In Between Life & Death
Project Documentation.

- Arjun Yadav, 2022.

Submitted to the Program in Communication Design, Indian Institute of Art & Design,

on May 07, 2022,

by Arjun Yadav,

in partial fulfillment of the requirements for the degree of Bachelor of Arts (Hons.)

in Communication Design.

All illustrations and photographs in this document are mine unless specified otherwise.

The creative genius was “both more primitive and more cultured, more destructive and more constructive, occasionally crazier and yet adamantly saner, than the average person.”

- Frank Barron

Acknowledgements

My heartfelt gratitude goes out to every single professor at the Indian Institute of Art & Design (past & present) who've taught me in varying capacities. I am what I am because of you.

Prachi Mittal, Anurag Dasgupta, Suman Bhandary, and Shyam Attreya, for being more than just my professors.

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Dad, for supporting me financially.

Finally, Mom, Shree, Shikha, and Anshul, for your selfless care and support throughout these four years. I hope to make you proud someday.

A note for the reader

The entire document is divided into distinct sections. However, as I was the sole creator of this project, it was impossible to follow a linear flow in the project. Different elements were developed simultaneously unlike the way they are presented in this document. References are made at every point necessary to communicate the chain of thought which might require you to go back & forth in order to fully grasp the context for a particular decision.

Secondly, the document should not ideally be viewed in isolation. It is part of an extensive ecosystem that I used to record the development of my project. In order to redirect you to other places, should you need more information in a particular section, I have taken the liberty to devise a key:

 will be followed by a Notion blog link where I've documented extensively.

 will be followed by a GitHub link to view the final code files.

 will be followed by a web link to view relevant webpages.

Lastly, if you are a student and/or someone working on a similar project, do not hesitate to reach out to me on my email: arjun.yadav18@iiad.edu.in for anything that I can help you with. All the best for whatever it is that you're up to.

"This book is not simply the physical object that you might be holding in your hands as you read these words, but a computational and networked object."

A quote from the preface of *Aesthetic Programming* (Soon & Cox, 2020, p.21)

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1. Introduction

As part of the Xperimenters programme at Science Gallery Bengaluru, one of our deliverables was to conceptualise, plan and execute one (1) public engagement programme for the exhibition season PSYCHE. This deliverable is also what became my Major Design Project*, submitted in partial fulfilment of my undergraduate academic requirements.

My project revolved around developing a web-game, titled In Between Life & Death, which converted a theory of human needs into systems of logic and applied them to a digital object. Furthermore, apart from the game being an outcome, I also conducted community playing sessions using Discord and hosted two workshops, titled Breaking Down The Making, to present the thought process behind the game.

All of the above were displayed and hosted as part of the online PSYCHE exhibition by Science Gallery Bengaluru from April 2022 - May 2022.

1.1 The Science Gallery

The Science Gallery is an international network of 8 galleries around the world that are part of a university linked network. Science Gallery Bengaluru is the only one in Asia and is funded by the Government of Karnataka. It has three academic partners: Indian Institute of Science, National Centre for Biological Sciences, and Srishti Institute of Art, Design and Technology.

The SGB defines itself as a “not-for-profit public institution for research-based engagement targeted at young adults”. They aim to work at the interface between the natural and human sciences, engineering and the arts through a Public Lab Complex, ever-changing exhibitions, and mentorship programmes.

During my time at IIAD, I had dabbled with trying to blend

* The Major Design project is the final 16 week independently driven graduating project.

different disciplines together and creating interdisciplinary work. When they launched open calls for the Xperimenters programme in August 2021, I knew that this was a space I wanted to work at; as they were doing exactly what I was trying to do, but on a much larger scale.

1.2 The Xperimenters Programme

I'd followed Komal Jain's work for quite a while before knowing that she was the spatial designer at this space called SGB. It is through her that I got to know about the Xperimenters programme.

Image taken from Science Gallery Bengaluru's Instagram page.

The open call read: *"Are you a young adult who is interested in exploring the interface of science, art, humanities and social sciences, design, and technology? Are you passionate about interdisciplinary research? Do you enjoy engaging with people to experiment and develop wild projects?*

We are looking for five energetic young adults who will work with the Science Gallery Programmes Team on our public engagement activities."

As I mentioned before, the emphasis on interdisciplinary exploration was something that resonated with me.

The application process was lengthy and gruelling but I enjoyed my interviews and the questions that the team posed. In December 2021, I received my acceptance. Interestingly, after I joined, I was made aware of the fact that there were 250+ applicants and only four of us made it through. What the team saw in us still remains a mystery to the cohort.

The cohort was extremely diverse and I had the opportunity to work alongside people who were extremely driven and radical in their thought processes; something that I did not quite get back in the academic environment of IIAD. They were like-minded people but extremely diverse.

Arjun Yadav (me!)

Background: Visual Design

Area of Interest: Human Computer Interaction, Data Visualisation & Creative Computation

Jyotsna Iyer

Background: Political Science & English Literature

Areas of Interest: Data Visualisation, User Research, Media Studies

Xperimenters

Samyukta Prabhu

Background: Economics, Finance & Media Studies

Areas of Interest: Natural Sciences, Business Studies, Technology, Economics

Snehaja Venkatesh

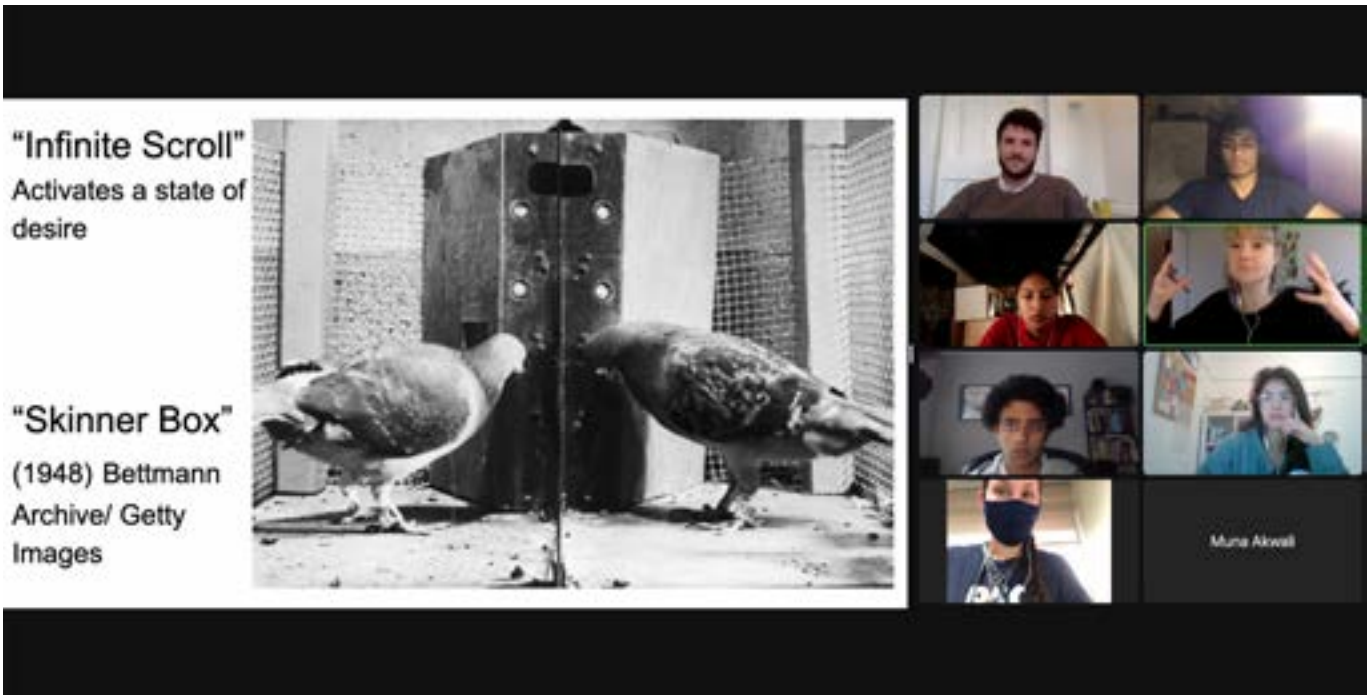
Background: Organic Chemistry

Areas of Interest: Linguistics

Our deliverables to the gallery were as follows:

- One public engagement programme conceptualised, planned, and executed by the Xperimenter.
- One journal detailing your experiences and reflections on different aspects of the programme.
- Programmes on Discord, and social media campaigns on Instagram and Twitter.
- A publication (co-created by all the Xperimenters) towards PSYCHE.

In the program, we were exposed to training and mentorship from global experts in various fields. This resulted in one of the most fruitful and diverse learning experiences of my life. I was exposed to science, culture, public engagement and art in an extremely unique way.



Screenshot during a pilot workshop, that I was a part of, hosted by Science Gallery Atlanta in March 2022.

1.3 PSYCHE

https://psyche.scigalleryblr.org/

PSYCHE was the online exhibition season that the Xperimenters exhibited their work in. It explored the human mind and the complexities of thinking and feeling. Here is the curatorial note from the exhibition website:

“Why do we think? Why do we dream? Why are we emotional beings? Is intelligence and the ability to think and feel restricted to humans?

Researchers have grappled with the inner workings of the human mind – from mapping billions of neurons to trying to understand the intangible expressions of thought and consciousness. We have experimented on the human brain with drugs, hypnosis, genetic techniques and more. The mind plays its own tricks through optical illusions, déjà vu, delusions and hallucinations. Combined with the imagination and hormones these manifest in intriguing behaviours.

Neuroscientists, chemists, doctors, psychologists, philosophers, mathematicians, systems analysts - each take us a few steps closer to unravelling the enigma of the psyche. It is worth noting that much of laboratory research to understand the human mind, in fact, is carried out on other living beings who exhibit degrees of decision making, planning and emotion.

The mind is inextricably implicated in our perception of the world and our experience of it. Our actions, informed by this perception, continue to shape the world. Our thoughts and emotions likely create a sense of wellbeing or a lack of it, yet we do not fully understand the biological or psychological or social underpinnings of our intellectual being.

The future of the mind could be stranger than fiction – weaponizing of emotions, extra sensory perception, prediction of criminal behaviours or the wiping out of traumatic memories – nothing, it seems, is impossible. Even machines need not be exempt – as we continue to replicate the human mind in-silico – from thinking or experiencing emotions in a manner similar to humans.”

Official PSYCHE poster developed by the team.

1.4 Mentors

As this document progresses, I will continuously refer to certain people who were instrumental in this project. Therefore, to save you the effort of constantly checking the footnotes, I shall introduce them in this section.

Jahnavi Phalkey

Jahnavi is the director of Science Gallery Bengaluru. She is a filmmaker and historian of science and technology. Before moving back to India, she was a tenured professor at King's College London.

Shaunaq Madan

Shaunaq is a web developer and creative technologist. He is the in-house web developer at the SGB. He was my internal team mentor.

Madhushree Kamak

Madhushree was one of our two contact points in the gallery. She is the programs manager at SGB with a masters degree in neuroscience from TIFR and a masters degree in design from NID.

Vasudha Malani

Vasudha was the other contact point in the gallery. She is a programs associate and majored in English Literature at Ashoka University.

Shashi Thutupalli

Shashi is a biophysicist and heads the Thutupalli Lab at NCBS. His lab aims to broaden the understanding of the origins and organisation of living systems. He was one of the external mentors I chose as part of the Xperimenters programme.

Professor R. Ramanujam

Professor R. Ramanujam is a retired professor from the Institute of Mathematical Sciences. He is a theoretical computer scientist and was one of my external mentors as well.

Saibal Datta

Saibal is a partner & the chief experience designer at GDD - a product design studio. He was an industry mentor at IIAD and my academic advisor.

2. Project Timeline

The Xperimenters programme will run from January 2022 - July 2022. Since the MDP had to end by April 2022, the work I did for the PSYCHE exhibition is counted towards the fulfillment of this academic requirement.

2022	January	February	February	March	March	April	April	May
TRAINING	Onboarding	Workshops, Training Sessions, and Seminars PSYCHE 101 Trainings and Artist Sessions						
PUBLIC ENGAGEMENT		Research for PSYCHE Decide ambit of the PE		Conceptualization for PSYCHE PE		PSYCHE Public Engagement Programme Executio		
MENTORSHIP	Identify mentorship goals Shortlist preferred mentors		MS 1		MS 2		MS 3	
OUTREACH		Identify schools and colleges Draft outreach strategy		Conduct outreach sessions and programmes		Build a relationship with the institutions Take the exhibition-season to teachers & student		
SOCIAL MEDIA	Decide collective and individual camapigns for IG and Twitter		Execute PSYCHE related programmes on SoMe Do Instagram takeover and share insights			PSYCHE related programming on Social Media		

Xperimenter programme schedule.

I largely followed this exact project timeline.

3.Understanding the problem

https://arjunsnotion.notion.site/Why-trust-science-notes-from-Proseminar-1-39af152001ca46c-f85198036aae48f35

3.1: The Grander Problem - Science & Culture

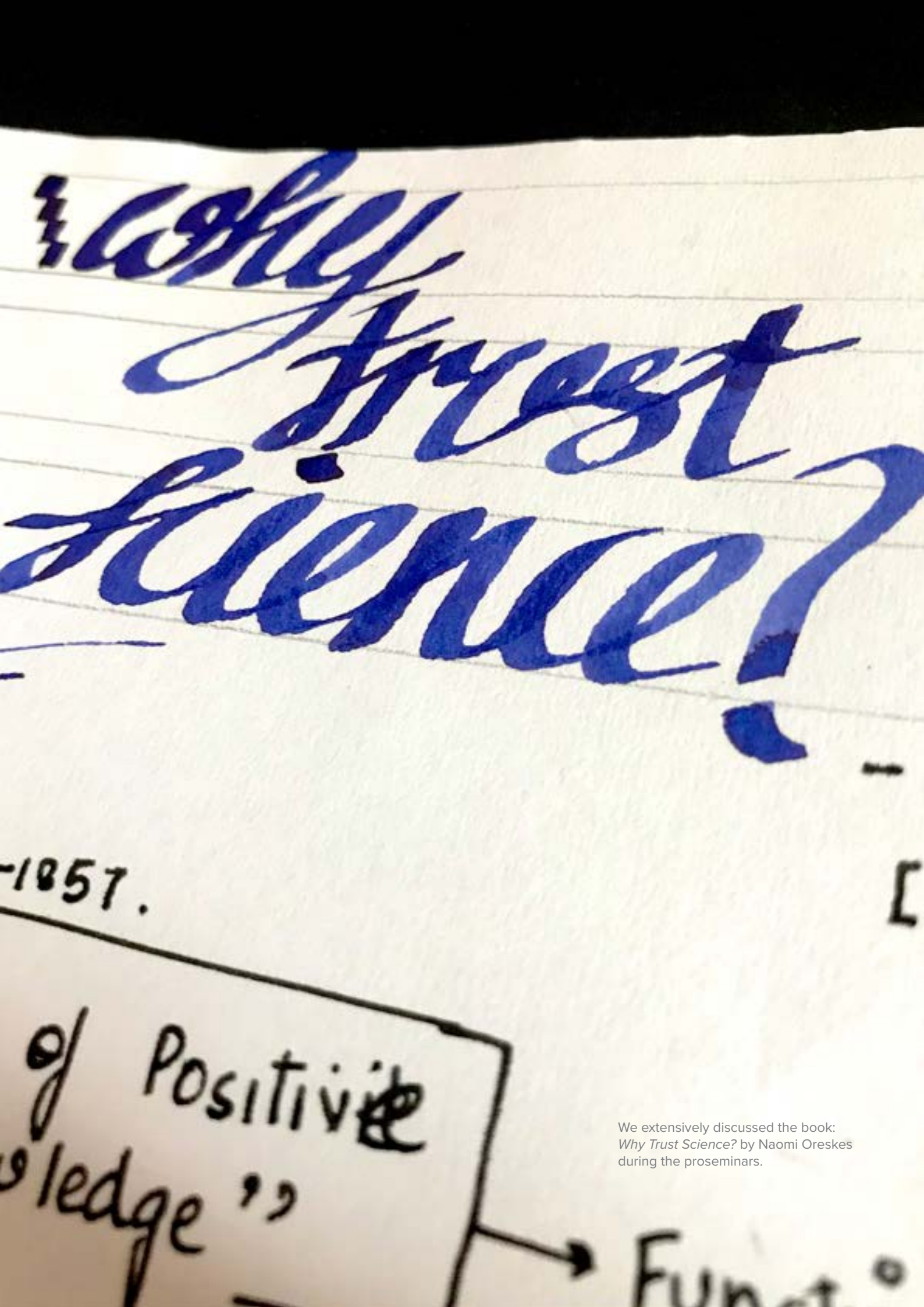
Before we move further to the specific context of my project, it is imperative to gather a sound understanding of the larger problem at hand. Through multiple discourses in the form of lectures and debates (with Jahnavi Phalkey and one session with Sarah Hyder Iqbal*), the cohort was informed about the issue of science falling out of culture.

As a discipline, science was never meant to be reserved for a select group of individuals. It was always meant to be another system of knowledge for exploring the truths of our world; much like philosophy or theology. However, a layer of exclusivity is now seen in science. It has become an exclusive academic discipline due to a variety of factors; a major one being the institutionalizing of access to knowledge. It is Science Gallery Bengaluru's mission to break that barrier of entry and make science, as well as the pursuit of science, accessible to everyone again.

"Finally, it concluded with this overarching question of why the public enterprise of science is now no more public and a part of society. Why it's considered just an academic discipline of study and not looked at as the collective pursuit for knowledge?"

- Excerpt from my reflective log during the first proseminar.

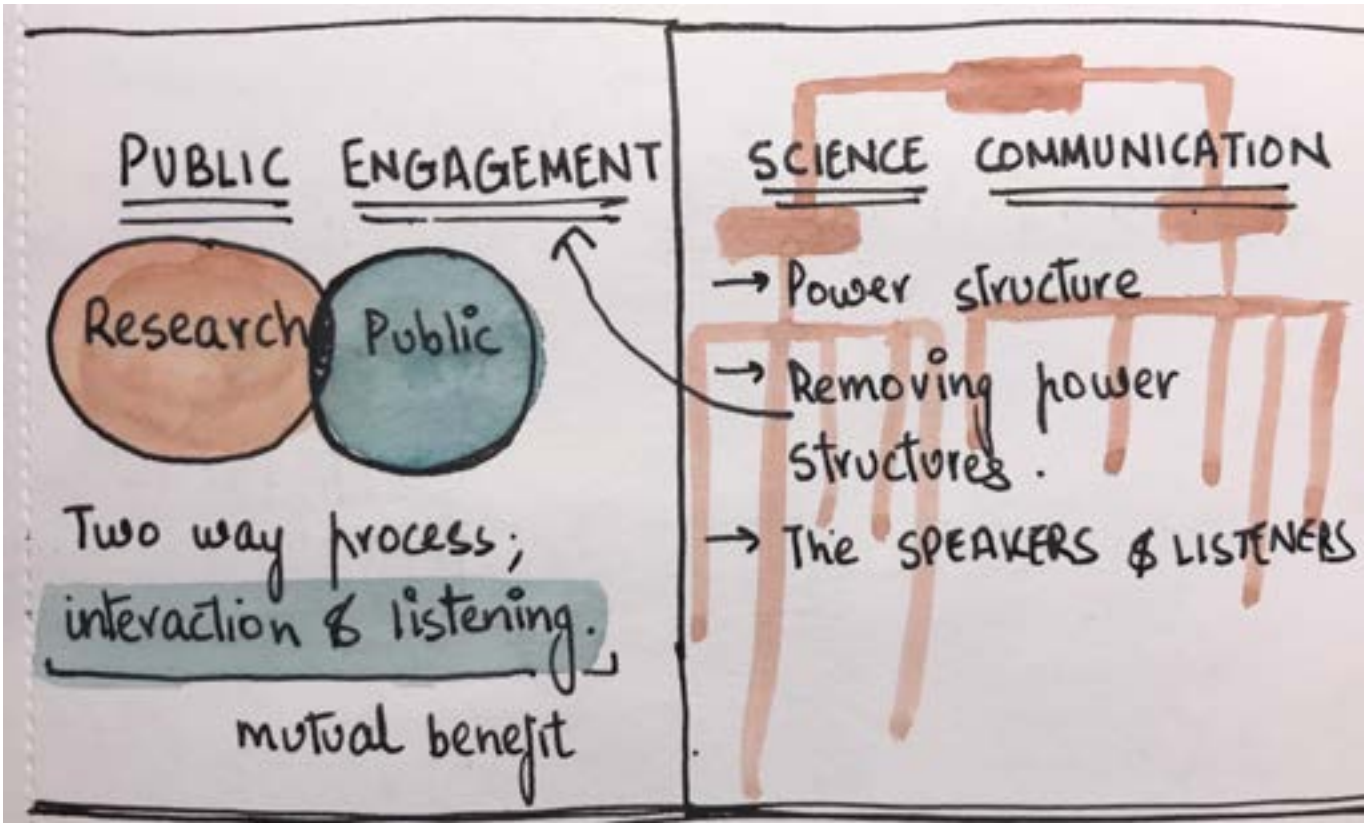
* Sarah Hyder Iqbal is a leading science communication and public engagement consultant. At the time of writing this document, she was working with the Wellcome Trust.



