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Conversations With Our Apps

Exploring the social context of communicating with technology

Master's thesis

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Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
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3. I fully agree to my work being used for study and scientific purposes.

In Prague on July 27, 2021

Rebecca S. Vaughan

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Abstract

The words and messages in apps are part of a conversation between people and their technology that we take part in every day. As technology becomes increasingly embedded into our daily lives, we form relationships with our devices and our apps. While we might think of these relationships as different, our behaviors and interactions with technology are still shaped by the social world, and these messages found in apps are based on existing patterns in face-to-face conversation. UX writing is the process of creating these messages in user experiences, which facilitate people's social interactions between apps and other digital products. Interacting with apps and other digital products is inherently social, and by using conversational language as a driving component of UX writing and Human-Computer Interaction, we can also cast User Experience (UX) as a type of communicative exchange between a person and an app, and therefore *User Experience (UX) as conversation*. Through qualitative interviews and usability testing with native and non-native English speakers, this research explores what type of language style works best for a global audience in these conversations with our apps and how we can strategically apply conversational patterns to improve the experience of users.

Abstrakt

Slova a zprávy v aplikacích jsou součástí konverzace mezi lidmi a jejich technologiemi, které se každý den účastníme. Jak se technologie stále více začleňují do našeho každodenního života, vytváříme vztahy s našimi zařízeními a našimi aplikacemi. I když si můžeme tyto vztahy představit jako odlišné, naše chování a interakce s technologií jsou stále utvářeny sociálním světem a tyto zprávy nalezené v aplikacích vycházejí z existujících vzorců osobní konverzace. Psaní UX je proces vytváření těchto zpráv v uživatelských zkušenostech, což usnadňuje sociální interakce lidí mezi aplikacemi a jinými digitálními produkty. Interakce s aplikacemi a dalšími digitálními produkty jsou ze své podstaty sociální a pomocí konverzačního jazyka jako hnací součásti psaní UX a interakce člověk-počítač můžeme také uživatelskou zkušenost (UX) vrhat jako typ komunikační výměny mezi osobou a aplikací , a tedy User Experience (UX) jako konverzace. Prostřednictvím kvalitativních rozhovorů a testování použitelnosti s rodilými a rodilými mluvčími angličtiny tento výzkum zkoumá, jaký typ jazykového stylu funguje nejlépe pro globální publikum v těchto rozhovorech s našimi aplikacemi a jak můžeme strategicky použít konverzační vzorce ke zlepšení zkušeností uživatelů.

Keywords

User Experience (UX) ● UX writing ● Conversational Language ● Social Construction of Technology (SCOT) ● Speech Acts ● Maxims of Conversation ● Sociology of Technology

Klíčová slova

User Experience (UX) ● UX writing ● Konverzační jazyk ● Sociální konstrukce technologie (SCOT) ● Projevy řeči ● Maximy konverzace ● Sociologie technologie

Title

Conversations With Our Apps: Exploring the social context of communicating with technology

Název práce

Konverzace s našimi aplikacemi: Zkoumání sociálního kontextu komunikace s technolog

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Contents

Introduction

When people use apps, the words and messages that we see and interact with are part of a conversation that we are having with that technology. As technology becomes increasingly embedded into our daily lives, we form relationships and communicate with our devices and our apps every day. While we might think of these relationships as different, our behaviors and interactions with technology are still shaped by the social world, and these messages found in apps are based on existing patterns in face-to-face conversation. If we think of these interactions, many of us may even realize that we communicate with our technology more often than other people.

Given the social foundations of our connections to technology, we can use this knowledge while designing the conversations or experiences we have with our apps. Aside from the visual design of shapes and colors, the writing within our apps drives people's actions and facilitates the social interactions between apps and other digital products, and UX writing is the process of creating these messages in user experiences.

While UX writing is a relatively new field in the IT world, it is in some ways a byproduct of software design and development processes. Before there was a dedicated role, designers or developers would write the words and messages in apps. Although, when messages were not carefully considered in context, they often created inconsistencies in the social and communicative patterns that people rely on.

Interacting with apps and other digital products is inherently social, and by using conversational language as a driving component of UX writing and Human-Computer Interaction, we can also cast User Experience (UX) as a type of communicative exchange between a person and an app, and therefore *User Experience (UX) as conversation*. Podmajersky summarizes this well, saying that UX text is "recognizable to humans as an interaction they are having with the words. When a person is interacting with the experience, they are in conversation with it." (Podmajersky, 2019, p.37)

Through qualitative interviews and usability testing with native and non-native English speakers, this research explores what type of language style works best for a global audience in these conversations with our apps and how we can strategically apply conversational patterns to improve the experience of users.

This research is an examination of UX writing through the lens of three primary areas: communications research, Science and Technology Studies (STS) – particularly Social Constructivism of Technology (SCOT), and interpretative tradition and flexibility.

Within communications research, there are several theories that support the way we can understand UX copy as conversation. These three primary components of communications research include Speech Acts as defined by Austin (1955) and his student Searle (1969), Computers Are Social Actors as defined by Nass, Steuer, and Tauber (1994), and Gricean Maxims as defined by Paul Grice (Cole et al., 1975).

This research will also draw from previous UX research, which illustrates how using plain and conversational language can help reduce cognitive load by creating more familiar elements within the user experience. In other words, when people recognize the language they hear in the conversations with their apps, they can focus on their goal instead of investing energy into understanding unfamiliar language.

The first chapter of this research examines some of the past research that relates to the social relationship that we have with technology today. Particularly, this chapter examines a few different areas. Communications research helps us understand the connections between User Experience (UX) and face-to-face conversation.

The second chapter outlines the methodological approach to exploring conversational language and social patterns found in technology. Fourteen participants were asked to interact with three identical prototypes that each had a different style of language. This difference in language style hoped to reveal how different types of conversations might influence their experience or their perception of the app, with the expectation that the language type that is closest to each person's communication style would create the best experience for that person.

The third chapter dives into the analysis and discussion of findings from this research, concluding with their relevance to social theories and the way people interact with their technology.

1. Setting the stage

This chapter examines some of the past research that relates to the social relationship that we have with technology today. Particularly, this chapter examines a few different areas. Communications research helps us understand the connections between User Experience (UX) and face-to-face conversation.

These connections also reveal the social foundations that can be applied to the conversation that occurs when people interact with their apps. Understanding the Social Construction of Technology (SCOT) and interpretive flexibility is also a crucial facet of how we can improve technology and create better experiences for a global audience. We also examine how participatory content design can help shape our digital conversations to reflect the social norms that people live by.

1.1 State of research

While there has been little sociologically-oriented research about UX writing specifically, there is related literature that's provided insight into how we can approach this topic from a sociological perspective. The theoretical lenses of other similar topics include communications research, Human-Computer Interaction, Science and Technology Studies (STS), and others.

So likewise, this research is an examination of UX writing through the lens of three primary areas: communications research, Science and Technology Studies (STS) – particularly Social Construction of Technology (SCOT), and interpretative tradition and flexibility.

These three areas of study are relevant to UX writing because of the complex and multidisciplinary nature of interacting with apps, having conversations, and subjective interpretation. While previous literature considered each of these theories and areas separately, this research combines these theories to observe a relatively new and under-researched field within software development.

1.1.1 Communications research

Within communications research, several theories support the way we can understand UX copy as conversation. By looking at our interactions with apps this way, we are reverting back to an inherently human and social behavior. As Podmajersky describes:

> “Conversation is somehow in our genetic makeup. Humans take turns speaking and responding in ways that cross languages, continents, and cultures. Conversation is a lot older than responding to pixels on screens and sounds from speakers, so it still governs how we respond to those pixels and sounds.” (Podmajersky, 2019, p.37)

These three primary components of communications research include Speech Acts as defined by Austin (1955) and his student Searle (1969), Computers Are Social Actors as defined by Nass, Steuer, and Tauber (1994), and Gricean Maxims as defined by Paul Grice (Cole et al., 1975). Each of these areas of study contributes to the idea that people’s interactions with apps are social and conversational by nature.

1.1.1.1 Speech Acts

Like games, experiences within apps are action-oriented environments. Excluding some social media or entertainment apps, people interact with apps with a specific goal in mind.

Considering this, it is logical that the language used in apps encourages actions that help people achieve their goals. Austin (1955) initially defined this type of action-oriented language, and his student Searle (1969) expanded upon these ideas years later. The works of both focused on the action behind linguistics and communication. Austin and Searle described all utterances as *speech acts,* which they categorized into three types. They were summarized very well by Cardona-Rivera and Young:

1. “*Locutionary acts*, or the act of putting words together into a form that is legal in the language. It is the act *of* saying something.”

2. “*Illocutionary acts*, or the intended meaning that the speaker wishes to convey. It is the act *in* saying something.”

3. “*Perlocutionary acts*, or the effected change in the listener’s mental state or future actions (or both). It is the act *achieved by* saying something.”

Both apps and people exchange locutionary acts throughout their interactions. They rely on each other to keep up a conversation that makes sense (or is “legal”) in that language. The challenge for UX writers is then to write messages in a way that elicits productive responses. In other words,

UX copy exists to motivate action and to enable people to achieve their goals within an experience with ease and confidence.

Within apps, people perform locutionary acts (or interact with the experience) by pressing buttons, entering information in text fields. With these locutionary acts, people are serving their illocutionary goal (or what they are trying to achieve by using the app). We can find many examples of illocutionary goals within apps and in-app messages, with examples in each of the categories that Searle (1976) outlined in his research:

- *Assertives* (also known as *representatives* or *constatives*) express a current state of affairs, communicate truth, and commit the speaker to the information they provide (like stating, claiming, hypothesizing, describing, telling, identifying, informing, insisting, suggesting, asserting, or swearing that something is the case). An example of this in UX writing would be descriptions, which usually include information about how the app works or what will happen when performing some action (like pressing a button).

- *Directives* get the reader to do something or take a particular action (like ordering, commanding, daring, defying, challenging). We see directives in many places in apps. For example, directives are a common strategy within error messages used to instruct people in a *"do this to complete your task"* format. Notifications can also be considered directives since their behavior alone is interruptive and commands your attention, usually with the goal of getting you to interact with that app.

- *Commissives* commit the speaker to some future action (like promising, threatening, intending, or vowing to do (or to refrain from) doing something). Within apps, action-oriented copy like in Calls To Action (CTAs), hyperlinks, or menu items can be considered a promise of what you can expect when you interact with those elements. Legal copy can also be considered as a promise or commitment between app creators and an individual. And lastly, reassuring copy that you find above buttons (often called "click triggers") or in settings are great examples of commissive acts, including messages like "We won't change anything without asking first.", "We won't share your information with anyone.", or "Your card won't be charged yet!").

- *Expressives* (also known as acknowledgments) reveal the speaker's attitudes or opinions toward a proposition (like congratulating, thanking, deploring, condoling, welcoming, apologizing). Expressives can be found regularly in a few types of messages, like success,

error, and welcome messages. Success (or confirmation) messages very commonly congratulate or thank people for completing a task or signing up for a service, such as messages like “Congrats, you did it!” or “Thanks for joining us”. After logging into an account for the first time, it’s also very common to see “Welcome!” as a type of greeting. Lastly, error messages commonly include apologies, especially when it causes people an inconvenience or when the error is the app’s fault, for example, “Sorry, we can’t finish your update.”

- *Declarations* change reality according to what was proposed in the declaration (like blessing, firing, baptizing, bidding, passing sentence, excommunicating). Declarations are the least common form of speech acts, but these might include messages that confirm changes to your account, subscriptions, or permissions within an app. For example, if your account is removed or canceled, you may get a message that communicates the change in reality, like “Sorry, you don’t have access to this account anymore.”, or “Sorry, this account doesn’t exist anymore.”

1.1.1.2 Maxims of conversation by Paul Grice

These core principles of UX writing (being clear, concise, useful, and consistent or truthful) echo Grice’s four maxims of conversation. Grice introduced his maxims like a set of social guidelines that participants recognize as a “mutually accepted direction” or a “common purpose” to maintain suitable and cooperative conversational exchanges (Cole et al., 1975).

These are defined by Grice as “*Conversational implicatures*, as being essentially connected with certain general features of discourse” and outline standards that each speaker’s “contributions” should meet so they can be a cooperative participant in communicative exchanges. Grice then refers to the combination of Maxims as the *Cooperative Principle*, or “a rough general principle which participants will be expected to observe” (Cole et al., 1975).

Grice goes on to define the four maxims, and just like face-to-face conversation that Grice describes, UX copy adheres to these same rules of discourse as part of their general principles.

1. The Maxim of *Quantity*, where the contribution is neither more nor less information than what is required. (concise).

2. The Maxim of *Quality*, where the contribution is genuine and authentic. (truthful, consistent).

3. The Maxim of *Relation*, where the contribution is contextually relevant to the ongoing communicative transaction. (relevant and/or useful)

4. The Maxim of *Manner*, where the contribution is unobfuscated (clear).

Gricean Maxims define a natural exchange of ideas, information, and normality that make up casual conversation as we know and accept it. And within the conversation of interacting with apps, these social norms undoubtedly still apply and guide UX writers in their writing strategies just as it guides social situations face-to-face. But while we have these guiding principles, we also know that communication and conversation are inherently social and thus can be subjective to each individual.

1.1.1.3 Computers Are Social Actors

Communication is grounded in social context. Each person's interpretation of language differs based on their own history of interactions with language. For example, a native English-speaker might interpret messages very differently from people who learned English as their second or third language. The act of interpretation changes the way individual people use language, and the way they use language then changes through being used by those individuals. So since each person's language is relayed through social interactions, we know that communication is grounded in social context (Cardona-Rivera & Young, 2014).

One of the main social actors in all of our modern lives are computers, and we can now look at these devices as social actors themselves (Nass et al., 1994; Nass & Moon, 2000). Nass discovered that people treat computers (and apply social norms) the same way as they treat other people. It therefore makes sense that people would also gravitate toward and better understand messages that share their same style of communication.

Knowing that people apply the same social norms to devices the same way that they do for other people, we can assume that this also extends to conversational norms and language preferences. This also allows researchers to further explore this intersection between communication research, social science, and human-computer interaction.

1.1.2 Social Construction of Technology (SCOT)

Within the larger field of STS, this research and analysis more specifically observes UX writing primarily through the lens of Social Construction of Technology (SCOT), suggesting that UX writing (and the technology that it's a part of) is constructed by the social world rather than the social world being shaped by technology.

The bicycle is a classic example of how different groups of people with different interpretations have shaped technological artifacts into what they are today. When you ask different social groups about their perceptions of the bicycle, each will have a different view. Those who have not used bicycles may see them as dangerous, but those who do use bicycles might recognize risks while rather viewing this as an appealing and adventurous quality. Similarly, when considering the development of the air tire, different social groups also had different priorities — racers would prioritize speed, while general consumers were concerned with convenience, while producers were interested in maximizing economic outcomes. As Bijker said, "Relevant social groups do not simply see different aspects of one artifact. The meaning given by a relevant social group actually constitutes the artifact" (Bijker, 1995, p.77)

Just as people gave shape to the bicycle that we use today, people have also given shape to apps that we use today (and especially language within those apps). As the social world changes, technology adapts and follows. It is rather the job of designers and writers to understand how different social groups perceive this communication and tailor it to a global audience.

The widespread use of apps is a great example of social construction for many reasons. Apps are commonly developed with specific problems in mind and integrated in people's everyday lives for a huge range of purposes. Developers often find inspiration for new apps based on common problems that need to be solved or and people use apps as a tool, with a specific goal or action in mind. Apps don't determine human action, but rather human action constructs the technology we use.

The field of UX (and job of UX writers) heavily revolves around human action and the social world. UX design principles are based in social science, psychology, and Human-Computer Interaction (HCI). Social science and psychology are heavily influenced by communication and the use of language. Conversational language (one of the pillars of writing for UX) is derived directly from everyday social interactions.

This research seeks to explore communication between apps and people by highlighting the connections between technology and conversation in the context of social science.

1.1.2.1 Technology constructs some human action

At the same time, there is no doubt that technology has forever changed the social world. Technological determinism (or the idea that technology determines human action) is also found in some apps. For example, apps like *Pokemon Go* notoriously sparked action by requiring people to physically search for Pokemon characters. Many exercise apps also exist for the very reason of getting people more active, and navigation apps enable activity by guiding people to their destinations.

But it's always important to remember that behind the screen, these apps, technologies, and experiences are still man-made. Humans design and craft every moment of each experience, while people often attribute their experience to the technology itself (in this case, apps).

These previous examples show technological determinism in a more literal sense, but there's increasing evidence that social media has changed more fundamental and intrinsic human activities. Researchers have yet to fully understand the full extent of the impact of digital presence in our lives, but research thus far shows significant impacts on social interaction outside of digital platforms and many mental health issues (like perceptions of self-worth, sleep habits, attention spans, anxiety levels, technology addiction, and several other areas).

1.1.2.2 Digital literacy

While UX copy should be modeled after natural language, digital literacy is an example of technological determinism.

Digital literacy refers to each person's set of skills that they need to live, learn, and work in a society where communication and access to information is increasingly through digital technologies like internet platforms, social media, and mobile devices. Because this set of skills is then gained through the use and exposure to technology, skillsets differ person-to-person.

Some populations, however, have higher digital literacy based on generational influences. For example, digital natives have grown up using digital devices daily and would then become familiar with technological language as part of natural vocabulary. Digital immigrants, on the contrary, have

had a more dramatic learning curve as they became familiar with digital devices only in adulthood. But through use of ever-evolving devices (or perhaps training from digital natives), digital immigrants have likewise been forced to adapt and integrate some technology-related terms in their vocabulary.

Furthermore, there's also the extreme of the digital divide, and acknowledgement that many people do not have access to digital devices or internet access at all. Of course, this population would have a very low skill set of digital literacy compared to others.

1.1.3 Interpretative tradition and flexibility

If all messages and language are so highly subjective, UX copy exemplifies interpretative flexibility in the sense that each message (or technological artifact) would have a different meaning and interpretation, not only for various groups, but also for each individual.

Subjectivity is one of the reasons that studying communication, language, and UX copy is so interesting. Since people have varying communication preferences and styles, we can assume that these differences would apply to communication with technology also.

Communication is also grounded in social context. Each person's interpretation of language differs based on their own history of interactions with language. For example, a native English-speaker might interpret messages very differently from people who learned English as their second or third language. The act of interpretation changes the way individual people use language, and the way they use language then changes through being used by those individuals. So since each person's language is relayed through social interactions, we know that communication is grounded in social context (Cardona-Rivera & Young, 2014).

