

Evaluating Audio Playback on Focals in Different Ambient Sound Scenarios

User Research Plan

March 13, 2018

1.0 Objectives

The purpose of this study is to evaluate Focals' audio performance in five ambient noise scenarios. This study will evaluate different sounds that the user would encounter on a daily basis, including notification tones, a turn-by-turn instruction, an Alexa joke, and an Alexa sports score update. In ambient noise levels ranging between 40-90 dB in order to create a baseline understanding of the way each sound type needs to be tuned to be optimally audible. The following criteria will be evaluated:

- 1) Audibility
 - a) What is the minimum volume level that a tone can be heard in each scenario?
 - b) What is the optimal volume level that a tone can be heard in each scenario?
 - c) At which volume level (if any) is each audio clip perceived as too loud or uncomfortable in each scenario?
- 2) Human Voice Comprehension
 - a) What is the minimum volume level that the user understands the instruction being communicated to them in each scenario?
 - b) What is the optimal volume level that the user understands the instruction being communicated to them in each scenario?
- 3) General Qualitative Observation
 - a) Aside from audibility and comprehension, is hearing each sound type on Focals a pleasant experience?

In this study, eight participants will be asked to listen to and evaluate 5 different audio clips (three notification clips and two human voice clips) in the following ambient sound scenarios:

Scenario	dB Level
Library, bird calls; lowest limit of urban ambient sound	40
Quiet suburb, conversation at home.	50
Conversation in a restaurant, office, background music.	60
Passenger car at 65	

mph at 25 ft; freeway at 50 ft from pavement edge; living room music.	70
Garbage disposal, dishwasher, Car wash at 20 ft, food blender.	80
Power mower, motorcycle at 25 ft.	90

The user will be asked to evaluate the clarity of each sound in each scenario on a 5 point Likert scale. The minimum and optimal audibility volumes of each clip in each noise scenario will be evaluated. Qualitative feedback will also be collected. For human voice audio clips (an Alexa joke and a turn-by-turn instruction), the user will be asked to repeat the joke or instruction to evaluate comprehension.

55-85 dB (3dB between steps)...

2.0 Methodology

2.1 Participants

Eight participants will be recruited internally using selective quota sampling; participants will be from technical and non-technical departments. Although an equal number of male versus female participants is desired, we will not be specifically controlling numbers.

Sessions will take place March 19, 2018 in Laseria at SPF3. A pilot session will be conducted on March 16, 2018.

Sessions will be scheduled in 1-hour blocks. It is not anticipated that the full-hour will be required; if there is additional time, it will be used for debriefing, troubleshooting, and/or resetting the test environment.

2.2 Setup

The sessions will take place in Laseria (2nd floor, SP3). Speakers and an amplifier will be producing the sound for the ambient noise scenarios. A DVT representative pair of Focals with a production receiver will be worn by the user to play back the notification tones. The glasses will be connected to a computer which the facilitator will use to play back the tones via terminal commands.

2.3 Procedure

Upon arrival, each participant will be briefed on the purpose of the session. The user will be instructed to let the facilitator know when they hear a sound. Once ready to proceed, the participants will put on the glasses and the ambient sound scenario will begin.

The facilitator will begin to play each sound, starting at volume level 1, ending at volume level 10. The user will indicate to the facilitator at which volume level they begin to hear the sound. The minimum sound level is when the data collection will begin.

The presentation of each sound clip will be counterbalanced as follows to avoid confounding variables:

Table 1. Participant counterbalancing

Participant	Sound Order
1	ABCDE
2	BCDEA
3	CDEAB
4	DEABC
5	EABCD
6	ABCDE
7	BCDEA
8	CDEAB

A = Notification Tone, Family A

B = Notification Tone, Family B

C = Notification Tone, Family C

D = Alexa Joke

E = Turn-by-turn Instruction

The user will be asked a series of questions after they've completed the tasks in a UI and also at the end of the session (see Appendix A).

Once the user will begin to hear tones, they will be asked to evaluate the volume level and the clarity of the clip on the following 7 point Likert scales:

Overall, the clarity of the tone was:

	1	2	3	4	5	6	7	
Very Unclear	0	0	0	0	0	0	0	Very Clear

The facilitator will mark for each volume level if the user was able to hear the tone, the optimal level, and any levels that were perceived to be too loud. Data will be collected [here].

Appendix A: Semi-structured Interview Schedule

Post-Playback Questions

1. Please rate the sound clarity at this volume level:

	1	2	3	4	5	6	7	
Not clear at all	0	0	0	0	0	0	0	Very Clear

2. [For notification tones] What did you like about this tone?

3. [For notification tones] What did you dislike about this tone?

4. [For joke/instructions] Please repeat what you heard. Was the use able to distinguish the joke/instruction?