We extensively discussed the book: *Why Trust Science?* by Naomi Oreskes during the proseminars.

Science has been communicated to the public using ‘science communication’. Broadly, this involves people from science talking about science through a multitude of mediums such as (but not limited to) podcasts, articles, films and panel discussions. The problem here is the underlying power structure and one-way communication.

Public engagement, on the other hand, aims to create a two-way channel for communication. This involves talking and listening for mutual benefit. By doing so, people can (a) engage with science irrespective of their academic background, (b) contribute to/pursue scientific inquiry or (c) shape research agendas through public debate and fora independent of scientists.



A page from my journal that highlights the problem.

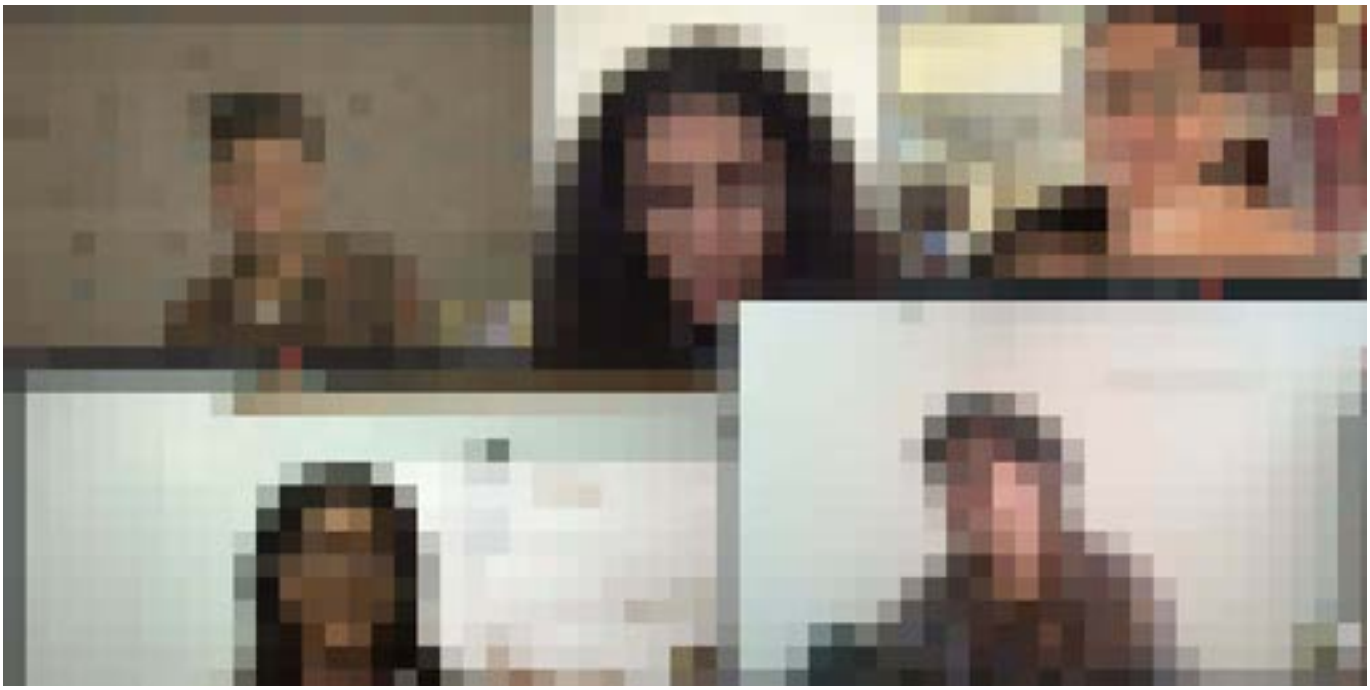
Therefore, our role as Xperimenters, was to incorporate the public engagement approach in our projects.

3.2 Resorting to a human-centered methodology

While other members of the cohort came into the programme knowing, broadly, the areas they wanted to work in, I decided to resort to a human-centred design methodology and inhibit my artistic inclinations from shaping the nature of the outcome.

This also became a good platform to test human-centered design as the leading force of a project against artistic vision doing so.

Upon discussing with Saibal, I created a focus group comprising of 12 young adults who belonged to similar socioeconomic backgrounds. The participants were either friends or colleagues. The goal was to understand the target audience (young adults) and let data shape the direction of the project.



Screenshots from some of my focus group calls. Images are pixelated on purpose.

The group was definitely not as diverse as I would have liked it to be. However, I was well aware of this during the time and deliberated upon this with Saibal. Including friends and colleagues was a conscious choice made due to the crunched timeframe I had. Everyone else began work on their projects while I was still trying to figure out a problem area.

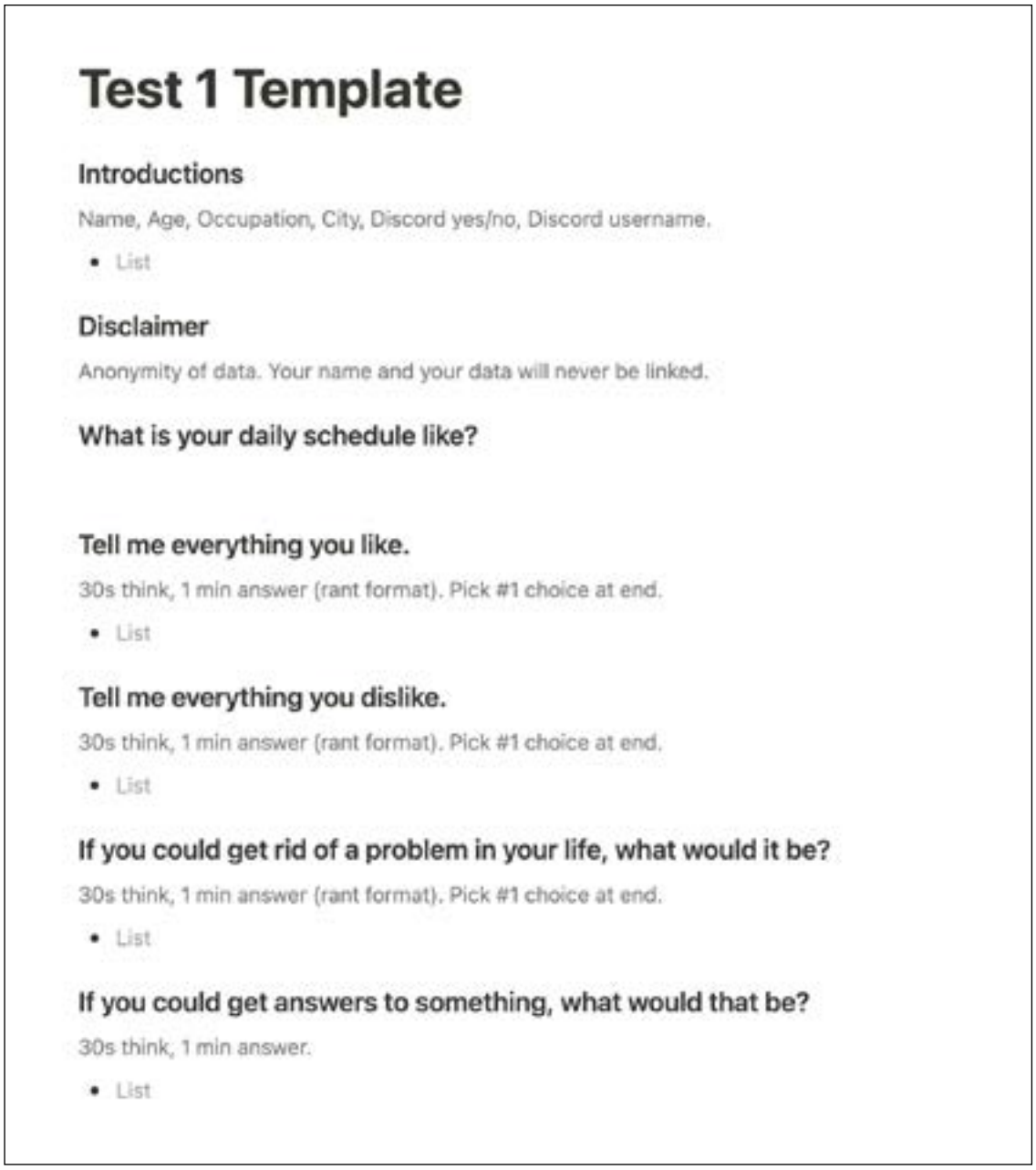
An audience group that I would have liked to pursue, given more time, would be young adults without access to smartphones or the internet. Since PSYCHE was a fully digital exhibition, pre-requisites involved a device with access to the internet. This leaves out a chunk of the Indian population; a gap that stung me incessantly throughout the project.

However, due to the lack of time, I chose not to pursue it.

3.3 Focus group studies

Sessions with my focus group were conducted over three weeks. Every Friday, I scheduled a 30-minute Google Meets video call with each member individually. Sessions were geared towards understanding different things that I wanted to know to develop the context for my project.

In the first session, I wanted to know more about their lives in order to empathize with them and leaving aside my biases. I probed them about their daily schedules, things that they like & dislike, problems in their life and questions that they'd like answers to.



Test 1 Template

Introductions

Name, Age, Occupation, City, Discord yes/no, Discord username.

- List

Disclaimer

Anonymity of data. Your name and your data will never be linked.

What is your daily schedule like?

Tell me everything you like.

30s think, 1 min answer (rant format). Pick #1 choice at end.

- List

Tell me everything you dislike.

30s think, 1 min answer (rant format). Pick #1 choice at end.

- List

If you could get rid of a problem in your life, what would it be?

30s think, 1 min answer (rant format). Pick #1 choice at end.

- List

If you could get answers to something, what would that be?

30s think, 1 min answer.

- List

A screenshot of the test template for session 1.

The first insight was from their daily schedules. As this was a time of change (the coronavirus outbreak of January 2022 was just beginning to recede), it was hard to find links between the drastically different schedules. However, as Professor Ramanujam told me, *"if you look long enough, there's always a pattern"*. Surely enough, there was a pattern here too (refer to the image on the following page).

These were some of the findings:

- YAs generally study (includes self-initiated work) in 3 parts of the day, each usually separated by breaks or household chores. The first is the morning window which stretches from anywhere between 9am-1pm, usually breaking for lunch. This was described by some as the most productive part of the day. The second is the lazy midday which stretches from anywhere between 2pm-5pm. The last window is the productive night with sessions from 9-2 am. Based on this, it can be concluded that YAs can spend a maximum of 14 hours working in a day. An estimated average would be 10-12 hours.
- 100% of the participants sleep after midnight, almost around 1 or 2 am. Even the participant who wakes up the earliest sleep at 1 am.
- 100% of the participants had allocated "chill/relaxation" times. One was during or after lunch (1-5) when they often watch TV shows or scroll through their phones. The other is the night which is generally around 11-1.
- Almost all make time for people in their lives, whether family or friends and usually have an allocated time for the same. Dinner time for people living at home is when it was found that everybody sits together. People living away from home usually talk to their family/someone late in the night between 11:30 - 2.
- An interesting timeframe that was found was the period between 4:30-7 when people usually step out of their homes. Participants expressed the need to want to go out during this time and that during this time, "it became impossible (to stay in the room)".

This study allowed me to understand suitable times of intervention that I could use in my programming. As part of the programme, Xperimenters were also required to do an On The Fringe session* engaging participants on Discord and this study highlighted the perfect time for doing so.

https://arjunsnotion.notion.site/How-are-young-adults-spending-their-time-513888a523b14f70947868bbcee5505e

https://discord.com/chan-

* On The Fringe were informal sessions conducted to explore topics that lay between boundaries. My On The Fringe session was around love and explored the biochemical reactions, as well as the psychological and sociological implications of the feeling. It was hosted in March 2022.

Class Time → 9-1/3 is class.
Night Work → 8-1/2/3 am night work (study)
Afternoon Work → 5/9 p.; 2-4:30/5.
Watching / Chilling (Phone) →
Step out → 4-7.

People centric
→ Talking to family or someone.

UNDERSTANDING THE LIVES OF YOUNG ADULTS (Immediate peer)

Done from 28th Jan - 30th Jan [WFH].

PARTICIPANT 3 (21)

Schedule: Yes.

- 8 AM — Wake Up.
- 8-7 — Morning chores + house work.
- 7:45 — Breakfast + Watching / Reading something.
- 9 — House chores + mild overseeing.
- 1 — Work (WFH: classes)
- 12-2 — Kitchen Help.
- 2-3 — Lunch
- 3-3:15 — Household chores.
- 3:15-4 — Sleep.
- 4-5 — Cycle / Go out or walks.
- 5-8 — Work
- 8-8:35 — Dinner
- 8:35-11 — Family time
- 11-1 — Watch or work.

PARTICIPANT 4 (20)

Schedule: NO.

- 8:50 — Wake up.
- 9-1 — Class & Work.
- 1-2 — Relax
- 2-3 — Lunch
- 3-4:30 — Work (In Bed)
- 4:30-6 — Relax
- 6:00-7:30 — Walk / Go out
- 7:30-9 — Dinner and family
- 9-12 — Work / Talk to people.
- 2-3 — Call someone or on phone.

PARTICIPANT 5 (18)

Schedule: No.

- 9:30 — Wake up
- 9:30-1 — Class / Work
- 1-3 — PubG
- 3-5 — Shows
- 5-6 — Relax
- 6:30-7 — Walks outside.
- 8-9 — PubG + Dinner
- 10-12 — Work

PARTICIPANT 6 (21)

Schedule: No

- 7-7:30 — Wake up + Morning chores.
- 8:15-9:15 — Commute to college.
- 9:15-12 — Class / Hang out.
- 12-3 — Lunch + Chill.
- 4-6 — Hang out with friends / Chill.
- 7-8 — Household chores.
- 8-10 — Dinner + Chill.
- 11-11:30 — Talk to home.
- 12-3 — Work + Talk.
- 3 — Sleep.

PARTICIPANT 7

Anomaly (working for outside Indian Tim

Schedule: Yes.

- 8:00 — Wake Up.
- 9:00-10 — Work out + Breakfast.
- 10-10:30 — Bath.
- 10:30-11:30 — Reads (Stock market)
- 11:30-12:30 — House chores
- 12:30-1:30 — Lunch.
- 1:30-2:30 — Sleep / otherwise work.
- 2:30-11:30 — Work. (Takes break @ 5)
- 11:30-12 — Talk to friend
- 1 — Sleep.

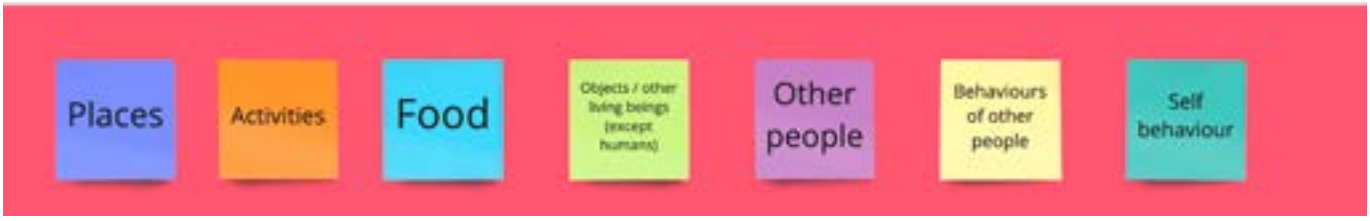
Identifying patterns in the daily schedules of Young Adults.

Next, I wanted to understand what young adults liked and disliked. This would allow me to ensure that whatever program I came up with was sensitised to the preferences of the target audience. I asked young adults to list everything they liked, in an almost rant-like format, with a time limit of one minute.

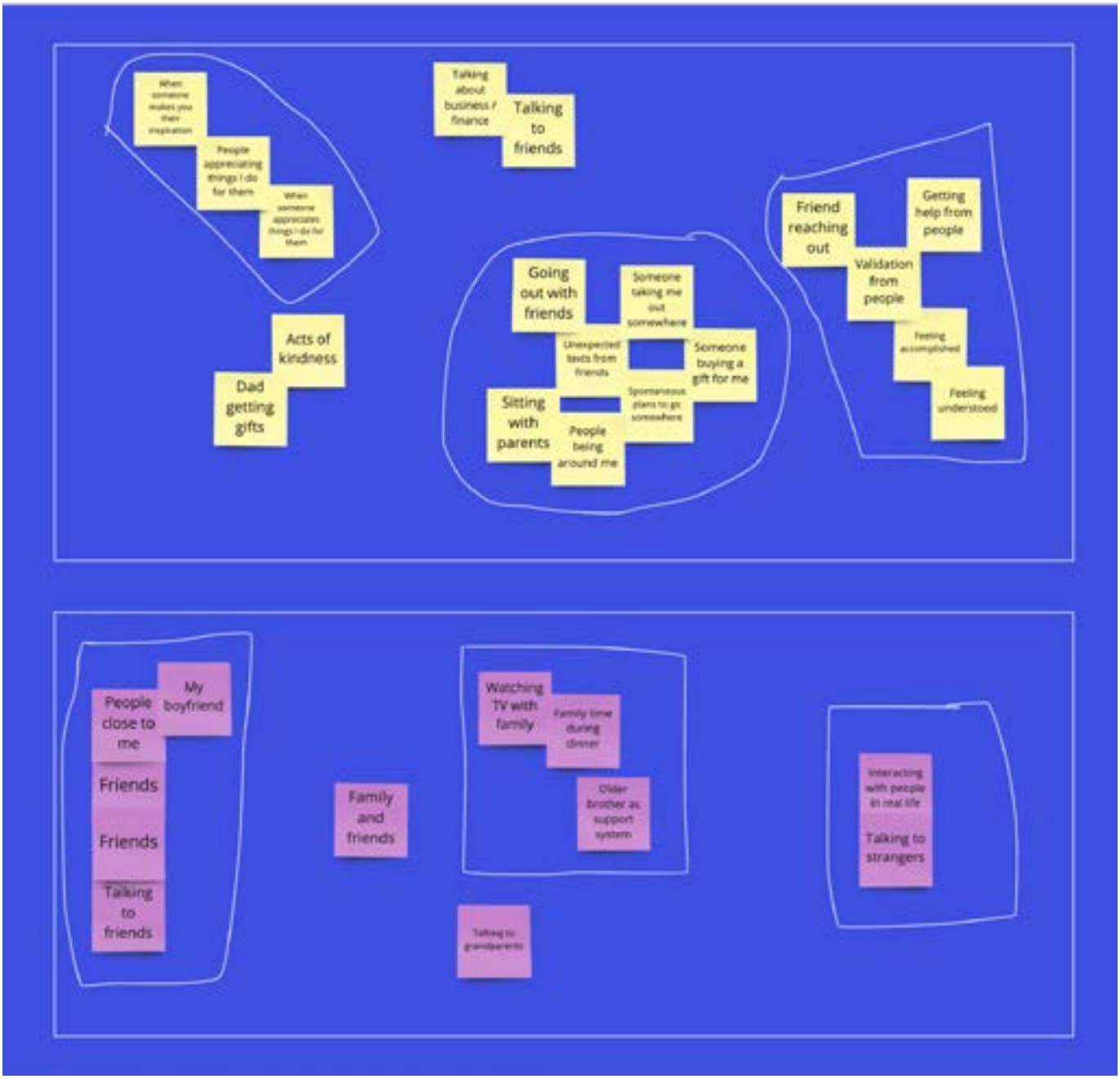
https://arjunsnotion.notion.site/What-do-young-adults-like-447490884f184226930cb3bb-8b0ec9a1

During the analysis, certain key categories were identified. By using an affinity map, I was able to further categorise these pieces of information thematically.