1.1.3.1 UX copy is socially constructed

Similar to the apps themselves, each message you find in apps is there for a specific purpose and is carefully placed with a goal in mind.

Using socially constructed language is one of the most important aspects of creating an experience that's efficient, natural, and easy to understand. Being natural and easy to understand removes friction or confusion, thereby allowing people to move forward toward their goal in the

most efficient way. Apps and UX copy should therefore echo language patterns that have already been established in the social world.

But of course, the language that's most familiar to one person may not be familiar to another, reinforcing this idea of interpretive flexibility. For any given language, the words that are most understandable to a native speaker would likely be different from the words that a non-native speaker would use. Understandable language can be subjective, but using plain and accessible language is one strategy that equips apps (and other technologies) with the best alternative to communicate most effectively with the widest audience.

"Plain language" is language that is designed to help readers understand as quickly, easily, and completely as possible. Words, sentences, and content structures are simplified to maximize ease of reading, comprehension, and accessibility for global audiences. The Plain Writing Act of 2010 defines plain language as: "Writing that is clear, concise, well-organized, and follows other best practices appropriate to the subject or field and intended audience." (U.S. Government Publishing Office, 2010)

Plain language is also considered a matter of accessibility, since language can be used to exclude some audiences. For example, using jargon has several negative impacts on readers. therefore excluding jargon and complicated language altogether. Jargon isn't natural nor is it used in social situations (except possibly among socializing specialists). Using jargon tells people, "you don't belong", jargon makes people less likely to believe what they read, and explaining jargon doesn't matter — people still find it difficult to read.

While the person on the other end of the screen may never think of this way, Norman has a thought-provoking take on communication with technology, stating that "it is common to think of interaction between a person and technology as communicating with the technology… [but] the real communication is between designer and person, where the technology is the medium" (Norman, 2019). He therefore urges people to think of designs as shared communication and the technologies merely as media.

Thinking along these lines, we as content designers and UX writers are communicating directly with the people that are holding that technology in their hands or looking at it on their screens. So it makes sense (and seems quite obvious) that we would communicate with those people through conversation.

1.1.3.2 Participatory design as a problem-solver

People participate in designing UX copy through conversation in daily life. Podmajersky refers to conversation as “a method of designing an experience that starts before the diagrams or screens” (Podmajersky, 2019, p.37)

The best and most intuitive language in digital products are the ones that are familiar to people already, and it’s the job of UX writers, researchers, and designers to echo the language people use socially and independently so there’s no need to interpret new language.

Within software development, UX research is one of the best ways to get insights about designs, copy, and perception of new apps or changes. Lupton also does a great job of explaining the value of design sociology as a problem solver in many areas:

> “Depending on how it is applied, design sociology can be considered as a method for social critique and the identification of social inequalities, disadvantage and marginalisation. It can be a form of participatory social research or action research. Design sociology research can also be a way of contributing to the development of new technologies and systems for the benefit of communities, activist groups, government agencies or industry. In many cases, more than one of these outcomes can be achieved.” (Lupton, 2017)

Similarly to the idea of interpretive flexibility, Lupton points out an important idea that different social groups often have different types of specific vocabulary (for example slang is often different across geographic location and various age groups), and so the sociology of the various communities within your target audience are crucial to understand the best way to communicate.

1.2 Research objectives

This research is an examination of UX writing through the lens of three primary areas: communications research, Science and Technology Studies (STS) – particularly Social Construction of Technology (SCOT), and interpretative tradition and flexibility. While existing literature considers these three areas separately, this research combines each of these theories to observe a relatively new and under researched field within software development.

1.2.1 Goals of this research

This exploratory research seeks to use qualitative UX research as a tool for discovering pain points and problems in the way apps communicate with people through UX copy. The aim of this research is to illustrate the similarities between conversation and the language used in apps, to learn how we can apply social and conversational patterns to improve people's experiences, and to showcase why UX copy is an important connection between technology and the social world.

1.2.2 Questions to answer

The following research was designed with these questions in mind:

- How do people relate relationships with their technology to their own social lives?
- Where can conversational language make the biggest impact to improve an experience?
- What kind of social and conversational patterns can improve technology for a global audience?

1.3 Chapter summary

This chapter examines the theoretical foundations of communication in technology, and draws connections between language and conversational patterns in the social world that also apply to the way people interact with their apps.

By applying findings from communications research, Science and Technology Studies (particularly the Social Construction of Technology), and interpretive flexibility, we can look more closely at User Experience (UX), the messages within apps, and people's relationships with technology to understand how people communicate with the technology that they are closest with.

To further investigate these connections between technology, language, and social interaction, this research is designed to examine how a global audience interprets various language types and why they might have a better experience with some conversations more than others.

Through qualitative interviews, this research both observes people's interactions with apps, seeks to understand their interpretation of different types of language in a conversation with mobile apps, and also looks for any social connections that people draw between their own social interactions and the way they interact with technology.

2. Empirical explorations

This chapter outlines the methodological approach to exploring conversational language and social patterns found in technology. Fourteen participants were asked to interact with three identical prototypes that each had a different style of language. This difference in language style hoped to reveal how different types of conversations might influence their experience or their perception of the app, with the expectation that the language type that is closest to each person's communication style would create the best experience for that person. Furthermore, by presenting three different versions of the same information, this research hoped to reveal the interpretive flexibility of how different social groups (native English speakers and non-native English speakers) might understand or interpret the same artifact of language.

This research was carried out using tools and infrastructure from Avast Software, however this was the extent of their involvement in this research. The interviews were scheduled by the user research team at Avast, carried out through company Zoom accounts, and the prototype designs were provided by the Avast One design team, however there was no further input about the content or goals of the research that was carried out. The only request from Avast was that these findings were shared with the company for anyone who was interested.

2.1 Methods

Given the goals of this research outlined above, the most appropriate methodological approach was to gather primary data through semi-structured a qualitative inquiry carried out through interviews that seek to investigate participants behavior, perceptions, and understanding of different language types they might find in digital products like mobile apps.

Semi-structured qualitative interviews were the best approach for getting a more in-depth look at what kind of language works best in digital security products and why. By observing how people interacted with the prototypes independently and also asking follow-up questions about that behavior, it allowed a more individual approach to understanding how people and technology can most effectively communicate with each other.

Through these qualitative methods, this research seeks to gather in-depth information about each research objective and "understand the why" behind each participant's behavior. By getting a deeper look into the perspectives of each person, the findings of this research might be able to

expand into further research or inform others who hope to improve the experience of users by investigating language and social patterns within technology.

2.1.1 Tools

The planning and interview structure was outlined in the beginning of February in a detailed session guide (see appendix for full session guide). The first step involved preparing an app prototype to use in the interviews. Avast product designers completed the visual prototype design, which they then shared editing rights so that it could be used in this academic research. While the original design did include placeholders for messages, it had not previously been reviewed or edited by any UX writers.

The interview plans centered around each participant talking through how they would interact with a cyber-security mobile app called Avast One. Avast One is a comprehensive security tool that includes three products in one: (1) a Virtual Private Network (VPN) that hides your device's location and allows you to browse like you are anywhere worldwide, (2) Webshield, which is an antivirus that blocks harmful files and websites, and (3) BreachGuard, which is a watchdog that alerts you in case anyone leaks your personal data online.

The prepared prototype was duplicated into three prototypes (see figures 14–16). The three prototypes were nearly identical, with the same features, design, and information in each one. The only thing that varied between them was the different types of tone and language used in the messaging: (1) playful, (2) conversational, and (3) technical.

2.1.2 Recruitment and selection

Once all three prototype versions were ready, interviews (including four pilots) were scheduled through Avast's user research team using an online user research platform called UserTesting in late April. The first four pilot studies are not considered as part of the results and analysis, but since there were no changes made between the final two pilots and the rest of the interviews, these last two were included as part of the results and analysis.

All participants were recruited through Avast's subscription to UserTesting and were selected through the platform with Simple Random Sampling given that they met the target criteria. Target criteria was defined by two sets of screener questions that were used to recruit each group

respectively (see figure 1). All interviews were remote and held online (through Zoom video conferencing) and were moderated with an interviewer.

Figure 1 – Screener questions

Group 1: Native English speakers

1. What is your highest level of education?
   - *Didn't finish high school*
   - *High school or equivalent*
   - Some college
   - Associate's degree
   - Bachelor's degree
   - Master's degree
   - Doctoral degree
2. What is your native language?
   - Chinese
   - Czech
   - English
   - French
   - German
   - Italian
   - Japanese
   - Spanish
   - Portuguese
   - Other language

Group 2: Non-native English speakers

1. What is your highest level of education?
   - *Didn't finish high school*
   - *High school or equivalent*
   - Some college
   - Associate's degree
   - Bachelor's degree
   - Master's degree
   - Doctoral degree
2. What is your native language?
   - Chinese
   - Czech
   - *English*
   - French
   - German
   - Italian
   - Japanese
   - Spanish
   - Portuguese
   - Other language
3. If you are a non-native English speaker, what is your English proficiency level?
   - *A1 (Beginner)*
   - *A2 (Elementary)*
   - B1 (Intermediate)
   - B2 (Upper-intermediate)
   - *C1 (Advanced)*
   - *C2 (Expert or proficient)*

2.1.3 Participants

There were a total of 14 participants (n = 14) that were interviewed for 60 minutes each, with 7 participants for each of the two target groups: (1) native English speakers and (2) non-native English speakers (see figure 13 in the appendix for a full overview of participant demographics).

The total sample included 7 male and 7 female participants that were between 18 and 51 years old (avg = 29.5). All participants had a high school degree or equivalent education level and all

non-native speakers self-reported an intermediate (B1) to upper-intermediate (B2) level of English proficiency.

All native English speakers were from the United Kingdom and therefore spoke British English. However, two of the native-speaking participants had very strong accents that made them difficult to understand (“Adrian” and “Archie”). While these two participants identified at native English speakers, it is possible that they may have grown up in a multilingual household or considered themselves to have reached a proficient level of English that was equivalent to a native-speaking level.

Non-native speakers gave both their native languages and the country where they lived. Two participants spoke Portuguese as their native language (with one from Brazil and one from Portugal), three participants were from Italy (speaking Italian natively), one participant was from Myanmar (speaking Burmese natively), and one participant was from France but spoke Spanish natively.

While there was no proof of English proficiency required, it was evident that one participant (“Simone”) did not speak English at a B2 (upper-intermediate) level since she had significant trouble communicating in English and expressing her thoughts during the interview

2.1.4 Interviews

Each interview started with warm-up questions, followed by showing the three prototypes in a randomized order to prevent primacy and recency biases.

While going through the prototypes, participants were asked to use the app as if they would on their own device (and without the interviewer present) and to think out loud as much as possible. The participants independently went through the introductory screens and then were asked to complete some tasks.

Some tasks were openly asked of participants while others were just observed. For example, when participants were on the dashboard, they were asked “how would you set up the VPN?”, which prompted them to move forward with the setup process. However, another task involved whether or not they finished all the steps to complete the VPN set up, which was observable without asking a direct question.

There were a total of six tasks that participants had to accomplish for each prototype and each task was defined by specific criteria:

Figure 2 – Task Success Criteria and Verifying Questions

	Task	Criteria	Verifying question
1	Understands what the app does	Can differentiate between the three services available through Avast One offers.	If you wanted to describe this app to a friend, what would you tell them?
2	Understands what the VPN does	Recognizes the benefits of using a VPN or how they would use it themselves.	If you wanted to tell a friend what a VPN is and what it does, what would you tell them?
3	Completes set up process	Finishes all steps that are required for the VPN to work.	Observed
4	Understands error message	Check their internet connection to solve the error.	What would you do to fix this problem? Is there anything else you would try?
5	Turns on VPN	Clicks the button that turns the VPN on and makes it work after setup.	Observed
6	Understands on and off states	Can identify when they do or don't have a secure connection.	Would you say that the VPN is working right now?

In some cases, verification questions weren’t necessary since many participants would report how they understood the product out loud while they went through the app. Furthermore, since VPNs are a common digital privacy tool, many participants had experience using similar products. To gauge whether participants were familiar with VPNs before seeing the prototypes, participants were asked whether or not they had seen or worked with similar products before.

Participants had to set up the VPN, fix an error, and then turn on their VPN connection. The error presented in the prototype was hypothetical. Rather, participants were asked to talk through how they would fix the error if they saw it on their device in real life. This caused confusion for several participants because they didn't understand that the error was not a problem with the prototype.

After these tasks were completed for all three prototypes, participants were asked several follow-up questions and discussed what they remembered about the language used in each version. They were asked to recall any messages that stood out to them and, if they remembered any specific messages, they were also asked to explain why it was memorable.

While some participants took their time going through the prototypes, others moved through the three prototypes very quickly. For those participants who accomplished their tasks quickly, there was much more time to discuss what they remembered and ask follow-up questions.

The role of the interviewer in these sessions was to listen, observe, and follow up with questions. All interviews were semi-structured and structured by a session guide that was created before the interviews began (see appendix for the full session guide). Any additional input from the interviewer was as minimal as possible. For example, participants were free to ask questions at any time throughout the interviews, but they were informed at the beginning that the interviewer couldn't reveal any answers until the end of the session.

2.2 Expected outcomes and hypotheses

Within apps, the voice and tone of digital products are based on communication strategies and conversational patterns that are observed in human interaction. The way we communicate is heavily dependent on our social groups, upbringing, education, and a wide range of social factors that have influenced communication style. This is another expression of interpretive flexibility, since every social group would look at language and communication differently.

However, communication research also reveals several universal truths about the way we speak to others and expect to be spoken to (for example with Grice's maxims of conversation). We also know that people expect the same social norms from computers (and by extension digital products) as they do from other people (as was revealed by research about Computers as social actors). These previous findings heavily influence and direct the hypotheses of this exploratory research about how people communicate with their apps.

2.2.1 Examining the voice of digital products

Voice and tone are two different but complementary features of language that's used in apps. Voice is an identifiable set of characteristics that sets you apart from others and the way that an app or brand communicates their personality. However tone (or tone of voice) is the way that we might communicate in any given context.

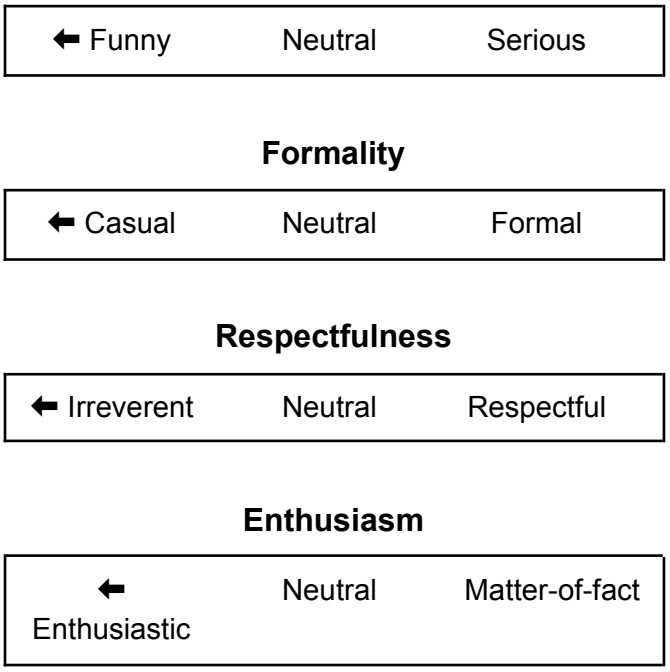
“Tone of voice is the way *we* tell our users how we feel about our message, and it will influence how *they'll* feel about our message, too.” (Moran, 2016a). According to work by Moran, there are four primary dimensions of tone of voice: (1) humor, (2) formality, (3) respectfulness, and (4) enthusiasm.

Humor in tone of voice is determined based on whether the app is trying to be funny or serious about the topic. However, the way that humor is received doesn't impact the intent behind it.

Formality is often defined by choice of words. For example, the use of contractions produces a more casual tone versus fully writing out all words. As Moran points out, “casual and conversational are not necessarily synonymous, but they do often appear together.” (Moran, 2016a)

Respectfulness is often targeted at the subject matter of the app rather than users of that app. Tones that are intentionally and unmistakably irreverent often make a product stand out against its competitors, whereas an offensive blunder would not be a portrayal of tone.

Figure 3 –
The Four Dimensions of Tone of Voice



(Moran, 2016a)

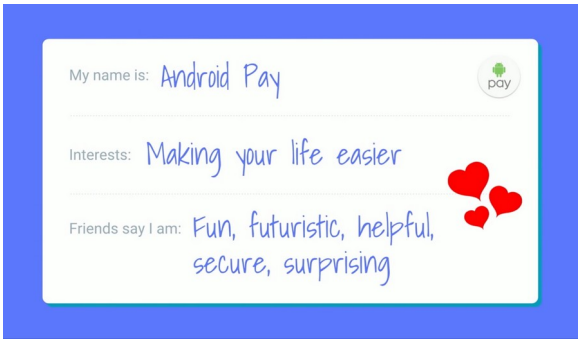
Enthusiasm denotes excitement behind messages, which is often communicated through exclamations, as opposed to more dry communication like you might find in contracts or scientific journals. Each of these four dimensions can be used on a scale, falling at either extreme or anywhere in between. The best combination of each of these tones will depend on each app's personality and its audience (or users).

Conversation is complicated, and through interacting with other people and being in social situations, people learn what kind of tones are appropriate for different situations. Although these same social expectations also apply to digital products, it may not seem so straightforward. Creating guidelines for your apps then become an essential tool to define each app's voice and tone, outlining different scenarios that specify how that app (or that app's personality) might communicate in various types of conversations.

A common strategy for developing a product's voice, tone, and defining principles is to think of it as a person and to imagine how you want other people to perceive them. One brainstorming exercise used to come up with these principles involves imagining that you're signing your product up for a dating site:

> "What words or info would you put in your product's dating profile? What will make them swipe right and want to learn more? You can then distill these qualities into descriptive words, which will become your brand principles." (Stanphill et al., 2017)

Figure 4 –
Google's product principles exercise for Android Pay



(Stanphill et al., 2017)

These brainstorming exercises are collaborative and usually include people who work on every stage of that product's development, including writers, designers, engineers, marketers, and product managers. Once teams agree on brand principles, writers need to think about how these principles will sound in writing. This process ultimately results in a set of writing guidelines that should define how the voice and tone of each product sounds.

Ultimately this personification of apps helps to bring humanity to our technology, and it's another example of how our technology is modeled after human behavior and social patterns. This idea of filling our own profiles and describing ourselves is so relatable that we can easily imagine how another person (or product) might describe themselves in human terms. Then, assuming that a product has piqued a user's interest, the obvious next step is to imagine how they might speak to each other in conversation.

