B-Present
A mental health application for users of all ages

Human-Computer Interaction and Affective Computing
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1 Introduction

Human-Computer Interaction (HCI) studies the interaction between users and computers, which occurs in the user interface. A branch of HCI is Affective Computing, which focuses on combining the user's emotions with intelligent interfaces. The goal is to design interactive products that are easy to learn, effective to use and ensure an overall enjoyable experience for the user, and the user interface design is a crucial part of this process.

The purpose of this paper is to discuss the thinking behind the design of a new application called *B-Present* and analyse it in the context of HCI. *B-Present* is a mental health application that merges "Just-in-time adaptive interventions" (JITAIs) with a more personalized space that the user can turn into their own safe space. It was created with the aim of supporting both the youth and adults during tough times, when they feel like friends and family members don't have the space and/or time to listen (see Appendix A for a story board). More specifically this paper will evaluate the usability of the application in terms of learnability and robustness. Regarding learnability, this paper will dive into the use of "familiarity" and "consistency" with the aim of accommodating new users in their interaction with the interface, in order to achieve maximal performance. Further, looking into robustness, it will observe the level of support offered to these users, while they perform several tasks on the application. While doing this, it will also discuss the integration of Neilson's heuristics within the user interface. Lastly, B-Present highly relies on the user's emotions, hence, a 2D emotion scale (Valence-Arousal Space), and the "simplified theory of flow" model will be used to evaluate how they are feeling after using the application.

2 Interface Development

2.1 Low-Fidelity Prototype and Survey

The process of developing a High-Fidelity prototype for *B-Present*, started from creating a Low-Fidelity prototype and several mind maps (see Appendix B). These served to gather ideas regarding the 4 main parts of the application, and what type of support could be offered to the user. Since the prototypes were going to be designed based on user requirements, a survey was sent out to prospective users. This consisted of 26 questions concerning mental health and the user's relationship with both friends and family members. Before the start of the survey, all users were informed about its purpose, all answers were anonymous and no question was required to be answered, thus could be skipped.

The survey received 37 responses, which led to great insight regarding similarities in people's behaviour when they are struggling with their mental health. For example, the answers showed that, when dealing with anxiety, many users rely on music, walking and breathing exercises, and less on cooking, humorous videos and ASMR. Furthermore, when asked what colours they believed reflected the words *Calm* and *Safe* the majority answered Blue, Green, White and Purple, while the colours reflecting *Panic* and *Danger* were Black, Red and Brown

(see Appendix C for more detailed responses). Hence, considering these responses, B-Present opted for a consistent, informal and friendly design, that relies on drawings as icons, and a blue/white colour palette.

2.2 High-Fidelity Prototype

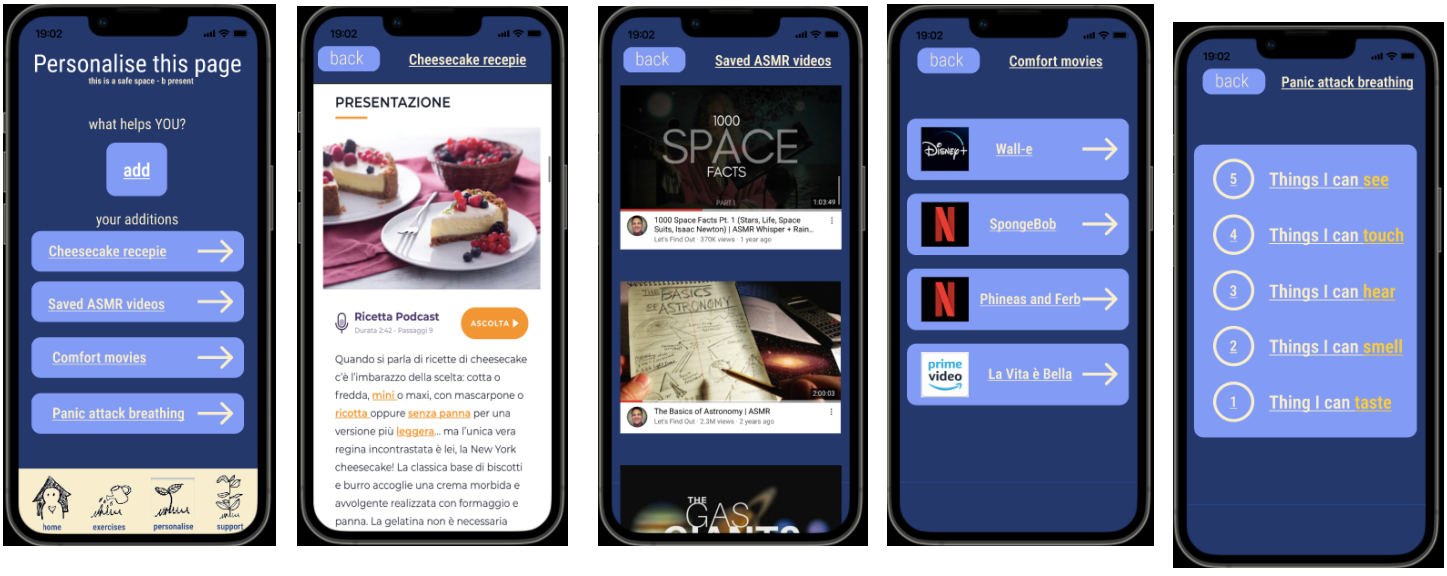
The prototype that was presented to the two different groups of users was created using *Figma*, and its structure can be divided into 4 parts. Firstly, the Home Screen, seen in Figure 1, which displays the user's overall health and activity. The thought process behind this information concerns an ideal detection of when the user might be struggling (e.g., user is getting less sleep, user has not been out of the house). If B-Present detects unusual activity, it will send out a reminder to use the app. The Home Screen is also equipped with a help button, which leads to a brief overview on how to use the application. In the context of HCI, this connects with principles of "robustness" (Responsiveness and Time Conformance), to ensure that the user perceives communication and support with the system.

