**1. Informed Consent**

1. Read and follow informed consent instructions.

**If they arrive with a signed consent form:**

* **“**Did you have any questions about the consent form you signed?”
	+ \*If so, answer questions\*

**If they arrive without a signed consent form**:

* “To begin, I will read over the consent form. Please let me know if you have any questions.”
	+ \*Read consent form\*
* “Do you have any questions about the consent form I just read?”
	+ \*If so, answer questions\*
* “If you would like to participate, I need you to sign the consent form.”

**2. General Instructions**

a. Read general instructions to users.

* “Thank you for participating in our study. Testing will occur in five stages. At the beginning of each stage, you will be given instructions about your task for that stage. During four out of the five stages, you will listen to and answer questions about a series of sounds that we have designed to alert users about security situations that they might experience while using a computer. During the other stage, you will answer a series of questions about yourself. After each stage, you will be offered a break. Please note that we are not testing you; we are testing the sounds that we have designed. Our goal is to improve the design of the sounds, and your feedback will help us do that. Accordingly, we appreciate your honest feedback about the sounds. If you have any questions during the study, please ask. Do you have any questions so far?”

b) Read descriptions of cyber threats/cues (see separate sheet).

**3. Measure Identifiability, Pleasantness, Urgency, and Conspicuity**

1. Read instructions to users.
* “During this stage of testing, I am going to present you with different sounds. You will also hear background noise from the JAWS screen reader. After each sound, I will ask you what security situation you thought the sound conveyed, and to briefly explain your choice. Please note that we have created several sounds for each security situation, so you can use the same answer multiple times. I will then ask you to rate the sound’s pleasantness, urgency, and clarity. After that, we will move on to the next sound. We will repeat this 9 times. If you would like me to replay a sound, or have questions or concerns, please let me know.”

b. Present 1 randomly selected sonification to the user (allow users to replay it if they so desire).

c. Ask user which threat was conveyed, and to explain why.

* “What security situation do you think the sound conveyed?”
* “Why do you think the sound represented [insert their answer]?”

d. **If user is incorrect**, tell the intended meaning and ask user for feedback.

* “The sound was supposed to convey [insert correct answer].”
* “What could we do to better convey [insert correct answer]?”

 e. Ask user to rate the sonification’s pleasantness, urgency, and conspicuity.

* “How pleasant is this sound on a scale of 1 to 5, with 1 being ‘extremely unpleasant’ and 5 being ‘extremely pleasant?”
* “How compelled would you be to react to this sound on a scale of 1 to 5, with 1 being ‘I would definitely ignore it’ and 5 being ‘I would definitely react to it?”
* “How clearly does this sound stand out from the background noise on a scale of 1 to 5, with 1 being ‘extremely unclear’ and 5 being ‘extremely clear?”

f. Repeat b. through e. for other sonifications in a random order.

g. After all sonifications have been tested, let the participant take a break.

* “That completes this testing stage. Would you like a break?”

**4. Select Best Sonification for Each Threat/Cue**

1. Read instructions to users.
* “During this stage of testing, I am going to present you with several sounds that were all supposed to convey the same meaning. As before, each sound will be accompanied by background noise from the JAWS screen reader. After each sound, I will ask you to identify the sound that you think best represents the intended meaning, and to explain why. After that, we will move on to the next set of sounds. We will repeat this 3 times. If you would like me to replay a sound, or have questions or concerns, please let me know.”
1. Present 1 randomly selected set of sonifications to the user (allow users to replay it if they so desire). [NOTE: The order of sonifications within the set should be randomized as well.]
2. Ask user which sonification best conveyed the intended meaning, and to explain why.
* “Which sound do you think best conveyed [insert name of threat/cue]?”
* “Why do you think the sound represented [insert their answer]?”
1. Repeat b. through c. for other sets in a random order.
2. After all sets have been tested, let the participant take a break.
* “That completes this testing stage. Would you like a break?”

**5. Measure Discriminability**

1. Read instructions to users.
* “During this stage of testing, I am going to present you with pairs of sounds. Unlike the previous stage, you will not hear background noise from the JAWS screen reader. The sounds in each pair will be the sounds that you just selected as the best sound for each meaning. After each pair of sounds, I will ask you to rate the sounds’ similarity, that is, how much they sounded alike. After that, we will move on to the next pair of sounds. We will repeat this 3 times. If you would like me to replay a sound-pair, or have questions or concerns, please let me know.”

b. Present 1 randomly selected pair of sonifications (randomization should be within and across pairs).

c. Ask user to rate the similarity of the sonifications.

* “How similar were the sounds to one another on a scale of 1 to 5, with 1 being ‘extremely dissimilar’ and 5 being ‘extremely similar?“

d. Repeat b. and c. for all other pairs in a random order.

e. Offer a break

* “That completes this testing stage. Would you like a break?”

**6. Answer Demographic Questions**

1. Read instructions to users.
* “During this stage of testing, I am going to ask you questions about yourself. If you would like me to repeat a question, please let me know.”
1. Ask user demographic questions.
2. Offer a break
* “That completes this testing stage. Would you like a break?”

**7. Measure Memorability**

1. Read instructions to users.
* “During this stage of testing, I am going to present you with a sound that you heard earlier, against background noise from the JAWS screen reader. After each sound, I will ask you to tell me if you remember what the sound was supposed to mean, and to briefly explain your choice. Please note that we have created several sounds for each security threat, so you can use the same answer multiple times. After that, we will move on to the next sound. We will repeat this 9 times. If you would like me to replay a sound, or have questions or concerns, please let me know.”

b. Present 1 randomly selected sonification to users (allow users to replay it if they so desire).

c. Ask user to recall the sonification’s intended meaning.

* “Do you remember what this sound was supposed to mean?”

d. Repeat b. and c. for the other sonifications in a random order.

**8. Debriefing Statement**

* “That concludes our testing. Thank you for participating in our study. Your feedback will help us improve the sounds that we created to alert users about threats that they might experience while using their computers. Do you have any comments or questions?”