Based on what we already know about writing for apps and about conversation, there are several outcomes that can be hypothesized based on this existing research. We can apply existing research from several related fields (like usability, accessibility, communication, social relationships, and human-computer interaction) to speculate about what kind of writing works best for apps and why.

2.2.2 Playful language

For the purpose of this research, playful language can be characterized by casual speech that people use in spoken or digital conversations. This might include the use of idioms, colloquialisms, and slang that creates a lighthearted and amusing tone throughout messages.

2.2.2.1 Advantages of playful communication

Playful language will succeed in cases where it reflects the casual nature of language that's used in spoken or digital conversations (like idioms, colloquialisms, and slang). Today, apps are integrated into people's daily lives. Many apps are also exclusively used to communicate with others. Particularly in messaging apps, on social media, and in conversations via text, the language used with friends or family is much more informal.

By including these informalities as part of the app's speech, the messages may reflect the playfulness of language that users are familiar with on other digital platforms. As a result, this use of playful and casual language may come across as more human-like by reflecting the casual nature of digital conversations that people might use in their real lives.

An additional benefit of playful language is that it includes more humor, and may therefore bring more joy to using that app for those that find the messages funny. As Moran said, "humor can be a powerful way of differentiating you from your competitors — as long as your users actually find it funny." (Moran, 2016b)

Wells uses the example of saying that the "stupid dog" is at fault in any situation, no matter how ridiculous: "It usually gets the point across that something isn't exactly right, without actually pointing fingers or assigning blame. It usually makes people relax and smile when they realize that the situation isn't nearly as horrible as it could be." (Wells, 2018, p.97)

Of course, there is no joke that is universally humorous, but humor itself is universal. Wells also describes how language translates across cultures, pointing out that humor is always perceived differently based on the audience and situation, but there are some similarities:

> "What is hilariously funny to one person may be questionable or offensive to another person within the same culture; therefore, it is even more difficult to find humor that translates across cultures. There are some nearly universal truths, however. People of all cultures

tend to laugh at incongruities, extreme exaggeration, understatement or overstatement, and irony." (Wells, 2018, p.97)

Overall, humor and playfulness can be a great benefit and admirable quality within messaging when used appropriately and at the right time.

2.2.2.2 Limitations of playful language

Although lightheartedness can be successful at times, it can produce strong negative results when used inappropriately. There are many factors that can make this playful messaging fail, depending on the context, audience, and topic being discussed. Moran summarized this issue well, saying "humor is extremely risky, because when it fails, you annoy and alienate your users." (Moran, 2016b)

The idioms, colloquialisms, and slang used in casual speech is not always culturally and generationally transferable. Therefore, there is a significant chance that using informal language will leave some of your audience out when they can't relate or don't understand. Slang in particular is known to be short-lived and quickly changing. While our grandparents may still use slang from their teen years in day-to-day communication, it's unlikely that the teens of today would regularly use that same set of vocabulary while speaking to their own friends.

Another potential issue is that the use of such informal language may make the app come across as untrustworthy, unprofessional, or immature. This is especially relevant given that the participants are being shown prototypes of a mobile security app. The topic of cybersecurity can be quite serious, so as was mentioned before, it is a risk. On one hand, "a playful tone for a serious industry has the potential of creating pleasant surprise and helping a company stand out from its competitors" (Moran, 2016b), but on the other hand, it may also cast doubt that a company is taking that matter seriously enough to trust them.

Lastly, there's a risk that playful language could get in the way of effective communication when overused or misunderstood. If playful terms are overused or come across as inappropriate, this could frustrate or annoy people while they're using the app. Furthermore, if slang, idioms, or other terms are unknown to participants, they may have trouble understanding that content.

Overall, using playful language is risky. While it could have great benefits by bringing joy and humor to an experience, it is difficult to write universally humorous content. Regardless of the

intent behind the writing, it must be well received, understood and appreciated by a global audience, and helpful enough to not interrupt user goals.

2.2.3 Conversational language

In this research, the term “conversational language” is synonymous with the plain language that is used to create neutral and accessible communication found in all areas of writing. Plain language is well described as the following:

> “Plain English is clear, straightforward expression, using only as many words as are necessary. It is language that avoids obscurity, inflated vocabulary and convoluted sentence construction. It is not baby talk, nor is it a simplified version of the English language. Writers of plain English let their audience concentrate on the message instead of being distracted by complicated language. They make sure that their audience understands the message easily.” (Plain Language Action and Information Network, 2011)

2.2.3.1 Advantages of conversational communication

Using plain and conversational language is successful because it maximizes usability and accessibility in all digital products, which are two qualities that are also epitomized by Grice’s maxims of relation and manner respectively.

Usable language embodies Grice’s maxim of relation by including only helpful and relevant information. To be usable or helpful to people, messages must also be significant or pertinent at that exact moment when people are reading it.

Accessible language goes hand-in-hand with Grice’s maxim of Manner because it describes that the language is unobfuscated or clear. To be accessible or available to a global audience, messages must also be clear and recognizable to many. It is easier for more people to understand messages written in plain language, which therefore makes the information available to a wider audience.

Language should not just be easy to understand, but instantly recognizable. Plain language gets messages across the quickest way possible, and according to America’s Plain Language Action and Information Network, plain language is “communication your audience can understand the first time they read or hear it.” (Plain Language Action and Information Network, 2011)

This quality of being instantly recognizable and understandable makes plain, conversational messages successful for several reasons. Overall, this type of communication avoids miscommunications. As a result, people are more likely to understand and follow instructions correctly and do not need to spend time looking for more information.

For businesses, clear communication also can improve the bottom line. Support and documentation teams can save time and resources because they would not need to explain the information in different terms, either to confused customers or in supporting materials (like FAQs or additional documentation). Not to mention, people have better experiences using digital products when all the information they need is readily available.

2.2.3.2 Limitations of conversational language

There are many benefits of using conversational language and not as many potential drawbacks as other language types. Of the three different options, conversational language seems most likely to be successful in all areas of messaging for apps. However, there are still some areas where plain language may not be the best strategy for messaging.

Since plain language is known for being simple and straightforward, there is little to nothing about this communication style that would stand out as memorable. Plain language may also fail to motivate action or leave people with positive memories of using that digital product.

Plain language may also not come across as warm and friendly when being compared to playful language. The language may therefore seem less human-like than the language that people might use in regular, every day, casual conversation.

2.2.4 Technical language

Technical language or communication is characterized by formal language that includes jargon, specialized terms, and excessively detailed information. By using this type of language, the writer or speaker makes the assumption that the audience will have a foundation of knowledge about the topic, or that the information they are sharing is common knowledge.

While this assumption is often not true, it is likely that native English speakers or those with higher education would have more exposure to a wider range of vocabulary, and therefore that they

would have an easier time deducing the meaning of unknown or specialized words overall. Regardless of whether audiences have prior exposure to the specialized terms found in technical language, there are both benefits and shortcomings to using this language style.

2.2.4.1 Advantages of technical language

One benefit of technical language is that it is often associated with professionalism, especially in a business sense. For this reason and in the context of a serious topic like security, technical language may work very well. When it comes to a serious topic like cyber security, people may feel that a company or product is taking the service they are offering much more seriously by communicating in a serious way.

When people are paying for a product, they may also appreciate the professionalism perceived from more formal and technical language. Although the prototypes that participants saw are the free version of the app, they may see the formality given as a sign or respect. For example, many support agents use formal language while speaking to customers to show professionalism. Since paid apps are a service, this same thought process may also translate to conversations with digital products.

Additionally, since security is also a complicated topic, people may think of specialized language as a sign of intelligence. Some people even insert complex words or language into their dialog when they are attempting to appear more intelligent. This mindset may therefore make people believe that the brand (or the people making the product) seem very qualified and capable of doing a good job.

2.2.4.2 Limitations of technical language

However, while using technical language may work well in some scenarios, there is also evidence that technical and complicated language has impacts on a general audience negatively in several ways.

Using jargon and specialized terms in messaging will cause problems for a general audience because it will interfere with their ability to understand and recognize the information. According to a 2019 study, Bullock and colleagues found that when people encountered scientific jargon, it impaired their ability to process the information. As a result, people were less likely to believe what

they were reading about, people perceived a greater risk, and people had lower support for adapting to that technology. (Bullock et al., 2019)
A following study in 2020 further supported Bullock's findings that specialized jargon caused problems for general audience readers. Shulman and colleagues found that "the presence of jargon disrupts people's ability to fluently process scientific information, even when definitions for the jargon terms are provided", and that " jargon use affects individuals' social identification with the science community and, in turn, affects self-reports of scientific interest and perceived understanding." (Shulman et al., 2020)

In other words, explaining jargon does not matter—people still find it difficult to read. Using jargon also tells people "you do not belong". More specifically, "reading science jargon makes people feel they're not good at science" (Grabmeier, 2020), and if we assume that this finding also applies to other specialized areas, using technological jargon would tell people that they're not good at technology.

Another element to consider is the way that the app or brand is perceived by other people. Given that intelligence and large vocabularies are positively correlated (Spearman, 1904), it seems logical to think that displaying one's own large vocabulary may display one's own intelligence as well. However, one additional study by Oppenheimer in 2006 revealed that the strategy of "deliberately increasing the complexity [of vocabulary] so as to give the impression of intelligence" ultimately does not pay off. Rather, participants found a "negative relationship between complexity [of texts] and judged intelligence" and that "increasing the complexity of a text does not cause an essay's author to seem more intelligent." (Oppenheimer, 2006) Therefore, using jargon or specialized language may have a negative impact on the way they perceive the app or the brand behind the app.

Furthermore, using jargon or any language that is unclear may obscure the expression of the writer and therefore violates the Gricean maxim of manner. As Oppenheimer also points out, "if authors are believed to be writing as simply as possible, but a text is nonetheless complex, a reader might believe that the ideas expressed in that text are also complex, defying all attempts to simplify the language." (Oppenheimer, 2006)

One other feature of technical language is that it often includes more details about how something works or the technical aspects involved, thereby making messages longer. While a specialized audience or those interested in the topic may appreciate the extra information, a general audience would prefer more concise writing.

When it comes to technical communication, Markel and colleagues found that “the point at which the subjects expressed a desire for shorter paragraphs was approximately 100 words.” (Markel et al., 1992) Similarly, when it comes to UX writing, Podmajersky writes that “people find it easiest to scan text when it is 40 or fewer characters wide, and three or fewer lines long.” (Podmajersky, 2019, p.97)

Excessive explanation and unneeded details in messages would also violate the Gricean maxim of quantity. If writers include more than is necessary for people to reach their goal or accomplish a task, then people may assume that they need to read everything if they want to successfully use the product. Furthermore, people usually do not want to read when they are using an app. According to Nielsen, “on the average Web page, users have time to read at most 28% of the words during an average visit; 20% is more likely” (Nielsen, 2008). Although web pages are not the same context as apps, it seems safe to assume that people would similarly read the minority of text that they find in apps.

2.3 Ethical concerns

As was mentioned before, the extent of Avast’s involvement with this research is their provision of the artefacts and infrastructure to complete the research. Avast’s design team provided the prototypes that participants saw during interviews and they also facilitated the recruitment and scheduling of interviews through their user research platform. The only request from Avast was that I share my findings with the company.

2.3.1 Informed consent

Each participant was informed that their interview would be recorded through the UserTesting platform before the start of the interview. To confirm this, each participant was asked again for their permission to record at the start of their interview sessions.

All participants were informed during their interviews that their personal information would never be shared with anyone in or outside the company. However, they were also told that researchers would share and identify them only with their demographic data since it is relevant to the context of this research. Participants continued to begin the interview after written consent through the platform and additional verbal consent during our opening conversation.

2.3.2 Voluntary participation

After the interviews, each participant was compensated through the UserTesting platform with $60 USD, which was included as part of Avast's subscription cost. Although Avast allowed access to company tools and Avast product designs to carry out this research, the company did not participate or give input on any of the research planning, goals, or results.

2.3.3 Confidentiality and anonymity

The recordings of the interviews are owned by Avast and only made available in "view-only mode" for the user research team at Avast. The transcripts of the interviews are available to read (see appendix for full transcripts), however all identifiable information has been removed to protect the identity of each participant. Additionally, all names used in this research are pseudonyms created by a random name generator, but demographic data is all accurate and was collected through the testing platform where participants booked their interview sessions.

2.4 Chapter summary

This chapter discusses the methodological approach to explore conversation and social patterns in apps and the approach toward getting a more in-depth look at what kind of language works best in digital security products and why.

This research involved qualitative inquiry carried out through interviews of seven native English speakers and seven non-native English speakers (n = 14). Each participant was shown three prototypes that were identical aside from the three different versions of language used to describe the same information.

The three language types (playful, conversational, and technical) were then defined and the advantages and disadvantages were considered for each language type. Based on these considerations, several hypotheses were discussed regarding their relation to the theoretical lenses of Social Construction of Technology, communications research, and social and conversational patterns.

3. Analysis and discussion

All the video footage from the interviews was transcribed and manually coded for descriptive and interpretive insights. While the transcripts for each participants were automatically generated from UserTesting, many of them were incorrect due to differences in pronunciation, particularly among non-native speakers. For this reason, the transcripts were manually recorded to ensure accuracy before analysis began.

Thematic analysis and traffic light reporting scheme were the two primary methods used to uncover themes and visualize patterns in the participant feedback.

There were a total of 14 participants (n = 14) that were interviewed for 60 minutes each, with 7 participants for each of the two target groups: (1) native English speakers and (2) non-native English speakers (see figure 13 in the appendix for a full overview of participant demographics).

The total sample included 7 male and 7 female participants that were between 18 and 51 years old (avg = 29.5). All participants had a high school degree or equivalent education level and all non-native speakers self-reported an intermediate (B1) to upper-intermediate (B2) level of English proficiency.

3.1 Uncovering themes

The primary method used to analyze this research was thematic analysis. Thematic analysis is “a systematic method of breaking down and organizing rich data from qualitative research by tagging individual observations and quotations with appropriate codes, to facilitate the discovery of significant themes” (Rosala, 2019). Themes are uncovered when similar findings appear more than once throughout the data or when multiple participants expressed similar thoughts, attitudes, or behaviors toward the same data.

Analyzing qualitative data can be challenging because each interview results in a long transcript and extensive notes, which can be very time-consuming to review. There are also many details involved in analyzing this behavior, both obvious and subtle, spoken and unspoken. It can therefore be difficult to identify which parts are useful and which are insignificant. Qualitative feedback can also contain many contradictions that lead to ambiguous results, which is why a

systematic approach like thematic analysis was essential for making sense of the feedback from these interviews.

The method to conduct thematic analysis for this research was primarily done using Dovetail, which is an online software used to manually code user interviews. While it did not speed up the process of going through the fourteen interviews here, it was helpful for organization and visualizing the coding results.

There were two primary categories of codes: (1) descriptive and (2) interpretive. Descriptive codes are used to identify what that data is about, and interpretive codes include the researcher's analytical lens. These will be discussed further in detail in the following analysis of this research.

3.1.2 Codes and categories

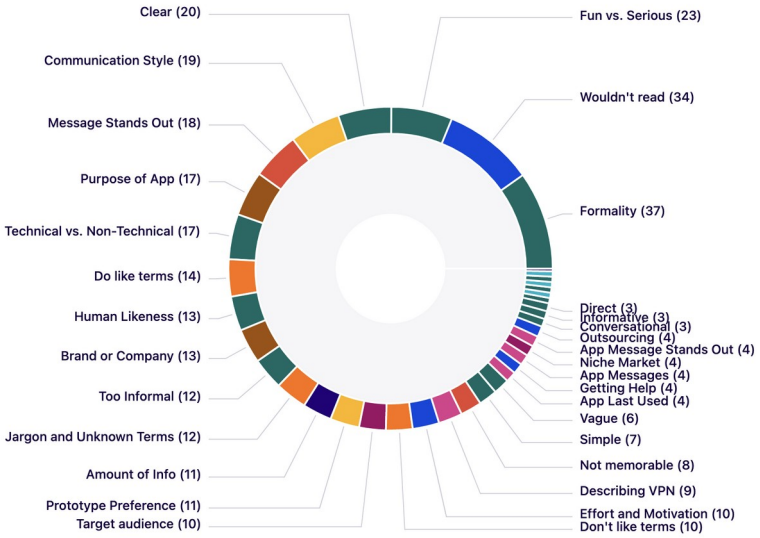
The data was manually coded using a tool called Dovetail, where both descriptive and interpretive codes were used to analyze and organize the data.

Descriptive codes were used to describe what the data was about.

The descriptors and tags here primarily correspond to the topic that each participant was discussing or commenting about.

Some of the codes also correspond as responses to particular question to make it easier to compare all the responses at once.

Figure 5 – Descriptive data codes



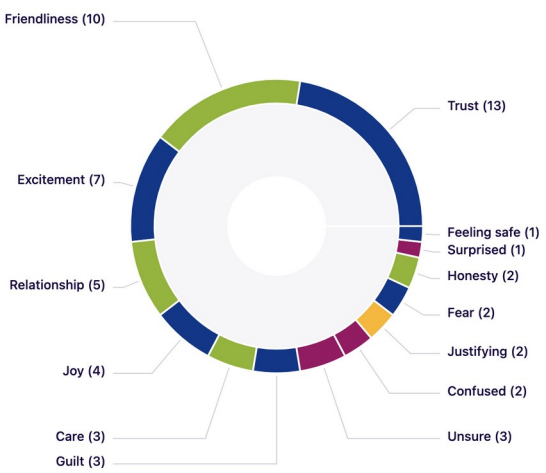
Automatically generated in Dovetail

Interpretive codes are an analytical reading of the data, adding the researcher's interpretive lens to it.

These codes relate primarily to human-like qualities that people may find in technology based on the research that people treat computers and digital products very similarly to other people.

Some of these also describe the emotions or reactions that participants seemed to have while discussing the language or the prototypes that they were looking at.

Figure 6 – Interpretive data codes



Automatically generated in Dovetail

While these codes were helpful to organize and make sense of the data, they were not part of the analysis in the sense of their quantitative frequency. In other words, the themes included in the discussion of analysis were not necessarily included based on the frequency that they were mentioned alone, but also based on how strongly participants felt about the topic or how each topic related to the theoretical lenses being discussed in this research.

3.1.3 Visualizing feedback

As part of the search for patterns, traffic light reporting schemes were also helpful to visualize connections and look at the results cohesively.

