Sober Puzzle

Rebuild your mind

Multimodal Interaction 2024-25

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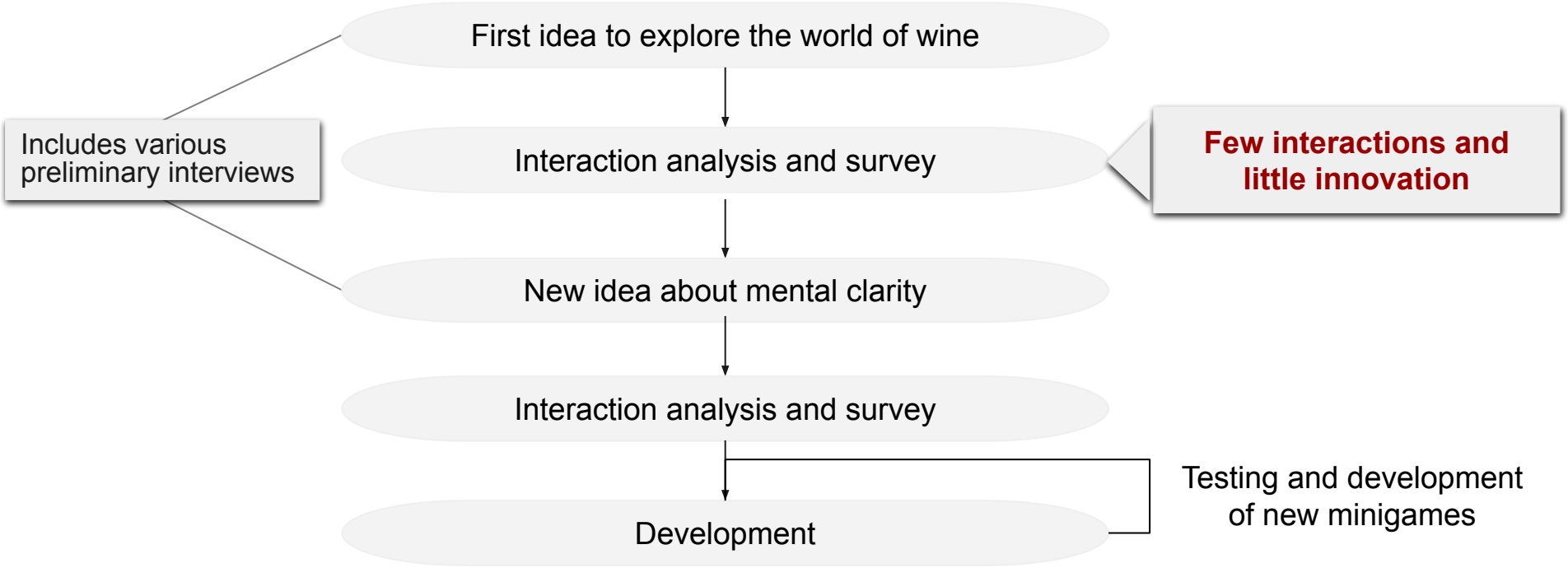
Development History



Project idea

The project is designed to provide users with an always available and easy-to-use tool to test their psychophysical condition in situations of tiredness or mental alteration

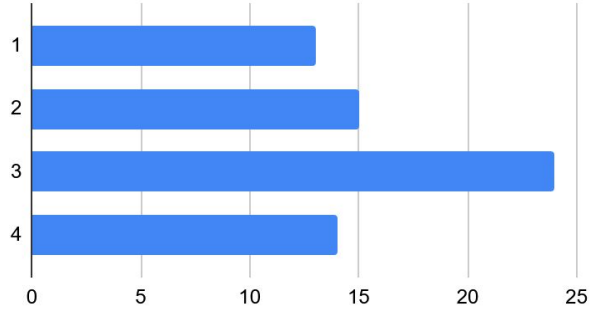
This is how our application was born

Sober Puzzle

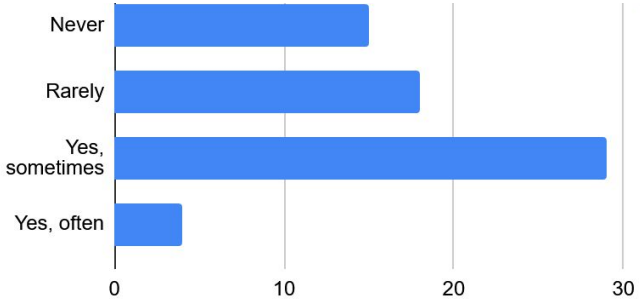
Need finding Phase - Subjects Analysis

To understand the interest of users in our project, a survey was conducted to identify the primary needs and the features that users are most interested in

