# Transcript – part 1

Interviewer

Alright, this is the recording for Participant 2 exit interview and this will be part one of the recording as well. Right, so first we're going to begin by discussing last week. How was your interactions with the objects in the past week? Was there anything in particular you liked about it or maybe disliked about it?

Participant

It so yeah, so I mean, it's definitely not some other way of interacting with your device, right? So there was a bit of a learning curve first, I mean, I think that was mostly over by the time I left your office. Like it was, I found it annoying when it would, like when it failed, right? So like you'd go through the three attempts and, oh well, that failed. I didn't quite. It was like challenging, but there are times when it would just. I think more often than not, it would just happen at the first try I'd get it right. But it didn't. Then it really made you sort of stop and think I have this phone on my desk, entire time that would always ask on my desk. So I was never really asked the time when I wasn't in that situation. I was either working or just relaxing though at the desk and so yeah, well, it wasn't a disturbance. It wasn't bothering, it was just kind of a bit of a trial and error process I felt. The main annoyance I suppose was the fact that I kind of had to, you know, create a bit of a jig with my fingers, to make it work right. And so I'm gonna hold it down in two ways that it wouldn't move 'cause I mean it's like plastic smooth plastic on smooth glass surface it slides. I don't think it would have matched which orientation it was in. I was holding it in like this one most of the time bracing it with my fingers like that. I think the most annoying fact was that it moved so easily. Overall, getting the contact to work and then authenticating was quite. It was perfectly fine and as we were using the two fingers right that was great. That was pretty easy.

Interviewer

Let's see, was there anything you noticed that went wrong with the model?

Participant

No, I mean, obviously, I mean, as we know, uh, the square, right? The confirm button, that didn't work. So I was using the double tap. That was the one thing. I even used, there are like apps to test whether touch screens are working, so they're ready. So like they kind of display every single touch, just trying to get it to show both. I couldn't really get.

Interviewer

I thought it was very strange. I was I gotta say like it was working on the phone that I was testing. I don't know, maybe it's just my screen.

Participant

Yeah, different touch screens, different devices. But no, I mean the authentication itself that worked flawlessly, yeah, I'd say there's no issues with that. I mean yeah, nothing went wrong other than the fact that it's a very slightly. Yeah, these are quite annoying too, the most annoying thing was that when I used the phone was that the edges right they're like, curved. That is going to make it a bit harder.

Interviewer

Yeah yeah, so was there anything that that prevented you from using the model at all?

Participant

No nothing really prevented me, I think. But it would be a different situation. If it was my the phone that I used all time and I was kind of out and about. I mean, right now, all my work from home and my most regular commute I do is to the gym daily and I don't bring this device with me then. So I think it would be a different story if it was a situation which I was, I didn't have something to rest on to do it right in a table. I think would be pretty much impossible to do this like free hand, you know it's I mean I guess we could do that, but like it would have been, being honest, I think that would be more annoying. You know or if I was in a lecture theatre, you know? Yeah yeah, yeah. So in the current situation, no it was great, but I think it would be more it would be harder in different situations.

Interviewer

So for the most part you, when you had to do authentications it was just all at the table.

Participant

Yeah, I was in my room essentially. So it wasn't really, um, it, yeah? It was pretty convenient to do. I'd rest it, I'd do it in the most stable way possible, so I put it on the side table at my bed or.

Interviewer

So, going away a bit from script, in the cases where you would be authenticating things. Do you think for the most part you would just generally be at a table anyway?

Participant

To be honest, yeah. I'm trying to think of situations in which I wouldn't be, I try to mostly use my device when I'm gonna be sat down and exactly like if I'm going somewhere with my phone I'd just be using it to play music or also text my girlfriend with, family or something? I wouldn't really be accessing anything that would require like high level security. You know, maybe like encrypted chat, they you know if it wasn't on that, but I would. I guess to be fair I do often access my bank when I'm on my way to the shops or something. For example, you know. So maybe that would be a situation in which that would happen, in which case I would probably require it to be more convenient than that. It's easy when you can just go and just tap and authenticate, you know so. Probably be a. I don't know it would. I think it would require a jig of some sort you know, so it couldn't move.