A traffic light reporting scheme is an analytical tool for usability testing that helps researchers visualize where people struggle or succeed while using digital products like apps. The system is named for the way that predefined tasks are color-coded in red, yellow, and green (like a traffic light) to signify how easy or difficult it was to complete a task.

Figure 7 –
Color Key for Traffic Light Reporting

1 Failed	The user fails to complete the task or is completely confused.
2 Completed with issues	The user completes the task but has some struggles and some issues understanding what they are presented with.
3 Completed	The user completes the task without trouble and understands everything they are presented with.

Tasks are assigned red, yellow, or green based on the descriptions in figure 7. Reports may also contain additional metrics like how much time it took to complete a task.

After all the data is collected and each task is assigned the appropriate color, results can be formatted into a table that shows all the results side-by-side. These results from traffic light reports reveal usability information like the difficulty of the chosen task, how hard it is for each individual to use the application, and any recurring pain points throughout their collective experiences with the app (Anderson, 2019; Cocirio, 2019)

Figure 8 – Defining Criteria for Task Success Traffic Light Reports

	1 Failed	2 Completed with issues	3 Completed
Understands what A1 does	Does not recognize or understand any of the features offered in Avast One or is unable to tell the difference between two or more features.	Correctly describes or recognizes some features in Avast One, but not others or is unable to tell the difference between two or more features.	Correctly describes or recognizes all features offered in Avast One and can tell the difference between all three features.
Understands what a VPN does	Does not know what a VPN is, how it works, or what it can do to benefit them.	Has a vague idea of what you can do with a VPN (like for Netflix) but doesn't know of any other benefits or reasons to use a VPN.	Correctly describes the security and recreational benefits of using a VPN.
Completes set up process	Does not complete one or more steps that are required for the app to work (like refusing to accept some terms or permissions).	Completes all steps required for the app to work, but is confused about what's being asked or why it's needed.	Completes all steps required for the app to work without hesitating or appearing confused.
Checks internet to fix error	Would not check their internet connection to try and fix the error.	Would try several other troubleshooting tactics before checking the internet to fix the error.	Would check their internet connection as a first step to fix the error.
Turns on VPN	Does not turn on the VPN until explicitly asked to press the button.	Turns on the VPN only after guidance or prompting.	Turns on the VPN independently with no additional guidance.
Understands on and off states	Does not know or incorrectly identifies when the VPN is on and off	Takes a long time to understand or understand incorrectly before figuring it out	Immediately and clearly can identify when the VPN is on and off

Traffic light reporting schemes are especially helpful for analysis because it creates an easy-to-read visual presentation of how things went for participants, which makes it easier to detect patterns. When patterns become clearly visible, these results can become more clearly actionable.

For example, if all participants fail to complete a particular task or struggle to complete it (indicated by a row of red and yellow blocks), researchers may want to investigate that further to solve that issue. However, if there's only one participant who has consistent trouble while others are successful (visible from columns of red and yellow), then the issue may be related to that person's technical abilities or comprehension rather than the app itself.

The numbers associated with each color code made it easier to find averages per participant or per task, giving another perspective to patterns as numerical values. While there's no statistical significance to these metrics and this does not constitute quantitative data, it is helpful to see the corresponding numerical totals and finding the averages of tasks and participant performance for interpreting results.

The traffic light reporting schemes for this research were initially created in Miro, which is an online whiteboard tool. All feedback was recorded screen-by-screen for each of the three prototypes, with notes also recorded that revealed the reasoning behind why each color was assigned for each task by each participant.

3.2 Interpreting key outcomes

All participants are mentioned by pseudonyms throughout these outcomes and discussions, but all demographic data is correct.

3.2.1 Confirmations

3.2.1.1 Participants compared messages to human interactions

One theme observed was that multiple participants compared their interactions with the prototypes to human interactions that they might have had in real life. More specifically, they compared the different types of language in the prototypes to people who might speak in a similar way. There were some similarities between the analogies made for each prototype, but each comparison was slightly different and insightful.

Two of the fourteen participants related the playful language to their personal and digital communication online or through text messaging. “Jasmine” (a 19 year old student from Brazil) described the playful language as “a modern way to talk. Like when you’re on the internet, when we're texting someone. She went on to say this language was like “ internet talk with other people or like young people use this language more like to write faster and things like that.”

Another participant, “Kayla” (a 28 year old communications student from Myanmar) said that the language in the playful prototype “gave me the excitement at the same time. It sounds so friendly to me. It just like my friends.” She went on to agree that this type of friendly language made her more interested and more excited to learn more about the product.

While not referring to any of the prototypes specifically, “Simone” (a 25 year old marketing and advertising worker from Italy) also stated that when messages were more personalized in apps (like when they were called by their name in greetings and other messages), it made them feel like they had a “friend relationship” with the app. She continued, “for me it’s this because when the app used my name[...], and send message to me, it's for me, it's very nice to receive these messages”. She went on to say that when she gets personalized messages like these, she thinks of a “normal conversation with other people[...], not a conversation with another app.”

One other participant, “Camille” (a 34 year old education management employee from the U.K.) also equated access to information being similar to speaking with a store representative, saying “this has a lot more information about the product, so you can take your time and read through things a lot more. So by the end of it, it almost feels like you've had a full conversation with a salesperson.”

“Camille” went on to describe the importance of having “as much or as little information as you want” and that within the prototypes, “it’s handy that you've got the headlines with the features and then you've got a little bit of information and then [...] you go further into it onto the next page and there's more information and features. And so you can kind of access it at a level that suits you…”

Two of the same participants also compared the conversational prototype to real-life conversation as well. “Jasmine” said that it was “more like[...] you’re talking with someone” and therefore “easier to understand”. “Kayla”, on the other hand, said this conversational language was like “polite and warm bank staff were just explaining the banking service.” She went on to describe the interaction that she imagined:

> “When we go to the bank, of course they are stranger, but like still, they are trying to, you know, welcome you and trying to explain politely. So it just sounds like that. Not like a complete stranger who unfriendly, [...] but like, not like you’re close or like not your classmate or something like that, you know, it's just like that. But like the [technical language prototype] is like very formal, very formal, like totally strangers.”

“Kayla” simultaneously described the technical language prototype, comparing either version to different conversations that she might have at a bank. While the conversational language was more like the “polite and warm bank staff”, she described that the technical language to be less friendly:

> “It’s like a stranger for me. It's just like a formal one. Like that's somebody that I don't know, it just telling to me, like, if I go to the bank, you know, the stranger, or like maybe the staff, for example, like the first version it seems to me that like the stranger is telling about me… about the VPN, the substance of the app maybe.”

Another participant “Felix” (a 29 year old computer engineering student from Portugal) used a similar analogy for the technical prototype, comparing the language to the type of people he might speak with at a bank. “Felix” said, “if we think about security we're, I mean, I'm just visualizing security in my mind. I just see maybe a lock or a safe and [...] guys in the suits. It's all about formality in my mind. Security is a bit more formal.”

These findings confirm that, whether or not people recognize it, the messages that people read within apps can be considered a conversation between the app and the person using it. This is evident given that people compare these messages to their interactions with other people, naturally referring back to what they know about social interactions. This also further reiterates that technology is socially constructed.

3.2.1.2 Non-neutral language is more memorable

Overall, participants also had much stronger opinions on both playful and technical language types while finding more neutral conversational language to be unmemorable or normal sounding. As part of the discussion after seeing all the prototypes when participants were asked what messages stood out to them, very few mentioned the conversational language prototype as memorable.

On the contrary, several participants described the conversational language in terms that weren't particularly special. In fact, two participants used the term "normal" to describe conversational language. "Tomas" (a 21 year old student from the U.K.) said it was "more like a normal app", and "Kayla" said, "I mean, it sounds so normal. Like nothing to excite me just to take the actions further." Yet another participant, "Felix" called it "neutral" compared to the other two prototypes. Similarly, "Gilbert" (a 42 year old full-time investment management employee from the U.K.) said that this language type was "what I would be used to in terms of what I would expect from this sort of brand, this sort of software. I understood it. And it's because it's what I expect, it's easy for me to understand."

Particularly "Kayla"'s feedback on this topic confirms the hypothesis that conversational language may not be the best strategy to motivate action. If messages are not memorable and do not stand out to people, they would likely be unwilling to dedicate their time and effort into something that does not at least grab their attention.

Furthermore, two other participants described that this plain and conversational language was not memorable. "Helen" (a 42 year old self-employed educator from the U.K.) said that "it didn't feel different enough to be, to be memorable", while "Ricky" (a 22 year old media production specialist from Italy) struggled to recall the conversational prototype at all, saying "I literally can't remember anything. I don't know why, maybe it's because it was the first one, but let me think about it... no, nothing. Nope."

For some, the conversational language did not stand out enough to be distinguishable from other language types. For "Helen" it was indistinguishable from the playful language prototype, saying "I don't remember lots of differences from the second one [conversational] to the first [playful], even in terms of the terminology and the wording." However it was the opposite for "Felix", who claimed that with "the third one [playful], I clearly noticed that it was informal, but between the first [conversational] and the second one [technical][...] I didn't read it thoroughly enough to identify the difference…"

Based on the comments about normality and ease of understanding, it seems likely that the conversational language is more consistent with day-to-day communication when compared to the other language types and therefore does not stick out in memory as anything special. Conversations are short, common, and regular, so it seems logical that conversations are more memorable if other speakers use language that stands out as unusual or unknown.

3.2.1.2.1 Standing out in a negative way

Being memorable is not always positive, and for some participants, the language in the playful and technical prototypes stood out in a negative way.

In addition to social psychology and many other areas, negativity bias also applies to UX and presumably the communication within digital products, where “people remember the bad more than the good. Users’ tendency to identify flaws in designs raises the bar for what they consider acceptable.” (Loranger, 2016)

Much of the negative feedback of the playful language related to the wording being “young and jargony” as “Helen” put it, being one of the four participants who mentioned that the language would be better suited for a younger audience. While some felt more strongly than others, there were several participants who did not necessarily feel positive about it, while also claiming that it would not impact their choice to use the app or not. For example, “Tomas” said this: “Again, so with like the words like ‘heck’ there. I wonder whether it has gone slightly too far in that kind of, in the use of that kind of language. Not that that would stop me from using the app, but yeah. I, I don't know, even so yeah. That's just my opinion anyway.”

Another participant, “Adrian” (a 20 year old student from the U.K.) appeared to be quite put off by the greeting in the playful prototype, saying “Obviously the first one that said ‘hiya friend’ stood out to me, but I mean, I didn't particularly like the, the tone in comparison to ‘welcome to Avast One’.” He continued saying, “that's making the assumption that we've met before... ‘hiya friend’ means we are friends.”

Finally from two other participants, “Felix” and “Ricky”, both men said that they remembered the informality for negative reasons. Of all the prototypes, “Felix” said that “the thing that stood out the most was the informality of the language in the third one”, and also mentioned that this language was “too informal” on several occasions. “Ricky” similarly said that from this playful prototype “I remember all the words that I don't like for sure.”

Likewise, there were also some participants that remembered the technical language prototype more negatively than positively. Two participants in particular mentioned that they had clarity issues with the language used in the technical prototype. “Tomas” mentioned “I remember the first [technical] one wasn't quite as clear as the other two” and that “I don't think I came away from it knowing entirely what it did”. “Gilbert” also said had trouble with the language, stating “I had an issue with the second [technical] one. It was a bit... I had to read again. And because of that,

maybe it's because my perception, I'm not used to that sort of terminology of that sort of level of software" (P4)

Another participant, "Kayla" also remembered only the formality and seriousness of the technical language, saying "the first [technical] one is like totally serious and like a very formal way and I don't like such kind of... I don't know. I don't want to do this."

Considering this and recognizing messaging in apps as conversation, these findings indicate that non-neutral language is much more memorable and therefore are likely less common in normal conversational interactions.

3.2.1.2.2 Error messages were memorable to many participants

Another interesting consideration is that half of the participants (7 out of 14) said that the error messages stood out to them the most. Although this is interesting feedback in itself, this finding cannot be taken at face value since many participants did not read the majority of other messages found within the prototypes. Rather, error messages seemed to be the exception in that people read them more consistently than any other type of message found within the prototypes. So the fact that they were more memorable to participants than other messages is likely due to the fact that there were few other messages they could reference.

However the fact that error messages were mentioned often as memorable doesn't necessarily indicate that the messages themselves are memorable. Rather, it seems more likely that error messages were memorable because they were read more consistently than any other messages in the prototype.

3.2.1.3 Non-neutral language gets in the way of information

With each of the two extremes (both playful and technical), people may be left with too little information, either because the language is too difficult to understand or too vague. Both playful and technical language include different types of unknown or unclear terms, which could both be considered jargon.

Since slang is often generationally and geographically specific, people who do not fit the right demographic may have a more difficult time understanding. This was pointed out by multiple participants as they recalled the different language versions they saw in each prototype.

“Helen” pointed out that the playful language would not work well for her “70 year old mother” (even though she was a native English speaker) but that her “20 year old friends would find the first [playful] one a bit more fun”. “Helen” also said this:

> “I think probably the wording in the third [technical] prototype would suit certainly myself and my mum the best ‘cause I think a lot of the terminology in the first [playful] one was a little bit jargony and felt a bit young. Maybe she wouldn't necessarily understand. I can't remember what some of the words were, but I was thinking that they sounded a bit young and more, more something that my teenage children would say rather than saying it kind of in layman's terms as it were, which I felt that the third [technical] prototype used better.”

Another participant, “Camille”, pointed out that the language was “very American” and identified this exact phenomenon, saying “when you go a bit more colloquial, it then becomes much more kind of geographically centered. So[...] what kind of works in some areas might not work in others.” She went on to describe how this colloquial language might exclude some audiences, saying:

> “For example, like my mom or my neighbors probably wouldn't use like ‘fo sho’ and stuff like that. So I think that it narrows the number of people who perhaps think, “Oh yeah, this is for me”. I know that like, like my husband's mom would probably be asking us like what some of the words mean and stuff.”

However despite being mentioned by several participants, age is not the only audience who may be left out by using slang. “Kayla” (who was 28 years old and from Myanmar) also had trouble recognizing and understanding some slang, particularly the term ‘fo sho’. When she came across the term she appeared confused and thought “maybe there's a spelling error or something…”.

These findings confirm the hypothesis that while slang is more like in-person conversation for some audiences, it will exclude a wider audience of people who do not fit the specific demographic of the writer and therefore do not recognize the slang and casual terms. The more colloquial and informal the language, the smaller audience that language might appeal to.

There were also occasions where both native and non-native English speaking participants did not recognize terms used in the technical language prototype, which then impeded their ability to understand the messages in the app.

While reading the descriptions of the product's main features, "Dorthy" (a 34 year old international educator from the U.K.) was unfamiliar with some of the terms, and therefore unable to understand what the product would do to help her. She said this: "I'm thinking I would probably want to do the 'block malicious emails and websites'. Yeah. But the 'encrypt your internet connection', I'm not that tech savvy so I didn't really know[...] what that means, or why I'd need it."

Another participant from the U.K., "Tomas" similarly commented on the technical descriptions of the product, saying, "I don't think I came away from it knowing entirely what it did… it was maybe just explaining what a Webshield is, as opposed to what it does, I think, as I'm not particularly into technology and security, whatever, just knowing basically just what it will do in a sentence such as 'it will protect you when you go onto a different website'... Probably more useful for me..."

When they admit that they do not understand some of these terms, both of these participants gave disclaimers that they are "not that tech savvy" and "not particularly into technology and security", which show the way that these messages may have made them feel excluded or like they are not good enough at technology to need a product that should be useful to everyone. These kinds of statements confirm the hypothesis that people feel left out or discouraged by the use of jargon in technical language.

In addition to these participants who outwardly said they didn't understand, there were also some who just continued on or used context clues to make sense of the messages. For example, "Kayla" said "I don't clearly get the word and don't understand the 'eavesdropping', but like in that case, when I'm reading that message, even though I don't understand, I just took the word like 'unauthorized'. So it is somehow, you know, unauthorized. That the other word that I took into my mind just to understand this." This further confirms the hypothesis that jargon and specialized terms in technical language will get in the way of people's ability to understand and process information.

3.2.1.4 In intuitive designs, language and tone might not matter

Although some struggled more than others, all participants were ultimately successful in setting up the VPN feature for use in all three prototypes, despite the difference in wording that they saw between each version. There are several possible reasons for this, and it is possible the wording helped them to navigate to the correct features. However, it seems more likely that the design was intuitive enough that the wording did not matter or perhaps the participants were all familiar enough with technology that the process was straightforward.

The findings of this research shows that if the design is intuitive enough or when user input or choices are limited, the language style in messages is “inconsequential” for functionality. While recalling the three prototypes, several participants pointed this out. “Gilbert” mentioned that “the functionality was clear in terms of the three or four functions available”, further specifying that “they[...] all got the message across”. While discussing the differences in the greetings, “Adrian” also commented that ”it's almost inconsequential. I don't think it really matters that much”, further confirming that that type of language may have changed his impression of the conversation but did not change his understanding of the message.

Many participants also noticed that the information was the same, just put in different wording for each of the three prototypes. In fact, five of the participants explicitly pointed this out. “Helen” said that the overview sections “seem to be the same in terms of what it's covering, it's just worded slightly differently”, “Felix” commented that “I think it's the same[...] but in other terms”, and “Ricky” similarly expressed that “...it's telling me the exact same thing, but in a different way”. “Xavier” (an 18 year old student from Italy) and “Vivian” (a 27 year old designer from France) both made similar comments about the information being the “same” as other versions they had seen previously.

Processes like setting up an app or a feature are purposely designed so that each step is as simple and straightforward as possible. Since the process has to be done one step at a time, people often have limited options to respond to questions or prompts at each step. For example, within this prototype, several screens had only one option to move forward or back, and with only one way to move forward or back, the need to move forward to complete the task is often intuitive enough regardless of the messages.

These screens with limited options can be thought of like a yes or no question. Either they want to move forward, so they answer ‘yes’ by pressing the only button available to move forward. Alternatively, they choose to not to move forward and answer ‘no’ by pressing the ‘back’ button or exiting the app. Either way, there are a limited number of appropriate responses and so the difference in tone or specific vocabulary has very little impact on the response.

3.2.1.5 Headlines and buttons are more important than the rest

The two primary parts of the conversation between people and apps are headlines and buttons. These two elements are the bones of the conversation and the most important parts for facilitating the exchange between the app and the person using it.

Headlines are the metaphorical loudest parts of a digital product's voice. The purpose of each title or headline is to "provide immediate clarity of context and action to be taken" (Podmajersky, 2019, p.48). These can therefore be considered expressive locutionary acts because they should immediately reveal the app's attitudes or opinions toward a proposition. For example, in the greeting on the first screen, the app immediately welcomes each person for the first time.