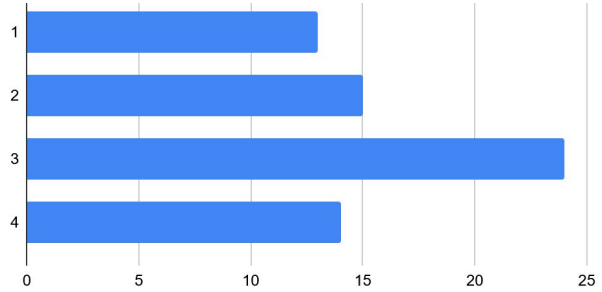
How often do you go out drinking?



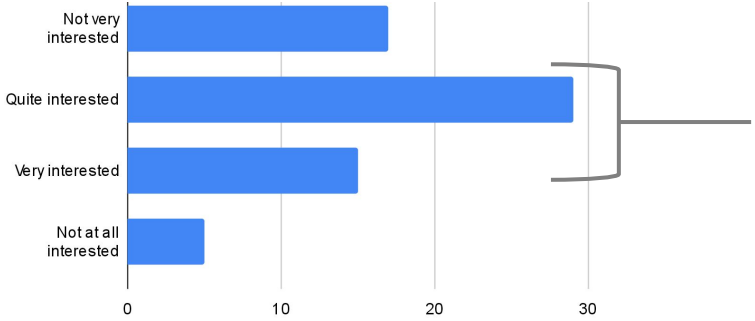
Have you ever made decisions or done important things even though you felt upset, tired or not very clear-headed?



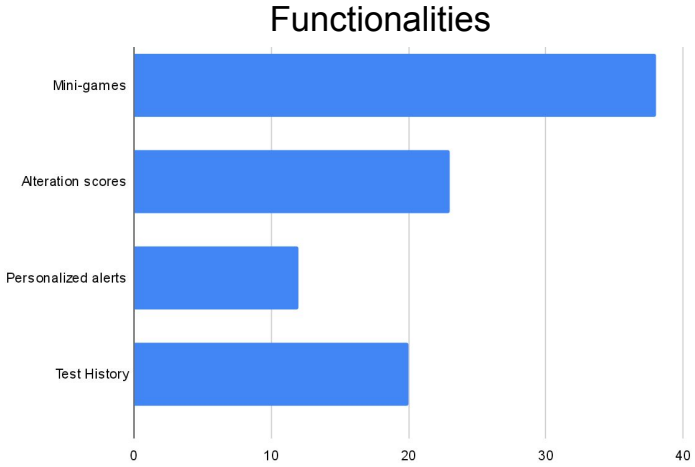
How often have you wondered if you were still lucid enough to drive or take important decisions?

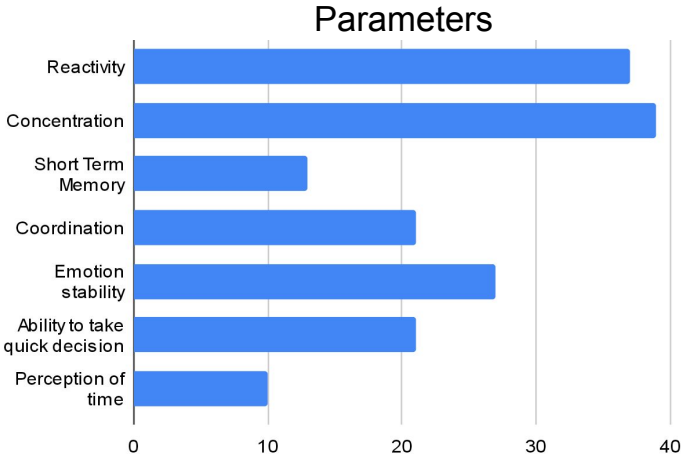


Need finding Phase - Functionalities



We have about 65% of people interviewed who express interest in the idea of having a physical tool or application that allows them to test their psychophysical state





Minigame - Description

Simon Says

Test your reaction time by tapping the button with the correct color as quickly as possible when a color is displayed

Hold Steady

An interactive test where you assess your reflexes by pressing the screen when you feel a vibration and releasing it upon a second vibration

Keep It Steady

A challenge where you place your phone on your head and try to maintain balance while walking

Golf It

An activity where you must stay focused on your phone's movements to guide a ball through a course into the hole

Minigame - Description

Memento Imago

A memory challenge where several tiles appear on the screen, some briefly turning green you must remember and tap those tiles once they turn grey