Interviewer

Yeah, yeah, so you've already touched on it but what did you think about the shape and the size of the item?

Participant

Yeah, I think I mean for convenience point of view, I think a card is great. I mean yeah you mentioned it was a bit thicker, but this would still fit in most wallets. I don't think this would be an issue. I don't think, if it served the genuine purpose, I don't think anyone would be annoyed about carrying this around, so I think this kind of shape and size is great. I think you could definitely modify. The objects a little bit perhaps if it had, for example, that little, if they had embedded rubber feet, didn't add any depth, but they also stabilise the device. That could be an interesting addition, something like that or say, something supposed to hold it to the device you need. If it had a jig to hold it in one direction, right? So it could slide up and down, but it couldn't go from side to side. Yeah.

Interviewer

Almost like a clip.

Participant

And then you see those kind of phone screen protector applicators you know just kind of go over the entire.

Interviewer

Oh yeah.

Participant

Device, although that would be hugely cumbersome. Maybe it would fall down or something. I don't know. But something to hold it on the device would be nice, so there wasn't sliding about the phone, right?

Interviewer

So if the item itself was a commercial product? Would you consider buying it for your authentication purposes essentially?

Participant

Yeah, I probably would. I suppose I'm quite, for a CS student, I'm pretty relaxed, I don't have much like, of anything to warrant or be for sure to be worth stealing or worth, you know, hacking. So I don't think I worry too much about it. I suppose something I'd probably worry more about sort of, for in the future or actually for when, you know, I've started saving up money and stuff, but not just kind of spending on food immediately. Yeah, I could see myself. I would be if it was more convenient, probably I would. In this state it's kind of a nightmare and it's kind of like those bank things some people have to log in. You know, like the card things I mean my bank doesn't have that, but I've seen other people have these. It's the kind of thing you'd leave at home if you didn't take with you, you know. But I would consider one of these for home use, but I wouldn't consider it for regular use.

Interviewer

Yeah OK, that makes sense. So just moving on, we'll talk about two factor authentication in the more general sense. I imagine you are, but are you familiar with other two factor authentication methods?

Participant

Yeah, yeah.

Interviewer

Which ones have you sort of used most frequently?

Participant

Google Authenticator is the main one. I mean then we all know like for texting but they text your number or they call you yeah. Well, I mean I'd say, I'm forced to use the texting one by companies I'm signing up for that, and then I choose to use Google Authenticator for things like, things like wallets and things like that, yeah, yeah.

Interviewer

Yeah, so would you prefer to use this method over these other two factor authentication methods that you've been using?

Participant

I think it would depend on the situation, but there was. There are some situations where I could see this being more beneficial, it's a bit. I think it's much more convenient to use when they're physical. When they're not in software, right the fact that this doesn't have to require a charge to interact with the device is quite nice. I don't know how it would work for like, trying to access like crypto wallet using these right? I don't know how it would work, but yeah, I can see that being a bit more reassuring. Having a physical object, I mean of course, you know as you said like you're right, this is like the key but you also require the passphrase you know, on top of it so someone get hold of this they couldn't just, you know, access your funds so. I can see it being useful or I can see it being a way of authentication. I definitely wouldn't want to rely solely on this yeah, well like you know, just as I don't rely on current authenticators, yeah.

Interviewer

So sort of a case of maybe more. At home you would use the models because you're less likely to forget them or it's just easier to store.

Participant

Yeah exactly yeah so as you say, yeah, it's hard to forget your code, the one the code you gave me for this is it's really quite easy to remember and yeah. I can't see it, I don't know what exactly the specifics are on this being easily like a brute force yeah yeah. So I don't know how is that, how easily, easy to do?

Interviewer

That I'm pretty sure that's got infinite password space.

Participant

Yeah, OK. So then you have. Yeah yeah yeah. So like from that point of view it's great, and the fact that it's physical, you can put it somewhere, you can lend it to someone you know without you know giving them the code so they could keep this for you and have not. You know, not access the link back to you and you'd be able to use it like that right?