Headlines are also crucial because they are "frequently the first and only text a person reads in an experience. That means that for the person to be successful, the title needs to provide context" (Podmajersky, 2019, p.48). This pattern of behavior was also evident in this research since the majority of participants read only the headlines and buttons.

Clickable elements (like buttons, links, and other commands) are important because they are the input from the people on the other side of the screen. These include any type of element with text that people interact with by tapping or clicking so they can get to their next step. Most often, they are verb-first commands that "allow the person to advance toward or commit to an action" (Podmajersky, 2019, p.53)

In her book, Podmajersky goes on to explain why buttons are such an important part of apps, saying:

> "They are how the person makes their purpose known. Buttons (and to a limited extent, controls) are how people 'speak' to the experience. The button must be used to enable the conversation between the person and the experience. Almost every other piece of text, from title, description, empty state, label, confirmation, error, and more, is the experience speaking to the person." (Podmajersky, 2019, p.54)

Buttons and interactive text could be considered two different types of locutionary acts. *Directives* get the reader to do something or take a particular action, so CTAs could be considered directives on the part of the app users, because they are commanding the app to perform an action. On the other hand, *Commissives* commit the speaker to some future action — and this is often the case when people move forward with CTAs. They are committing to some action so they can move on to the next step.

Podmajersky points to some of the ways that buttons reflect everyday conversation between people. According to her research, "buttons that used a word that the person would actually say in

a conversation outperformed generic buttons and buttons with words the person wouldn't have chosen" (Podmajersky, 2019, p.54) She also reveals that even "The order of the buttons is important: just like they would be in a conversation, the most common or primary action would be brought up first." (Podmajersky, 2019, p.54)

Overall, these two elements (headlines and buttons) are the primary and most important parts of the conversation between apps and people.

3.2.1.6 People don't read messages for several reasons

While some participants took their time going through the prototypes, others moved through the three prototypes very quickly. For those participants who accomplished their tasks quickly, there was much more time to discuss what they remembered and ask follow-up questions. Much of the feedback from these participants wasn't focused on language, but it gave great insight into how people might speed through steps to accomplish tasks without paying attention to the in-between steps.

Many participants openly admitted that they wouldn't read informational messages throughout the app, and when they were asked why, a few themes were apparent in their responses. You can find a full overview of how much time was spent reading per participant and per task in figure 19 in the appendix.

3.2.1.6.1 They do not want to read in the first place

When people download an app to use as a tool or do some task, it is safe to assume that they are not there to read information. People are looking to achieve a specific task and move on with their day. Therefore, when information is too long, this violates Grice's maxim of quantity and people will become disengaged with the app. As was mentioned before, people often read around 20% of the text they find on web pages (Nielsen, 2008) and it is likely that this pattern of behavior also applies to apps.

Within this research, most people just moved through the prototypes quickly without comment, but some pointed out when information was too long, particularly with the more detailed technical descriptions. The overall sentiment was summarized well by "Vivian", who said "I don't, I wouldn't like to read too much information as well. Like I will be... really prefer direct messaging over having

a lot of information to read." Another participant "Simone" also explained her loss of interest when messaging is too long, saying this:

> "Because the sentences is too long than the first [playful] or the second [conversational] prototype, and when the user to read too much much information, maybe it's not very interesting to use this app. And maybe is this... when the sentence is too short and too clearly it's, for me, it's the best because the information arrived immediately and I understand the best than on long information."

Other participants also mentioned that they would prefer less information. "Ricky" commented that "There are a lot of stuff written down here, which I'm not going to read, for sure. <laughs>" and that "I would prefer like [...] a recap, [...], for the different feature available."

This pattern of not reading was also very apparent with the privacy policy information. Only one participant spent the time to read through the full page of text in the prototype and just two said that they would usually skim through similar information in apps. The vast majority of participants, however, openly admitted that they would "ignore" or that they "would not read" that information. One participant, "Ricky", even let out an audible "oof!" and a nervous laugh upon seeing the full page of text for the first time.

Participants made it clear that they would not read privacy policy information in various ways. "Tomas" commented that "I feel guilty about not reading any of that, but going past that anyway" and "Kayla" casually mentioned that "As usual, I'm gonna skip it.". Meanwhile, "Xavier" compared downloading an app to buying a new smartphone, saying that "When you buy it, you just want to use the smartphone. You don't want to read the manual."

"Adrian" also commented on people's general disregard for privacy policy information, saying:

> "I don't think anyone in this world actually reads through those things, so, and it's just boring. And there's like, there isn't any, I mean... even if they tell you something like… 'we'll come to your house and kill your dog', I think if he want to use the VPN, you're probably just going to accept it anyways, so you're probably not going to decline it."

The comments and behaviors of the participants in this research support the hypothesis that any information that is too long and therefore violates Grice's maxim of quantity will cause people to

become disengaged from the conversation and to skip potentially important information because it is too lengthy.

3.2.1.6.2 They do not want to read what they already know

Since VPNs are a common tool and many of the participants had former knowledge and experience using similar products, many people skipped through informational messages and chose not to read because they did not believe they would learn anything that they did not already know. Five even mentioned this reasoning specifically.

“Felix” said “I know what a VPN does, so it will probably tell me things that I already know. So[...] this thing I wouldn't read it”. “Xavier” said that the information was “too long”, and also that “I am already familiar with what a VPN is, so I would not read through all of this”. Yet another participant, “Dorthy” similarly skipped through the information after saying “it's telling me what the VPN does, which I already know.”

This finding also supports Grice’s maxim of quantity since the app in this case is giving much more information than that person needs to know. For this reason, it is important for writers and designers to understand their audience and to include an appropriate amount of information within apps. Two participants even suggested giving people the option to read more when they want to. “Vivian” suggested including “a button that says ‘learn more’”, while “Camille” was enjoyed having the option to read the headlines for a short summary and then continue reading if she felt she needed to, saying;

> “You can kind of access it at a level that suits you really, because obviously we're all different using these sites. And some people will already have a clear idea of all the terminology and everything that they know and other people will be going into it completely blind and, and have no prior experience. So it's... to be able to make it easy, to have not feel overwhelmed, but to have as much or as little information as you need to make a decision is I think quite important.”

Overall, too much information is a common reason for not reading informational messages, whether because the length of that text is too much or that specific person is already familiar with the tool and therefore the content of the messages.

3.2.1.6.3 They trust familiar brands and companies

Another theme that emerged in people's reasoning for not reading was their trust in companies or brands that they already know. People seem to assume that larger and more well-known companies will protect their information or make tasks easy enough so that extensive information is not necessary. In addition to being too long, "Xavier" commented that this trust in the company was one reason he would not read privacy policies, saying:

> "When the privacy policy is too long, I honestly don't feel like reading it. I just, maybe if I'm not sure to trust or not the company I would search on the net, is it safe to like, give your data? So I know Avast, for example, or Facebook or Google, and, but like some software like Facebook, Google, Avast, or some Microsoft software, I trust them. So that's why I usually skip the terms of the privacy policy."

Additionally, this theme of trust was true for requests from the app to access information on their devices. One participant, "Gilbert" mentioned that their knowledge of the brand or company would influence their decision to allow or not allow permission, saying "I would click 'allow', cause I want to see what's going to happen, if I trust the company name, obviously." Another participant, "Felix" also commented that the presence of the dialog alone would reinforce their trust in the app: "This is the important part. It shows me that it's a somewhat trustworthy app. I will allow it. It's asking me to pass all my data through the VPN."

Overall, people tend to trust known companies and brands to protect their information or make tasks easy enough so that information is not needed. People therefore assume that their information is being handled properly and like they do not need to read through information to reassure themselves that they are safe.

3.2.1.6.4 They do not need more convincing once they have the app

In the hypothetical situation that each participant had already downloaded the app and were looking at those screens on their own smart device, a few participants found the messages to be unnecessary. Since they had previously decided to use that app and go through the effort of downloading and setting it up, their minds were already made. Two participants in particular spoke about how these messages were not needed.

"Ricky" commented that "Most of the time when I'm downloading an app, I already know what the app is about". "Vivian" also commented that she did not need another reason to continue setting

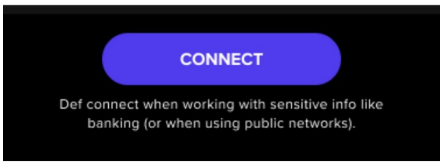
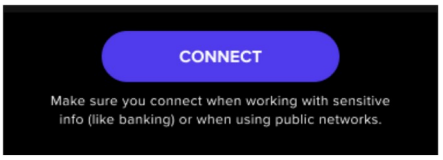
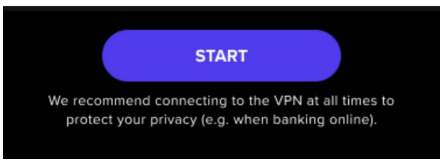
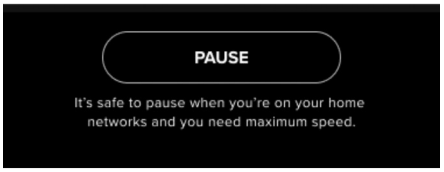
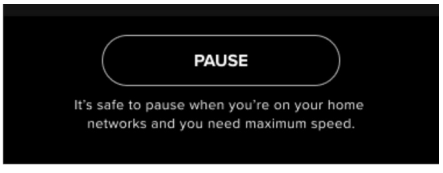
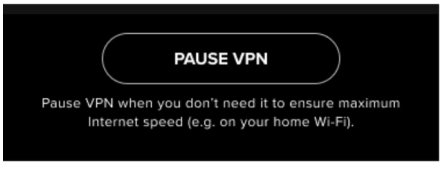
up the app once she had already started the process, saying “maybe this information here, I don't need it anymore. And it kind of adds me one more click. Okay. So it is very informative. Very nice. The information is short, but then if I say set up is because I already know that I need to do it. I don't need maybe another reason to do it.”

Here participants reinforced the idea that the informational messages were not necessary and therefore did not add further value to them while they completed the set up process. This confirms the importance of timing and relevance when presenting information to people in apps, and in this case, the information violated Grice’s maxim of relation, which therefore caused people to further disengage from their conversation with the app.

3.2.1.7 People appreciate honesty (even when it is bad news)

Many participants pointed out the app’s recommendations about when they should use the app and when it may not be needed. These messages could be found just below the buttons that turn the VPN on and off, and included recommendations about when it is safe to turn off their connection and when it was especially important to keep it on (see figure 9).

Figure 9 – Recommendation messages from each prototype

Playful language	Conversational language	Technical language
		
“Def connect when working with sensitive info like banking (or when using public networks).”	*“Make sure you connect when working with sensitive info (like banking) or when using public networks.”*	*“We recommend connecting to the VPN at all times to protect your privacy (e.g. when banking online).*
		
“It’s safe to pause when you’re on your home network and you need maximum speed”	*“It’s safe to pause when you’re on your home network and you need maximum speed”*	*“Pause VPN when you don’t need it to ensure maximum internet speed (e.g. on your home Wi-Fi)*

Recommendation messages are a type of description that include bits and pieces of important information relevant to a person's current place in an app. Descriptions can be used in many different ways, but their overall purpose is to "help people move forward in the experience knowing what to expect, establish the brand, and reduce liability" (Podmajersky, 2019, p.58)

Descriptions are a classic example of an *assertive* illocutionary act because it is communicating truth and belief on behalf of the app by telling people how things work or what they can expect. However, recommendations in particular could also be considered *directive* acts since they are advising people on how they should use a feature or product. For example, these particular messages are advising people when they do and do not need to use their VPN and may therefore influence that person's actions.

Advice or recommendations are often close to buttons to give people a "heads up" about whatever else they need to know before committing to that action. These information messages serve many different purposes, and can make a huge impression on how people perceive an app or brand. Loranger explained how these recommendations can make experiences much better for people, saying this:

> "Pleasant encounters come in all forms and sizes. Microcopy, small bits of copy that provide instructions or alleviate concerns, can significantly boost positive impressions and prevent negative ones from ever forming. Microcopy can make a huge impact when it is presented just in time, in context, is easy to understand, and possesses the proper tone of voice." (Loranger, 2016)

Throughout the prototypes, multiple participants pointed out these recommendations as helpful and seemed to appreciate the extra advice they provided. When using a new app, especially one related to a serious topic like security, some people may be intimidated or unsure of how they should set it up or use it on a daily basis. So getting advice from the experts (in the form of these recommendation messages) can help answer questions about when people should use it or not. For example "Camille" said this:

> "And then obviously there's a recommendation there, which I think is good because sometimes you can have so many settings that it's like, do you go with sometimes enabled or, and it gets a bit confusing. So I like the fact that it recommends a setting for you."

“Camille” also later mentioned that these recommendation messages were particularly memorable to her. “Jasmine” also pointed out that “they give like advice of where to use it or not”, and “Vivian” also appreciated these messages, saying “that is nice that they tell me when it is safe to pause. So maybe I don't use my, my, how do you say like my limitation here.”

Several other people also pointed out the app’s advice that they can pause the app when they need maximum speed. “Tomas” commented that “I didn't even know that browsing speed was affected by VPN, but I mean, it's good to know that the app has it covered, I suppose.” Since this recommendation about speed may have come across as a negative side effect of using the app, some participants perceived the app and brand to be more honest after seeing this suggestion.

“Archie” further explained that while the honesty was appreciated, some people may become less interested if they think their internet would get slower:

> “I liked the way they've done it. It's very honest that the VPN would… you might compromise the speed of your internet if you use VPN. So they're, they're very open and honest about it, but at the same time, it might put people off as well. That if I use it, it's gonna impact my internet speed. So why do I use it? Why do I pay money for it? The people who are technically savvy, they will understand the reason and they will probably go for it. But general public who don't understand how VPN works and what goes behind VPN, they will, they might actually generalize saying that, Oh, if I use this, this is going to compromise my internet speed. Let’s not use it.”

Despite the valid reasoning that some may be less attracted to use a product that could potentially slow them down, more participants showed positive responses to this information, with some participants saying that this recommendation message made them feel more cared about. For example, “Kayla” said this:

> “Because like the last message, like it's making me feel it really helpful because my VPN like the access route is like already hidden. So like anyone cannot see. So I cared about my privacy and I don't need to use it often. Only when I need it I just have to, you know, like connect, rather than it's like connect all the time. So I feel like it's really helpful by reading that message.”

Whether it is beneficial for the product or not, including information that is truthful is appreciated and expected in conversation according to *Grice's Maxim of Quality*. Any information that is included in the conversation with apps should be genuine and authentic.

Based on the social and conversational expectations for speakers to be truthful and genuine, if the app failed to come forward and be honest regarding limitations or misleading expectations, these withholdings would cause more negative feelings about the app and experience than the risk of being straightforward about any possible drawbacks directly in the conversation.

3.2.2 Contradictions

3.2.2.1 Comprehension was similar for both groups

There was no significant difference in comprehension between native and non-native speakers. This finding was true for all three prototypes. In particular, there were very little differences between the playful and conversational prototype results overall, but some participants experienced trouble with the technical language prototype. This rejects the initial hypothesis that native English speakers would be more likely to understand specialized terms in technical language or slang and colloquial terms used in playful language.

On the contrary, both groups seemed likely to understand the terms at the same rate. These findings were made clear through the traffic light reports, which showed an overall summary of how each participant completed the same list of tasks for each prototype (see figure 17).

For both playful and conversational language, all native and non-native speakers successfully completed most tasks without trouble. However, there was one exception to this observation. One single native-speaking participant struggled to complete tasks for all three prototypes. However, excluding this participant, none of the others between native or non-native groups experienced significant issues with the playful and conversational prototypes.

Both groups also had similar experiences with the technical language prototype, and multiple participants from both groups struggled to complete some tasks. This was primarily visible for task four, where participants were asked how they would solve the error to continue turning on the VPN. When the error message did not specifically mention the reason for the error, many participants were unsure of how to solve it and therefore did not say that they would check their internet as part of their troubleshooting.

Participants completed tasks most successfully with the conversational language prototype. While the playful language prototype had similar levels of comprehension, it was still slightly less successful. However, the technical language prototype showed more problems with comprehension than the other two.

These findings show that both native and non-native speakers are equally susceptible to the negative impacts of using slang and jargon in conversation. While native speakers of any language may have had more exposure to a wider range of vocabulary, this does not make them more likely to understand specialized terms.

3.2.2.2 Non-native speakers spent more time reading

Based on the second traffic light report that demonstrated how much time participants spent reading (see figure 19), non-native speakers spent more time reading or seemed to read the messages more carefully throughout each prototype. On the other hand native English speakers were more likely to skim through messages or skip written information altogether compared to non-native speakers.

These findings indicate that non-native speakers may need to exert more effort to understand the same amount of information. It is also possible that native English speakers were able to absorb the same enough information faster, but these findings are based only on observation and would require further research to understand the reasons behind it better.

3.2.2.3 Errors messages were read most consistently

While most participants skimmed through messages or didn't read the messages at all, error messages were the exception. Across all prototypes and participants, error messages were read far more frequently and consistently than any other messages. This showed that participants were far more likely to give attention to and actively interact with their technology when they were solving a problem.

The purpose of error messages is to “help people get where they want to go and, if necessary, indicate that there’s a problem getting there the way they intended” (Podmajersky, 2019, p.87). When something is preventing someone from moving forward, errors can provide maps to help

people navigate to where they want to go. They are similar to headlines and buttons in that they often provide verb-first commands about how to solve the problem.

When people experience problems with their apps, these are truly “make-or-break” moments that will determine how much effort a person is willing to put forth to achieve their initial goals. As “Camille” described it, “if you got stuck, when you're online, you kind of by yourself or you just sat at home or wherever you are and there's just you and your screen. So if you can't find the information on that screen, then you've got nowhere to go for help”.

This finding that participants read error messages more often than other messages shows that people rely on that information to move forward, and that they expect it to help them accomplish their goals. Loranger explained well that this information can bring humanity to apps and digital products by showing up right when they are needed:

> “Encountering error messages is never pleasant, but in time of need, error messages can take the place of a customer-service agent. Harsh and obscure messages can turn a slight inconvenience to an antagonistic encounter. Courteous and helpful messages can mollify a potentially disastrous situation.” (Loranger, 2016)

This rejects the hypothesis that one single style of language would increase people’s engagement with their apps and improve their experiences with technology. Rather this finding shows that the type of message significantly influences the amount of attention and engagement that people will give, thereby adding complexity to the question of what kinds of language work best in apps and why.