Figure 1: Home Screen

Using the tab menu (for familiarity with several other apps) we can move to the Pre-Chosen Exercises (or JITAIs), in Figure 2, the user is presented with 4 different options. In *Something to hear* there is the option to listen to music, podcasts, voice messages from loved people and audiobooks. In *Something to watch* the user can access their saved pictures and videos. For *Take some time to breath*, B-Present offers different meditation and breathing exercises and finally in *General Wellbeing* there is space to journal or block websites and/or contacts that could worsen their mental health. All screens are equipped with a title to ensure that the user always knows where they are, a back button, and horizonal scrolling to view every available option.

Figure 2: Pre-chosen Exercises

The third part of B-Present is the personalised aspect of the application. The survey responses clearly show that every user can have different preferences. B-Present supports the user in granting them the option of creating new sections within the app that can consist of links, drawings, videos and other, as shown below.



The last, but not least important, part of the application is the "Support" screen, in Figure 3. B-Present believes that it is important to ensure as much support as possible to the user, thus if there is a time in which B-present does not satisfy the user fully, they will have the option to use the "Support" page in order to discover similar applications and Psychology or LGBTQ+ pages. More detailed pictures of the prototype are in Appendix D

Figure 3: Further Support

3 User Testing

3.1 Participants

B-Present is designed to be used by people of all ages, as anyone could struggle with mental health. For the aim of this paper, two groups of users were tested on the same prototype of the application. The first group consisted of users from the age of 18-25 the second group of users above the age of 35.

3.2 Tasks

Firstly, it was important to observe how intuitive and usable the navigation bar was for the users. These tasks highly rely on the principles of learnability, as from task to task the user will learn that the navigation bar serves to switch between the 4 main parts of the application. The user always started at the home screen and was asked to move, first to the “Exercise”, then “Personalise”, then “Support” screen, as three separate tasks (Figure 4).