Interviewer

I suppose is there anything that you would preferably have changed to make it more attractive for using a commercial sense, or not a commercial sense we've moved past that, over other two factor methods, yeah?

Participant

So I think if it was like just hands down more convenient. It would be much better, I just had to kind of stabilise it and if you could kind of hold it down and it doesn't move it'd be even better because it can move and slides in both ways, you know. That would be nice. And as I said, the thickness, I think is probably acceptable, but if you can get it even thinner that would be great. I did worry about it actually breaking, but never managed to break it. You wouldn't be able to.

Interviewer

No, it's very strong.

Participant

Make this yeah, you wouldn't get it to break. This, like in the same way that you think, it's like a credit card, right? Hard to break but breakable, you know. Yeah, I mean I felt like sometimes it wasn't registering my touches and I felt like sometimes it just wouldn't authenticate when I personally felt like it really should have yeah. I mean then again I have no, I don't have access to the app debugging stuff. I can't see if it should have actually registered that and stuff so I don't know. What would make this more attractive? I suppose if it was. One thing that would make it more attractive is if my bank required it. Like if the bank turned around and said yes you have these like they said that at some point you the card like thingies. Yeah then yeah I would have it.

Interviewer

So, so you'd accept in a situation where you have to use it that you would use it no problem.

Participant

Basically, yeah, I if it was this one, I don't know if I would consider changing banks, but like you know it's yeah, if I had to use it I'd use it. But in at this stage I probably wouldn't because of how inconvenient it isn't, but as you say, like if it was at home or something else it would actually be quite nice. Peace of Mind for peace of mind you know.

Interviewer

Yeah, it just needs a bit more development to make it.

Participant

Although it would be nice as an alternative, you know? Like like. It's like a key instead of how using your fingerprint right? Like I'm connecting the dots is or the passcodes on Android instead of, you know fingerprint, that could be the equivalent of using the dots or your password, yeah?

Interviewer

Fair enough. Right, I think you've already touched on that tiny bit before, but how secure does it actually feel to use this item?

Participant

It doesn't feel secure. It feels like I realise how secure it is and like it's really secure. It's great, but it doesn't feel. It feels like a it feels a bit like a toy. And it feels a bit. It's a little bit jarring, but I realise how secure it is and it is quite secure. But it doesn't necessarily feel it.

Interviewer

It's sort of that the security sort of feels detached from the object?

Participant

Yeah, definitely. Also, the fact that you know the passcodes, I mean it can be quite simple, this is. It can be quite complicated. You know you couldn't really rely on that, but so in a way it's not. It abstracts the kind of complicated because we kind of associate security with, you know, a really annoying password to remember, or you know a program choosing a passcode for you then you need to remember if you go back. And like a really complicated string, right? That's a pain in the \*\*\* so in a way, it's quite nice to have something so simple being so secure, but another. It's quite jarring in comparison to everything else that we have.

Interviewer

So just sort of from what you're used to it. It feels like having this simple method of authentication is just not as secure as other complicated methods.

Participant

Yeah, it's a bit counter intuitive in that you know we're told security is this that and the other, anything and they're really not. And then you get given these this little simple plastic and it solves all your problems.

Interviewer

That's quite interesting actually. So what types of services would you actually consider using those for?

Participant

I probably wouldn't use it on like daily things like nothing quick. Nothing like logging into my phone or if it was logging into my personal machine, but it would if it was like logging into like my work machine like I'd get that this would be a down sight simpler than like everything I had to do when I was like interning at a bank like that was just annoying, you know? This would be much better. I'd have killed to have this when I was working in this in this company, so if it was a work machine. I definitely consider it and I think it was kind of above me in terms of security, right? Like a bank like I was looking into my bank or, you know? If it was to do like transaction that was kind of like maybe, that pay like on in the order of paying rent right or transferring large sums of money then yes, I could consider that yeah. So nothing quick. Something that had to be secure or something that was kind of above being mandated securely prefer this than re entering like a couple different passwords and things like that, you know.

Interviewer

Yeah, right, and sort of assuming that any device could use it which devices would you consider using it on?