3.2.2.3.1 Playful language works well in errors messages

Seeing an error message in an app is not always a pleasant experience, and apps should adjust their voice and tone to show empathy and match the severity of the problem when communicating to people at that moment. Just as in normal conversation, people do not appreciate being blamed or when others make light of serious issues.

However, this research found that several participants enjoyed the playful language version of an error message (see figure 10), that revealed a problem with internet connection. Since using humor in messages for a global audience is risky (and even more so in sensitive situations like error states), this finding rejects the hypothesis that humor is problematic for a general audience.

Finding humor in unfortunate situations is a very human quality that can be found in many situations, from easing stressful situations, to coping mechanisms, to releasing “nervous energy that might otherwise turn into something less productive. It can provide an outlet for fear or anger if channeled constructively.” (Wells, 2018, p.97)

It is therefore not surprising that playful messages can help lift spirits when used carefully and appropriately in low-risk error states. Wells wrote this about finding humor in mistakes:

> “One of the best uses of humor, particularly when dealing with differences in cultures, is when we can find situations to laugh at ourselves and our own mistakes. This is particularly effective when we make mistakes in language usage, cultural mistakes, or unintentional blunders.” (Wells, 2018, p.98).

Participants mentioned several reasons that they enjoyed the playful version of the error message. Upon seeing the message for the first time, “Tomas” laughed and said “Well, it’s explaining what I'm saying in my head to be fair. Big red bar is never nice.” This shows that many people might naturally react with humor since this tone immediately reveals that the error is not a big deal. “Jasmine” also laughed and said “it is funny” when she saw the message for the first time, while “Gilbert” acknowledged that “...it’s jokingly saying that it's a massive red bar” with a straight face.

“Felix”, however, had the most to say about the playful error message and had some expertise on the topic since he was studying to be a software engineer. “Felix” enjoyed the sentiment of the message overall, saying “I am of the opinion that an error message can be less formal so that it doesn't alarm the user.” However, he went on to say that the message was still “too much” by trying to be too humorous, saying:

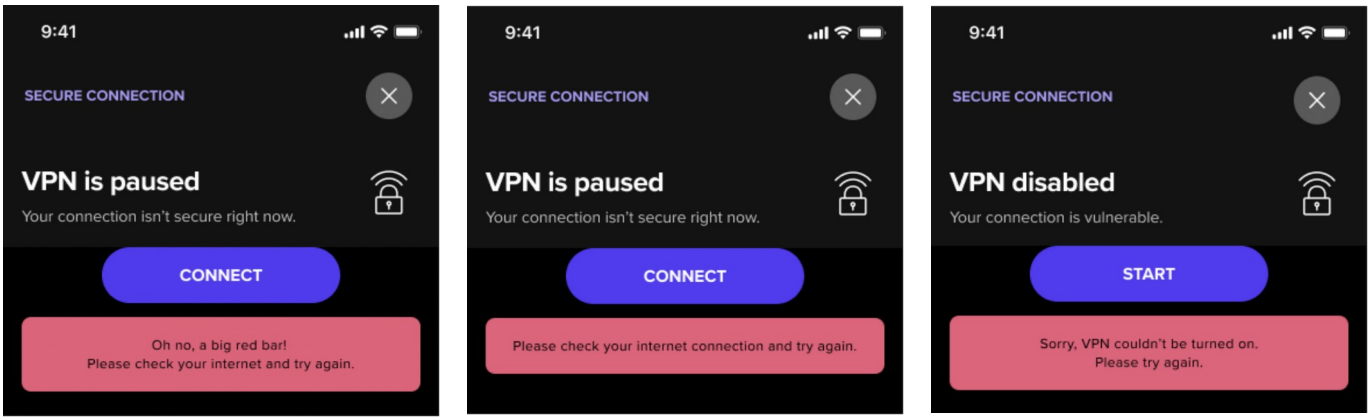
> “*Oh no*, I think it's, it's, it's kind of reassuring that the app knows that it's not a big deal. The error is just expected, instead of just saying ‘error’ or something [...] that it doesn't really know about. And we have to talk to [...] a technician to solve it. It's a little more approachable, but the ‘big red bar’ is a little too much in my thing, but something like, ‘oops, something went wrong’ or showing a smiley, a sad face or some, I mean, something a little more friendly, but not ‘a big red bar’. It just, I don't know. It doesn't, it doesn't tell me anything. It doesn't add anything. Okay. But I agree with the, well, the informality for errors.” (P8)

“Felix” went on to say that the playful error message was one of the messages that stood out from the prototypes. He mentioned that he had “two opposing sides” in his opinion of playful errors in an app regarding a serious topic. He compared it once again to human interaction, saying this:

> “Even a guy in a formal suits with... very well-designed... very well-dressed and all of that with a very formal language. When it, when he makes a mistake, it's nice to see just a little more informality just to approach us with a little more, I don't know the word, but it's like smiling and admitting the mistakes. That's what I, I say the, ‘oops’... it's good for the user to know that there were [...] humans designing it and they're not sure what's happening. I think that shows... that they're honest instead of technicalities and all of those formalities.”

Overall, the playful message in this prototype was successful because it brought more humanity to the app, and showed a natural human reaction to making a mistake, which is humor. While humor is subjective and can get in the way of information if it is overused or inappropriately included, playfulness can also add brevity to the conversation between people and their apps.

Figure 10 – Error Messages From Each Prototype



Playful language

“Oh no, a big red bar! Please check your internet and try again.”

Conversational language

“Please check your internet connection and try again.”

Technical language

“Sorry, VPN couldn’t be turned on. Please try again”

3.2.2.3.2 Vague technical language causes problems in error messages

While playful language can also be problematic when used inappropriately, the participants in this research also revealed that the ambiguous language found in the technical version of the error message (see figure 10) was problematic for almost everyone. This ambiguous language did not give any specific methods to fix the problem, and by being too generic, it therefore interfered with people’s ability to get the information they needed to move forward toward their goals.

Many of the participants had similar feedback regarding this error. After the initial confusion, most participants suggested several problem-solving ideas (often including the classic “turn it off and back on again” techniques).

The primary problem with the technical error was lack of clarity, as several participants pointed out. “Jasmine” said that this message “didn't explain what happened”, “Felix” stated that it “didn't have much info, and “Archie” proposed that “when it comes to the issue with the app or with VPN, it needs to say what the issue is instead of saying ‘there's an issue.’”

“Tomas” recalls that clicking the button worked because it was a prototype, but on his real device, “if it hadn't worked the second time, that would be really annoying because it doesn't really tell me what to do from that point [...] that's why I'd have to, I suppose, sort of outsource advice and go to Google and try and find out how to fix it. Whereas for the other two [playful and conversational] is sort of mentioned specifically internet connection was the issue."

In addition to “Tomas”, several other participants also said that they would search outside the app for more information, either on Google, forums, or other sites where people might ask the community about similar problems.

Some participants also expressed that the error may have been their own fault, even when the message did not directly place blame on anyone. However, it is worth mentioning that all but one of these self-blaming participants saw the technical prototype first, and so they had not seen any of the more specific errors that they could reference as a possible cause.
“Camille” was the first participant to consider if their own device was at fault, and when she compared the more specific error to the technical version, she said “it's a bit clearer as to the type of error message that it is that the internet that's at fault rather than my phone or the app.” This shows that she had previously thought it may have been a problem with her own device before seeing the specific reasoning in the next error.

“Kayla” also believed she was to blame “because I didn’t allow that”, referring to the permission request, or that perhaps “I dunno, like, that make me to subscribe the plan, like the secure VPN package plan or something like that? Maybe?” Similarly, “Dorthy” also believed that maybe she needed to purchase a plan to solve this error, saying “I'm guessing. I'd probably have to buy… my free plan is over and I need to buy a plan or something from somewhere.”

One other participant, “Vivian”, also reflected on her interpretation of these errors during discussion, saying how much of a difference it made to know the reason for the error:

> “If I remember, well, in the first [technical] one, they didn't really give me a specific reason. They just tell me, like, ‘this is not working’ or something like that, ‘please try again’. Were there... the other two, I think they... they pretty much tell you a reason. In just telling you a reason, it doesn't leave you with this question, okay, did I do, did I do something wrong? Do I need to go back? And I had to check something that I didn't? Okay. Maybe it is more about you not doing something right. When they tell you, okay. Is the internet okay, you already, you know. Maybe even if it's not true, but they are giving you a reason. Okay. Like ‘it might be the internet. So check your internet and try again’. I think I would prefer like a message that tells me a small, like a reason than leaving it, leaving it to me and not knowing exactly what to do."

This theme in comments shows that some people are more likely to take blame on themselves when it is not explicitly clear why the error happened. When no reason was mentioned at all, several participants immediately started to second-guess their own actions and behavior up until that point, showing that people naturally start looking for ways to understand what happened, even if it is at their own expense.

3.2.3 Some unexpected outcomes

3.2.3.1 Some liked the use of jargon, even when they didn’t understand

Despite previous research that shows jargon’s negative impact on a general audience, some participants preferred the use of jargon and saw it as a sign of professionalism. One participant in particular “Ricky” had very positive things to say about the use of technical terms that he did not know, which he called “higher level language”.

“Ricky” was not familiar with several of the words that he encountered in the technical language prototype, which he pointed out on his own, “for example here, ‘people from eavesdropping’... I totally don't know what it is about. Like, I don't know anything about it, but it, it looks dangerous.” In another example, he mentioned “...the IP address, I don't know what it is. I don't know what it deals with, but I know that it's something that I need to be careful to. I need to take care of. And the app is doing that for me.”

However, rather than internalizing his lack of understanding, he rather took these specialized terms as a sign that he does not need to understand and that is okay. “Ricky” got a different message from this use of jargon: “So it's telling me something like you can't understand these things and it's fine because everyone has his own role, but I can take care of it for you…”

“Ricky” enjoyed the idea that he did not need to worry about all the technicalities. He wanted the app to tell it like it is and take care of things in the background, regardless of whether he understood every message. As a metaphor, “Ricky” compared this to his own line of work as a photographer and videographer:

> “When, when someone calls me for a video for a photo shooting, I'm not there explaining them how the sensor is working, how the lens is working, how the auto focus is working. They don't want to know nothing about it. They just want to, to, to, to receive the, the picture of the dad and the son, the picture of the, the husband and the wife. Okay. So the th, the, the sports for the crowd funding project, I don't know. But they don't want to care about the things that I'm working.
>
> So the, the computer I'm using the software, because they can’t understand that, but it's fine because it's not they, their role. I have my role. And then the app has its own role, and I'm fine with it. I, I appreciate the fact that he said to me, the, the rights, the right words. So it's not trying to use a different language, an, an easier language, but it's using the right language. I appreciate that. I can't understand that. I can't understand that, but who cares? I just want it to be safe.”

While this finding was unexpected, it still somewhat confirms the idea that jargon leaves the reader out. However the difference is that the reader does not mind being left out in this case, in fact he seems to enjoy the feeling that he is being taken care of by professionals. This may also be an uncommon opinion given that only one participant expressed this point of view, but that would have to be determined in further research.

3.2.3.2 Some thought technical language was more simplified

After going through the technical language prototype, three participants commented that they thought the language and terms were more simplified compared to the others. This was unexpected given that it included more jargon and specialized terms compared with the other two versions.

“Helen” referred to the language in the technical prototype as “layman’s terms” and commented that it “would suit certainly myself and my mum the best” because “it was just easier to understand from a non-technical point of view that this is what this was going to do for you”. She also said that she preferred some of the terminology such as “enabled” and “disabled” (as opposed to “connected” and “paused”) because it was “a little bit more concrete for someone like my mom”.

“Archie” had similar thoughts on this language, calling it “more simplified” and saying “I would say that was a layman language for people to generally understand what it is. It was not more technical. It wasn't technical as compared to other two, but in terms of the wording”

While “Gilbert” had similar comments about targeting a less technical audience, he believed that the messages might be more specific in an attempt to explain the features and details more thoroughly for an audience that had less technical knowledge to begin with. “Gilbert” said “it looks like it was catered for a call to action, maybe for someone less technical. But I think that almost played against that because it made me read more texts and it wasn't phrased in a very useful... in my opinion, the most user friendly language”

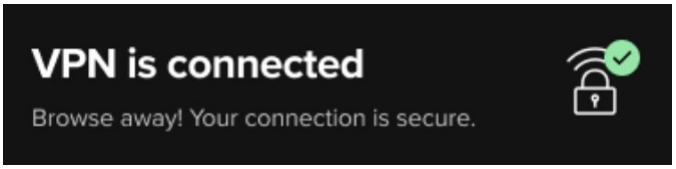
One interesting observation is that these were the oldest three people who were interviewed for this research, which may indicate that different generations are used to different styles of language and may perceive more formal language as simple. However this was an unexpected finding nonetheless and rejects the hypothesis that more technical language would be more difficult to understand for all audiences.

3.2.3.3 Playful language worked well to motivate action

Playful language was a great motivator, particularly for two of our non-native participants. One participant “Ricky” enthusiastically approved of the message that confirmed that his VPN was connected, saying:

> “Now that I’m reading it again, “browse away”, I'm getting the right message… a difference from before, I don't know why, but right now, browse away, I liked it. I liked it ‘cause I have to go away. So I have to go away from the app. The app is telling me, okay, but right now go away and just look for what you want to look for. Okay. So it's giving me the right message. It's like, hurry up. Cause you're, you're free megabyte is, is running away. So hurry up.”

Figure 11 – Confirmation Messages From the Playful Language Prototype



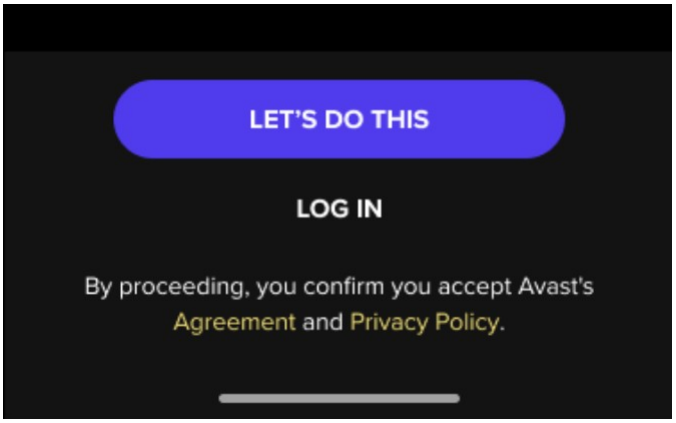
“Browse away! Your connection is secure.”

Another participant “Kayla” felt very strongly about the button on the first introduction page in the playful language prototype. She expressed that it made her feel motivated and excited to continue using the app.

> “So like, I mean like the, all the texts really pushed me to take the action that “let's do this”, you know, it sound cool. I mean, I, I I'm really now, you know, it's really driving me into click “let’s do this”. <laughs>”

“Kayla” also commented that one of the reasons she liked this language was because “It sounds so friendly to me. It just like my friends”, which encouraged her excitement about the language.

Figure 12 – Call to Action on the Introduction Screen of the Playful Language Prototype



“Let’s do this”

Furthermore, when comparing this button to the other button in the conversational language prototype, she said this:

> “It's kind of like a fun thing, like to do rather than like “get started” okay, in that case, I have to finish it. It's like a deadline for me to finish all this stuff. And I don't want to do that. “Let's do this”, this to me, like more encouraging to take the actions for me.”

Playful language is a technique used by teachers in a classroom setting (known as The Playful Approach) for many reasons, including to motivate young learners. Dunn describes that the Playful Approach “motivates by inserting suspense, surprise and mystery: *Oh dear! What next?*” (Dunn, 2015)

Error messages are also similar to this teaching technique for young learners. Playful language is often used to encourage further action, for example “Try again,I know you can do it.” (Dunn, 2015) This is a tactic often found in error messages, as we don’t want people to give up and stop using our app.

Playful language can therefore be seen as a motivator for people to perform locutionary acts or to continue interacting with the app. In these prototypes, it motivated our participants to continue through the set up process and to go forth using their internet while feeling safer.

3.3 Chapter summary

Overall, the playful message in this prototype was successful because it brought more humanity to the app, and showed a natural human reaction to making a mistake, which is humor. While humor is subjective and can get in the way of information if it is overused or inappropriately included, playfulness can also add brevity to the conversation between people and their apps.

Many participants also revealed both stronger opinions and more problems with playful language and technical language overall. This finding reinforces the idea that plain and conversational language has the highest amount of language found in everyday conversation and that being memorable is not always a positive trait when it comes to language in apps.

There were also several examples that confirm Grice’s maxims of conversations, several messages that show clear action and intention illustrating Speech Acts, and also many conflicting opinions from participants that exemplify interpretive flexibility. These patterns also further support that technology is socially constructed and based on social patterns and natural human behavior.

Conclusion

This research examined messages and language used in apps through the theoretical lenses of communications research, Science and Technology Studies (particularly the Social Construction of Technology), and interpretive flexibility. By looking more closely at User Experience (UX), the messages within apps, and people's relationships with technology, this exploratory work sought to understand better how people communicate with technology.

The connections between these areas of study also reveal the social foundations that researchers, designers, and writers can apply to the conversation that occurs when people interact with their apps. To further investigate these connections, this research is designed to examine how a global audience interprets various language types and why they might have a better experience with some conversations more than others.

Through qualitative interviews with 14 participants, this research observed people's interactions with apps in an attempt to understand their interpretation of different types of language and to look for any social connections that people draw between their own social interactions and the way they interact with technology.

Each participant was shown three prototypes using three language types, each that communicated the same message in different terms and tones of voice: playful, conversational, and technical language.

Overall, this research revealed some interesting findings, particularly that people naturally made connections between the language and conversation in apps and their social lives and interactions with other people. This is a clear example of how technology is socially constructed based on the interactions that we have with other people. Furthermore, this research revealed that UX writing is a clear example of Social Construction of Technology because it is based directly on the natural social interaction of conversation.

There were also successes and failures for each type of language, many of which were related to conversational expectations that we already know of, such as Grice's maxims. When any of the language types violated these maxims, participants were more likely to disengage from the conversation. This research clearly contributes to the validity of Grice's maxims of conversation, particularly in the sense that successful UX writing is defined by these conversational laws.

Many participants also exhibited interpretive flexibility, both on an individual level and among various social groups, who tended to view the same language in different ways. Between the two groups of native English speakers and non-native English speakers, there were very few significant differences between the two. The most observable difference was that native English speakers spent less time reading through text in the prototypes compared to non-native speakers who spent more time reading on average.

