HCI Report

Introduction

In this study, we evaluate a mockup of a mobile app. The mobile app would allow users to manage photos, and communicate with their Pix-star digital photo frames. We chose the ‘Think Aloud’ protocol to help evaluate the app. The think aloud involves participants completing some key tasks within the app while dictating their thought process. We then take the screen capture and audio recording from the think aloud and use it to help evaluate the app. Our aim is to understand any immediate issues with the design before taking the app to the next stage in development.

Reasoning for Think Aloud

We decided the think aloud method would be the most appropriate for testing the Pix-star app mockup. This is because we are evaluating the first iteration of design and therefore the main goal should be to understand obvious design flaws, before committing large monetary resources to development. The think aloud gives designers perspective on what they’ve made by showing it to someone with no prior experience. Something that may be obvious to creators may not be so obvious to the users. By getting participants to speak their mind, we can learn not only where they get stuck but why. As the Pix-star app is still in its early stages, there could be many major changes to be made. The think aloud focuses purely on the completion of key tasks, so as the design of the app changes, the process of the think aloud always remains a relevant way of showing how viable a design is. For an interview or survey, the questions could become redundant at the next stage of evaluation. Similarly, they could miss obvious problems in subtasks that the designer assumes to be intuitive and therefore not doesn’t ask questions about.

Methodology

Before we began with the think aloud, we gave each participant as much time as they required to read our ‘Participant Information Sheet’. When they were satisfied, they signed our consent form and we then gave them a unique participant number.

The first step we took was introducing the concept of the think aloud. We did this with the use of a carefully written script. The script introduced the participant to the format of the think aloud and included training. We gave an example of how the think aloud process worked, and then asked the participant to ‘speak aloud’ while solving a simple arithmetic problem. We never referred to the protocol as the ‘think aloud’, as we were mindful that this terminology encourages a participant to explain their actions. This in turn makes the participants aware of the process and they would likely make a conscious effort to rationalise their actions. This would disturb their normal behaviour of interacting with the application in a natural manner. Instead, we referred to the protocol as a ‘speak aloud’.

We wanted to keep the experience of each participant consistent throughout the process and so it was important that each individual was introduced to the process in a similar way. The script also reminded them that we were evaluating the application and not the participant. We attempted to memorise the script, and to guide us we used flashcards with bullet points which covered the required information.
Once the participant is comfortable with the think aloud protocol, we read out to them the design fiction for the first task. Before we began the recordings we gave the participant time to ask questions.

While the recordings were underway, we didn’t talk to the participant. Sometimes, when the participant was was no longer making any progress, we offered them a hint. To ensure that the participant talked constantly throughout the process, we sometimes had to remind them to carry on speaking. When the participant had completed each task, we stopped the recordings. We then resumed the recordings (with notice) again when they were ready for the next task.

When the participant had completed all of the tasks we thanked them for their participation. We then named each screen capture recording and voice recording with the participants' unique id. The voice recording data was initially stored on a location on an android phone which had no auto-back-up feature. When the recordings were complete we transferred the files onto the laptop which we recorded the screen captures on. The reason for this being that this laptop has drive encryption software installed upon it. We then spent some time converting the audio records into written transcripts. Any personal data which through circumstances we could not control ended up in the recordings was redacted in the transcripts. Again, these transcripts were stored on the encrypted hard-drive. Upon the completion of evaluating the results within this report, all electronic data will be deleted. We will be keeping the consent forms in a lockable cabinet.

Results

Success Rates:

Task 1	Task 2	Task 3	Task 4
2/5	2/5	2/5	5/5

The following is a write up of the main issues noted when users tried to complete each task.

Task 1 - Create a new photo album and play it on the frame

- In order to create a new album, the app required users to select which sources they wanted Pix-star to access photos from (social media options or on device photos). The main issue encountered here was that the on screen instructions weren't clear enough. The text was too small, and didn't stand out. With the design fiction in mind, the participants were focused on getting the photos from the device so were confused at this menu. They couldn't progress having only selected "camera roll" as the app required them to also select "Instagram".

- Another common issue which surfaced was that participants struggled to notice the "add album" button (or plus icon). Additionally, the implementation of the Pix-star app means that the functionality of this button is also confused. The app only allows you to use or create photo albums within the external sources. For example if you go to "camera roll" within the app, you can use existing albums from "camera roll" or you can create a new album within "camera roll". This confused a few participants as they thought they were picking photos from albums within "camera roll" to be a part of their new album. As a result they completely missed the plus icon for adding a new album.