Light It Up

A reflex test where you shake your phone every time the camera light turns on

Count It Up

A visual memory test where you watch objects moving on the screen and then report how many you saw earlier

Tongue Twister

A voice challenge where you should repeat a tongue twister displayed on the screen in the least possible time

Minigame - Parameters to test

Reactivity

- Simon Says
- Light It Up
- Hold Steady

Concentration

- Hold Steady
- Count It Up
- Memento Imago

Coordination

- Keep It Steady
- Golf It
- Tongue Twister

Short Term Memory

- Memento Imago
- Count It Up

App Interaction - Description

To function effectively, our application engages with the user through a range of interactions:

Haptic Interaction

The use of touch and physical feedback in human-computer interaction. It allows users to feel sensations like pressure, vibration, or texture, enhancing the realism and intuitiveness of digital experiences

Audio-based Interaction

A type of human-computer interaction where sound is used as a primary means of communication between the user and the system. This can include voice commands, speech recognition, auditory feedback, or environmental sound detection to enhance or control the user experience

Tangible Interaction

A style of human-computer interaction where users interact directly with visible objects on the screen, typically through actions like clicking, dragging, or touching, allowing immediate feedback and a sense of control over the interface

Speech Interaction

Speech interaction allows humans to communicate with machines using voice, to enable intuitive, hands-free commands, questions, and responses across devices and applications

App Interaction - Minigames Correlated

Simon Says
Haptic Interaction

Hold Steady
Haptic Interaction
Tangible Interaction

Golf It
Tangible Interaction
Haptic Interaction

Keep It Steady
Tangible Interaction
Audio-based Interaction
Haptic Interaction

Memento Imago
Haptic Interaction
Audio-based Interaction

Light It Up
Haptic Interaction
Tangible Interaction

Count It Up
Haptic Interaction

Tongue Twister
Speach Interaction

Multimodality and Fusion

The app combines multiple sensory channels (visual, haptic, auditory, vocal) to achieve different kinds of multimodal interfaces

Different modalities integrate with others

Different Relations

Equivalence

Multiple ways to achieve the same result

Complementarity

Different modalities carry different informations that complement each other

Redundancy

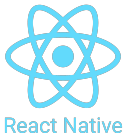
Same signal on multiple channels to increase robustness

Minigames and Multimodality

Minigame	Modalities	Modalities Relations
Symon Says	Haptic, Visible (colours)	Complementarity
Hold Steady	Haptic, Tangible	Equivalence
Golf It	Haptic, Tangible	Complementarity
Keep It Steady	Haptic, Tangible, Audio-based	Complementarity
Memento Imago	Visibla, Audio-based, Haptic	Complementarity
Light It Up	Haptic, Visible	Redundancy
Count It Up	Visible (moving objects), Haptic	Specialization (visible for memory, haptic for support)
Tongue Twister	Speach	None

Frameworks & Libraries

Our application is developed using one of the most innovative framework called “React Native” Also with the help of Expo’s libraries, we manage to control all sensor needed for our application as well. Finally to test it, we use Expo Go for run the application on our smartphone.



- React Native Gesture Handler
- React Native Camera Kit

- Expo camera
- Expo audio
- Expo haptics
- Expo sensor
- Expo speech recognition

Expo Go

Prototyping and Related Challenges

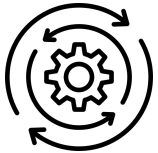
During the development of the application, an iterative and incremental methodology based on the Agile approach was adopted, involving the creation of functional prototypes covering various aspects of development:

- Interactive wireframes: defining the UX and navigation
- Mini-game prototypes: defining the logic of mini-games and their basic functions
- Mock tests with real users to observe interactions in real time

Prototypes were used to address development challenges:

- Define whether the interactions implemented for each minigame were sufficient
- Evaluate whether the implemented minigames correctly assess users' cognitive and physical reactions
- Obtain feedback from interviewed users to improve usability and present interactions

Testing



The entire development process involved continuous testing

Testing involved:

- the individual minigames by going to test individual features and interactions
- the overall UX of the application that allows for all of the proposed minigames to be played sequentially

Testing was critical to

Identify critical user interaction issues, such as the absence of vibration or audio in the Keep It Steady minigame that made the user unable to tell when the minigame ended

Identify improvements in user interaction, such as adding vibration in the Golf It minigame so that the user is more aware of the speed of the ball

Identify the minigames of greatest interest, discarding those with fewer interactions and that may give more precise metrics on the parameters to be analyzed

Identify metrics to assess the parameters most requested by users during the need finding phase

Thanks for your attention!