This finding may indicate that non-native speakers need to exert more effort to understand the same amount of information. It is also possible that native English speakers were able to absorb the same enough information faster, but these findings are based only on observation and would require further research to understand the reasons behind it better.

There were, however, some differences between the older few participants and the rest of the sample, since older participants seemed to perceive more formal and technical language as simple compared to the rest.

There were also some themes regarding responses to the various types of language. The playful message in this prototype was successful because it brought more humanity to the app, and showed a natural human reaction to making a mistake, which is humor. While humor is subjective and can get in the way of information if it is overused or inappropriately included, playfulness can also add brevity to the conversation between people and their apps.

Many participants also revealed both stronger opinions and more problems with the playful language and technical language prototypes. This finding reinforces the idea that plain and conversational language has the highest amount of language found in everyday conversation and that being memorable is not always a positive trait when it comes to language in apps. This can also be considered a reflection of social construction of technology, since people tend to use plain and conversational language when speaking to others in everyday face-to-face interactions.

These findings show that both native and non-native speakers are equally susceptible to the negative impacts of using slang and jargon in conversation. While native speakers of any language may have had more exposure to a wider range of vocabulary, this does not make them more likely to understand specialized terms.

Despite the fact that many of these theories were originally developed several decades ago, the findings from this research continue to feed back to the original idea that well-defined social

patterns have historically shaped the technology that we have today and will continue to shape our technology in the future.

Within this field of UX writing, which is quickly changing and evolving based on newly detected social patterns, it seems that we will be able to continue applying the theories of SCOT in further research. This is further confirmed by the fact that technology is increasingly embedded and included in people's everyday lives. People are forming relationships with their technology that rivals the closeness of personal relationships with other people, and the more human-like this technology becomes, the easier it will be for people to apply social patterns to our behavior toward technology. In fact, this is already visible in the amount of information that can be deduced about a person by merely looking at their technological devices:

> "Technology is present in every area of our lives and, for many, life without it has become unthinkable. As a consequence of this dependence and the extent to which technology devices (computers, tablets and smartphones) are being used for work and social activities, a clear coupling between devices and their owners can now be observed. By coupling, we specifically refer to the fact that information present on a person's device, be it user-generated or created by the native OS, can produce great insight into their life." (Nurse et al., 2014)

Known limitations and next steps

There are several limitations in this research that were not addressed and could be improved upon with further research.

Given that this research was carried out during the height of the COVID-19 pandemic, in-person interviews with real apps were out of the question. Therefore, while participants were asked to pretend as if they were using a real app, they were not. Since participants were limited to viewing prototypes online instead of real apps on real devices, this caused confusion several times.

Some of the observed behavior could not have reflected participants' real life behavior as if they were using an app normally. Rather, when people wanted to use the app one way but were limited by the prototypes, they were asked to simply describe what they would do. If participants were able to show what they would do instead, the observational findings of this research could be vastly improved.

Several participants also assumed that since the design was the same, the messages were all the same as well. Similarly, several participants quickly realized that while the wording had changed, the message was the same, and so they didn't likely didn't expect that this was the only change between prototypes. This could be remedied by further research that eliminates some of the visual elements of app design, therefore causing participants to focus more on the wording and language than looking for discrepancies in the visual appearance.

Additionally, this qualitative research focused on the why, and the findings of this research were not statistically significant. Therefore, further study would be required to validate the numbers and outcomes of this research qualitatively to determine their accuracy with other products and a larger number of participants.

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Additional resources

Session guide for Master's research

Avast Software & Charles University

Research goals

- To explore where conversational language is most useful or helpful
- To understand what kind of language stands out to people within apps
- To observe differences in comprehension and preference between native and non-native English speakers
- To develop strategies for applying conversational (and other types of language) in apps

Prototypes

1. P – Playful language
2. C – Conversational language
3. T – Technical language

Randomized ordering

To reduce biases, the order of the 3 prototypes will be randomized for each participant (including for pilot studies).

Pilot interviews			
P1 – PTC	P2 – CPT	P3 – CTP	P4 – TPC
P5 – TPC	P6 – PTC		
Final interviews			
I1 – TCP	I2 – TPC	I3 – PCT	I4 – CTP
I5 – PCT	I6 – CPT	I7 – TCP	I8 – CTP
I9 – PTC	I10 – TPC	I11 – PCT	I12 – CPT

Frequency of prototype ordering

PTC – 3x	CPT – 3x	TPC – 3x	
PCT – 3x	CTP – 3x	TCP – 3x	

Miro visual summary

Introduction

Hi [name]

Nice to meet you. How are you today?

[if asked back] I'm doing great, thanks for asking :)

Thanks for meeting with me today. My name is Rebecca Vaughan and I'm a researcher at a company called Avast and I'll be walking you through this session today.

So I have some info that I'll read through to start out (just to make sure I don't forget anything), including a quick overview of what this session is about. We're showing people 3 prototypes of an app that we are currently working on and we're watching how they engage with them in order to learn which one works better for them and why.

Also, just to be clear about our intentions — we're not testing you or your technical abilities at all. The goal here is to learn how we can improve our app, so if something seems unclear to you, that's valuable feedback. On the other hand, if something stands out to you as positive, I'd also love to hear your thoughts about that too.

Does that sound OK?

If you have any questions while we're looking at the apps, feel free to ask. But with that being said, I may not be able to answer all of your questions because we want to learn about how you would engage with the apps on your own. So at the end of the session, if there's still something you'd like to know more about, I can try to answer all your questions.

Do you have any questions so far?

We asked for permission to record this session for our internal purposes so I'll share some background on that. Mostly, it allows me to watch our session again in my own time, so I can focus more on your feedback than on taking notes.

We won't share your personal information (like your full name or contact information) with anyone inside or outside my company at any point, but we might share demographic data (like your age or occupation) because this is relevant in the context of our product.

Do I still have your permission to record this session?

[if yes] Thanks for confirming!

One last thing before we move on. I just want to confirm that this interview will take about 60 minutes of your time and one week after the interview you'll be paid through the UserTesting platform.

Sound good so far?

[if yes] OK great, thanks! Let's get started :)

Warm-up

1. Tell me about the last app that you used.

2. Is there any message (like errors or descriptions) that you remember from this app? ● Tell me about the last time that this app spoke to you. ● How did the app communicate with you? ● *[if no, skip questions 3-7]*

3. What stood out to you about that message? ● How did you feel when you read that?

4. *[If positive]* **It seems like this message really made your day** 5. *[If negative]* **It seems like this must have been very frustrating for you** ● What would have been more helpful in that moment?

6. My understanding is….. **7. Do you agree?**

OK, thanks for sharing this info with me.

Prototype 1

Next, I'd like to show you the first of 3 prototypes. I'll share my screen and give you remote access so you can click through the prototype on your own. I also have a few tasks that I'll ask you to complete as if you normally would (without me here watching).

Do you have any questions before we start?

[Open link 1, share screen, and allow remote access]

Now let's say you've just downloaded an app called Avast One for mobile security and what you're looking at is your smartphone screen.

Task 1: Navigate to the dashboard

[Looking at the overview screen]

1. **Can you help me understand what you see here?**
2. **Without clicking on anything yet, how would you proceed from here?**
    - What do you expect to happen and to see next?

Thank you, so now please proceed as you would on if you were on your own.

Task 2: Evaluate the dashboard

[Looking at the dashboard screen with "Set up" buttons]

What do you see here on this screen?

Metric for task completion

- **3 = Completed**: The user completes the task without trouble and understands everything they are presented with.
- **2 = Completed with issues**: The user completes the task, but has some struggles and some issues understanding what they are presented with.
- **1 = Failed**: The user fails to complete the task and/or is completely confused.

Task: Understands what the product does

(3) (2) (1)

Task 3: Set up the VPN

Before we move on, I just want to reemphasize that I'm not testing your technical abilities at all. I'm only interested in seeing how you'd interact with the app if I wasn't here.

Please don't worry about hurting our feelings. We want to hear the good and the bad – it's all valuable information to us. So as much as you can, please just think out loud and talk me through your thought processes while you're going through the apps. Does that sound OK?

So from this dashboard screen, how would you set up the VPN?

Metric for task completion

- **3 = Completed**: The user completes the task without trouble and understands everything they are presented with.
- **2 = Completed with issues**: The user completes the task, but has some struggles and some issues understanding what they are presented with.
- **1 = Failed**: The user fails to complete the task and/or is completely confused.

Task: Understands set up process

(3) (2) (1)

P1	P2	P3

Task: Understands error message

(3) (2) (1)

P1	P2	P3

- What happened here?
- How would you fix this problem?

Task: Turns on the VPN

(3) (2) (1)

P1	P2	P3

Task: Understands on and off states

(3) (2) (1)

P1	P2	P3

- Based on what you see, is it working? How do you know?
- What does “it’s connected” mean?
- Could you use it right now?

Have you seen or worked with anything similar before?

- *[if yes]* What does it remind you of?
- *[No] - [Can be sure they don't have experience with this type of product]*

Task 4: Return to dashboard

Now if you wanted to exit this page and go back to the dashboard, how would you do that?

Prototype 2

OK, thank you. So next we'll look at our second prototype. It may look familiar to you because it's a different (but very similar) version of the first one. So we'll follow the same steps as we did for the first one.

[Return to Prototype 1 instructions and follow for Prototype 2]

Prototype 3

OK thanks, so we've made it to our last prototype! Once again, we'll look through a different version of the first two and we'll follow the same tasks and directions as before.

[Return to Prototype 1 instructions and follow for Prototype 3]

Task 5: Comprehension

[Stop sharing screen and allowing remote control]

Let's say you wanted to tell a friend about this feature (the VPN). How would you describe it?

- What would you tell them this feature does for you?

Task: Understands what the VPN does

(3) (2) (1)

P1	P2	P3

Words used to describe the VPN

P1	P2	P3

Wrap-up (3 min.)

- **Looking back, what messages stood out to you from these prototypes? Why?**
- **Which one stood out to you the most?**

- **You were talking about this one prototype, what do you remember about the other ones?**

Extra follow-ups

- Could you show me one of the sites that you use regularly or that really speaks to you?
    - What do you like about the site?
    - What about this site speaks to you?

Thank you for your feedback. We have completed everything I had planned for our session.

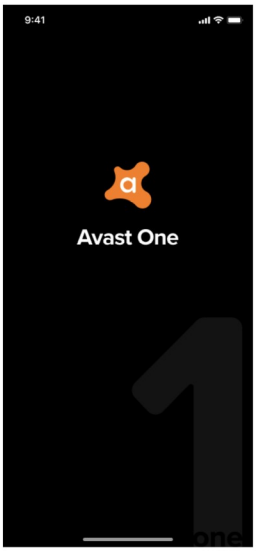
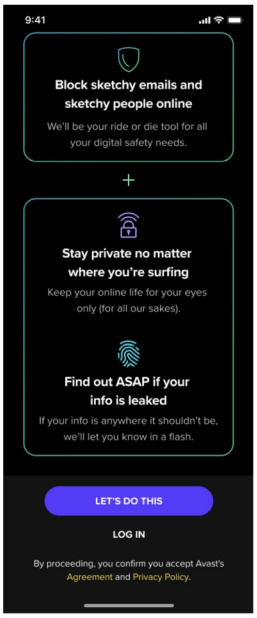
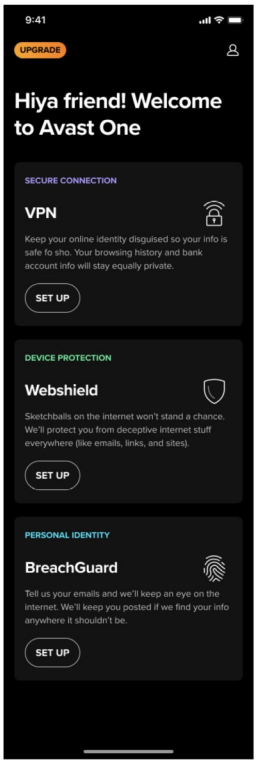
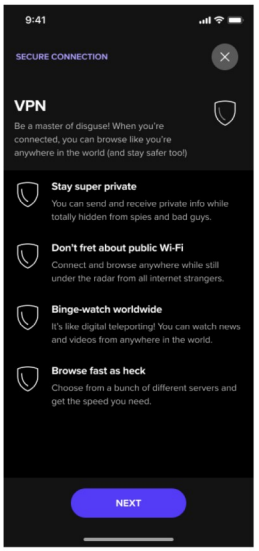
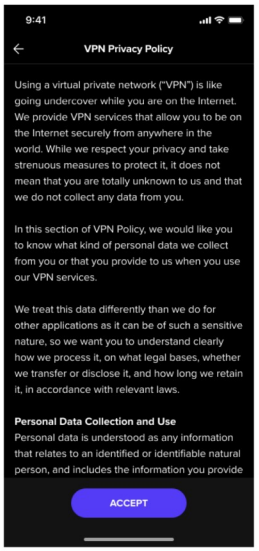
I mentioned earlier that I might not be able to answer all of your questions during our session because I want to learn about how you observe what you would do without me around. But I also mentioned that if there is something you would like to know more about, I will try and answer it at the end of our session. Do you have any questions for me?

OK, well thanks again for your feedback and for taking the time to meet me online today.

Have a great day and stay safe! Bye

Figure 13 – Participant demographics										
Participant & pseudonym	**Sex**	**Age**	**Highest education**	**Employment status**	**Industry**	**Annual income**	**Web expertise**	**Country**	**Native language**	**English proficiency**
P1 – Tomas	Male	21	High school or equivalent	Full-time student		Less than $19,999	Average	United Kingdom	English	Native
P2 – Camille	Female	34	Master's degree	Self-employed	Education management	$20,000 - $39,999	Average	United Kingdom	English	Native
P3 – Helen	Female	42	Some college	Self-employed	Publishing	$40,000 - $59,999	Advanced	United Kingdom	English	Native
P4 – Gilbert	Male	42	Bachelor's degree	Full-time (30+ hours per week)	Investment management	$60,000 - $79,999	Advanced	United Kingdom	English	Native
P5 – Adrian	Male	20	Bachelor's degree	Full-time student		$80,000 - $99,999	Average	United Kingdom	English	Native
P6 – Archie	Male	51	Master's degree	Full-time (30+ hours per week)	Education management	$60,000 - $79,999	Advanced	United Kingdom	English	Native
P7 – Jasmine	Female	19	Some college	Full-time student		Less than $19,999	Advanced	Brazil	Portuguese	B2 – Upper-intermediate
P8 – Felix	Male	29	Bachelor's degree	Full-time student	Computer engineering	Less than $19,999	Average	Portugal	Portuguese	B2 – Upper-intermediate
P9 – Xavier	Male	18	Some college	Full-time student		Less than $19,999	Advanced	Italy	Italian	B2 – Upper-intermediate
P10 – Simone	Female	25	Master's degree	Full-time student	Marketing and advertising	Less than $19,999	Average	Italy	Italian	B2 – Upper-intermediate
P11 – Vivian	Female	27	Associate's degree	Self-employed	Design	$40,000 - $59,999	Advanced	France	Spanish	B2 – Upper-intermediate
P12 – Ricky	Male	22	High school or equivalent	Self-employed	Media production	Less than $19,999	Advanced	Italy	Italian	B2 – Upper-intermediate
P13 – Kayla	Female	28	Bachelor's degree	Full-time student	Communications	Less than $19,999	Average	Myanmar	Burmese	B2 – Upper-intermediate
P14 – Dorthy	Female	34	Bachelor's degree	Full-time student	International education	Less than $19,999	Average	United Kingdom	English	Native

Figure 14 – Playful language prototype

Screen 1 Splash screen	**Screen 2** Intro screen	**Screen 3** Dashboard	**Screen 4** VPN info	**Screen 5** Privacy policy
				

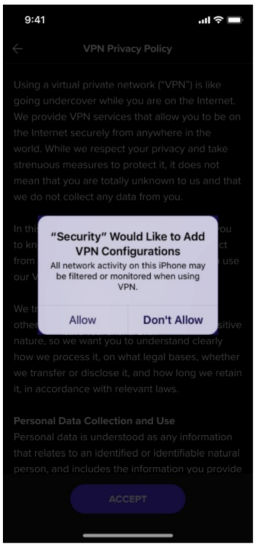
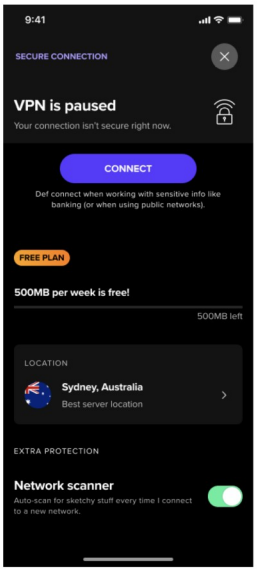
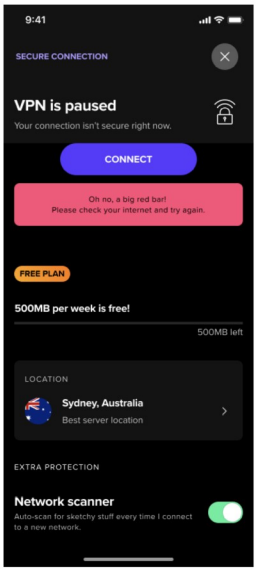
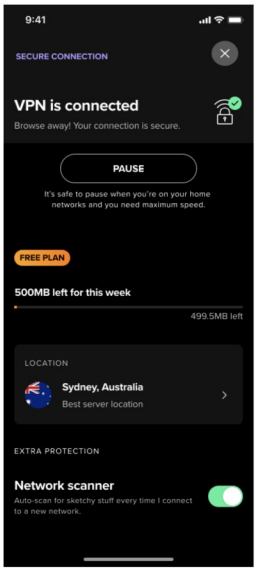
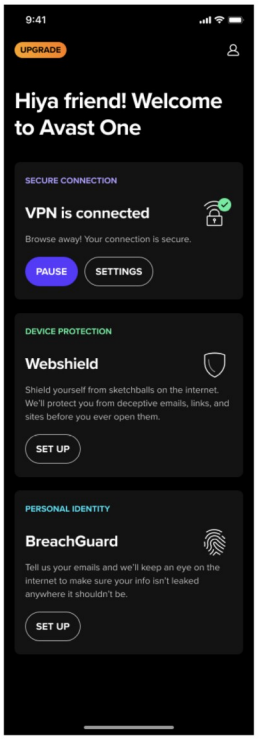
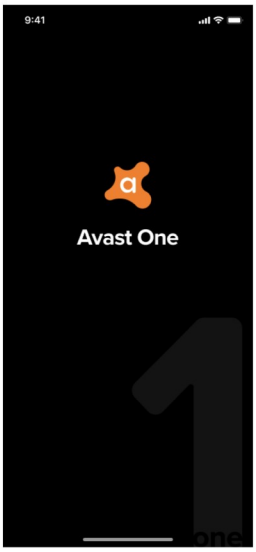
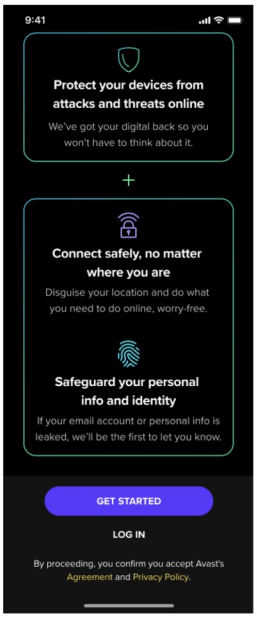
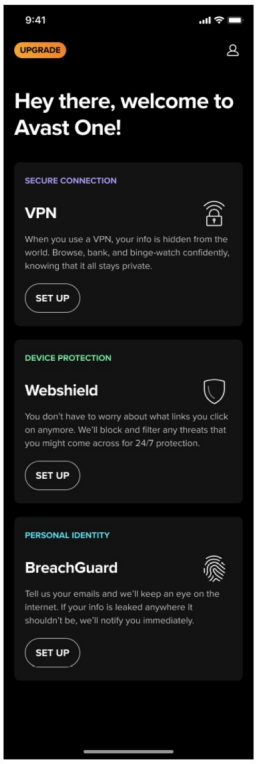
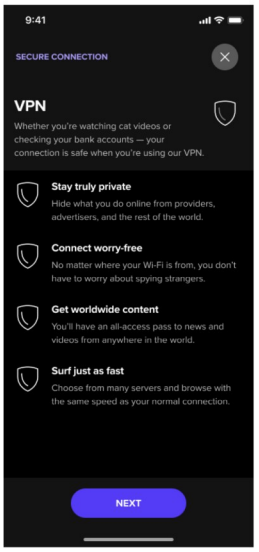
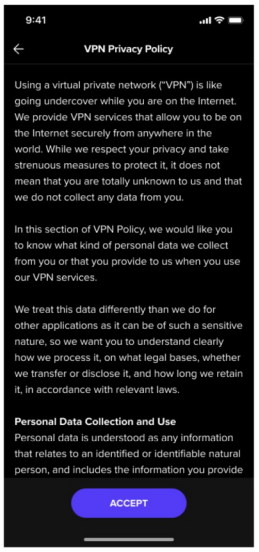
Screen 6 Permissions	**Screen 7** VPN off	**Screen 8** VPN error	**Screen 9** VPN on	**Screen 10** Dashboard
				