- Most participants had a problem trying to display the new album. Most participants didn't immediately equate the 'admin' tab with managing albums and photo frames, which is essentially what the page does. When on the admin tab, to change album the user must locate a drop-down menu at the top of the screen which then lists available albums. Participants tended to think the double arrows either side of the play button should change albums, and sometimes missed the dropdown menu entirely.

Task 2 - Remotely add a photo to someone else's frame

- Firstly participants wanted to know whose frame they were making changes to. On the admin tab, there is a small icon in the top right corner that deals with this, however, a couple of users couldn't identify the icon and others mentioned how they felt it didn't represent a photo frame, or the function to switch frames very well.

- After selecting the frame icon, users can then pick between available frames or pair a new frame. Some participants expressed confusion after selecting "Jack's Frame" taking them immediately back to the

admin tab as there was no indication of what had changed. At no point does the app display or confirm what frame your actions are applied on.

- To share an album across frames, some participants tried to find the album under the photos tab first, but once they reached the “holiday” album there is no option to share the album. The implementation allows the user to switch between paired frames as they please to display the photos which they own. The implementation assumes no photo albums are associated with the frame itself and to display other photos, users must use the messaging service. Most participants classified the task as sharing of photos instead of taking control of the frame.

Task 3 - Send photos and comments to friends

- In this task, participants struggled most to find the add friend button on the friends tab because it’s small and understated. Otherwise, users could traverse the friends tab smoothly as it resembles existing messaging apps.

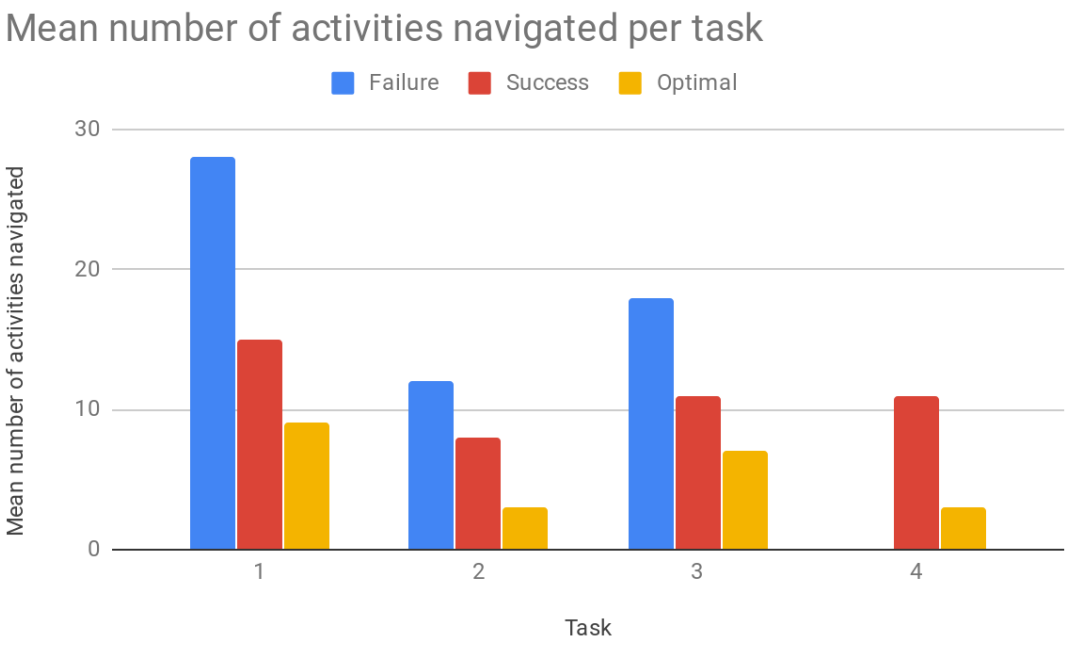
- Similarly to the last task, some users tried to send photos from within the photos tab. Once they found the photos they wanted to send, there was no option for sending them using the in-app messaging service.

Task 4 - Control frame play mode

- All participants found the play mode icons intuitive and easy to find and most were able to easily complete the task. The only criticism received was that they felt the mood-based music choices to accompany the photo album weren’t ideal. Participants would have rather used their own music if any to play from the photo frame. Participants also noted that there was again no feedback as to what effect their actions were having on the photo frame. This was important as in this task, they were supposed to be controlling somebody else’s frame.

