessions

- ▶ Carefully monitor the participant's fatigue level.
- ▶ Accept comments via word processor.
  - Be careful with family members trying to help.

# Recruiting and Preparing Participants

- ▶ Get in touch with actual potential participants. They are generally receptive, but like everyone else, they're also cautious.
- ▶ Prepare simple screening documents so it is quick and easy to recruit, schedule, or disqualify participants.
- ▶ After any usability test session, send the participant a thank-you note.
- ▶ Consider hiring interns, or even specialized recruiting agencies.
- ▶ Expect recruiting to take longer than usual.

## Study Tips

- ▶ Prepare a script and practice.
- ▶ Conduct pilot tests.
- ▶ Read tasks aloud to users.
- ▶ Review and label pictures, video, and screenshots right after sessions.

# Measurements

- ▶ Consider and predetermine any measurements you want to collect.
- ▶ Create concise rules and protocols for dealing with any measurements you choose to collect.
- ▶ Predetermine task end points.