

Kate Covers Experiments Observations

Team Kate, 6.811 PPAT Fall 2014

Water resistance test:

Checklist:

1. Dummy CI
2. Paper moisture meter
3. Faucet
4. Rain covers

Expected time: 10-15 min

Steps:

1. **Static Water bead test:** A good test on any type of waterproof gear is to see if water beads on the surface to form fine droplets. If droplets bead, this is a sign the gear is waterproofed and is repelling water. If gear doesn't bead but 'wets out', darker patches are seen where water is being absorbed through the surface. The test was done as follows:
 - a. Put paper towel in between implant cover
 - b. Let drops of water sit on cover (10s, 10min)

Observations: No wetness found on the paper towel.

2. Paper towel, paper inside the cover - **Faucet experiment:** Take a piece of paper, paper towel or anything else that will show when it gets wet, and close it inside the case, place the cover under a faucet and see how much does the paper gets wet using a paper moisture meter. The test was done as follows (mild version, instead of faucet we did it by flinging water by hand):

- a. Put paper towel under the implant cover
- b. Place implant cover on vertical surface
- c. Simulate rain by flinging water

Observations: No wetness found on the paper towel.

Sound directionality quantitative:

Play different tunes at specified frequency at different angles and see if Kate answers to them.

Perform experiment in an anechoic chamber and tabulate the amplitude results from Kate's responses.

Checklist:

1. Relatively quiet environment
2. Laptop
3. Video camera
4. Sound covers

Expected time: 20-30 min

Steps:

1. Make Kate sit at a fixed chair at a particular angle in the middle of the tables on all of her four sides
2. Choose a horizontal place (table) and construct spokes at 45 degrees of each other (total 8 spokes)
3. Place laptop, open: http://www.audiocheck.net/testtones_hearingtestaudiogram.php and start playing the sound files from TOP for each frequency, till you reach concurrency. Determine the threshold for each and record it in the table below.
4. Repeat the test, without and with covers

Observations:

Trial 1 (without covers):

Angle	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
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0	70	70	60	60	50	60	60
45	70	70	70	60	50	50	70
90	70	70	50	50	50	60	50
135	70	70	60	60	50	70	70
180	70	70	60	50	50	60	60
225	70	70	60	50	50	60	60
270	70	70	60	50	40	60	60
315	70	70	70	60	50	60	50

Trial 1 (with blue covers):

Angle	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
0	70	70	60	50	40	50	50
45	70	70	70	50	40	50	50
90	70	70	60	60	50	60	60
135	70	80	60	60	50	60	70
180	70	80	80	70	50	60	70
225	70	80	70	60	50	70	60
270	70	70	60	60	50	60	60
315	70	70	70	60	50	50	50

Trial 1 (with rabbit covers):

Angle	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
0	70	70	60	60	50	60	60
45	70	70	70	60	50	60	60
90	70	70	60	60	50	60	60
135	70	70	60	60	50	60	60
180	70	70	70	60	50	60	60

225	70	70	70	60	50	60	60
270	70	60	60	60	40	60	60
315	70	70	70	60	50	60	60

Sound directionality qualitative:

Have a conversation with Kate on two different topics (Where you grew up?, Favourite place to travel) for 3-5 min each and collect her qualitative feedback.

Checklist:

1. Team members situated at different angles (except Dhruv) and Kate
2. Two scenarios: Noisy (restaurant having brunch, and quite – MIT/Jenny Home)
3. Video recording for transcription, note taking
4. Sound covers

Expected time: 20 min for each environment.

Observations (Quite classroom, blue covers):

Q1. How was the experience on using the covers/without the covers?

The loudness and clarity was better. It feels clearer.

Q2. What/Who were you able to understand and who were you not? Why do you think so?

Everyone were okay with/without covers. (Might be due to learning effect of us interacting with Kate over a long time. There's insufficient time to do this in a controlled study)

Q3. In general, were you able to understand people from behind?

We didn't speak from behind her.

Q4. In general, were you able to understand people from front?

Already answered.

Questions (after both the scenarios)

Q1. What worked well with the covers and what did not work well? Why?

Q2. In what ways, was the experience different?

Already answered.

Q3. How was loudness/clarity of people from front/behind different with/without the covers?

Clarity improved. Amplifying the sound around Kate

Q4. Were they comfortable to wear or not?

“I don’t feel them at all. But, they might fall off”

Q5. Any more future design implications?

Team: They are fragile right now. Break very easily. Would like to have a sturdier one.

Observations (Restaurant, blue covers):

Q1. How was the experience on using the covers/without the covers?