Statistics

We thought it was important to analyse some statistics to confirm patterns we had noticed while considering the think aloud transcripts. We had originally thought to use time taken for each task to use as a metric to measure the ease of use of the application. However, using time as a metric would provide unrealistic feedback. This is because people will take longer to complete a task if they must think about the task itself while trying to verbalise their thoughts.
Instead, we opted for counting the number of activities navigated per task. We defined activity in this case by when a completely new screen was presented after a button touch. Pop-up options and sub-menus which appeared on top of a screen weren’t counted. A ‘Failure’ was recorded when we had to give the user a hint.



The main issue which the data indicates is a basic lack of understanding for users within the application as to what each icon means. This confusing iconography often lead to cases where users were not sure what each button press would result in. They had to cycle through many unnecessary areas of the application before understanding how the app works. Across the first task, the overall increased number of activities navigated through could be put down to the fact that the users were less familiar with the app than in later tasks. However, the overall pattern remains the same. It took users multiple attempts to find out how to complete any given task. In cases where users could not complete the task, they often found themselves in repeating loops, where they felt like they had exhausted all options and were left with no choice but to try and revisit areas of the application. Another reason for the increased number of activities navigated was that as the system gave very limited feedback, users weren't sure when they had completed a task.

Recommendation

A major problem with the Pix-star app is that users are not told what frame they are making changes to. Within the 'Admin' tab, users can switch between frames, choose which album is playing and alter the relevant settings for these albums. However, there is no indication of whose frame these changes are referring to. This is a violation of the visibility of system status heuristic which states that the system must keep the user informed about ongoing processes within the app through feedback. This is usually handled by a status bar, however there is no framework to handle this here. When a user selects a frame, the system returns to the admin tab without a noticeable change or feedback. For this case specifically, we would suggest that the system should display a brief popup which explains you are now adjusting frame 'A' for example. However, to improve on the visibility of system status throughout the application, we recommend a status bar placed at either the top or bottom of the screen, informing the user which frame they are currently accessing, and which album is playing. This would make certain that users would have a greater understanding of their actions.

Some key icons used were often overlooked by users. The result of this was that key functionality was effectively hidden from users for a time. Users would eventually discover the functionality, but most had to search through the app in a somewhat exhaustive manner. An example which stood out to us when analysing the results was the plus symbol within the photos tab. Although a recognisable symbol, it's dull in colour and very small. This caused it to be missed by some participants in our think aloud. A task as common as adding an album should have a greater presence on the page. This can be achieved by making it larger, more colourful or by adding text below the icon. The position of the icon in the top corner of the screen may have made it harder to see; displaying it more centrally at the bottom of the screen would make it harder to miss. Similarly, the frames icon on the admin tab poorly represents photo frames. Some participants mentioned they tried the

button not knowing what it was meant for, this is another important part of the app which should be more clearly displayed. I would recommend finding a more recognisable image for the icon, for example a real picture frame as it would be more familiar. Additionally, combining the icon with a caption would be a simple way to make it clearer. We would also rename the admin tab to “Frames” as it is mostly concerned with switching between frames and deciding what is being played on them. Overall, there is an issue throughout the app where users have to rely on their memory to use the app efficiently. Our suggested changes would take a step to making the app easier to use through recognition instead of recall.

When users were tasked with sending photos to friends or playing albums on a different frame, the participants often wanted to start the task in the ‘Photos’ tab. This problem occurred in both task 2 and task 3 but the app wasn’t designed to complete these tasks using the photos tab. The effect of this was that the users felt lost, and frustrated that the app didn’t feel flexible enough to meet their needs. I would recommend that under the photos tab the app offered a button to cast an album or selection of photos to a frame of choice. There should also be a share button that offers to send photos to friends using the in-app messaging service. This highlights how the app is designed for users to only be able to complete tasks in particular ways. The design doesn’t incorporate ways for users to navigate shortcuts within the interface for more efficient use.