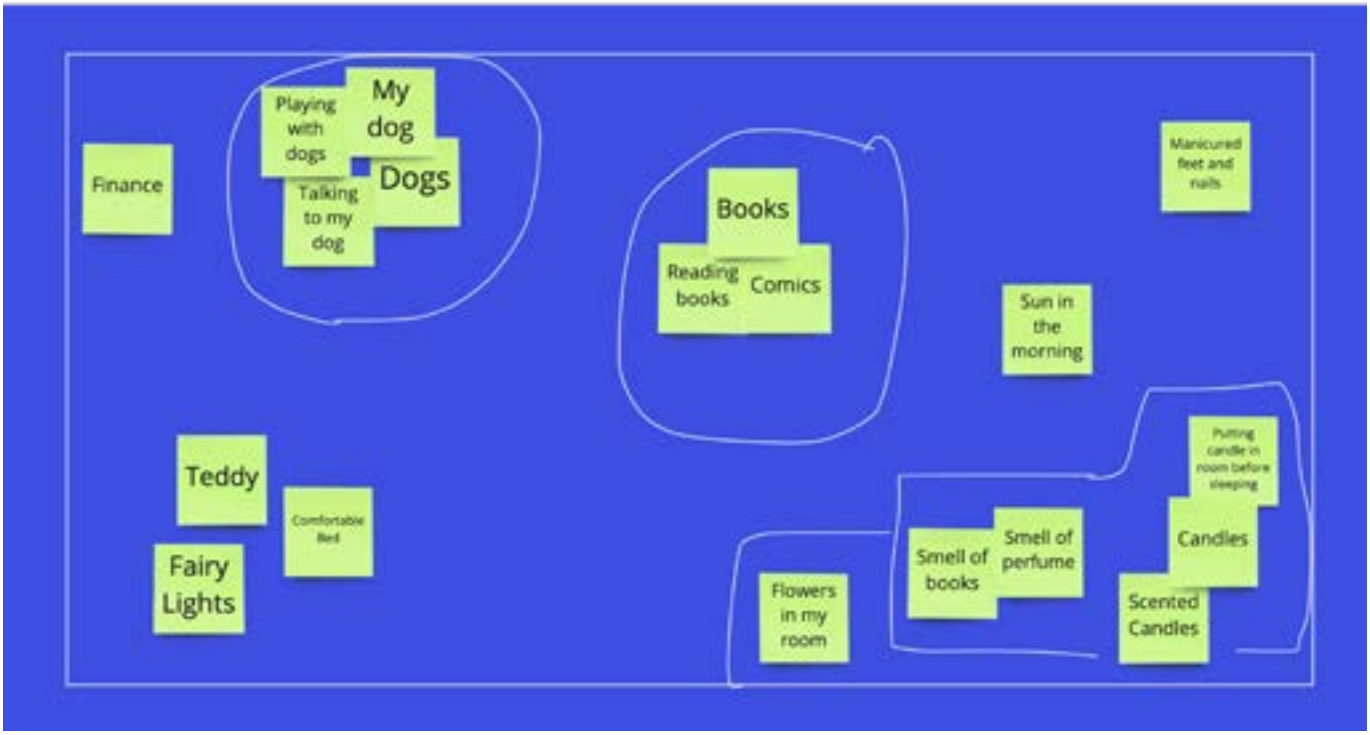
Key Categories (Level 2)



Looking at behaviour of other people impacting happiness (Level 3.0)



Looking at objects / living beings (except humans) (Level 3.1)



Looking at activities Level 3.2

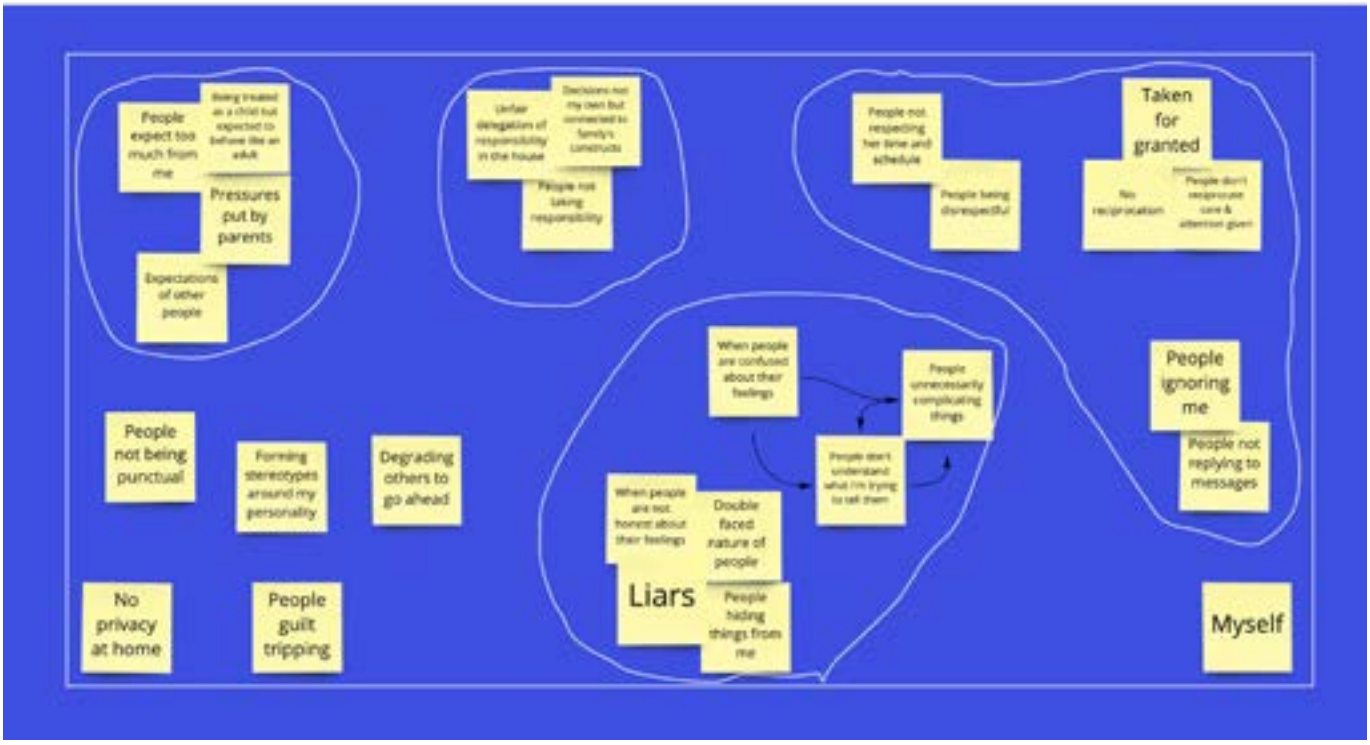
Key clusters of things that young adults like.

The same process was repeated to understand everything that young adults disliked.

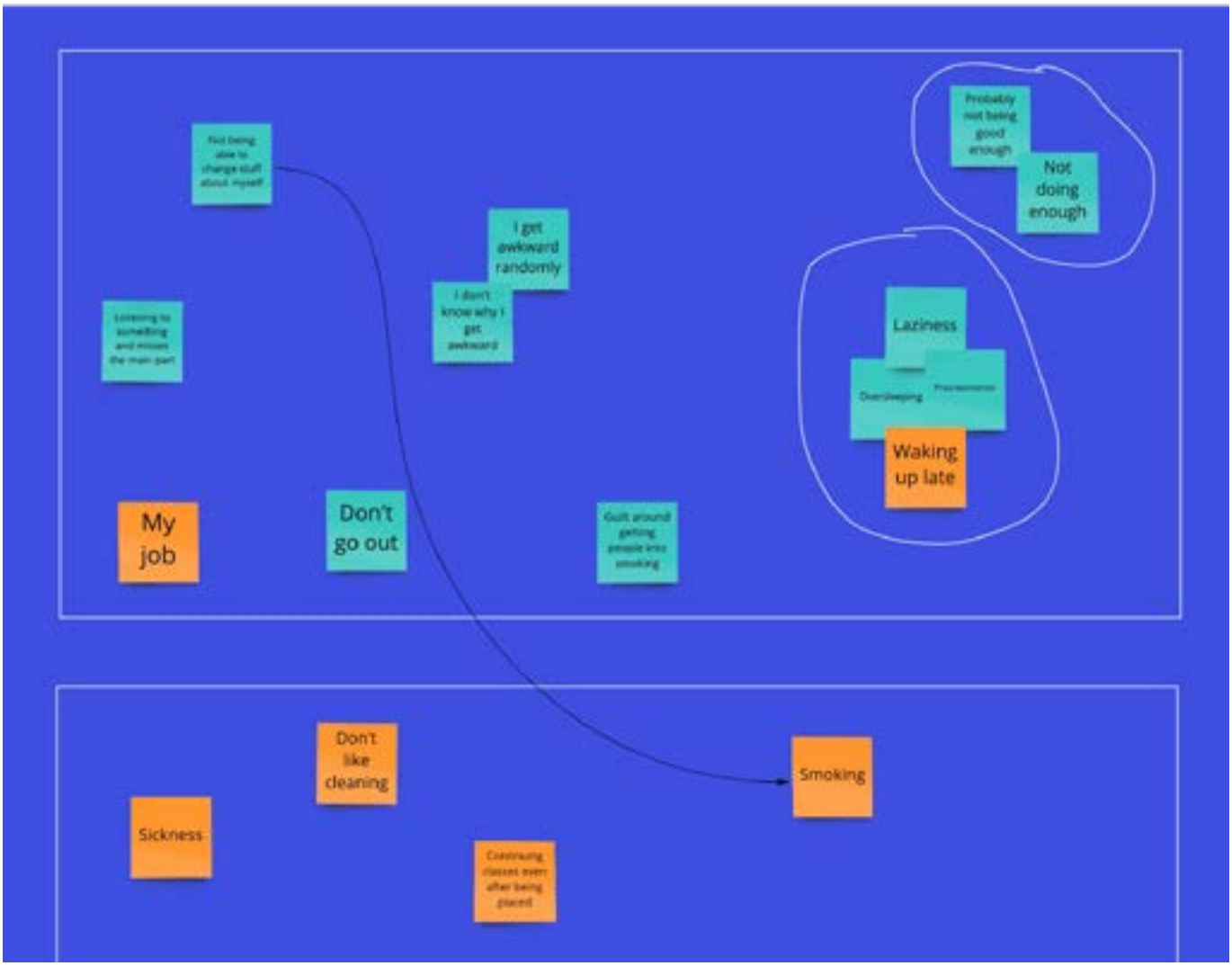

Everything (Level 1)
Fish
Degrading others to go ahead
Double Faced nature of people
People not being punctual
Sun not coming OUT
Unhygienic things
Pressures put by parents
Dust
Water getting wasted
People guilt tripping
Traffic
Public of Delhi
Covid
BJP clan
Messy room
Don't like cleaning
Waking up late
Laptop hanging
People ignoring me
Smoking
Myself
Teachers in my school
Don't go out
Not doing enough
Bad odour
Delhi
Messy things
Sickness
My job
Liars
Laziness
Taken for granted
No privacy at home
Categories (Level 1)
Places
Activites
Food
Objects / other living beings (except humans)
Other people / groups of people
Habits of other people
Habits of self

Key Categories (Level 2)

Looking at behaviour of other people impacting discontent (Level 3.0)



Looking at behaviours of self and activites (Level 3.1)



Key Clusters (Level 4)

Here are the key findings:

- There's a huge impact on other people doing something to affect an individual's happiness. If you look at L1, everyone has at least one sticky note related to either actions of other people that affect them positively or the company of other people, which are primarily friends & family. It would be interesting to see if dislikes stemmed from the same sources as well.
- Interestingly the above insight goes in line with The Longest Running Study on Human Happiness at Harvard (Harvard Gazette, 2017).
- A large part of an individual's happiness was made up of activities. Going out, exercising and art were three (that could be considered) universal ones.
- Another interesting point to delve into could also be the effects of smell on human psyche.
- All people had relationships with either friends or family. "The happy isolated man" is a myth.
- A common point of discontent is other people not respecting / reciprocating things that the participants would do for them. Reciprocation was something a lot of them were seeking.
- Lying was another point that came up often. Whether it was lying in the form of not being honest about their feelings to their own selves or more explicit methods of lying, these caused a lot of pain to the participants. Why do people lie and the complexity of thought that leads to this could be interesting to see.
- The fear of not being good enough or similar fears around the future along with peoples' expectations & the need to meet them was another thing YAs disliked.

This section of the study allowed me to further empathise with my prospective audience. Finally, I wanted to understand what young adults were curious about.

I aimed to find a common thread that united the questions young adults wanted answers to. As I would come to know later, this was the most important focus group session and dictated much of the direction of my project.

https://arjunsnotion.notion.site/What-do-young-adults-dislike-d1fd2f-58408c48b0b71db340f8301fdd

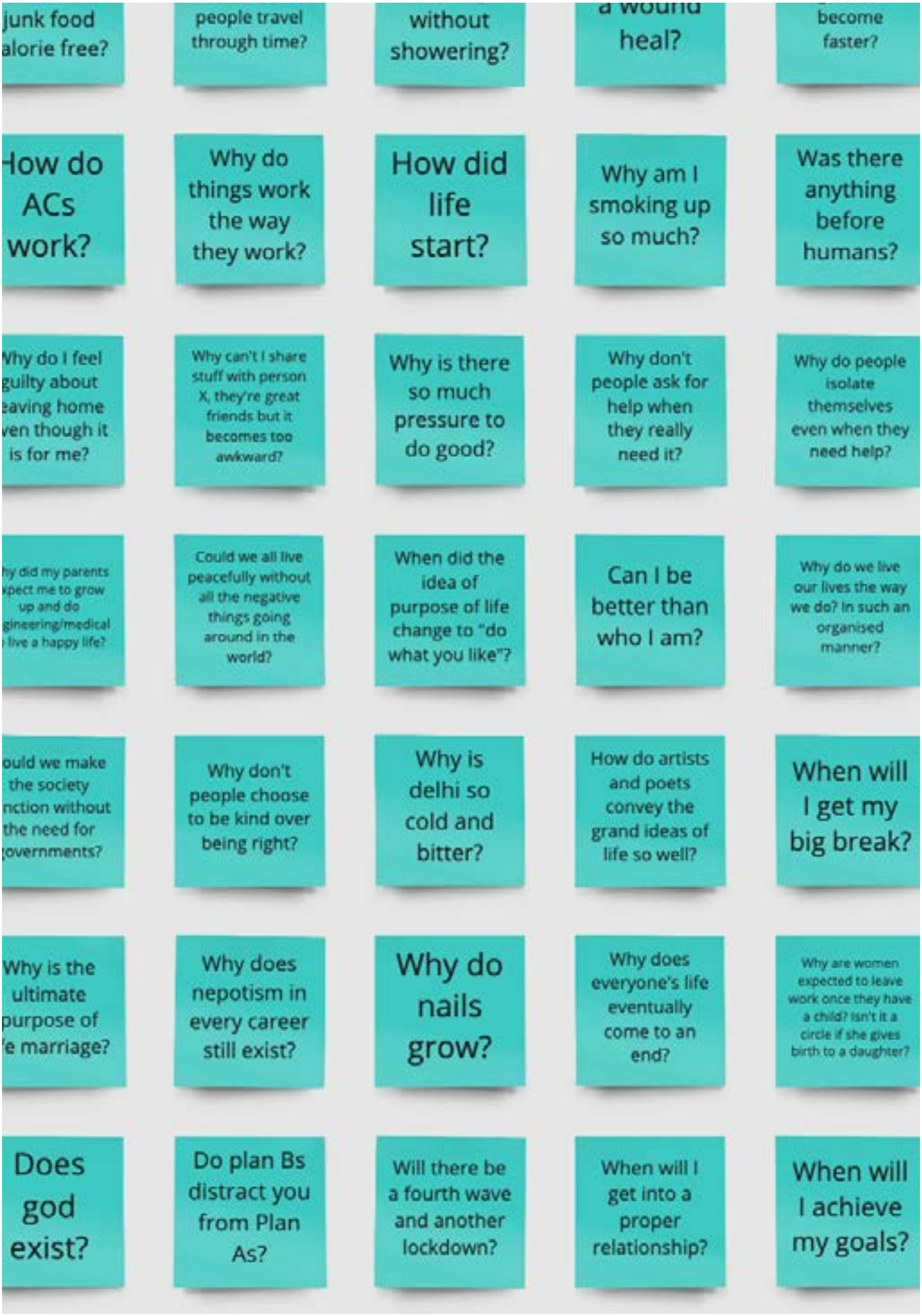
Answers were collected in the form of a brainwriting session on Google Jamboard (as introduced by Katrina Enros in her Facilitation Methods* talk). Each participant had a minute to list down as many questions as they could. Putting a time limit allowed participants to sense urgency and say everything that was on their minds. As a result, I collected 72 questions.

https://arjunsnotion.notion.site/What-are-young-adults-curious-about-Arriving-at-a-theme-4230f088db-6541ca85a01d9388d379d0

All 72 questions.

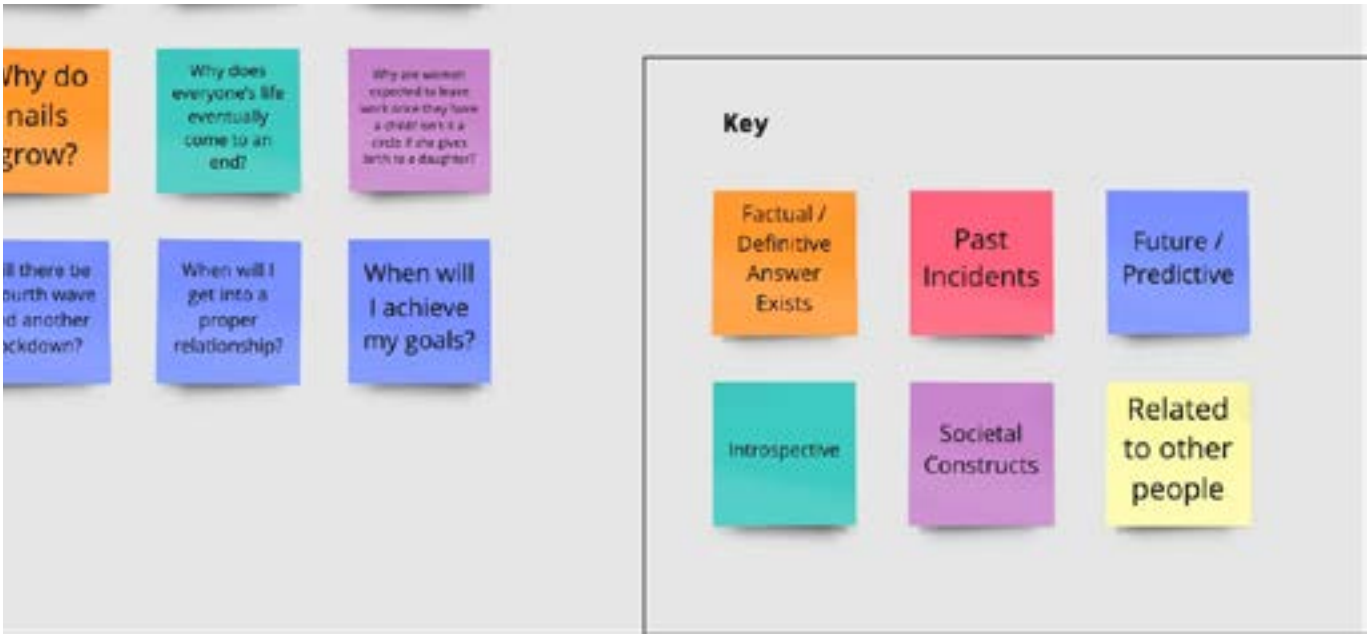
Analysis was a tedious task because of the diversity and quantity of data. I decided to use a modified version of an Affinity Map by using the core concept of categorisation. I analysed the data in levels.

* Katrina Enros was the associate Director at Science Gallery International and taught creativity & design thinking at the Trinity College. She took a facilitation methods workshop for us.


junk food alorie free?
people travel through time?
without showering?
a wound heal?
become faster?
How do ACs work?
Why do things work the way they work?
How did life start?
Why am I smoking up so much?
Was there anything before humans?
Why do I feel guilty about eaving home ven though it is for me?
Why can't I share stuff with person X, they're great friends but it becomes too awkward?
Why is there so much pressure to do good?
Why don't people ask for help when they really need it?
Why do people isolate themselves even when they need help?
hy did my parents xpect me to grow up and do gineering/medical live a happy life?
Could we all live peacefully without all the negative things going around in the world?
When did the idea of purpose of life change to "do what you like"?
Can I be better than who I am?
Why do we live our lives the way we do? In such an organised manner?
ould we make the society nction without the need for overnments?
Why don't people choose to be kind over being right?
Why is delhi so cold and bitter?
How do artists and poets convey the grand ideas of life so well?
When will I get my big break?
Why is the ultimate purpose of e marriage?
Why does nepotism in every career still exist?
Why do nails grow?
Why does everyone's life eventually come to an end?
Why are women expected to leave work once they have a child? Isn't it a circle if she gives birth to a daughter?
Does god exist?
Do plan Bs distract you from Plan As?
Will there be a fourth wave and another lockdown?
When will I get into a proper relationship?
When will I achieve my goals?