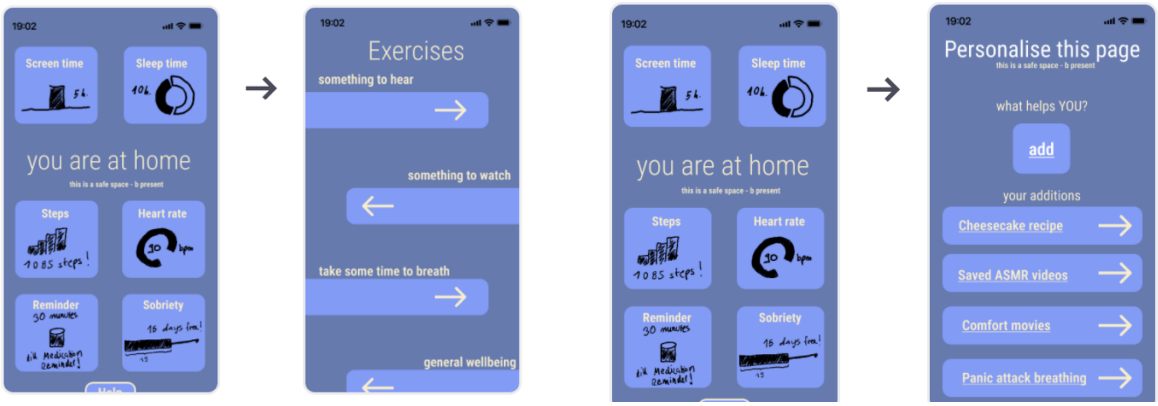


Figure 4: Three tasks regarding the navation bar

Regarding robustness, one of the tasks was to locate the help button on the home screen. The help button is a crucial part for the communication between the user and the system. The purpose of this task was to understand whether the location of the help button (Figure 5) was intuitive or confusing.

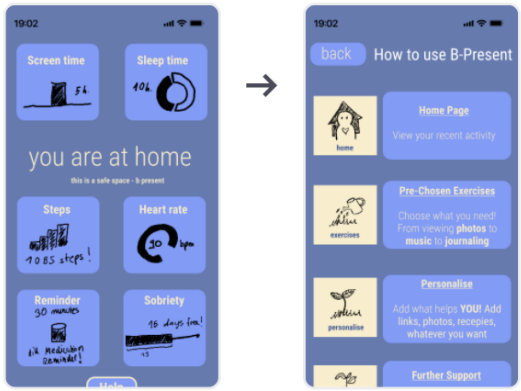


Figure 5: Task to locate the help button

Lastly, the task to locate the Cheesecake recipe on the "Personalise" screen was brought out (Figure 6). This served to observe whether the user understood the purpose of this screen, instead of confusing it with the "Exercises" screen.

Figure 6: Locate the Cheesecake recipe in the "Personalise" screen

3.3 Questionnaires

At the end of the learning session, the user was asked to provide self-annotations, on a Likert scale, with regards to its experience with the tasks and the application in general. The questions were the following:

1. How bored did you feel during this testing?
2. How engaged did you feel during this testing?
3. How frustrated did you feel during this testing?

These responses will serve for the theory of flow model which will be discussed later.

3.4 User Test

The final user testing was brought out using the software *Useberry*. It consisted of 11 blocks, between the tasks and the questionnaire, and received 34 responses. These can be split in two groups: 13 responses from users ranging from 18-25 years of age, and 21 responses from users older than 35. For the purpose of this paper, the younger users will be referred to as *Group 1*, while the older users as *Group 2*.

The hypotheses that will be tested in the Results and Discussion section, as a result of the user testing, are the following:

1. Hypothesis I: Group 1 will outperform Group 2 in terms of number of average time taken to complete a task.

2. Hypothesis II: As a result of the testing session, Group 2 will experience higher levels of frustration, compared to Group.

Hypotheses I and II assume that the younger generation (Group 1) has more experience with technology, thus the aspect of familiarity (from the usage of other applications) will affect the speed in which the group will learn how to navigate *B-Present*.

The Mann-Whitney U-Test (two tailed) was used to analyse the results gathered for the theory of flow model. For this test, to avoid bias, both populations will be made up by the first 11 users from each group that responded to the user testing, The Hypotheses for this test were the following:

1. Hypothesis $_{0\text{-}B}$: Both populations are equal on boredom
2. Hypothesis $_{0\text{-}F}$: Both populations are equal on frustration
3. Hypothesis $_{0\text{-}E}$: Both populations are equal on engagement
4. Hypothesis $_{1\text{-}B}$: Both populations are **not** equal on boredom
5. Hypothesis $_{1\text{-}F}$: Both populations are **not** equal on frustration
6. Hypothesis $_{1\text{-}E}$: Both populations are **not** equal on engagement

4 Results and Discussion: Describe results and statistical analyses

The following table shows the average time to complete 5 tasks. The first task was to find the help button, tasks 2,3 and 4 were to move from screen to screen using the navigation

bar, and finally task 5 was to find the cheesecake recipe. As it can be observed, there is no clear distinction between the results of the two groups. Previously this paper claimed to believe that as the age of the user increases, the time to complete a task also increases. However, this can only be observed in task 5. In fact, this task was the task that required the greatest number of clicks.