Participant

I'm not sure if smart phones is the best place to use it. I see the value of the smart phone for it though, 'cause you've always got on you. You know that yeah? If you could work like you know, I'm not saying it would, but if it could work with like a track pad that would be kind of cool. Yeah, 'cause? You know, but then, like what about desktop computers? That kind of thing? So, so I think we're thinking we would have to have like a smart phone or tablet kind of thing, right? And if you could then use that to authenticate like a system on a desktop or laptop right now.

Interviewer

Well, maybe just sort of assuming that you have some kind of a touch screen attachment.

Participant

Yeah, that would be quite nice. I could. I could definitely work. I guess we have those kind of track pads like plugging USB like something like that, you know that we don't. No. Yeah, I think that would be better to use it. If you could get it working like with desktops. It would be nice to use 'cause there's nothing you can do. A smartphone is where I want to do it this is what I want to do with this you know, like. Annoyingly, my bank only has a smartphone app, it doesn't have a website or anything. Yeah, so in that sense I'd have to use the phone to do it, but the more traditional bank like you know, like, it's my online bank I do everything on but if, I have, if I was using my bank of Scotland account then I'd rather just authenticate here and then do it there so if this could be so, this could be used as like. I don't know how you call it. If the authentication was done with phone, but the actual work, if it authenticated something on the desktop that would be quite nice, you know.

Interviewer

So, so again, it would sort of be best used for more stationary things, essentially.

Participant

Yeah, like if I was to use it for something that. Like I could do on my phone with fingerprint then? Yeah, so if someone was, yeah. If fingerprint was removed and exchanged for this I'd be quite annoyed on my phone. Things that you can do with your finger print, I probably wouldn't want to replace so. It's hard to explain, but I wouldn't want to have to exchange the convenience of just that with then you know, entering my passcode, you know that would be a bit of a bit of a bound right up there.

Interviewer

Yeah.

Participant

But that would be more overhead.

Interviewer

Right, that makes sense. So all very nice insights. So for now I'm just going to stop the recording just here.

# Transcript – part 2

Interviewer

OK, this is Part 2 of the interview for participant 2. Perfect OK. So obviously during a study you only use the one objects. Now you've had the chance to use the other two that were designed. What do you what do you think of them? Basically, which would you prefer to use and why?

Participant

Yeah, so I think I'd choose different objects depending on the situation, right, or like the criteria right? If it was for like convenience of like carrying it around, I would much rather that the credit card kind of model and pendant model. I can see the pendant model if it was kind of used, it was implemented in a slightly different way. For example, if maybe the central thing was like on one of the sides you know. Obviously you couldn't use that one to like authenticate, right? But what I mean is move the other ones have the pinhole in there but this would, lay weird on the chest, feels like I can place on here if it was coming that way. It would be much more. Even really, just leaning in to you, even though right. Like there if it was smaller as well that so, so I think kind of this would be, the pendant would be an incredibly convenient model if it was kind of in a slightly different way, and I can see the I can see this current lock mechanism being quite reassuring from. You know, we discussed like this doesn't look like anything you used to authenticate. Well, I don't know, like a library card, perhaps, but you don't use it this way. Yeah, so if this was like a padlock style as it's been implemented here, it's kind of, it references things that we know already, right? Yeah, there's a very usability heuristic in.

Interviewer

Yeah, it's more familiar for security.

Participant

That I suppose so. I like this kind of a die model, I could see using it on like a desk or something? Yeah, it's it seems like stamping right seems much more convenient than you know, rotating on the card and you know it almost looks pretty, you know. It would be really inconspicuous, noone would have any idea what it is. Well, no, they would. They would have no idea that it was used to authenticate. I think every model has it's advantages in this current situation, I'd probably just rather keep the card just 'cause you could put that in your wallet. But I said, like I don't know if I'd want to have it in my wallet I probably use this at home, you know. Yeah, yeah.

Interviewer

That that makes sense. Is there any sort of particular thing that stands out on any of the other two models that you don't like in general?

Participant

Yeah, like I referenced like on this model like what I don't like is that if it was to be used like a pendant, it's kind of the wrong rotation, like it's kind of like, I probably want it as flat as possible against my chest.