Reflection

Student 1 - I believe the think aloud was mostly a successful methodology when it comes to discovering what unfamiliar users struggled with. The biggest advantage was having a fresh perspective on the app and seeing trends in how users attempted to complete the tasks. We also learnt more about the app ourselves by viewing it through the perspective of our participants. However, during the study, most people tried to describe what they liked or didn’t like about the app instead of describe their subtasks and this lead to participants glossing over things they deemed to be obvious decisions possibly impacting their failures. Also, the type of results that the think aloud produces are very surface-level issues, plus most candidates found the same handful of problems with the mockup. This means it is difficult to evaluate the structure of the app especially as most people haven’t used a digital photo frame app before. The on-rails experience of Figma at this stage makes it harder for users to interact with the app, for example there may be buttons that don’t work because they aren’t needed to complete task. This can unfairly inflate the negative response towards the app because the user is frustrated with the unfinished mockup. If I performed the study again, I would make sure the participants understood that they should describe each subtask for them to complete the task instead of trying to evaluate it themselves. I would also try and give the user a period to get used to the app before trying to complete the first task. This should reduce the bias between the results of different tasks because, from the statistics, the success in earlier tasks suffers from the participants unfamiliarity with the app layout. It is reasonable to assume any application takes some time to get used to.

Student 2 - For our study, the think aloud gave a way for participants to experience using the application in a natural manner. The think aloud process also meant that users had no preconceptions of the application. This was because the protocol doesn’t pose questions with any bias. In general, users usually provided feedback which was very helpful in determining the exact places where they were having issues. This made it easy to locate the major design issues within the application. If I had to do the study again, I would spend more time writing the script to make users explain their intentions in greater detail. Often, participants resorted to saying where they thought the application was broken, and not their thoughts about why they were making choices. Although their feedback was useful in highlighting parts of the application which didn’t seem logical, they somewhat strayed from the types of responses we were wanting. Another area where the study fell short was that users didn’t always progress through the whole task without receiving a hint. This meant that we potentially missed out valuable information in the latter stages of the tasks. To avoid this issue, I would edit the design fictions to make the objectives shorter. This would make the tasks more achievable and so we would see the participants covering and providing feedback on a larger proportion of the application. A final area where we could improve the study would be to use a varied group of participants. For example, most participants were computer science students who were likely to be more familiar with navigating mobile applications compared to the average user. If I were to do the study again, I would seek out a group who don’t have experience working with software, in order to produce results more aligned to the general population.

Appendix

1.0 Think Aloud Script

Hello my name is: [Your name]

Today we will be using a mockup of the Pix Star smart photo frame mobile app on this laptop. The app is designed to help you manage a smart photo frame. Today we will attempt to complete some typical activities within the app which a user may find useful. You will not be entering any personal information into the app, and your participation today is purely voluntary, you may stop at any time. The purpose of this exercise is to identify issues with the pix star photo frame app. Please remember we are testing the app, we are not testing you.

In this observation, we are interested in what you think about as you perform the tasks we are asking you to do. In order to do this, I am going to ask you to speak aloud as you work on the task. What I mean by "speak aloud" is that I want you to speak aloud constantly from when the task has been described, up until when you have finished the task. Please do not try and plan out what you are saying, just act as if you were alone, speaking to yourself. It is most important that you keep talking. If you are silent for a long period of time, I will prompt you to speak.

Now we will begin with some practice problems. First, I will demonstrate by speaking aloud while I solve a simple problem: "How many windows are there in my parents house?"

[Demonstrate thinking aloud.]

Now it is your turn. Please speak aloud as you multiply 13 * 16.

[Let them finish]

Good. Now, those problems were solved all in our heads. However, when you are working on the laptop you will also be looking for things, and seeing things that catch your attention. Please verbalise your thoughts and opinions on these things as well. As you are doing the tasks, I won't be able to answer any questions. But if you do have questions, go ahead and ask them anyway so I can learn more about what kinds of questions the pix star app brings up. I will answer any questions after the session. Do you understand the process? Would you like to ask any questions?

Now I have some tasks printed out for you. We are going to go over each task in turn before you attempt them and see if you have any questions before we start.