Groups	**Average time to complete Task 1**	**Average time to complete Task 2**	**Average time to complete Task 3**	**Average time to complete Task 4**	**Average time to complete Task 5**
Group 1 (18-25)	00:19	0:04	0:09	0:03	0:05
Group 2 (>35)	00:16	0:09	0:04	0:02	0:23

To assess the effectiveness of the navigation bar, the following question was asked: *To what extent do you agree with this statement: "The navigation bar is intuitive and easy to use"?* The responses were recorded on a Likert Scale (from 1-5). Out of 27 answers, 20 users replied *5*, and 7 users replied *4* (5 being "very easy").

Moving onto the emotional model evaluation, as stated previously the Mann-Whitney U-Test (two tailed) was used to determine the levels of Boredom, Engagement and Frustration after the tasks were completed. A Likert scale was used to record the responses, more specifically in the following way:

1. Boredom: 1(not at all) – 5(very bored)
2. Engagement: 1(not at all) – 5 (very engaged)
3. Frustration: 1(not at all) – 5 (very frustrated)

The results of the two groups can be seen in the following two tables (Raw Data Appendix E):

Group 1

Emotion	**Sum of the Rank**	U
Boredom	122	65
Engagement	129.5	57.5
Frustration	141.5	45.5

Group 2

Emotion	**Sum of the Rank**	U
Boredom	111.5	75.5
Engagement	123.5	63.5
Frustration	111.5	75.5

As both groups were composed of 11 users, the critical value for this test was 30.

- alpha = 0.05
- n1 = 11
- n2 = 11
- Critical value = 30

As all of the U values are greater than the critical value, we do not reject Hypothesis $_{0\text{-B}}$, Hypothesis $_{0\text{-E}}$ and Hypothesis $_{0\text{-F}}$. Hence meaning that both groups showed the same levels of Boredom, Engagement and Frustration. Once again, age difference does not seem to affect the results in a meaningful or drastic way.

5 Conclusion and Evaluation

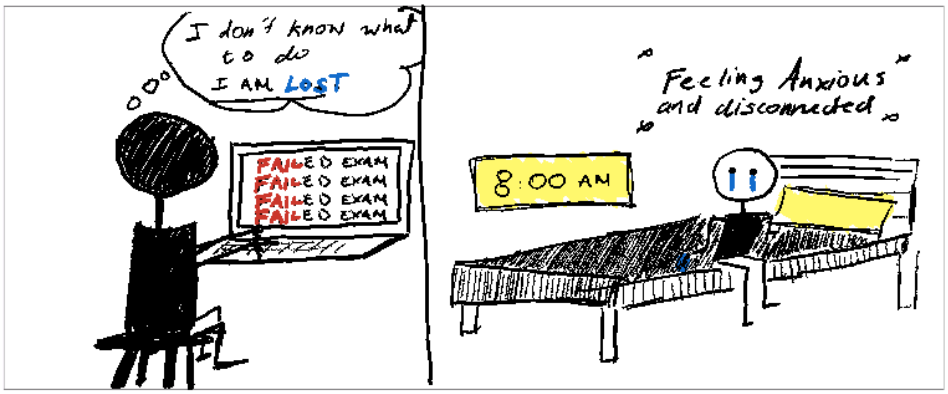
The described results show that both Hypotheses I and II can be rejected. Through the user testing, it could be observed that users from both age groups were fully capable of navigating through B-Present, without increasing frustration levels. An aspect that should be improved of the application in the future would be the location of the help button, which is currently located in the bottom-middle of the home screen. By analysing the average time to complete the task of clicking on the help button (task 1), we can conclude that it was overall the task that required the most amount of time. This is because it doesn't reflect familiarity, as the help button is usually located above everything and on the side.