Interviewer

You can sort of see that that one I had to do a bit of work to make that work yeah to make it bigger. I wanted it a lot smaller than that, but.

Participant

Yeah I can also see how this one here is like the one with the most engineering, I suppose, right yeah.

Interviewer

Yeah, there's there's four separate parts for that.

Participant

The pillar, and then the rings. Yeah, actually yeah, and like it's complicated. I'm amazed that it even works. It's kind of miraculous. So it's this is an achievement in itself. But I think, uh, the pendant. It would be a bit weird, I don't know it's like it's a padlock. Since you wouldn't wear a padlock or for people to wear this and that's that was kind of, yeah. So I mean, this is very important as the only thing that I dislike about this is that it's got sharp edges.

Interviewer

Yeah, it could take your eye out.

Participant

This this is totally yeah, here's something that would hurt it, isn't it? It has a bit of weight to it too, it's impressive in in that sense. It's quite cool, it's it feels like a real dice, but yeah, the sharp edges, I mean, but that's just nitpicking, I have no real issues with that.

Interviewer

Alright, fair enough. So to sort of sum up that I guess overall you still prefer the credit cards.

Participant

Probably yeah, but that could just be bias from having it for the week, you know.

Interviewer

Yeah, that's that's why I've got multiple participants.

Participant

That's very true. But I do like the credit card. It's nice and convenient and like it's I can see the reasoning behind it, you know. Yeah, yeah, this seems like. I mean, this seems like a bit of a stretch and it's really cool that it actually even works at all to me. [Die] And this is just impressive, but I'm not sure if I'd like want to use it. [Pendant] It feels quite, you know, like just point out it doesn't feel like it would break, which is what you expect something with this much, you know, movement. Everything moves, with respect to each other, you know? That's kind of cool.

Interviewer

Yeah, fair enough. I suppose it might also be worth talking about. Again, the sort of how secure they feel you mentioned the pendant one seems very familiar as a security object, so it feels quite secure, yeah?

Participant

Yeah, this feels really secure. Of course. Yeah, if someone actually. Yeah, the issue with this one right would be that if someone actually cares to break into your stuff, you can just take it apart and see what the code would be, right 'cause it's physically in there the code, right? It's there recorded through their little conducted dots. So in a way, it's probably the least secure one. Like if it was a, if someone actually cared, if someone tried and they figured out and this was like well knowing what these things were. They were like little conductive recorded passwords. As cool as it is it actually is still storing the password. Whereas in this one and this one, the password is. It's in your, you know the password it's and you're using this as a tool to put it in. This one has the password so.

Interviewer

It's quite a strange thing 'cause the credit cards seems the least secure, but actually is the most.

Participant

That here.

Interviewer

Where the pendant seems the most secure and yeah kind of is the least.

Participant

Yeah, I suppose so yeah, you'd have to know what it is in the first place though, but then with the numbers. It does just give off that it's a padlock pretty much like an invite.

Interviewer

Yeah, that's true. Assuming that these were a widespread thing. Do you think that that would become an issue?

Participant

Yeah, I think the moments when you, know what this was it would be free to. I mean it's you know I wouldn't just do it myself but you know you could just get in there. I'm assuming that you know anything small enough to like a nail, probably. Maybe they'll just take it apart and you get the code and it probably wouldn't be so hard to put it back in again.

Interviewer

Yeah, I mean, as it is quite difficult to pull it apart, but it's possible. It's absolutely possible.

Participant

Oh it is. Yeah, I suppose without breaking, it wouldn't even matter if you break it you probably all you need would be to put in the current through.

Interviewer

That yeah.

Participant

Essentially so. It's funny. You probably just need the bottom ring.

Interviewer

That's quite interesting. Right, so I think that's more or less everything for the models themselves. Now I did also get some feedback about the app from my last participant as well. Is there anything in particular about the app itself that you might want to bring up?

Participant

Yeah the only issue I have with the app is that if you're in your last attempt you can't tell whether or not you succeeded or failed right that from this point on you could only bring up the pop up, you know. And the pop up doesn't actually tell you whether or not you succeeded or failed, yeah, that's my one issue. Uhm, other than that the app works just as you'd expect. I mean, yeah, it doesn't have back button stuff working.