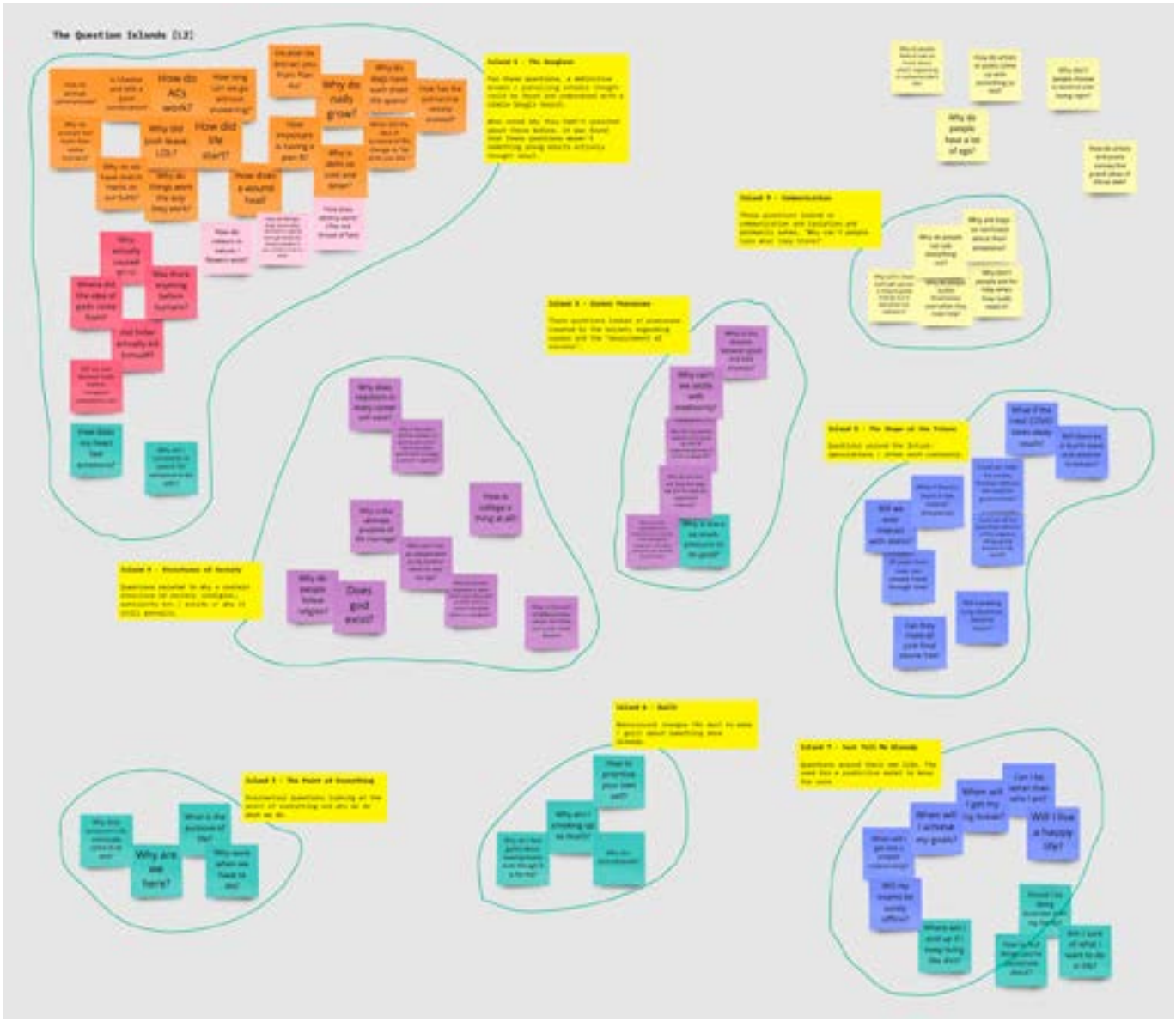
In the first level (image on page 38), questions were categorised according to the kind of answer they would result in. For example, factual answers such as ‘how do ACs work’ were clubbed under the category: ‘Factual/Definitive Answer Exists’.

All 72 questions categorised according to a key.

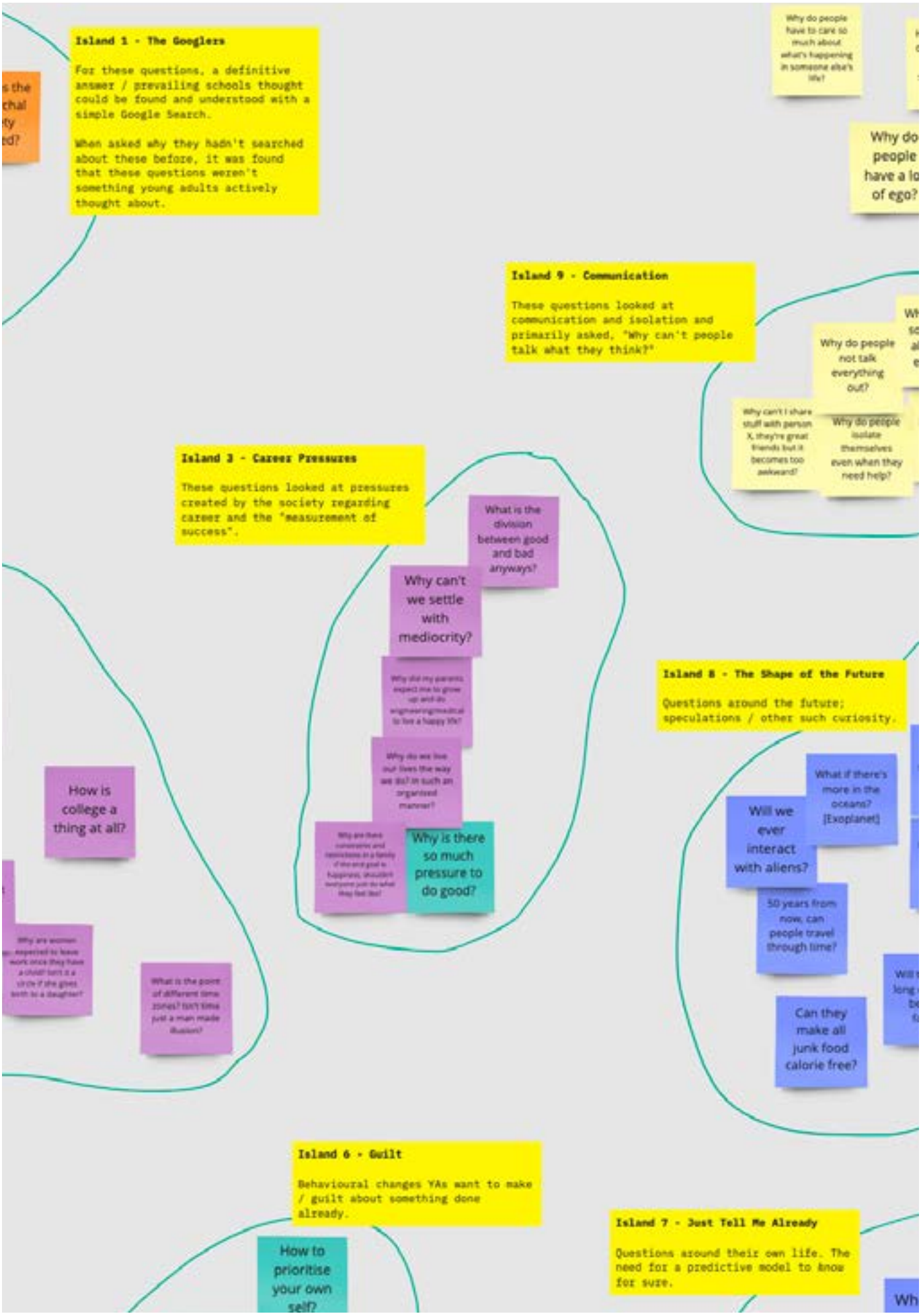


The key used to analyse the questions.

Then, I used these categories to further form ‘islands’ of questions that fell under a similar bucket. These were segregated thematically based on the nature of the question and, sometimes, on the nature of the answer.

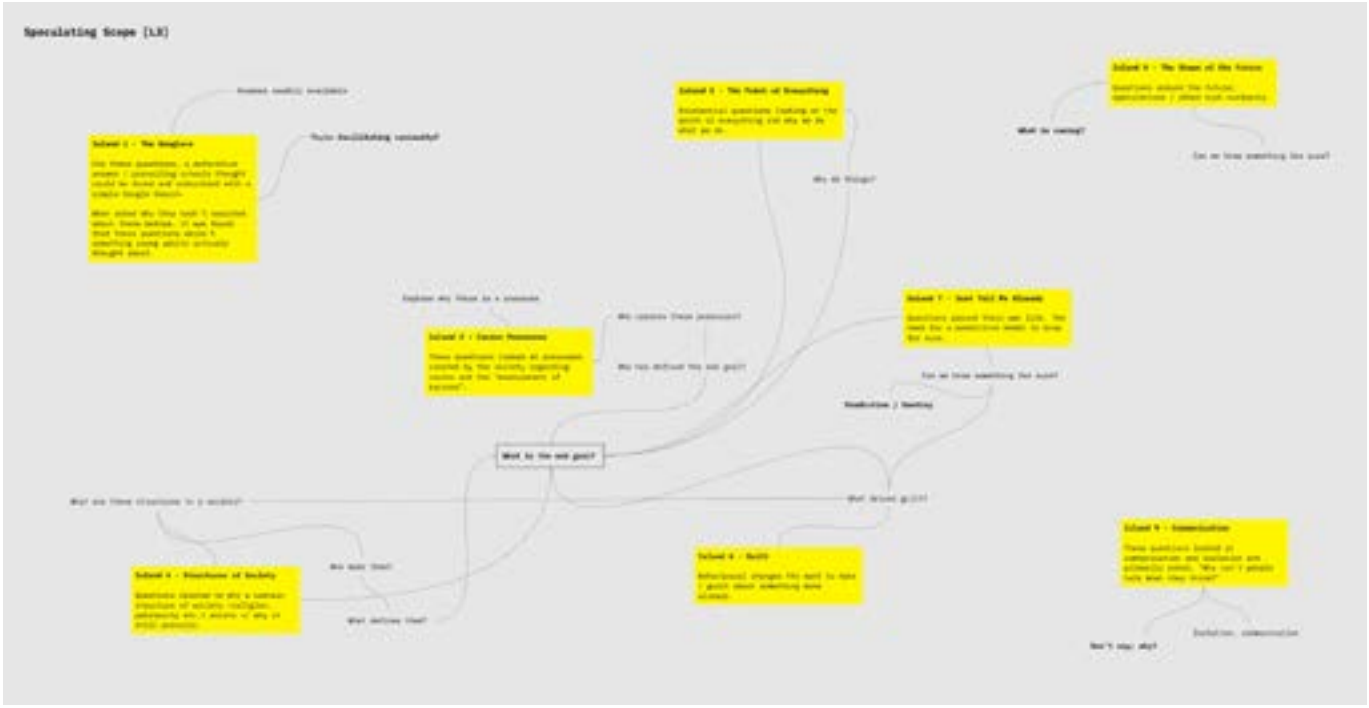


Question islands.

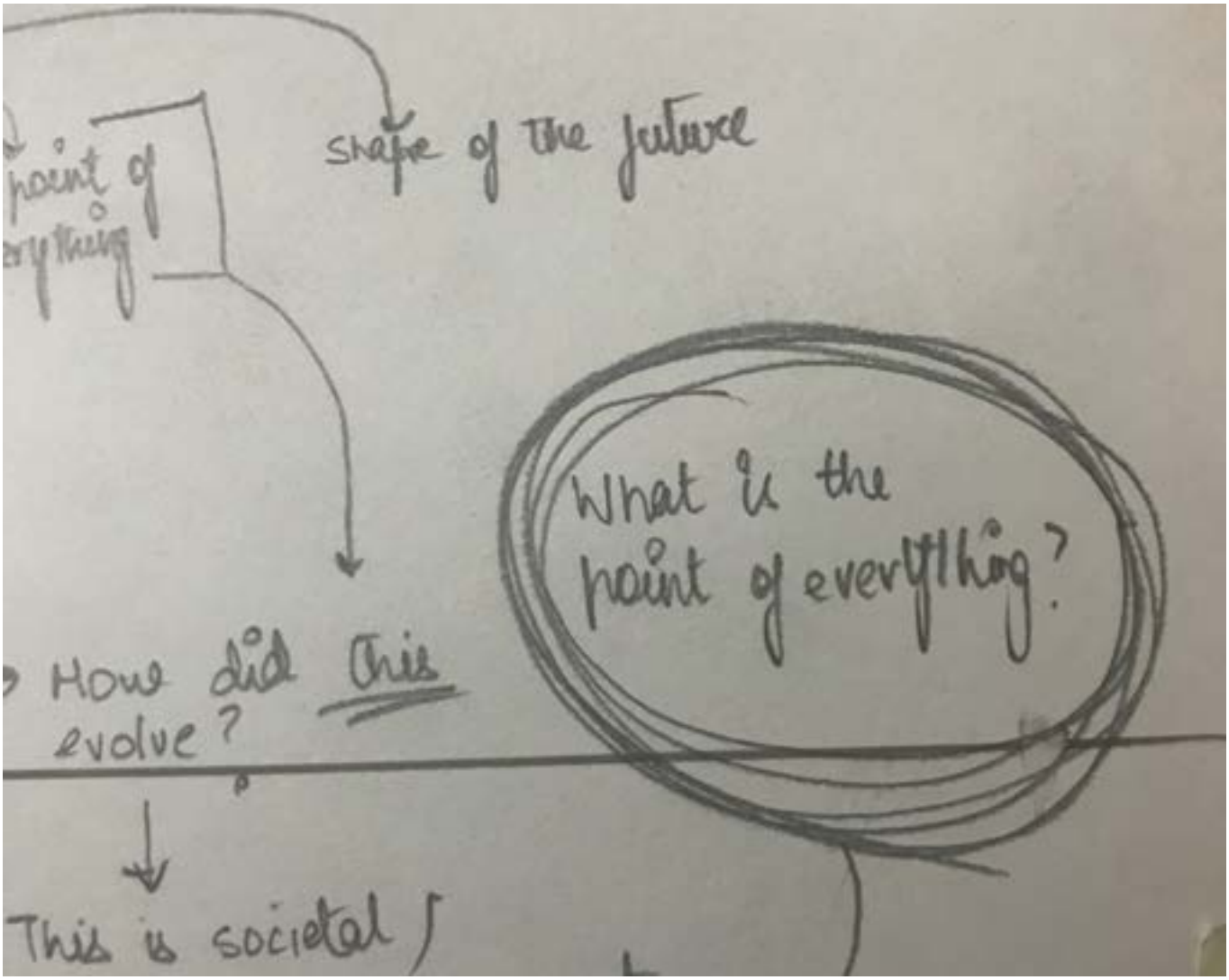

Island 1 - The Googlers
For these questions, a definitive answer / prevailing schools thought could be found and understood with a simple Google Search.
When asked why they hadn't searched about these before, it was found that these questions weren't something young adults actively thought about.
Why do people have to care so much about what's happening in someone else's life?
Why do people have a lo of ego?
Island 9 - Communication
These questions looked at communication and isolation and primarily asked, "Why can't people talk what they think?"
Why do people not talk everything out?
Why can't I share stuff with person X, they're great friends but it becomes too awkward?
Why do people isolate themselves even when they need help?
Island 3 - Career Pressures
These questions looked at pressures created by the society regarding career and the "measurement of success".
What is the division between good and bad anyways?
Why can't we settle with mediocrity?
Why did my parents expect me to grow up and do engineering/medical to live a happy life?
Why do we live our lives the way we do? In such an organized manner?
Why are there conversions and restrictions in a family of like and goal is happiness, shouldn't everyone just do what they feel like?
Why is there so much pressure to do good?
How is college a thing at all?
Why are women expected to leave work once they have a child? Isn't it a circle if she gives birth to a daughter?
What is the point of different time zones? Isn't time just a man made illusion?
Island 8 - The Shape of the Future
Questions around the future; speculations / other such curiosity.
What if there's more in the oceans? [Exoplanet]
Will we ever interact with aliens?
50 years from now, can people travel through time?
Can they make all junk food calorie free?
Island 6 - Guilt
Behavioural changes YAs want to make / guilt about something done already.
How to prioritise your own self?
Island 7 - Just Tell Me Already
Questions around their own life. The need for a predictive model to know for sure.

If you notice carefully, each island could be considered a distinct theme to work on. For example, ‘Just Tell Me Already’ could be an interesting theme to develop predictive & speculative models based on current data. However, I wanted to find connections between the distinct themes as well. I asked myself, “what if there was a global question that could unite parts of these other sub-questions?”

Indeed there was. I did what I’d like to call a ‘scope exploration’ wherein I listed the possible sub-themes that I could explore within each major theme. Once I asked enough questions, I was able to arrive at a universal question that connected a lot of the islands that my focus group had listed.



Therefore, the theme became to try and explore why human beings are motivated by the concept of an ‘end goal’ and what this end goal could be.



A close-up from one of my information collection maps.

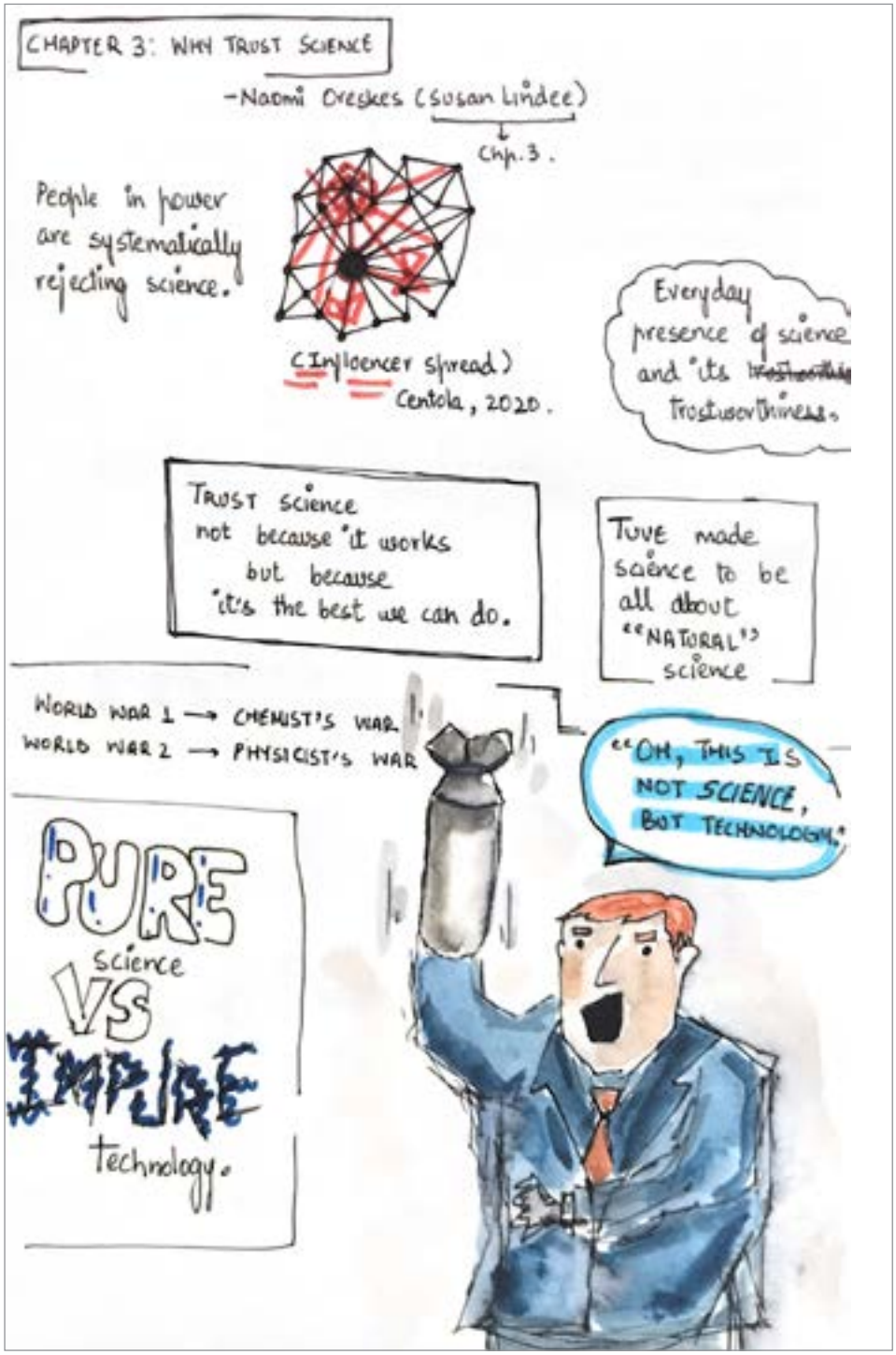
Can we use Psyche to almost ‘defabricate’ society; strip it off its materialistic tendencies and re-explore what human beings require to be happy? Make people rethink about what they’re doing and why they’re doing it?