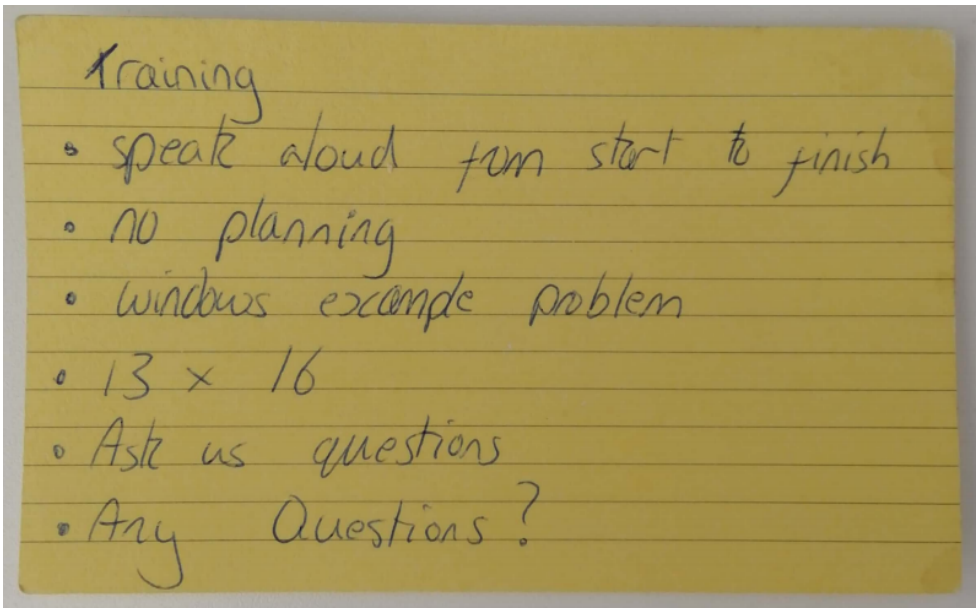
[Hand them the task.]

Here is the task you will be working on. Why don't you read it aloud just so you can get comfortable with speaking your thoughts?

Do you have any questions about the task?

We will begin recording now, you may begin.

1.1 Example Flashcard used when introducing the think aloud protocol to the participant



- Example comes from the part of the script referring to training

1.2 Participant Task List

Task 1: Create a new photo album and play it on your frame:

While on holiday, Bob went to London and took several nice photos using his camera phone. He really enjoyed his holiday and wants to put some of the photos where he can see them every day. Thankfully Bob recently bought a digital photo frame that allows him to display pictures. So he decides to create an album, name it “the London Eye”, and set it to play on his photo frame. Next, he went back to the admin page to choose the “The London Eye” playlist. He then enjoys the beautiful scenery in his frame.

Task 2: Remotely add photos to someone else's frame:

Bob recently started as a University student in Edinburgh, he wanted a way to stay connected with his family back home. So before leaving, he also bought them a digital photo frame, which he can remotely add pictures to. He recently had a holiday and took many nice pictures. He would like to put these on his family's photo frame. So he opens his phone's photo frame app and chooses the album “holiday”. He then chooses his father’s frame named “Jack’s frame” and shares his photos.

Task 3: Send photos and add comments:

After the exam, Cynthia went to a Korean restaurant to celebrate. She thought that the food and environment of this restaurant were pretty good, so she would like to share the food of this restaurant with Amy. She opened the photo frame app. Firstly, she added new photos from camera roll into the food album. She then added Amy as a friend, found Amy's contact page and then tried to send 2 photos from the ‘food’ album. However, she found that she only wanted to send the first photo, so she deleted the second photo and only sends the first one. After a few seconds, she discovered that Amy added a comment on the photo. Cynthia was very happy because Amy said that the food looks delicious.

Task 4: Control frame play mode:

When using the app, Justin wanted to set the play mode for his parents' frame. He opens the digital photo frame app. After clicking the admin button, he sets the volume, background music, play interval and sequence of play. (Assume Justin's parents frame to also be named "Jack's Frame".

Note: The tasks we gave the participants were heavily modified versions of the design fictions. We edited the original fictions as we thought that they had potential to confuse the participants.

1.3 Figma App mockup

https://www.figma.com/proto/OYtjGGYyVMOMZ448ojh8TT/APP?scaling=scale-down&node-id=16%3A90

1.4 Transcript Excerpt

Participant 5 - Task 2

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Participant: "I'll go see if my dad is in Friends. Search maybe."

Enters friends tab and tries to search for name but it isn't supported

Participant: "Maybe he's called Dad. I can't type, am I supposed to scroll?"

Scrolls through friends list

Participant: "Ah, there you go. My dad is called Jack, but there's no one here called Jack. So, do I have to invite him? I'll try to click the add button. Okay this doesn't look like it's working."

Tries to press add friend button in the top right which doesn't work

Participant: "I can't add my dad so we'll go back to photos and try that."

Navigates back to photos tab until they find the holiday album

Participant: "I can't click on the holiday album."

Unable to press Holiday album

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1.5 Participant Information Sheet

https://drive.google.com/open?id=1-D_htJITUQwYFwlqm4Az-O7XBWMyTLWM