Kate herself commented (without asking) that the covers were very good. They help amplify the voice close to her (in front) than the other voices (background) noises.

Q2. What/Who were you able to understand and who were you not? Why do you think so?

Observation: Hard to understand you, Dhruv. Gets harder with background noise. But, that’s nothing to do with CI covers. Others were fine both with and without the covers.

But, Kate said that covers made her put a lesser effort.

Q3. In general, were you able to understand people from behind?

Invalid for the restaurant. We couldn’t test with speaking behind her.

Q4. In general, were you able to understand people from front?

Already answered.

Questions (after both the scenarios)

Q1. What worked well with the covers and what did not work well? Why?

Q2. In what ways, was the experience different?

Q3. How was loudness/clarity of people from front/behind different with/without the covers?

Clarity improved. Amplifying the sound around Kate

Q4. Any more future design implications?

Intactness quantitative:

Checklist:

1. Define headshakes
2. All prototyped covers

Expected time: 10 min

Steps:

1. Define different headshake positions and determine if the covers fall on that particular headshake. Try to make the head shake consistent with every prototype we test.
2. Do the same for with and without cover(s).

Observations:

Covers	Headshake	Fall?
Rain covers	Vertical up and down	No
	Horizontal swing	No

	Clockwise roll	Yes, sometimes
Sound covers	Vertical up and down	No
	Horizontal swing	No
	Clockwise roll	Yes, 1 out of 3 times

Conclusion: We will not be able to target attachment well.

Diary study:

Checklist:

1. Give covers to Kate
2. Give questions list to Kate

Steps:

Give all instamorph covers to Kate, ask her to record her observations during the meeting.

Possible questions to consider:

Direct Responses from Kate:

Q1a. How was your experience on using the sound proof cover (s)? and the rain covers?

I love the little "sound cups"! I find that it is considerably less difficult to hear the person I'm looking at when I am wearing these, particularly when there is background noise. It appears to give a volume boost to the sound source that I am facing.

Q1b. How was your experience without using the covers?

The covers are really cool and fit the processors quite well. I did make a suggestion to Jenny when she dropped them off -- the cut out for the cable needs to be a little bit wider, which more room toward the top. As it is right now, I worry that the cable will be torn by the plastic. This seems like an easy fix, but I've only tested these a few times because I don't want to risk cutting into the cables (they are the only set I have). The rain covers didn't seem to affect my hearing all

that much. They may have made background noise a little more uncomfortable (I tried them in a loud restaurant), but they don't seem to have any negative effects on my hearing walking around outside, etc. (in the situations in which I would be wearing them).

One major consideration that we need to address is that they become physically uncomfortable within about 10 minutes, because the edges are sharp. After sitting on my ears for a while, I start to feel the edges that touch my outer ears. This could probably be solved by sanding the edges.

I have not tried them in the actual rain because, as you know, one has holes in it and I'm hesitant to test them on my real ears before doing so on the demo ears.

Q2. (Sound directionality) What kind of people were easy to listen to? What kind of people were you not able to listen to?

The sound cups allowed me to hear the person I was facing much better. I love that it gives me a little bit of control over who/what I want to hear best. I feel more confident in traditionally difficult listening environments (where background noise is present, which is the case in almost all social situations).

They would not be helpful for hearing people standing to my side or behind me.

Q3. (Sound directionality) Were you able to listen to people from behind with the covers? Was there any difference in loudness/clarity?

I can listen to people behind me if it's a very quiet environment, but it's more difficult with the sound cups than without (which is exactly what I was hoping for!). I definitely feel like there is a volume boost in the direction I'm facing, which allows for greater clarity and better speech discrimination.

Q4. (Sound directionality) Were you able to clearly listen to people from front? Was there any difference in loudness/clarity?

(See above!)

Q5. (Rain covers) If willing to test: Did the water surfaced in when sweating/walking in rain?

Was it different from without covers?

I'd want to test this on the demo ears first!

Q6. Did the implant drop sometime? If yes, how many times? Please record as you go.

The processors did not fall off in normal use at all! I shook my head pretty vigorously to see if they would fall off, at which point my right ear fell off

Q7. Other than that, what went well?

The designs are cool. The sound cups are a little loose, particularly on the left side, but I love the simplicity of them. I don't even need to take my ears off to put them on!

Q8. What did not go well?

The edges of the rain cover are too sharp as they are now. Also, there are holes in the right one due to thin plastic.

Q9. What are your directions for future?

Perfect the rain cover! Perhaps try sanding the edges or seeing if they can be printed with softer edges. Add the waterproof cloth to the backs.

If possible, it would be cool to create a mould for the sound cups.