Ears and Hair: What Headsets Will People Wear?

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ABSTRACT
Many different audio headsets are commercially available. To choose a headset for a short-term use environment, we conducted a pilot study to elicit end-user criteria for headsets. We discovered a number of severe end-user issues with less traditional designs, and concluded that a minor variant of a traditional design is more appropriate for our application than many of the more exotic options that have recently become available.

Keywords
Electronic guidebooks, headsets

INTRODUCTION
Institutions often provide electronic devices for short-term use, such as the audio tours commonly rented in museums. Such devices need to be immediately acceptable, easy to use, and suit the user's desired experience, or people will simply decline to use them. Users are particularly sensitive in regard to devices with audio headsets. For example, museum visitors may decline an audio tour because the headset looks uncomfortable or intimidating, or because they want a social experience and believe a headset will isolate them from their companions [3].

This paper reports findings from a pilot study of end-user criteria for headsets. We conducted the study to inform the selection of a headset for an electronic guidebook that is designed to enhance visitor interaction [1]; we needed to identify a headset that visitors would willingly wear and find easy to put on, and that would leave them able to converse with their companion. Since previous studies of headsets tend to focus on quantitative measures of sound quality and physical fit (e.g., [2]) as opposed to subjective end-user responses, we believe that our list of criteria will be useful for other designers. A single designer may not think of every issue — we did not think of them all before running our pilot study — and ignoring any one of these issues could lead to rejection of both the headset and the device. While some of these criteria are most applicable to rental or short-term use situations where conversation is desired, many apply in other situations.

PROCEDURE
We conducted user tests with a variety of headsets. We evaluated both one-ear and two-ear headsets (stereo sound was not required for our application); the headsets used various over-ear (ear cup, ear pad) and in-ear (earbud, ear canal plug, non-occluding ear tube) earphone designs. We observed each participant putting on the headset, offering instructions only if they failed. We then talked with the participant while they listened to audio played through the headset from a CD player. After they used each headset, we asked participants about ease of use, comfort, ability to hear and converse with us, and audio quality. After using 6-8 headsets (different participants used different subsets of a total of 9 headsets), we interviewed participants about overall preferences. Because the interviews were semi-structured, topics arose beyond our original list, e.g., perceived social acceptability.

PARTICIPANTS
We asked 5 women and 3 men from the Xerox PARC community to test the headsets. Most participants were between 40-60 years of age, the majority wore glasses during the experiment, and all had normal hearing. We chose participants according to demographics that were appropriate for our target application, although we believe the end-user values that emerged are quite general.

FINDINGS
In this section, we present the values expressed by the participants.

Ease of Use. Users want headsets that they can quickly and easily put on and take off. Participants mentioned that they may need to do this repeatedly, e.g., they may take the headset off while using the restroom.

The first problem faced by users is determining how to put on the headset. Participants were unfamiliar with many of the headsets (the exception being over-the-head headsets). Participants had several resources for figuring out how to put these on. Some headsets had affordances that helped, e.g., earbuds. Participants resorted to known models of use, often incorrectly, e.g., they put a band over their head when in fact it was intended to go behind their head. In other cases, they based their attempts on how they had seen similar devices worn; one participant correctly put on a headset, saying it was like one used by Janet Jackson. Participants varied in whether they used these resources cognitively or tactilely: some participants would studiously examine a headset before trying to put it on, while others would simply start trying different positions on their head. Participants often thought they had put on headsets correctly when in fact they had not — and in most cases,

listening to the audio did not give them a cue that they had the device on incorrectly. For example, people put on headsets upside-down or backwards and failed to correctly attach parts of headsets that were intended to stabilize the position of the headsets. In a practical situation, these mistakes could lead to discomfort and/or poor hearing. As a result, personal instruction would probably be required for most unfamiliar models.

A second ease of use issue is how easily the user can put on the headset when they already know how it is used. Some of the smaller, in-ear headsets require significant dexterity, and a couple of participants mentioned they might require a mirror to position them correctly. Further, putting on a headset involves working with ears, hair and glasses, which for some of our participants required two hands.

Public Humiliation and Conspicuousness. Users are concerned about how headsets make them appear in public. In addition to wanting to be able to use headsets easily, users want to appear competent when using headsets in front of others. For example, one participant said she worries about "feeling a fool" if she puts a headset on wrong. Others wanted headsets to be inconspicuous.

Comfort and Creepiness. Many comfort issues were practical. Headsets often interacted with head, hair, or glasses. Some people with larger-than-average head size or hair noticed a pinching with over–the-head styles (we expected people with more elaborate hair styles to be resistant to over-the-head headsets, but this did not turn out to be the case). The most unforgiving designs were those that were meant to fit specific parts of the ear, e.g., some of the in-ear devices did not fit the shape of some participants' ear canals and were therefore extremely uncomfortable. Many of these are not available in different sizes.

Participants had many responses that were more affective than pragmatic. They often stated that they did not like the sensation of the headset touching them, e.g., "[I] hate covering up [my] whole ears," or a band over the head feels "like somebody's petting you the wrong way." Several participants used the word "creepy" when talking about different headsets.

Most participants were emphatic that they do not like to put anything in their ears. Earbuds, with minimal ear penetration, were the least offensive of the in-ear options. Other in-ear headsets, such as the ear tube that fits deep into the outer ear canal, provoked very negative responses; one participant said the ear tube reminded him of earwigs in a Twilight Zone episode, while another said it felt "intrusive." Interestingly, people were not always able to predict which headsets would give them an unpleasant "in-ear" sensation. Some participants expressed surprise at how comfortable in-ear headsets were once they tried them on. However, while participants were generally willing to try on headsets in our experimental setting, it is probable that users would reject them based on appearance in an actual rental or short-term use setting.

Secure Fit. Users care about how secure the headset is (i.e., they do not want it to fall off). Accordingly, some participants expressed a preference for bands over the head since they perceived them as being more secure. On a related note, some participants expressed concern that items like earbuds could fall out while they were walking.

Hygiene. Participants valued hygiene, even for headsets that did not go into their ears. All but one of the participants spontaneously mentioned hygiene concerns, e.g., "This is a very personal apparatus. I wouldn't want to share this with a member of the general public."

Ease of Conversing. Most users found it easier to converse with us when wearing one-ear rather than two-ear headsets. Going from one-ear occluding headsets to one-ear non-occluding headsets was a much subtler improvement.

Participants had a range of strategies for conversing. These included simply talking while leaving the headset in place and the CD playing; leaving the headset but pausing the CD; flipping one headphone away from the ear; or taking off the entire headset.

Sound Quality. As is to be expected, participants had strong opinions about sound quality, disliking effects like "hissing" noises.

Sound Leakage. Headsets vary widely in the degree to which they "leak" sound into the surrounding environment. This phenomenon is often annoying to people nearby. We observed that while most headsets had some leakage (considerable in the case of earbuds), sealed vinyl ear pads had comparatively little leakage.

DISCUSSION

Balancing the above factors, we chose an over-the-head design with a single sealed ear pad. The only such commercially available headsets we could find were meant for telephone use and came with a microphone, which we removed. The resulting headset was the only design that met the minimum threshold for all user criteria. We believe that other designs are likely to lead to problems in our setting, e.g., participant objections on the grounds of comfort led us to reject non-traditional headsets with in-ear earphones, and the two-ear headsets have a strong isolating effect and inhibit the ability to converse.

To date, we have observed 59 museum visitors with this headset. Only one minor usability issue has arisen (some users position it slightly incorrectly, which causes discomfort if not corrected).

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