Excerpt from my reflective log.

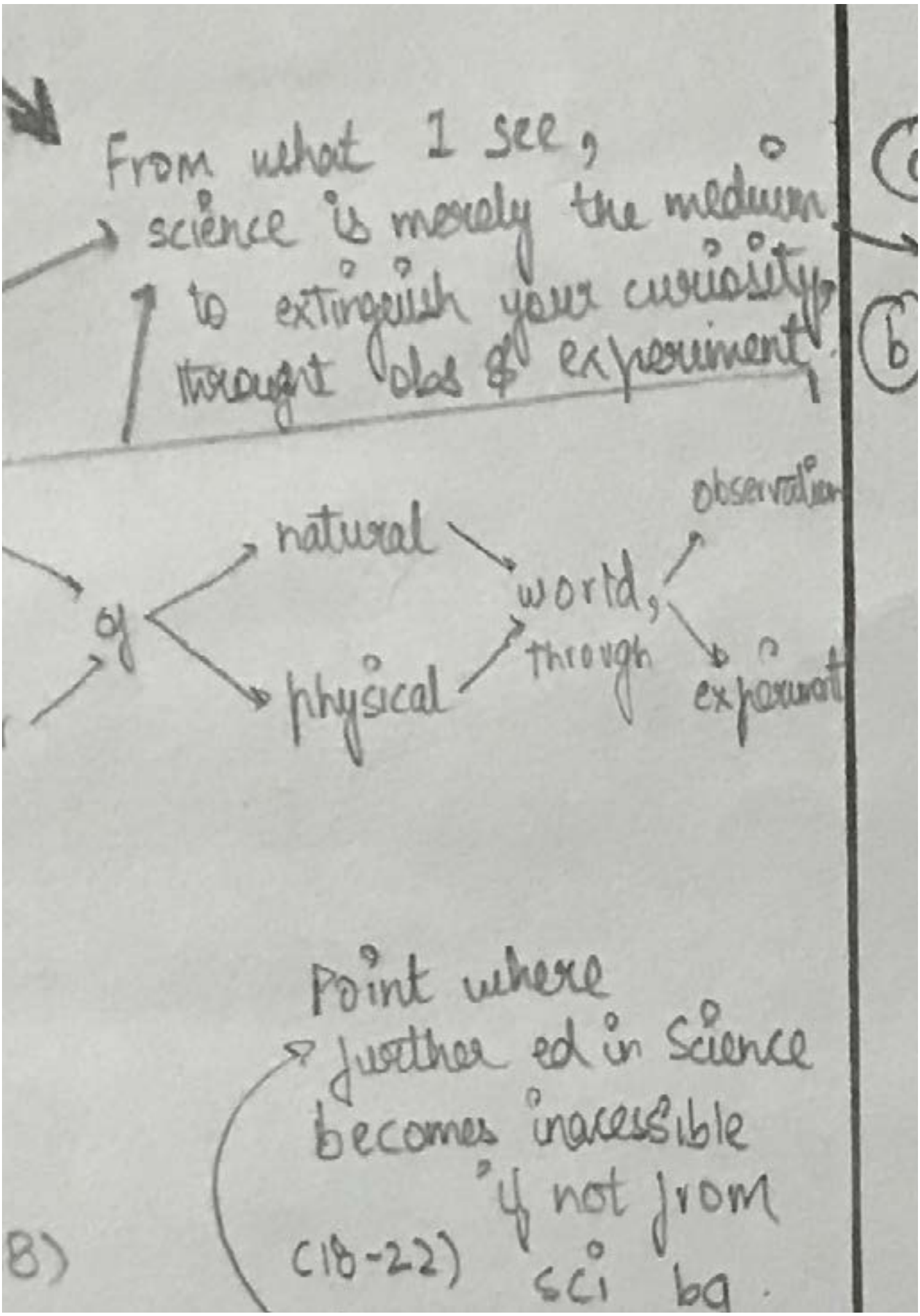
4.Research

Once I knew the domain I wanted to tackle, I had a plethora of things I needed answers to.

My knowledge of science & culture was acquired through proseminars with Jahnavi Phalkey wherein we discussed the book: Why Trust Science by Naomi Oreskes. I also explored this rather new domain with other sources such as talks and papers in order to get a broader understanding of these two disciplines: first individually and then together.



A page from my journal documenting discussions around Chapter 3 of *Why Trust Science?*


From what I see,
science is merely the medium
to extinguish your curiosity
through obs & experiment.
natural
physical
world,
through
observation
experiment
Point where
further ed in Science
becomes inaccessible
if not from
sci bg.
(18-22)
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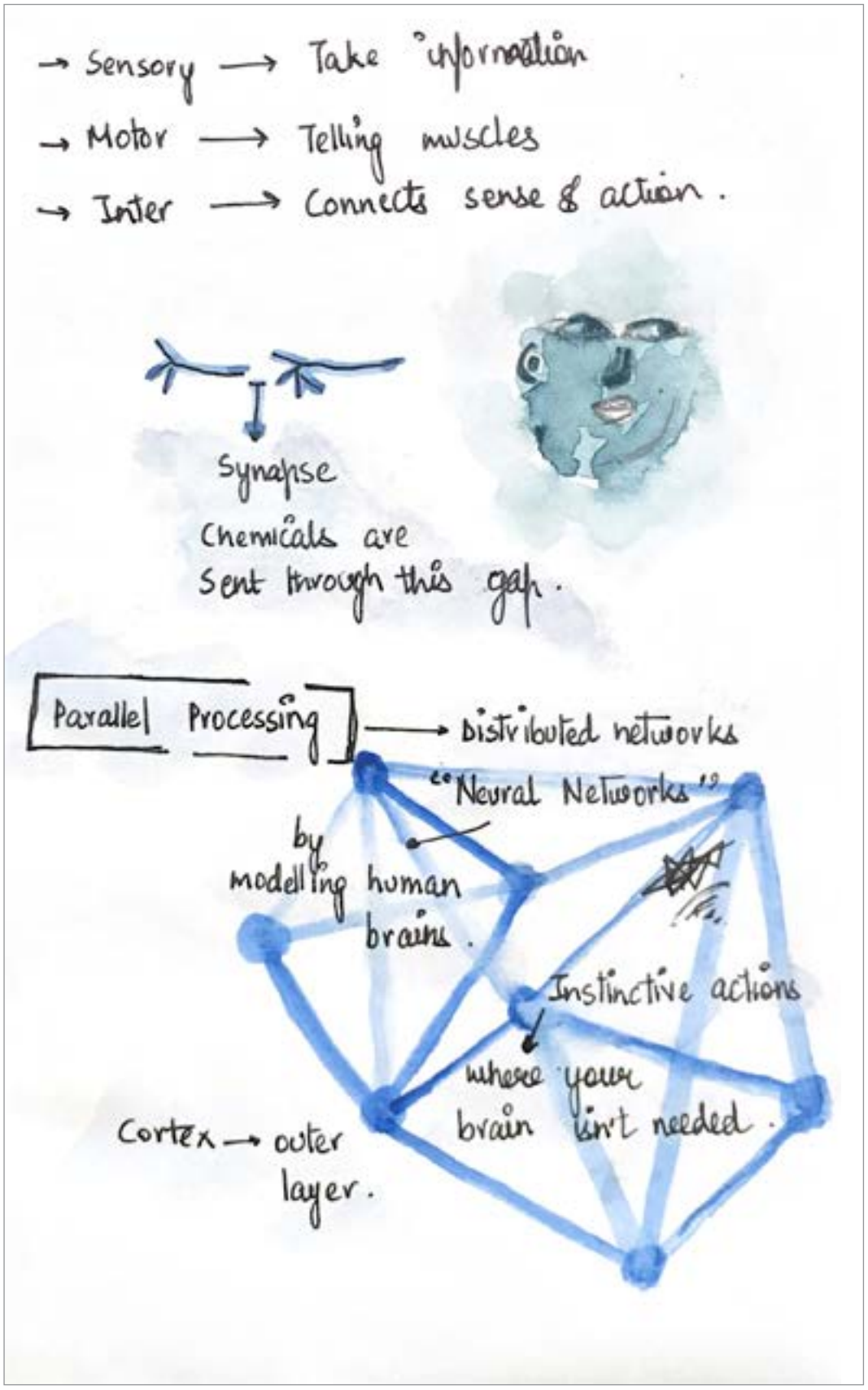
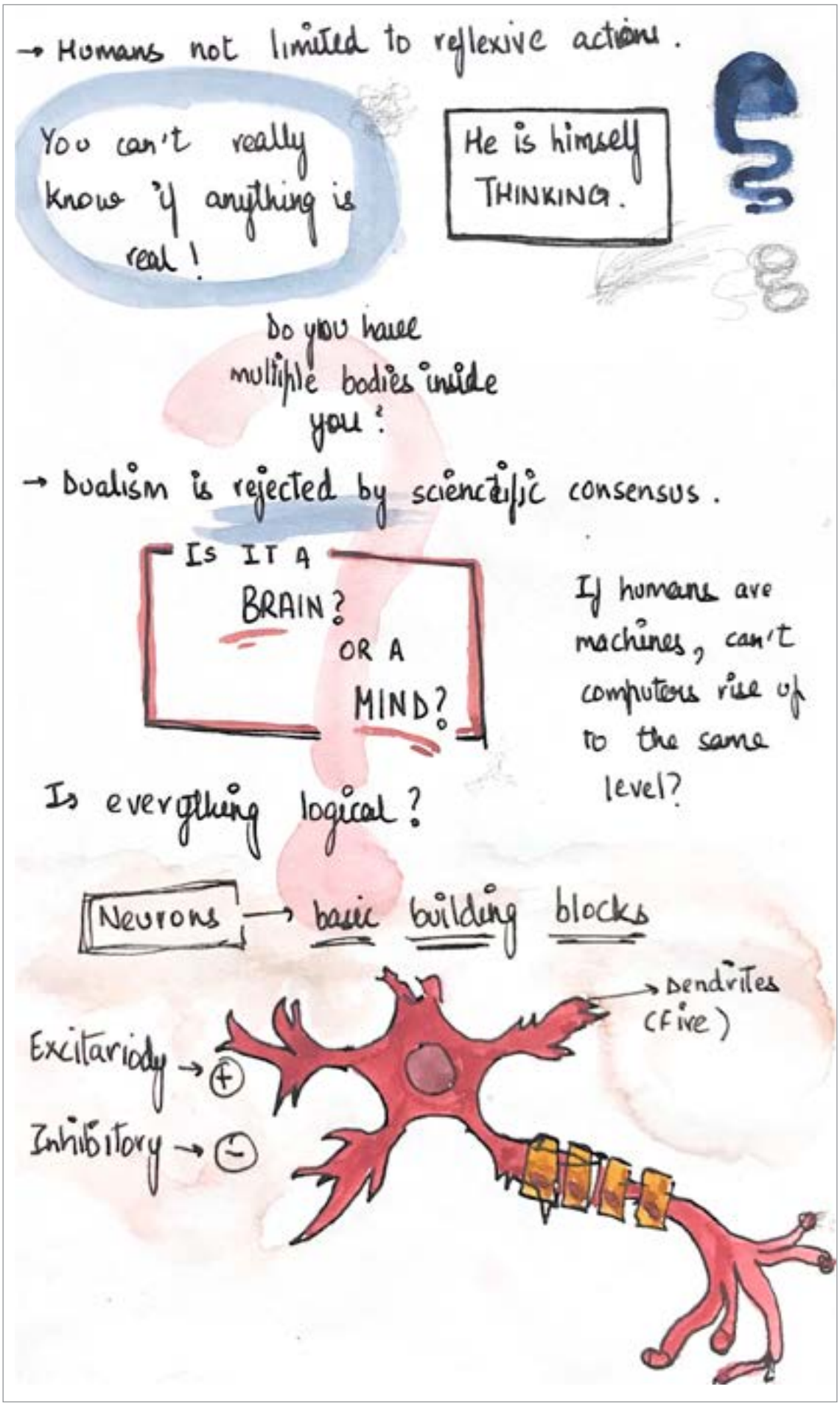
Since we were also grappling with an exhibition that explored the human mind, we were recommended to undertake the Open Yale Course, *'Introduction to Psychology'*. This formed the necessary foundation to understand the theories of psychology & neuroscience that I later explored.



Some notes from the first lecture of PSYC-110.

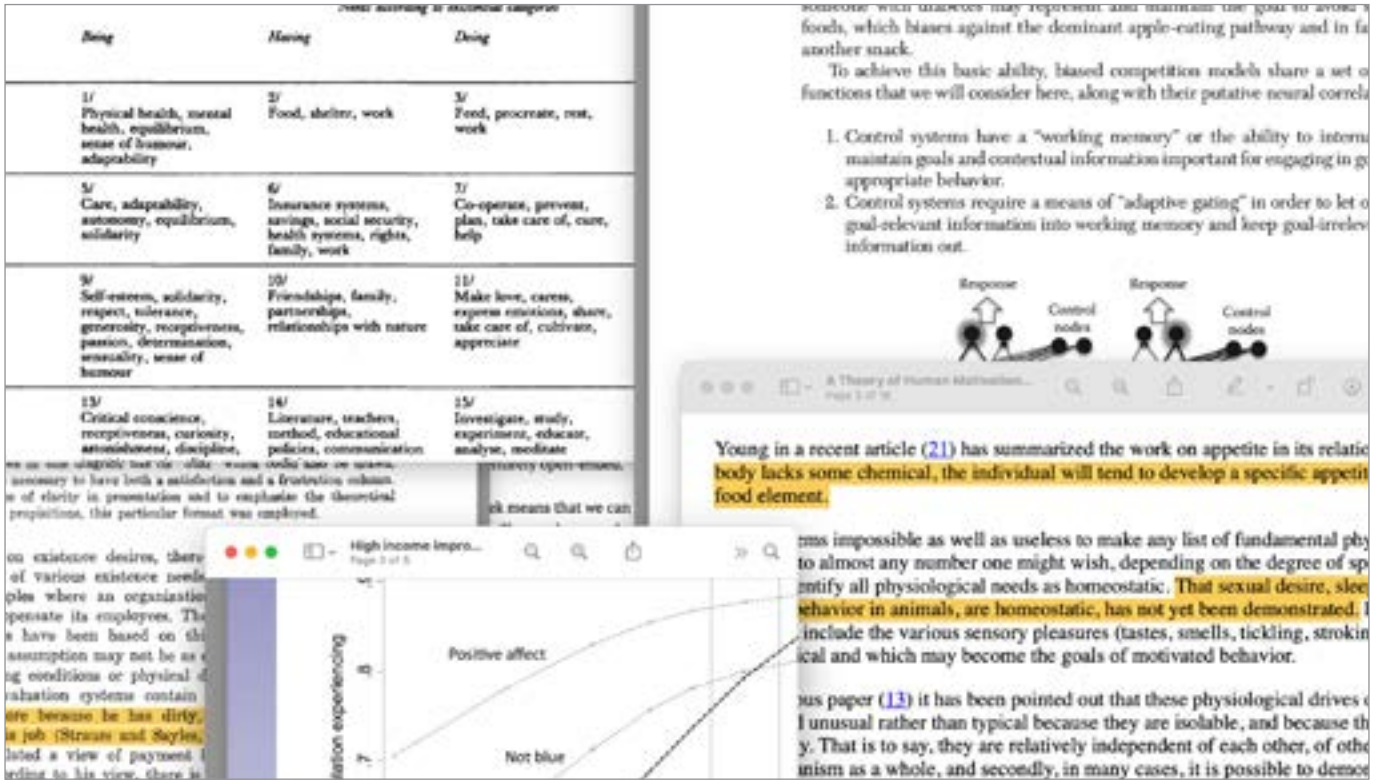


An interesting lecture from PSYC-110 that led me to question whether everything was logical.

4.1 Literature Review

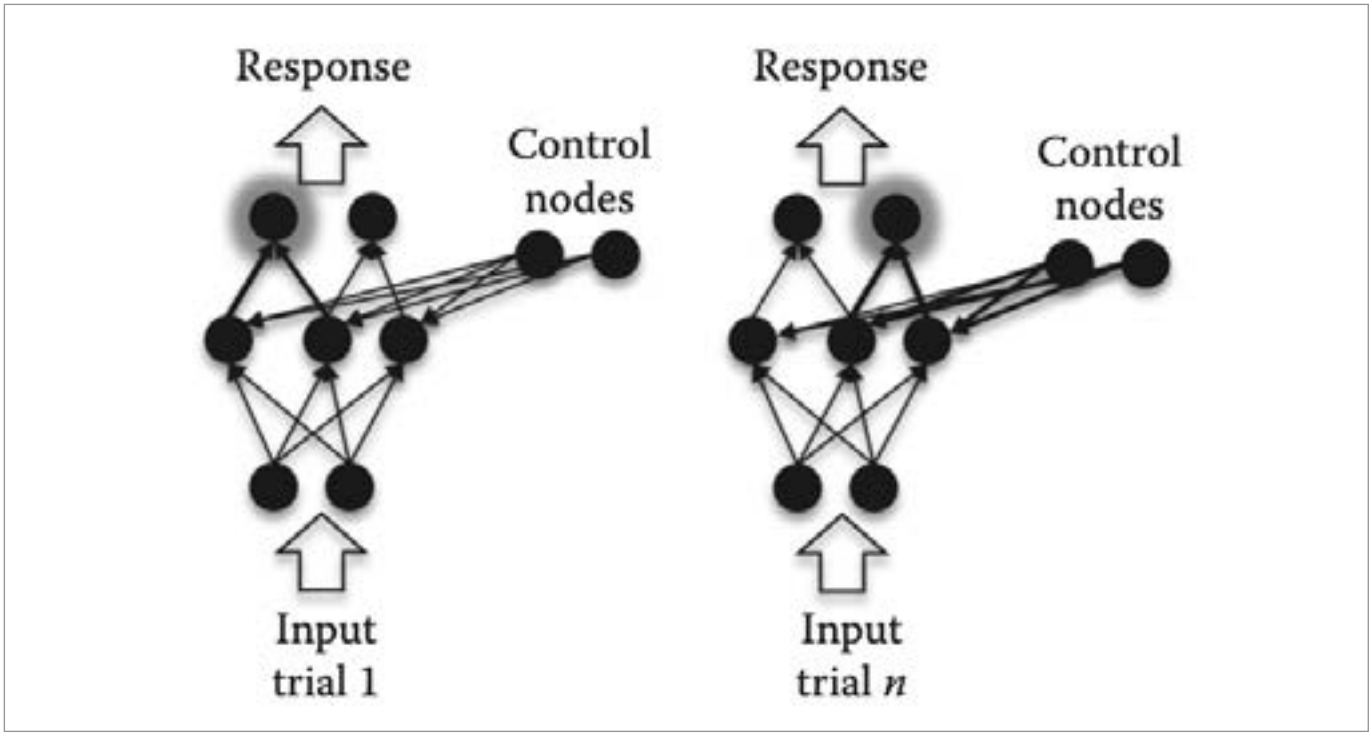
The question at hand was: what is the end goal? Naturally, the first branch of science that could deal with answering this question was philosophy. Now, there are many arguments both for & against philosophy being considered a “branch of science” (De Haro, 2020 & Friedland, 2012) and I would not like to digress into discussing my understanding of the segregation.

However, when exploring this question philosophically, it became very hard to arrive at a substantial & objective answer. Most of the theories felt too abstract to further derive ideas from them. An extremely valuable resource for the same is the article, The Meaning of Life (Metz, 2021), published in the Stanford Encyclopedia of Philosophy. However, for my project, I moved away from the rabbit hole that philosophy could have been and focused my attention on neuroscience & psychology.