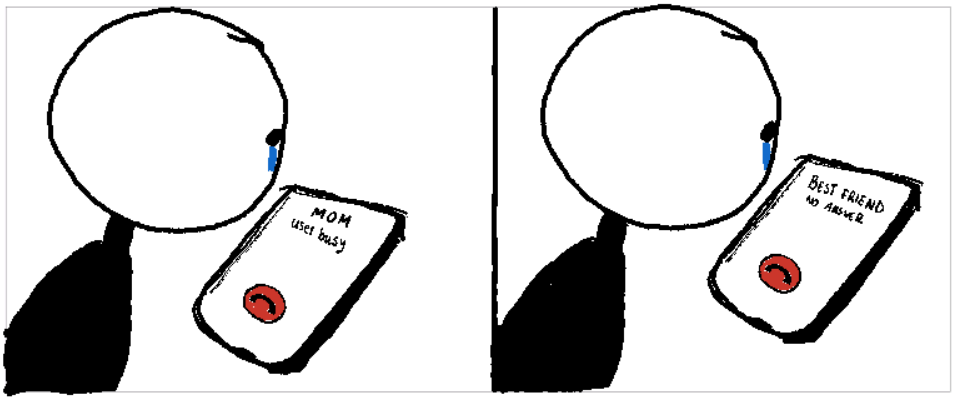
References

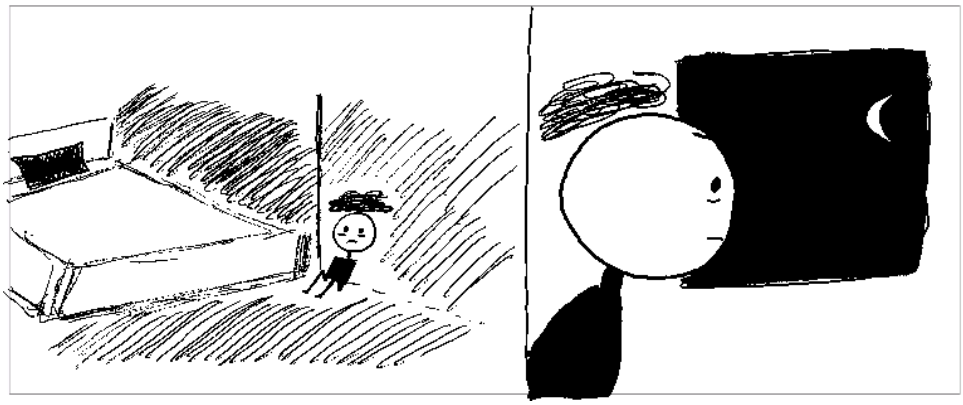
Interaction Design: Beyond Human-Computer Interaction, 4th Edition, Preece, Sharp, Rogers (2015)

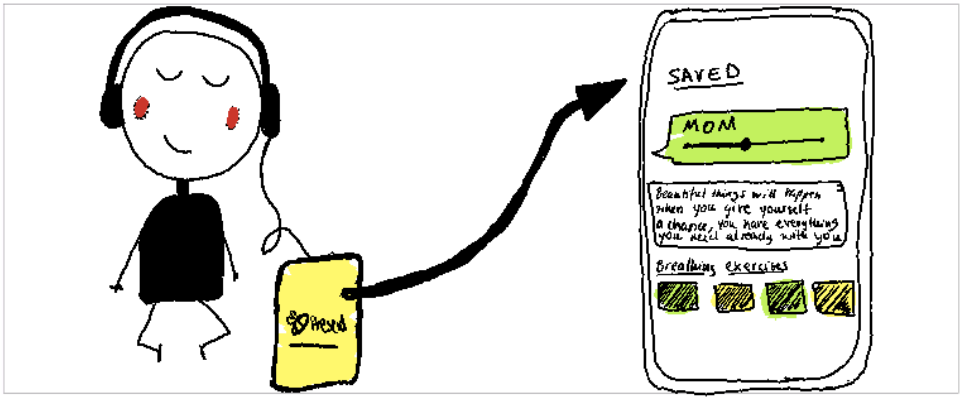
Appendix:

A: Story Board

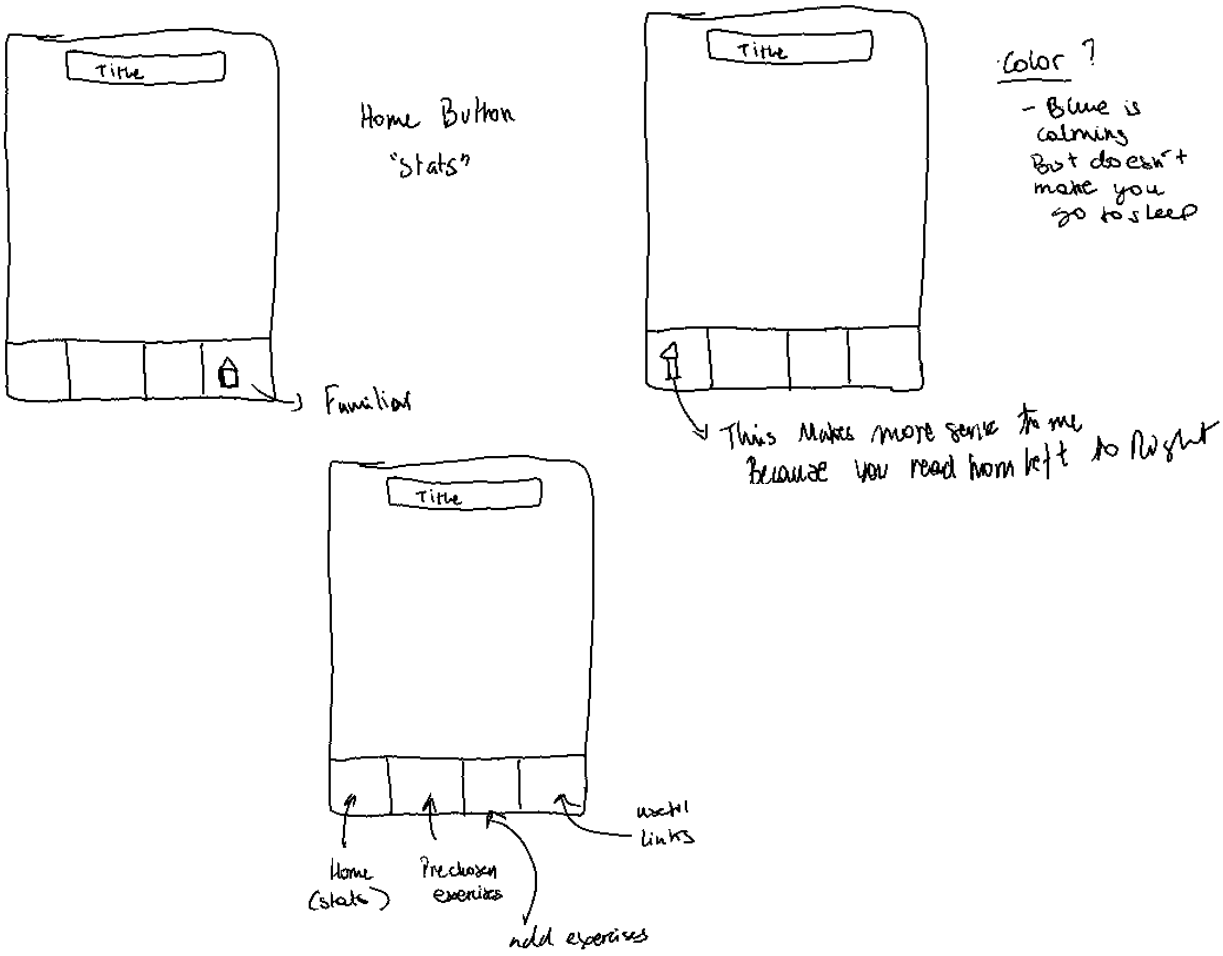








B: Low-Fidelity Prototype and Mind maps



C: High-Fidelity Prototype

Link: https://www.figma.com/file/haO3xU5y9wMkf7eCGYpIkr/B-present?node-id=0%3A1

D: Raw Data

Mann-Whitney U-Test (two tailed)

Boredom	Group 1	Rank	Group 2	Rank
	1	6.5	1	6.5
	1	6.5	1	6.5
	1	6.5	1	6.5
	1	6.5	1	6.5
	1	6.5	1	6.5
	2	15.5	1	6.5
	2	15.5	1	6.5
	2	15.5	2	15.5
	3	19.5	2	15.5
	4	21.5	2	15.5
	4	21.5	3	19.5

Engagement	Group 1	Rank	Group 2	Rank
	1	2.5	1	2.5
	1	2.5	1	2.5
	2	6.5	2	6.5
	2	6.5	2	6.5
	3	10	3	10
	3	10	4	15
	4	15	4	15
	4	15	4	15
	5	20.5	4	15
	5	20.5	4	15
	5	20.5	5	20.5

Frustration	Group 1	Rank	Group 2	Rank
	1	8	1	8
	1	8	1	8
	1	8	1	8
	1	8	1	8
	1	8	1	8
	1	8	1	8

	2	18	1	8
	2	18	1	8
	2	18	1	8
	2	18	2	18
	3	21.5	3	21.5