Figure 15 – Conversational language prototype

Screen 1 Splash screen	**Screen 2** Intro screen	**Screen 3** Dashboard	**Screen 4** VPN info	**Screen 5** Privacy policy
				

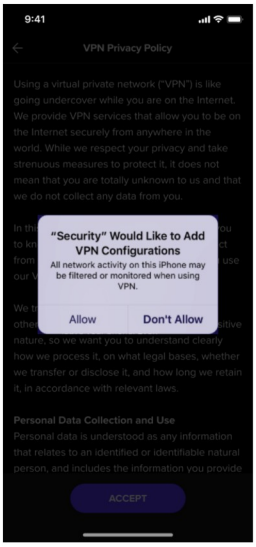
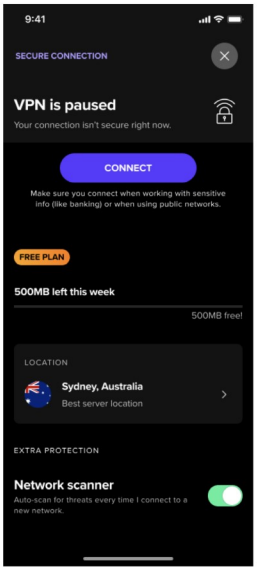
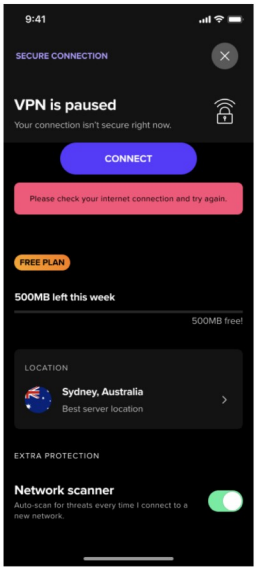
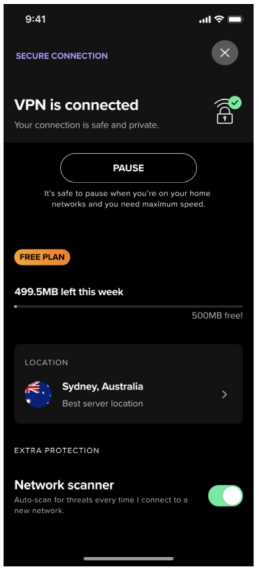
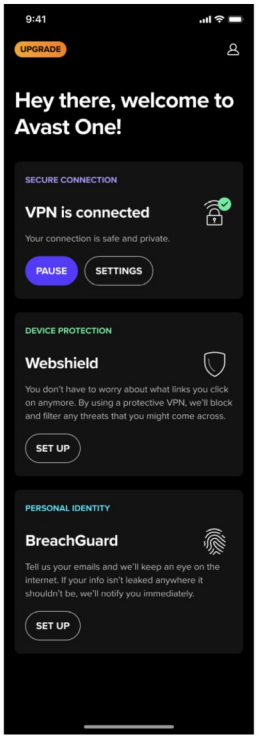
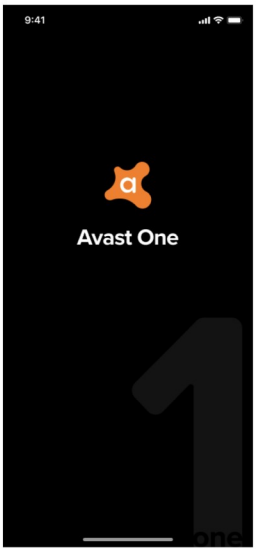
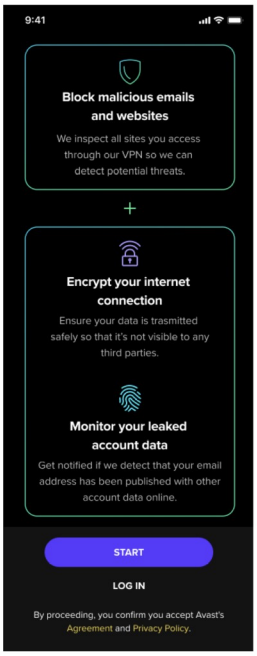
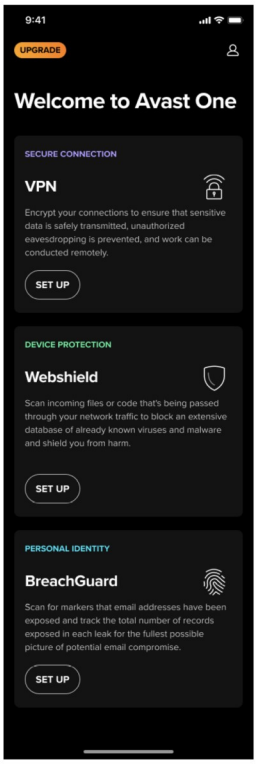
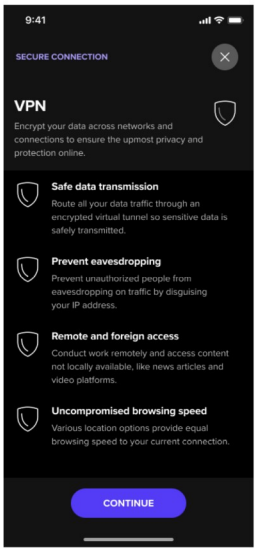
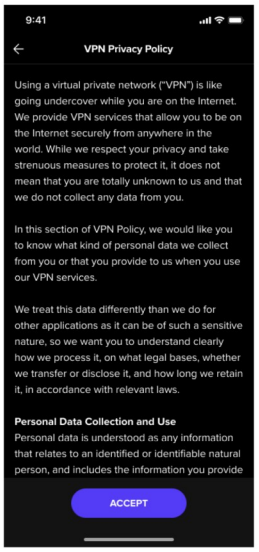
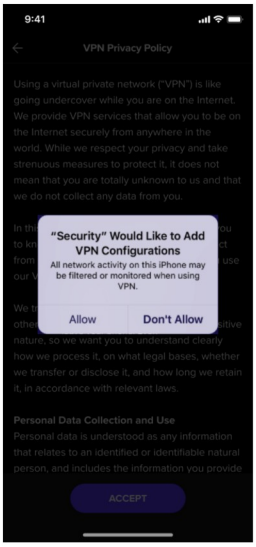
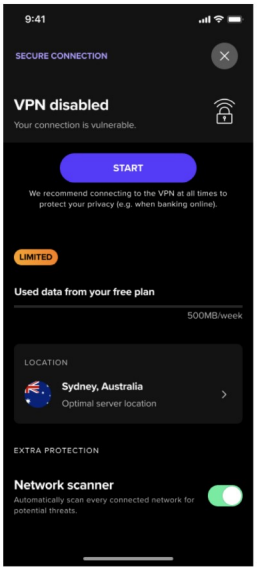
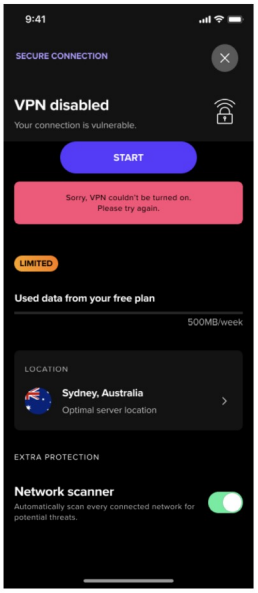
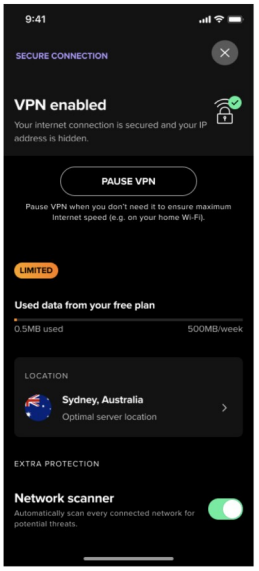
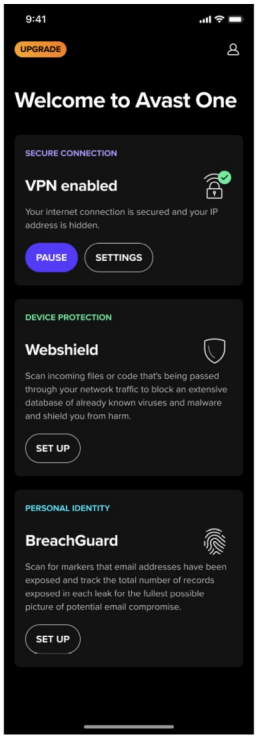
Screen 6 Permissions	**Screen 7** VPN off	**Screen 8** VPN error	**Screen 9** VPN on	**Screen 10** Dashboard
				

Figure 16 – Technical language prototype

Screen 1 Splash screen	**Screen 2** Intro screen	**Screen 3** Dashboard	**Screen 4** VPN info	**Screen 5** Privacy policy
				

Screen 6 Permissions	**Screen 7** VPN off	**Screen 8** VPN error	**Screen 9** VPN on	**Screen 10** Dashboard
				

Traffic light reporting schemes

Figure 17 – Task completion

Playful		Native English speakers task overview							
Task	Description	P1	P2	P3	P4	P5	P6	P14	Task summary
1	Understands what A1 does								
2	Understands what a VPN does	+	–	–	+	+	+	+	
3	Completes set up process								
4	Checks internet to fix error								
5	Turns on VPN								
6	Understands on and off states								
Participant summary		3	2	1	3	1	2	1	

Playful		Non-native English speakers task overview							
Task	Description	P7	P8	P9	P10	P11	P12	P13	Task summary
1	Understands what A1 does								
2	Understands what a VPN does	–	+	+	–	+	–	–	
3	Completes set up process								
4	Checks internet to fix error								
5	Turns on VPN								
6	Understands on and off states								
Participant summary		3	3	1	1	2	2	2	

Conversational		Native English speakers task overview							
Task	Description	P1	P2	P3	P4	P5	P6	P14	Task summary
1	Understands what A1 does								
2	Understands what a VPN does	+	–	–	+	+	+	+	
3	Completes set up process								
4	Checks internet to fix error								
5	Turns on VPN								
6	Understands on and off states								
Participant summary		2	3	2	1	2	1	3	

Conversational		Non-native English speakers task overview							
Task	Description	P7	P8	P9	P10	P11	P12	P13	Task summary
1	Understands what A1 does								
2	Understands what a VPN does	–	+	+	–	+	–	–	
3	Completes set up process								
4	Checks internet to fix error								
5	Turns on VPN								
6	Understands on and off states								
Participant summary		2	1	3	2	3	1	3	

Technical		Native English speakers task overview							
Task	Description	P1	P2	P3	P4	P5	P6	P14	Task summary
1	Understands what A1 does								
2	Understands what a VPN does	+	–	–	+	+	+	+	
3	Completes set up process								
4	Checks internet to fix error								
5	Turns on VPN								
6	Understands on and off states								
Participant summary		1	1	3	2	3	3	2	

Technical		Non-native English speakers task overview							
Task	Description	P7	P8	P9	P10	P11	P12	P13	Task summary
1	Understands what A1 does								
2	Understands what a VPN does	–	+	+	–	+	–	–	
3	Completes set up process								
4	Checks internet to fix error								
5	Turns on VPN								
6	Understands on and off states								
Participant summary		1	2	2	3	1	3	1	

Figure 18 – Defining Criteria for Task Success Traffic Light Reports

	1 Failed	2 Completed with issues	3 Completed
Understands what A1 does	Does not recognize or understand any of the features offered in Avast One or is unable to tell the difference between two or more features.	Correctly describes or recognizes some features in Avast One, but not others or is unable to tell the difference between two or more features.	Correctly describes or recognizes all features offered in Avast One and can tell the difference between all three features.
Understands what a VPN does	Does not know what a VPN is, how it works, or what it can do to benefit them.	Has a vague idea of what you can do with a VPN (like for Netflix) but doesn't know of any other benefits or reasons to use a VPN.	Correctly describes the security and recreational benefits of using a VPN.
Completes set up process	Does not complete one or more steps that are required for the app to work (like refusing to accept some terms or permissions).	Completes all steps required for the app to work, but is confused about what's being asked or why it's needed.	Completes all steps required for the app to work without hesitating or appearing confused.
Checks internet to fix error	Would not check their internet connection to try and fix the error.	Would try several other troubleshooting tactics before checking the internet to fix the error.	Would check their internet connection as a first step to fix the error.
Turns on VPN	Does not turn on the VPN until explicitly asked to press the button.	Turns on the VPN only after guidance or prompting.	Turns on the VPN independently with no additional guidance.
Understands on and off states	Does not know or incorrectly identifies when the VPN is on and off	Takes a long time to understand or understand incorrectly before figuring it out	Immediately and clearly can identify when the VPN is on and off

+	Indicates that the participant has used a VPN before or is familiar with similar products.
–	Indicates that the participant has not used a VPN before and is not familiar with similar products.
Number in participant summary	Indicates the order in which they saw each prototype (1 = first position, 2 = second position, 3 = third position)

Figure 19 – Scope of reading

Playful		Native English speakers reading overview							
Screen	**Description**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P14**	**Task summary**
1	Intro screen								
2	Dashboard								
3	VPN description	+	–	–	+	+	+	+	
4	Privacy policy								
5	Permission dialog								
6	VPN off								
7	Error message								
8	VPN on								
9	Dashboard								
Participant summary		3	2	1	3	1	2	1	

Playful		Non-native English speakers reading overview							
Screen	**Description**	**P7**	**P8**	**P9**	**P10**	**P11**	**P12**	**P13**	**Task summary**
1	Intro screen								
2	Dashboard								
3	VPN description	–	+	+	–	+	–	–	
4	Privacy policy								
5	Permission dialog								
6	VPN off								
7	Error message								
8	VPN on								
9	Dashboard								
Participant summary		3	3	1	1	2	2	2	

Conversational		Native English speakers reading overview							
Screen	**Description**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P14**	**Task summary**
1	Intro screen								
2	Dashboard								
3	VPN description	+	–	–	+	+	+	+	
4	Privacy policy								
5	Permission dialog								
6	VPN off								
7	Error message								
8	VPN on								
9	Dashboard								
Participant summary		2	3	2	1	2	1	3	

Conversational		Non-native English speakers reading overview							
Screen	**Description**	**P7**	**P8**	**P9**	**P10**	**P11**	**P12**	**P13**	**Task summary**
1	Intro screen								
2	Dashboard								
3	VPN description	–	+	+	–	+	–	–	
4	Privacy policy								
5	Permission dialog								
6	VPN off								
7	Error message								
8	VPN on								
9	Dashboard								
Participant summary		2	1	3	2	3	1	3	

Technical		Native English speakers reading overview							
Screen	**Description**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P14**	**Task summary**
1	Intro screen								
2	Dashboard								
3	VPN description	+	–	–	+	+	+	+	
4	Privacy policy								
5	Permission dialog								
6	VPN off								
7	Error message								
8	VPN on								
9	Dashboard								
Participant summary		1	1	3	2	3	3	2	

Technical		Non-native English speakers reading overview							
Screen	**Description**	**P7**	**P8**	**P9**	**P10**	**P11**	**P12**	**P13**	**Task summary**
1	Intro screen								
2	Dashboard								
3	VPN description	–	+	+	–	+	–	–	
4	Privacy policy								
5	Permission dialog								
6	VPN off								
7	Error message								
8	VPN on								
9	Dashboard								
Participant summary		1	2	2	3	1	3	1	

	1 **Failed**	**2** **Completed with issues**	**3** **Completed**
Amount that participants read messages per screen	Does not read any of the text on the screen, only clicking through to the next step.	Reads only part of the information but less than half of the messages visible on the screen.	Reads most to all of the words visible on the screen.

+	Indicates that the participant has used a VPN before or is familiar with similar products.
–	Indicates that the participant has not used a VPN before and is not familiar with similar products.
Number in participant summary	Indicates the order in which they saw each prototype (1 = first position, 2 = second position, 3 = third position)