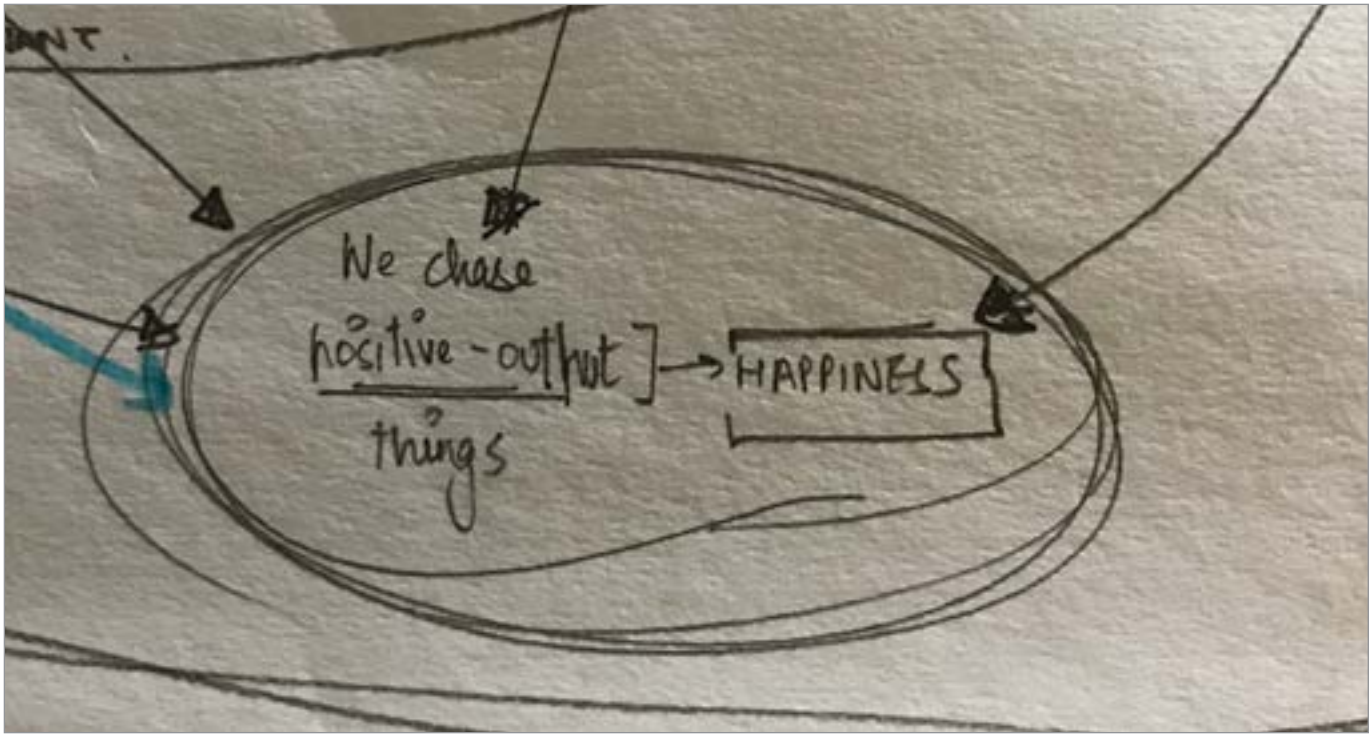
My first insights came from The Neuroscience of Goal-Directed Behavior (Satpute, Ochsner and Badre, 2011). An important theory in human cognition is the effect of a control system over human behaviour. A system of neurons in the brain fire in response to sensory changes in the environment and multiple firing patterns can be observed. This terminates with a behavioural response to the stimuli that acted as input for these firing patterns (Satpute, Ochsner and Badre, 2011, p.51). Furthermore, Satpute, Ochsner and Badre (2011) refer to Desimone et al’s concept of a biased competition model which assumes that the working memory exerts control over these

firing patterns by inhibiting certain pathways to bias the goal-relevant pathway over others. Therefore, it can be concluded that human behaviour is motivated (to a certain degree) by certain kinds of goals.



Source: *The Neuroscience of Goal-Directed Behavior* (Satpute, Ochsner and Badre, 2011); p. 52.

As a naive 21-year-old design student, I promptly arrived at a belief that the ultimate end goal is happiness. Happiness is what human beings chase either directly or indirectly.



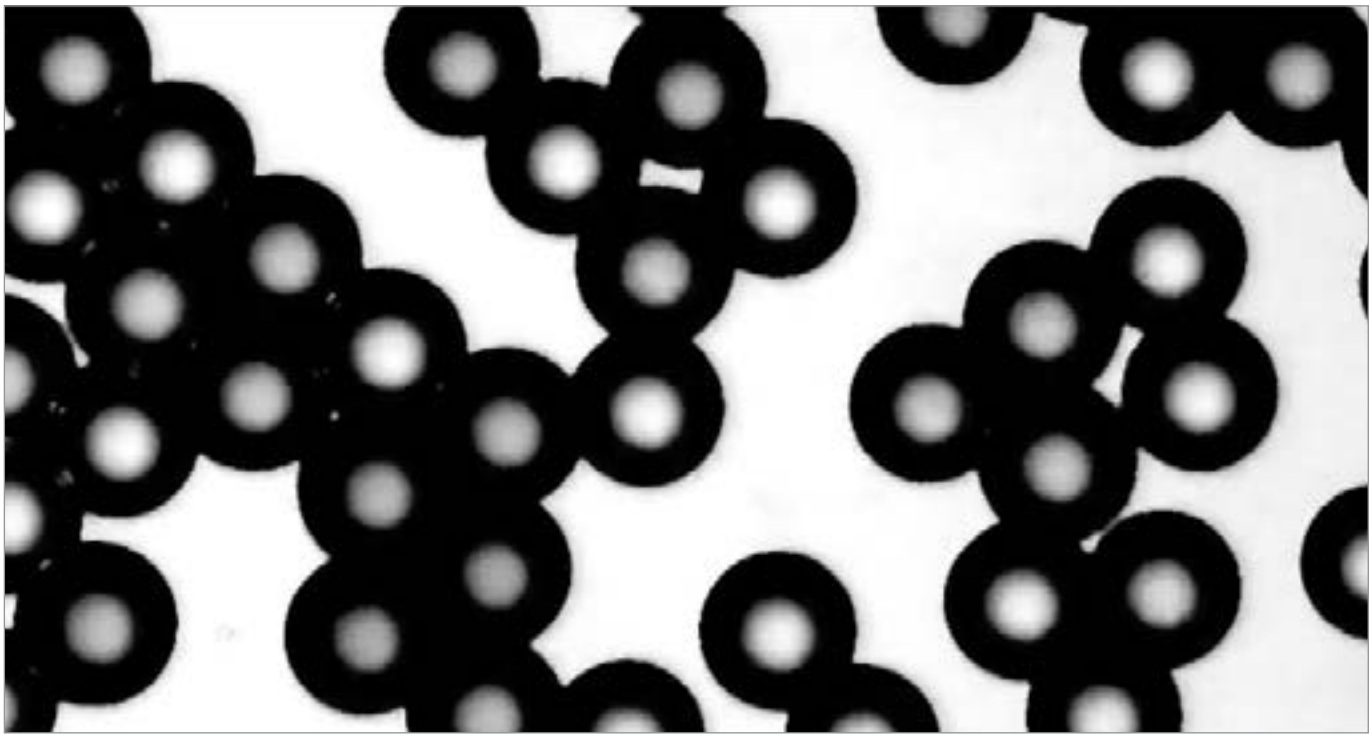
Therefore, my study forayed into domains of human happiness and whether I could forge patterns in human happiness. During this phase, I came across a project by Asai et al. (2018) called HappyDB. Happy DB was an open-source corpus of 100, 000 crowdsourced happy moments. For a long time, this remained my area of focus. I wished to create some sort of data visualisation using HappyDB (further expanded upon in section 5.3).

```
27684,78,24h,I completed my 5 miles run without break. It makes me feel strong.,I completed my 5 miles run without break. It m
27685,21,24h,went to movies with my friends it was fun ,went to movies with my friends it was fun ,True,1,,bonding
27686,8,24h,I was shorting Gold and made $200 from the trade.,I was shorting Gold and made $200 from the trade.,True,1,,achiev
27687,586,24h,"Hearing Songs It can be nearly impossible to go from angry to happy, so youare just looking for the thought tha
while, but as long as youare headed in a more positive direction youall be doing yourself a world of good.","Hearing Songs It
you out of your angry feeling and moves you in the direction of happiness. It may take a while, but as long as you're headed i
27688,489,24h,My son performed very well for a test preparation.,My son performed very well for a test preparation.,True,1,,af
27689,976,24h,I helped my neighbour to fix their car damages. ,I helped my neighbour to fix their car damages. ,True,1,,bondin
27690,3972,24h,Managed to get the final trophy in a game I was playing. ,Managed to get the final trophy in a game I was playi
27691,14,24h,A hot kiss with my girl friend last night made my day,A hot kiss with my girl friend last night made my day,True,
27692,1230,24h,My new BCAAs came in the mail. Yay! Strawberry Lemonade flavored aminos make my heart happy.,My new BCAAs came
27693,9950,24h,Got A in class.,Got A in class.,True,1,,achievement
27694,4862,24h,My sister called me from abroad this morning after some long years. Such a happy occassion for all family membe
all family members.,True,2,,affection
27695,4891,24h,The cake I made today came out amazing. It tasted amazing as well.,The cake I made today came out amazing. It t
27696,737,24h,"There are two types of people in the world: those who choose to be happy, and those who choose to be unhappy. C
possessions","There are two types of people in the world: those who choose to be happy, and those who choose to be unhappy. Co
possessions",False,2,,enjoy_the_moment
27697,498,24h,My grandmother start to walk from the bed after a long time.,My grandmother start to walk from the bed after a l
27698,2124,24h,i was able to hit a top spin serve in tennis,i was able to hit a top spin serve in tennis,True,1,,achievement
27699,156,24h,I napped with my husband on the bed this afternoon and it was sweet to cuddle so close to him.,I napped with my
27700,1783,24h,My co-woker started playing a Carley Rae Jepsen song from her phone while ringing out customers.,My co-woker st
27701,3382,24h,"My son woke me up to a fantastic breakfast of eggs, his special hamburger patty and pancakes. ","My son woke m
27702,54,24h,After a long time my brother gave a suprise visit to my house yesterday.,After a long time my brother gave a supri
27703,794,24h,I went to the movies with my sister today for the first time since a long time.,I went to the movies with my sis
27704,1510,24h,I consumed a well garnished bowl of ramen twice today. It was so delicious.,I consumed a well garnished bowl of
27705,5732,24h,I picked my daughter up from the airport and we have a fun and good conversation on the way home.,I picked my d
home.,True,1,bonding,affection
27706,6215,24h,"My daughter waved at me and said ""mama"" for the first time when I came home this morning","My daughter waved
27707,402,24h,Going to the mountains and hiking the trail to the top.,Going to the mountains and hiking the trail to the top.,
27708,2957,24h,"We were competing against another team in a online game, I was playing with my friends most of them were my ch
we grew up together and went to the same school since we're just kids. We've been playing this game together for almost 2 year
now and we kinda formed a team for ourselves for this game. The game started smoothly and everyone was being hyped about the f
Slowly, things started to become interesting and exciting then before we know it it became a close fight where the score was 2-
1 more point
```

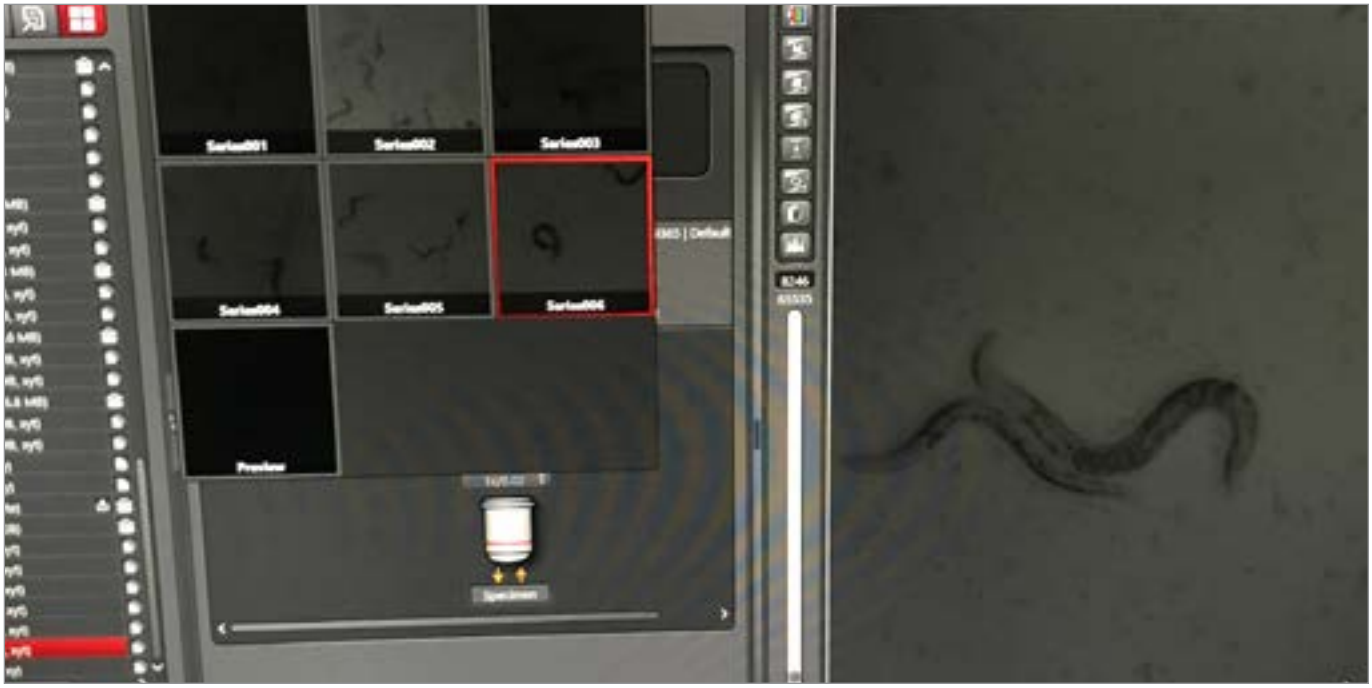
A snapshot of the open-source database (Asai et. al, 2018)

Anecdoatal overview of HappyDB using a word cloud (Asai et. al. 2018)

However, my fixation on human happiness was rather shortlived. When I visited Shashi's lab at NCBS, it reminded me of what I had originally come to the SGB for. Seeing the experimental work in his lab reignited my creative spirit and gave me newfound zeal to further explore the question at hand and come up with something that I'm passionate about instead of basing everything on reason; something that Saibal had also suggested against.



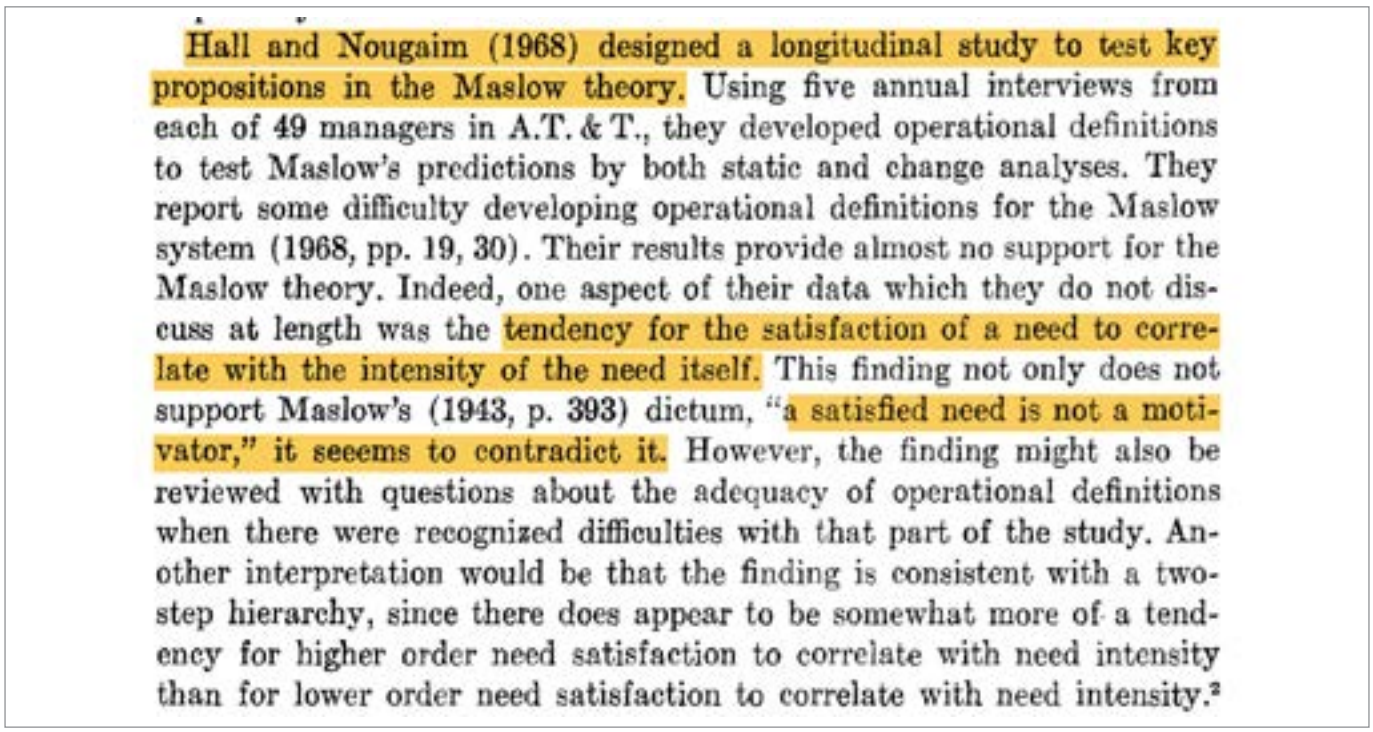
A snippet of particles from one of Shashi's PhD. experiments; source: Shashi Thutupalli.



A photo taken during one of my visits to Shashi's lab. Here, they were monitoring the movement of worms in different environments.

I went back to reading papers on the internet in order to pivot from my original idea. In an interesting paper, The Neuroscience of Goals and Behavior Change, Berkman (2018) discusses behaviour change in two dimensions: motivational (will) and cognitive (way). While the cognitive dimension is a separate area of study altogether, the motivational dimension seemed fascinating. With this newfound focus, I attempted to change my perspective a little bit. Instead of trying to answer what the end goal is (answering a subjective question using objective research), I attempted to answer why an end goals exists (objectivity meets objectivity, taking into account the subjectivity demanded by the question).

This overlap between human happiness and motivation led me to the field of psychology, especially the theories of human needs. From A Theory of Human Motivation (Maslow, 1943), which is considered the first conclusive framework of human motivation, to the rather recently developed Matrix of Needs & Signifiers (Max-Neef, 2010), I started to form an answer to what human beings need, which could be a conclusive determinant for why human beings behave the way they do.



Hall and Nougaim (1968) designed a longitudinal study to test key propositions in the Maslow theory. Using five annual interviews from each of 49 managers in A.T. & T., they developed operational definitions to test Maslow's predictions by both static and change analyses. They report some difficulty developing operational definitions for the Maslow system (1968, pp. 19, 30). Their results provide almost no support for the Maslow theory. Indeed, one aspect of their data which they do not discuss at length was the tendency for the satisfaction of a need to correlate with the intensity of the need itself. This finding not only does not support Maslow's (1943, p. 393) dictum, "a satisfied need is not a motivator," it seeems to contradict it. However, the finding might also be reviewed with questions about the adequacy of operational definitions when there were recognized difficulties with that part of the study. Another interpretation would be that the finding is consistent with a two-step hierarchy, since there does appear to be somewhat more of a tendency for higher order need satisfaction to correlate with need intensity than for lower order need satisfaction to correlate with need intensity.[2]

A snippet from *An Empirical Test of a New Theory of Human Needs* (Alderfer, 1969) which marked my foray into finding empirical data for human need theories.

These theories ended my research phase. I had plenty to move forward with and my insights are discussed below:

- Multiple neural network sequences operate on the same stimulus. Sequences that result in positive outputs strengthen over time while others fade (Satpute, Ochsner and Badre, 2011).
- Maslow's theory of human motivation was considered almost a postulate because of the lack of any other theories to build upon during that time (Maslow, 1943).
- Maslow's hierarchy is based on the pre-potency of lower-level needs; i.e needs for homeostasis are considered most important (Alderfer, 1969).
- Mammals have a seeking system as a core human brain instinct. The act of seeking is itself a fulfilling activity (Goldhill, 2017).
- There is no empirical data to support Maslow's theory. Hall and Nougaim's 1968 longitudinal study not only found no support for Maslow's theory but also contradict a key proposition (Alderfer, 1969).
- People desire more concrete needs as a consequence of not being able to satisfy less concrete, abstract needs (Alderfer, 1969).
- Relationship between what is satisfied and what is desired (Alderfer, 1969).
- An increase in frustration may lead to increased desire and continuous satisfaction may lead to lesser desire (Alderfer, 1969).
- Human need theories are still a result of an individual or group of individuals' analysis. No empirical starting point can mean individual values seeping into propositions of the theory and how observations are analysed.
- All theories after A.H. Maslow in 1943 are either extensions or refutations of the same.