Interviewer

Oh, that was on purpose [so as not to interrupt data collection].

Participant

OK, so I mean, yeah, um from that point. I didn't really explore the app, I didn't go to settings or anything, I just authenticated so no issues that it worked as expected, just it would be nice to add a bit more feedback, you know like that.

Interviewer

OK, bit of feedback on the app 'cause you just can't tell whether you actually authenticated. Yeah, so obviously these models they've all been 3D printed and the big part of the idea of tangible objects for authentication is 3D printing. So I was just curious about my participants. How many of them would consider owning a 3D printer in the future?

Participant

Yeah I think, you know if it was a situation in which I had the time and the money I can see myself getting a 3D printer. I have no immediate need for one but then again, as you say, if this became. Like if there was a. If. I've raised my concerns, if these concerns were solved, I would definitely want one of these, you know. If I if. You know would I want to pay someone else to print it for me or would I want to use a shared printer? You know, security implications of printing out a password essentially or an authenticator on, you know, someone else's machine are obvious but so maybe. I wouldn't just get it for one of these I don't know, I've never really been that interested in it. I've seen friends who graduated recently, he got himself a printer and he's been having fun with it. I'm not sure if I would, imagine it being a bit finicky and stuff. It sounds really fun. I saw that you can get rainbow filament. That sounds very fun. Yeah, yeah. Sounds great, but yeah yeah, and I think the technology is also a bit far off, you know, in fact I don't know what printer this guy has, or what kind of printer you guys have. I’m not sure exactly how they work but they're kind of rough. I mean, they're really impressive. All the pretty printed objects I've held. This is the coolest one. I also had a 3 D printed Frisbee holder swing cord that kind of works in it'll kick, but it was a bit of a bouncy material, so the segment hooked underneath and the Frisby wouldn't move out. You know it's like one of these ultimate frisbee discs. Yeah, so that was great. That's nice, I've had like a like a model gun. Obviously not working like. Like an old fashioned revolver it's interesting. It's really intricate when these 3D printed objects have moving parts, this had a, moving, moving barrel yeah I suppose yeah I was seeing trains and objects with objects that move inside of them. Things like that. Those are all really cool, but I don't think it's for me, no.

Interviewer

Yeah, do you ever think that maybe in the future they'll become a lot more widespread? You know, people will have them in their homes, like with paper printers. Or what do you think about that?

Participant

I think as they get cheaper, they'll become less novel and I think you know people might have them if they had a hobby that involved one, I think it'll stay within that realm of necessity and hobby. I think you know, I don't think it'll become more of a tool. Well then, so not everyone. I don't think it will be something that everyone has. I think you know you'll probably get places that pop up like Laundromats that offer printing you know things like that, and I think you'll also get people who have a hobby like I can see people in like the modelling communities and some game communities I suppose you know the printed like Warhammer, that kind of game I'm thinking like. Yeah, arty enthusiasts. You know. Printing plain parts. Or you know carved. Like things you know. So I can see it being really useful for that I could see it being useful for things like, you know I could see that there's obviously potential medical applications you know in dental applications for yeah. I think if it was good enough here for garages and things like that, you know I don't think it will be, you know, a household thing I think we're already so far I hope that I never have to own a [paper] printer in my life you know like yeah so I think we're already getting away from needing printers and I just think I don't think we'll ever need a 3D printer either. I think it would be like a hobby thing, but in that sense I hope that I can expect them to get way, way, way better on that, you know and yeah, I just don't think it'll become a household thing.

Interviewer

That makes sense. You, you mentioned the sort of idea maybe having little copy shops for the 3D printers as well. That's a. That's a sentiment I've heard quite a lot, so yeah, that that makes sense actually and everything very helpful. So this is all of the all of the questions that I wrote down for this. And once again, I will just say all of this stuff. It will be an anonymized, I've messed that up twice. On recording as well and all that will be anonymized. The recordings will be deleted and after being transcribed you know your name and everything that's going to be removed from all of the data, except the consent form which I need it for. So thank you very much for your help. I'm going to stop recording just now.