I also ended up collating my research typographically.

pathway would be to eat the
be represented and internall
ing the goal-relevant pathwa
someone with diabetes may
foods, which biases against
another snack.

To achieve this basic abi
functions that we will conside

1. Control systems have
maintain goals and cont
appropriate behavior.
2. Control systems requir
goal-relevant informati
information out.

Response

eds according to existential categories

	Doing
work	3/ Feed, procreate, rest, work
tems, l security, s, rights,	7/ Co-operate, prevent, plan, take care of, cure, help
family, with nature	11/ Make love, caress, express emotions, share, take care of, cultivate, appreciate
achers, ational nunication nrawn. olumn. retical	15/ Investigate, study, experiment, educate, analyse, meditate

ntirely open-ended.

ek means that we can

Young in a recent article (21) has sur
body lacks some chemical, the indivi
food element.

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to almost any number one
entify all physiological nee
behavior in animals, are hor
include the various sensor
ical and which may become

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l unusual rather than typica
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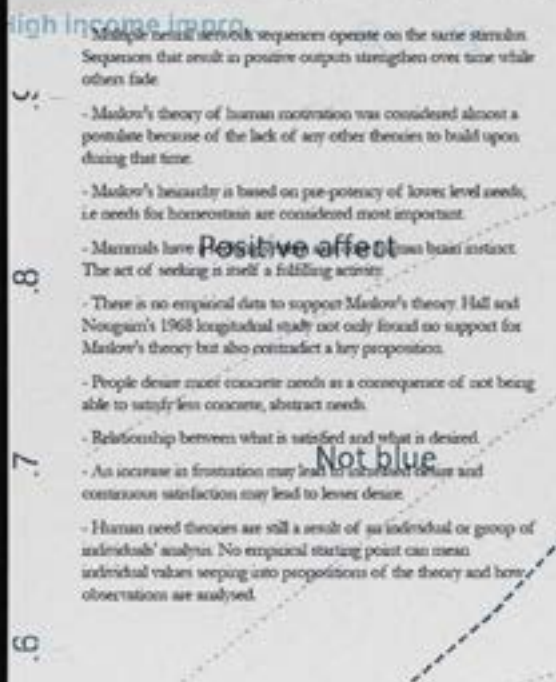
anism as a whole, and secon
g somatic base for the drive
eepiness, maternal response

e pointed out again that an



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15/
Investigate, study,
experiment, educate,
analyse, meditate
entirely open-ended.

ek means that we can

High income impro...

- Multiple neural network sequences operate on the same stimulus. Sequences that result in positive outputs strengthen over time while others fade.

- Maslow's theory of human motivation was considered almost a postulate because of the lack of any other theories to build upon during that time.

- Maslow's heirarchy is based on pre-potency of lower level needs; i.e needs for homeostasis are considered most important.

- Mammals have a seeking system and one human brain instinct. The act of seeking is itself a fulfilling activity.

Positive affect

- There is no empirical data to support Maslow's theory. Hall and Nougaim's 1968 longitudnal study not only found no support for Maslow's theory but also contradict a key proposition.

- People desire more concrete needs as a consequence of not being able to satisfy less concrete, abstract needs.

- Relationship between what is satisfied and what is desired.

Not blue

- An increase in frustration may lead to increased desire and continuous satisfaction may lead to lesser desire.

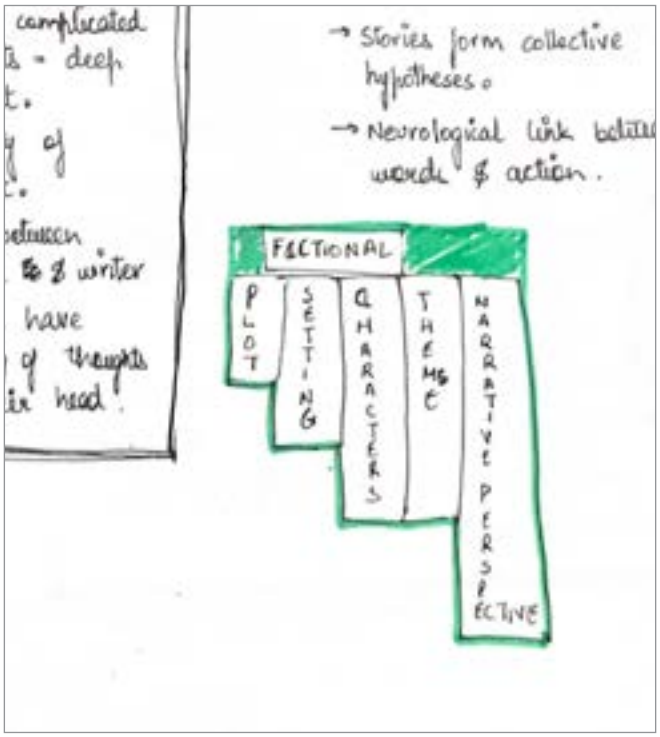
- Human need theories are still a result of an individual or group of individuals' analysis. No empirical starting point can mean individual values seeping into propositions of the theory and how observations are analysed.

Ladder

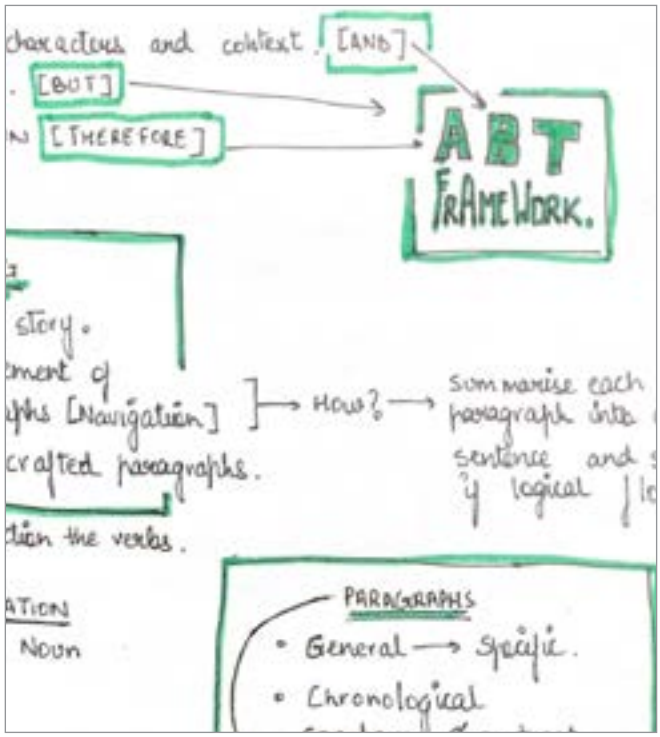
5.
8.
7.
9.

5. Ideation & Proposals

In this project, ideation and proposals went hand-in-hand. Our project proposals were written under the guidance of Karthik Ramaswamy* from the Indian Institute of Science. However since our ideas kept evolving, we had to rewrite proposals almost every week. Therefore, I shall use each the core idea of each proposal to show how my ideas evolved over time.



Some snippets from Karthik's session recorded in my journal.

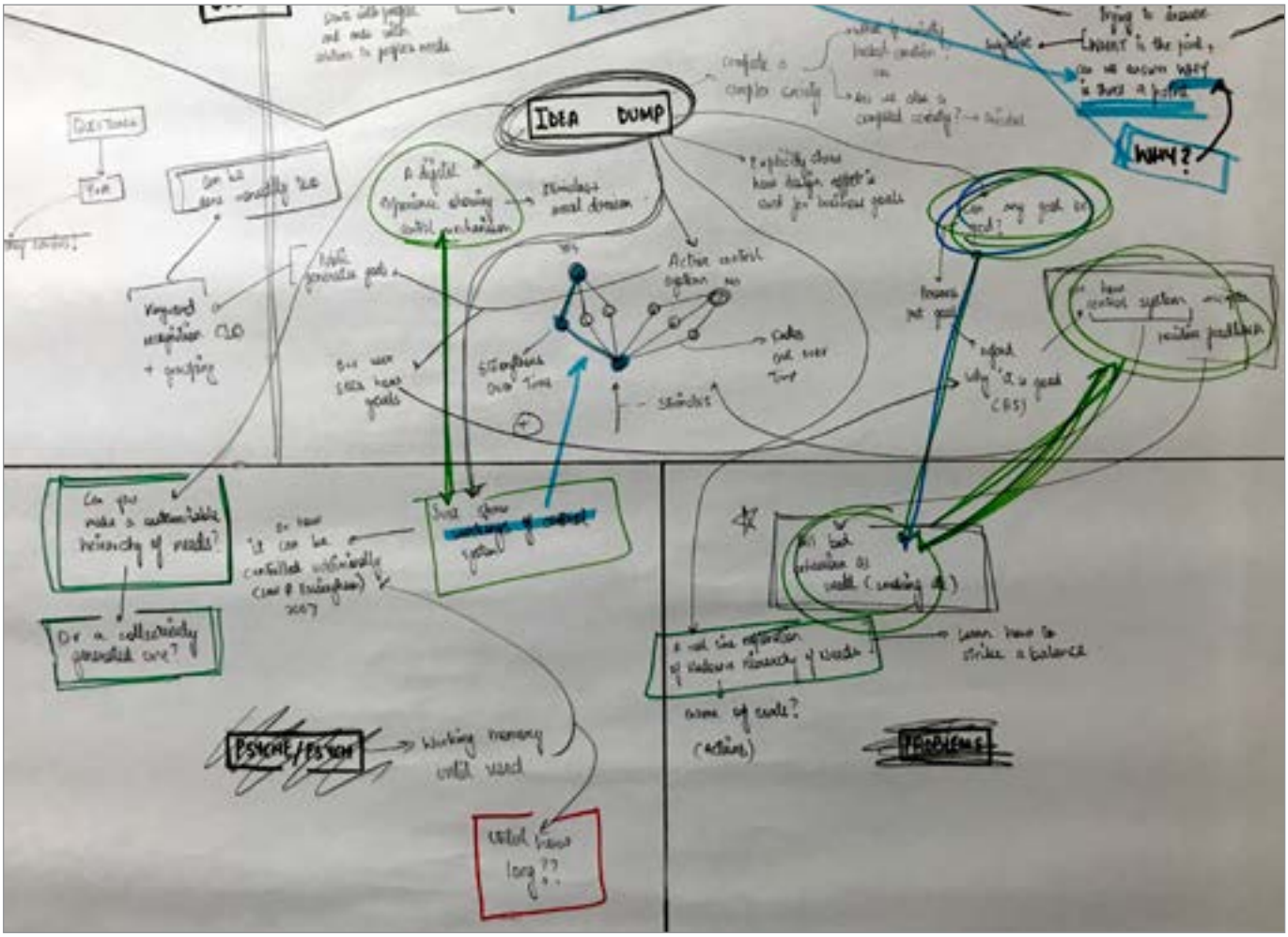


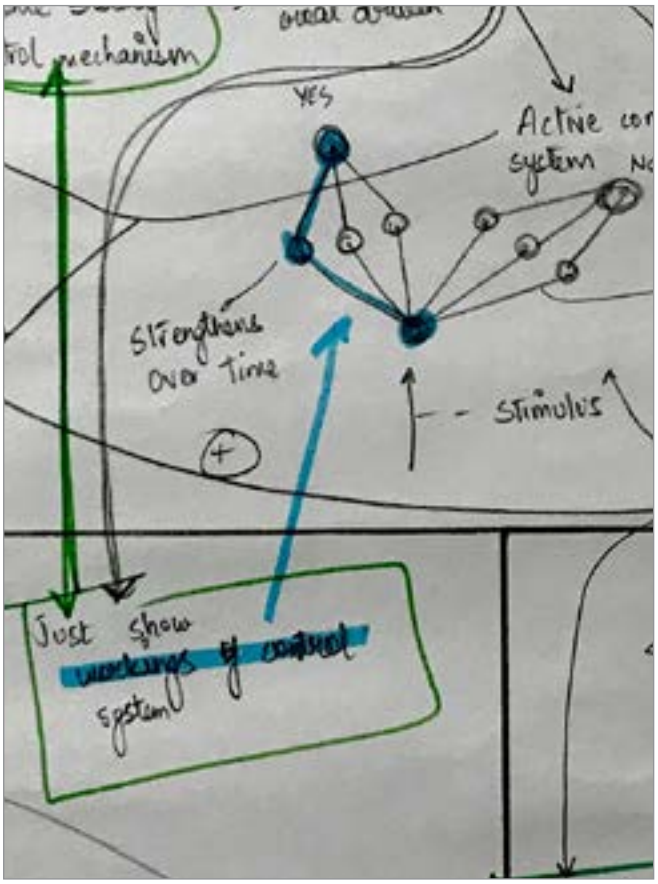
5.1 Idea Dump

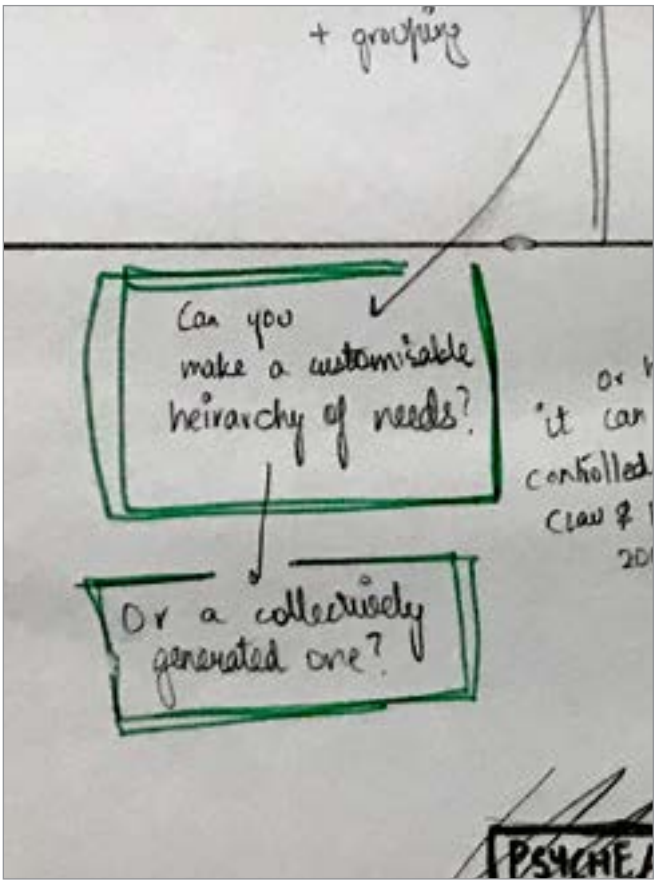
While this wasn't covered in any of the proposals, this is where all of my ideas were initially listed. As I studied more and identified gaps in research that I could creatively address, I started to record ideas on a large sheet of paper (images in the next page).

Some of these ideas featured visualisations of the brain, creating a database, data visualisations using existing data, making a game, shooting a film and making a digital installation. As a designer, I find it extremely difficult to pursue things without reason. For all of these ideas, the foundational reason just wasn't strong enough. Therefore, none of these were actively pursued even though some were chosen by my mentors.

* Karthik Ramaswamy is a science communicator at the Indian Institute of Science. He took a writing workshop for us and helped us peer review the project proposals.

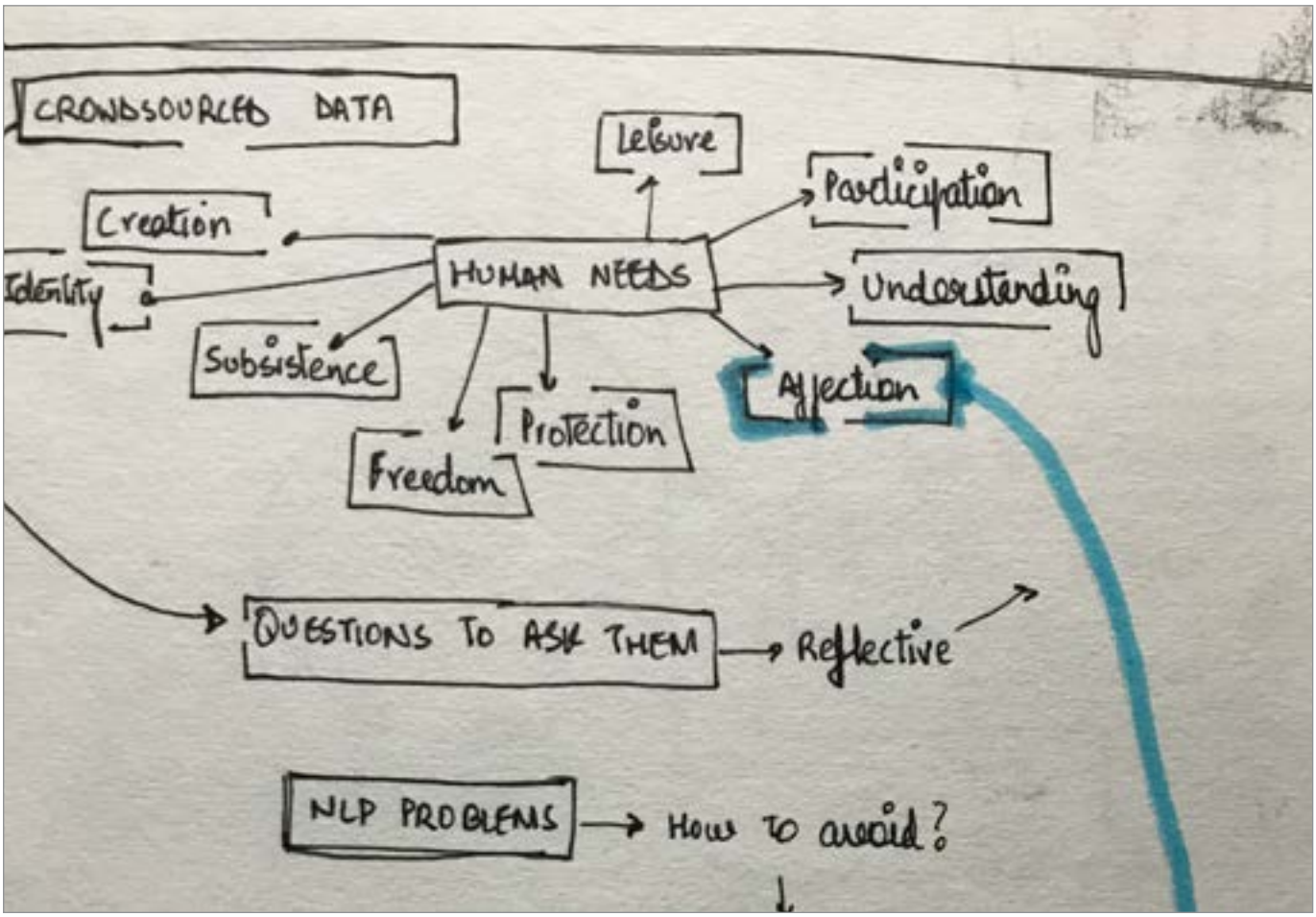

IDEA DUMP
WHY?
Can you make a customisable heirarchy of needs?
Or a collectively generated one?
PSYCHE/ESSAY
working memory until used
PROBLEMS


YES
Strengthens over time
Stimulus
Just show


+ groupings
Can you make a customisable heirarchy of needs?
Or a collectively generated one?

5.2 Can I make a live database of human needs?

In my first proposal, I saw a gap in existing research where human need theories stemmed from clinical experiences (see section 4.1) and not from empirical data. This seemed bizarre to me as it is obvious that individual values of the theorist seeped into the resulting theory. Therefore, a live database of human needs became the core proposition of my project.



Brainstorming around this concept.

"(The current theory) ... conform(s) to the known facts, clinical and observational as well as experimental. It derives most directly, however, from clinical experience."

An excerpt from *A Theory of Human Motivation* (Maslow, 1943).

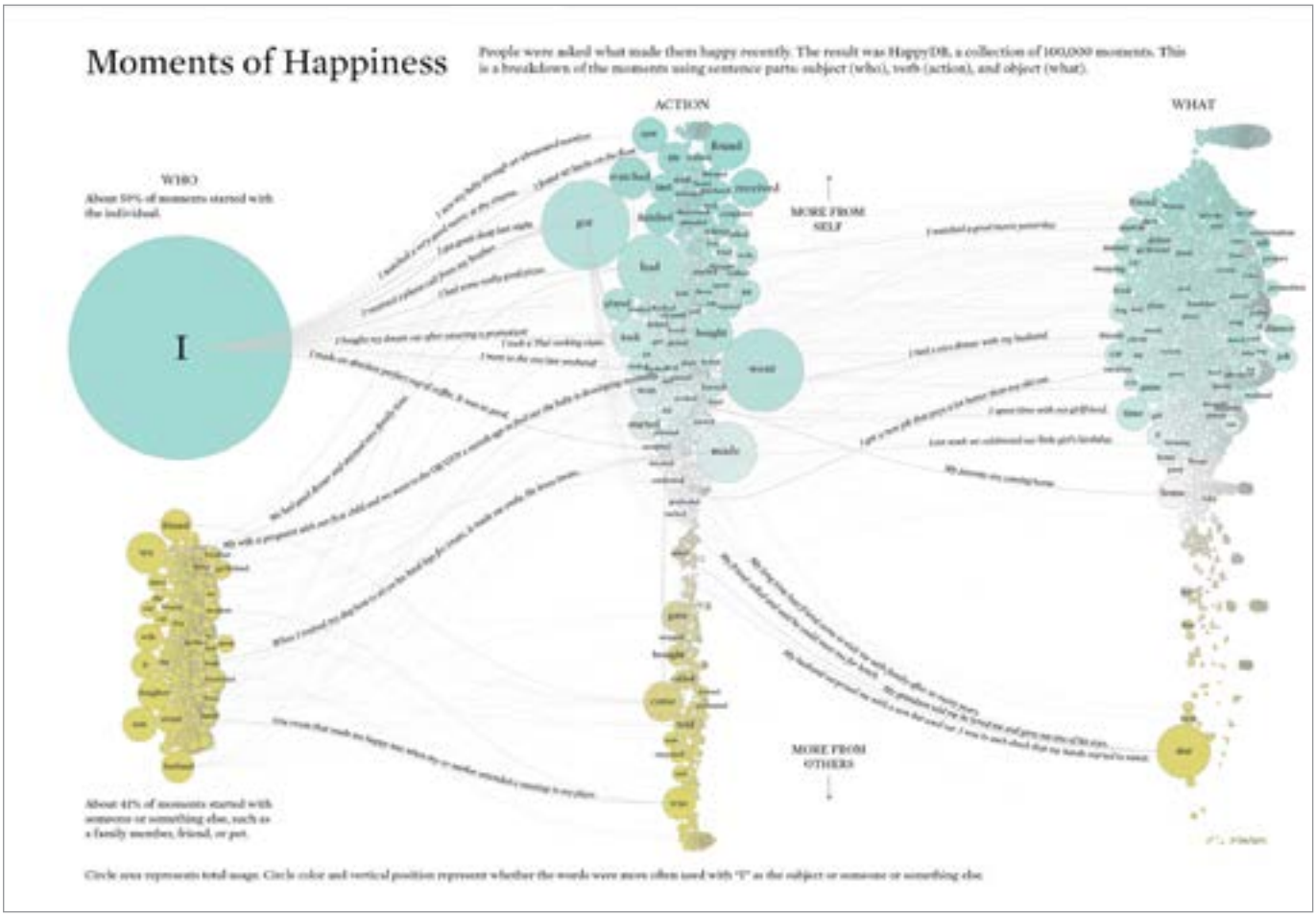
Essentially, you would come onto a portal and type in things that you think you need and they would be fed as individual bubbles to the database.

The problem with this idea was later pointed out to me by Professor Ramanujam. He pointed out that needs are subjective. You may think you need something at one point in time, but you may merely want it later under different circumstances at a different point in time. Therefore, how do you really remain objective here?

His arguments made sense and I went back to the drawing board.

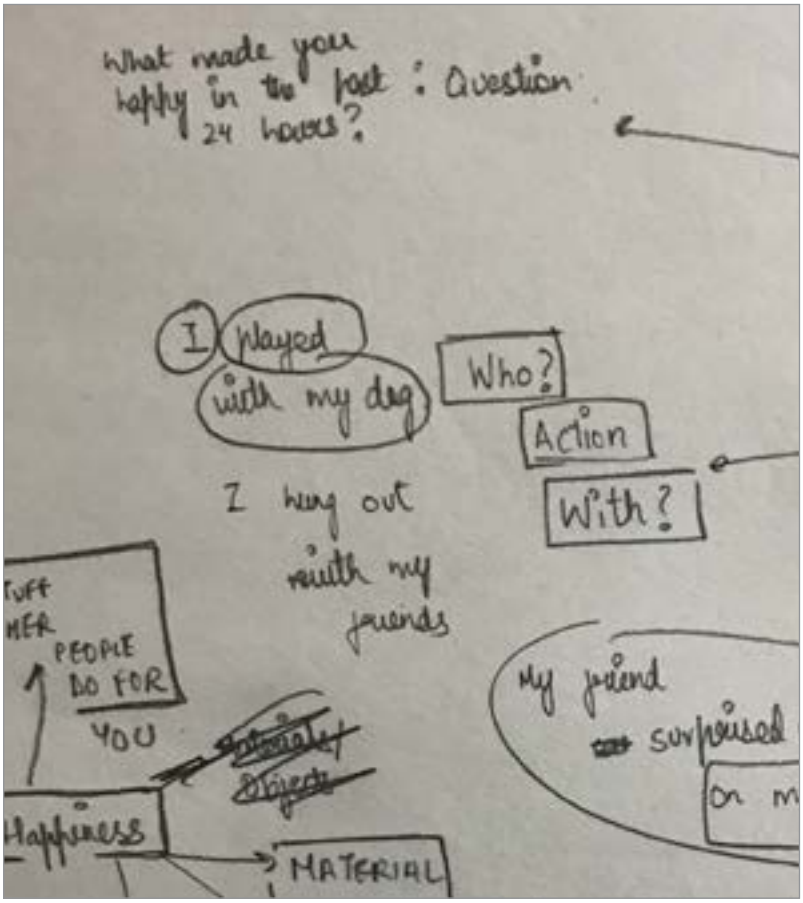
5.3 Can I visualise HappyDB by using a human need theory?

My next idea involved the usage of HappyDB. There were very few visualisations of HappyDB, primarily because it involved the use of computer programming as the dataset had a massive 100, 000 datapoints. Apart from the rudimentary visualisations in the original paper, the only other visualisation that aided in the analysis of this data was a project called Moments of Happiness by Nathan Yau for FlowingData.

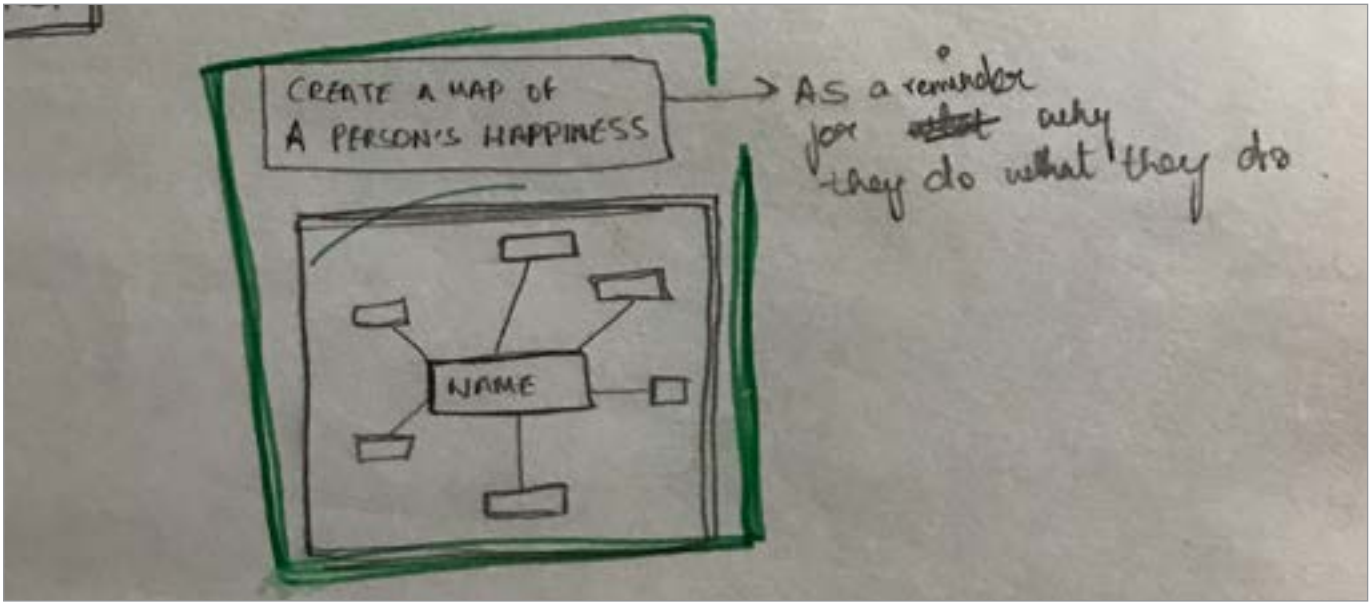


Nathan used text analysis to map relationships between the subject, verb and object of statements in HappyDB. Source: FlowingData, 2021.

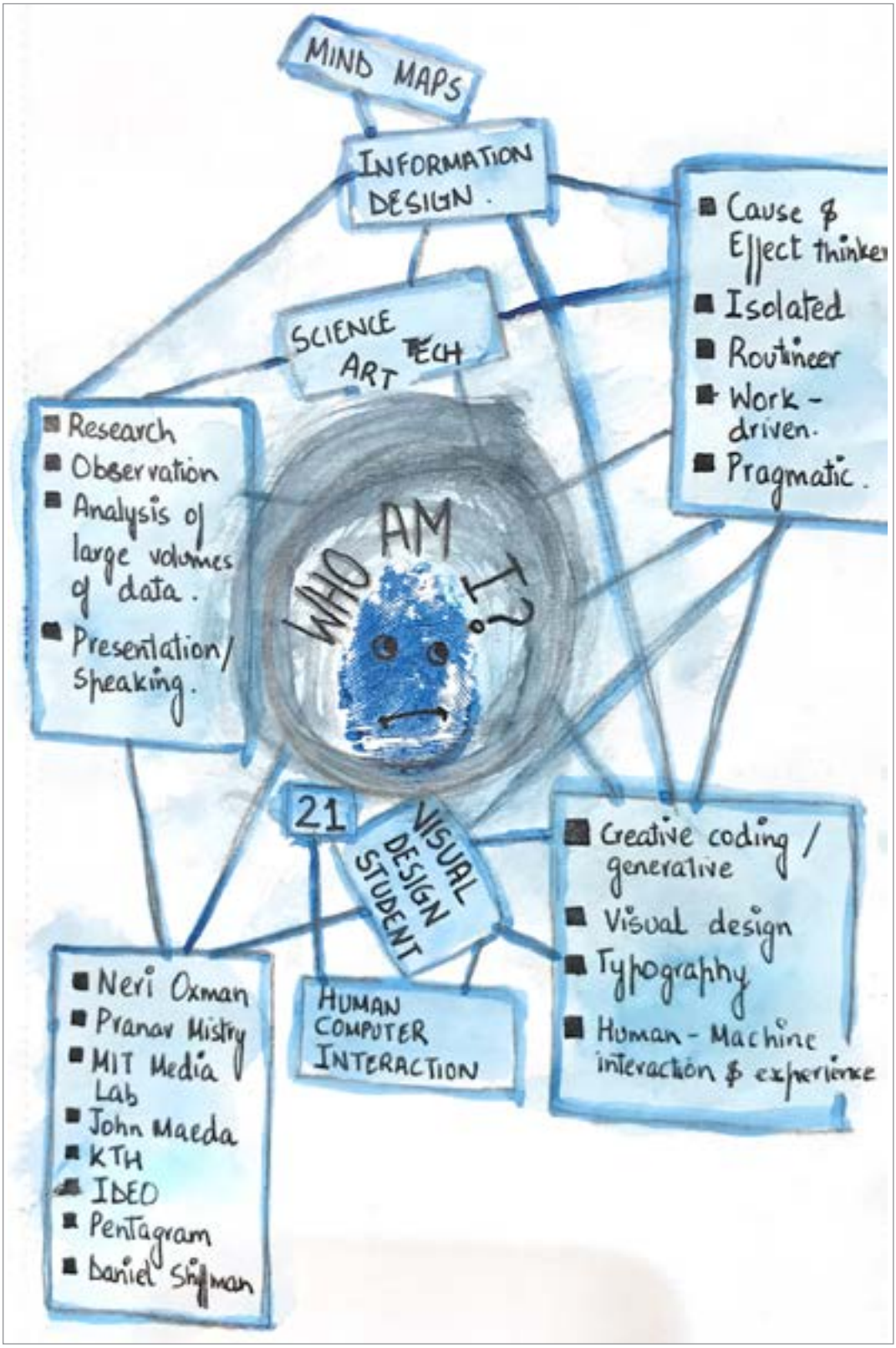
I identified that no project, as of the time of writing this document, acted as a live database for human happiness that also utilized some kind of sorting mechanism. What I aimed to do was connect Max-Neef's *Matrix of Needs & Satisfiers* with data from HappyDB. Essentially, you would sort the database using text analysis and further understand the needs that people actively satisfy for their happiness. The same could be analysed with other human need theories being the base framework as well.



Iterations of a vague concept wherein a computer program would utilise text analysis and create a map of human happiness.



I would have stuck to this idea for the duration of the project had I not visited Shashi's lab. Shashi's lab at the NCBS aims to broaden the understanding of the origins and organization of living systems. The visit reminded me of why I initially came to the SGB.



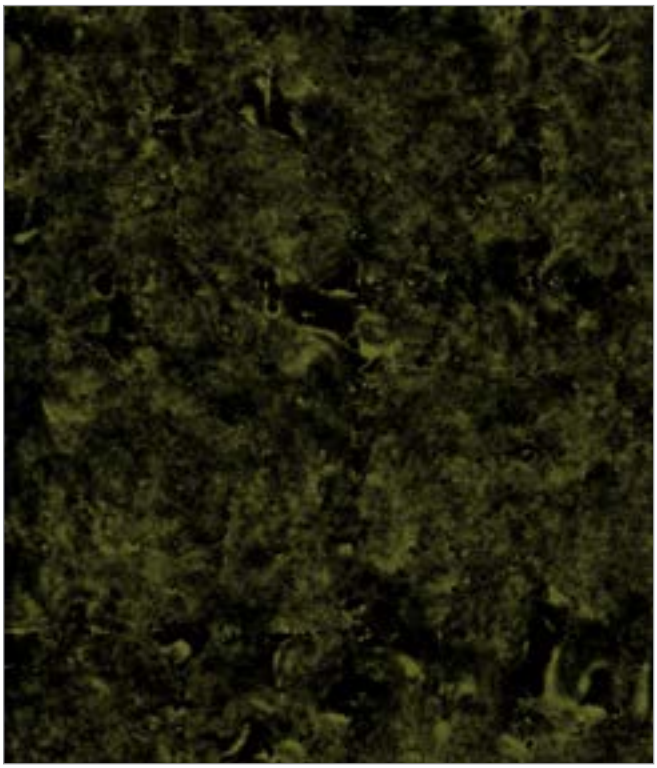
An exploration of self that I'd done before moving to Bangalore for this project.

Both, Saibal and Shaunaq, kept reminding me to do something that I was innately fascinated by but I resorted to being a creature of reason. I defended my ideas by convincing myself that the data demanded a certain kind of solution and that artistic inclination could not be considered in this decision. The element of play and experimentation had vanished from my project.

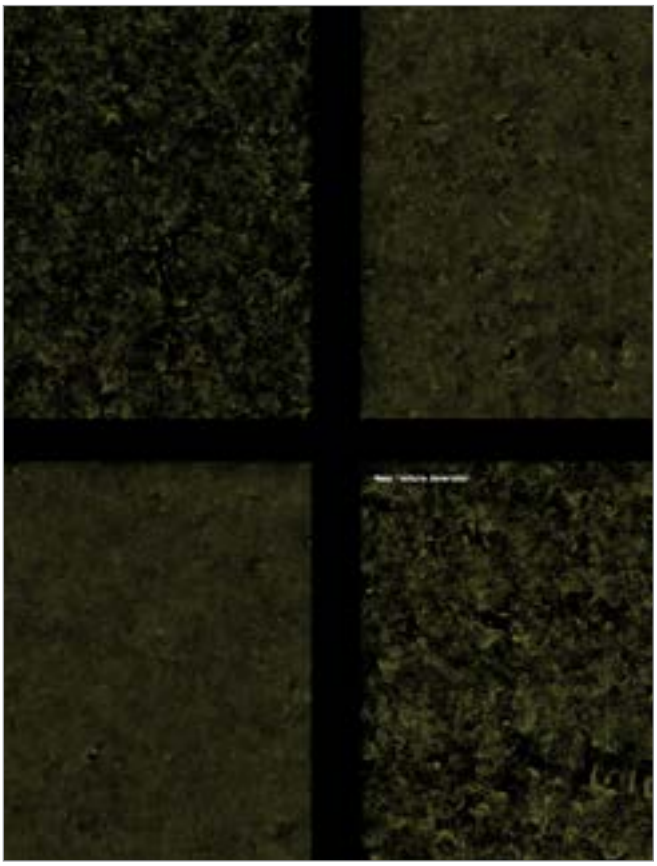
“Interaction between systems of particles was something I was keen on exploring but I had somehow let the design process dictate the scope of my project. And unfortunately, the element on play had vanished from my project.”

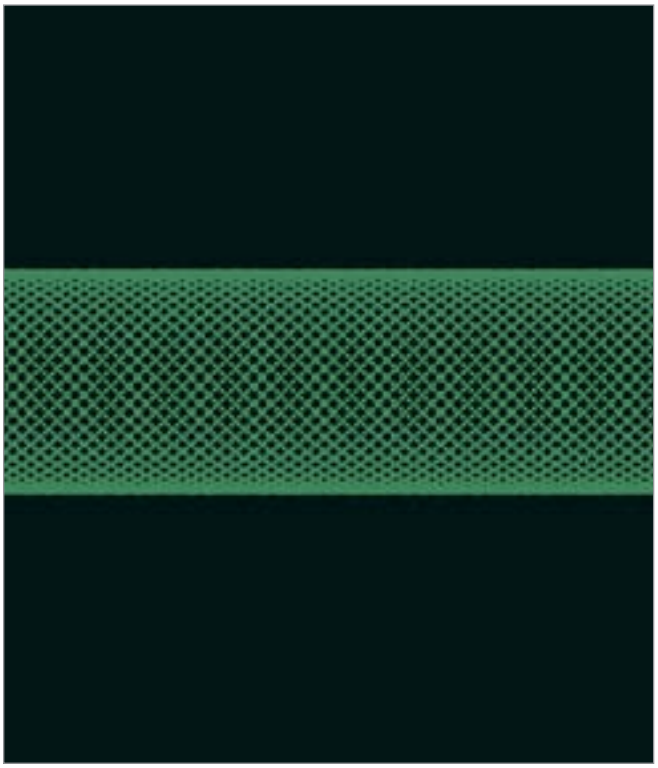
Excerpt from my reflective log.

I conducted many experiments during this time and simultaneously tried to arrive at a connection between something that I was passionate about and something that would also serve the purpose. Here are some of them:

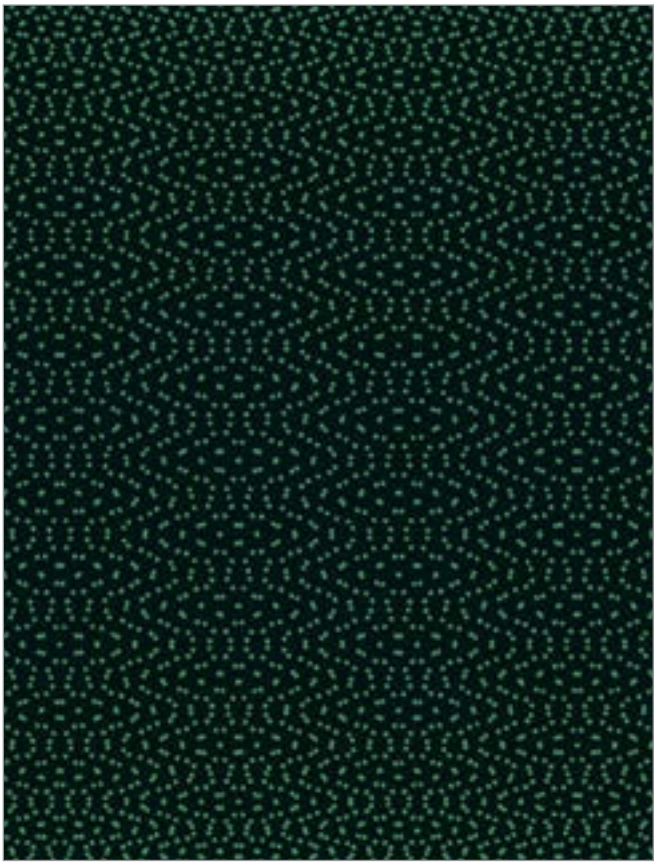


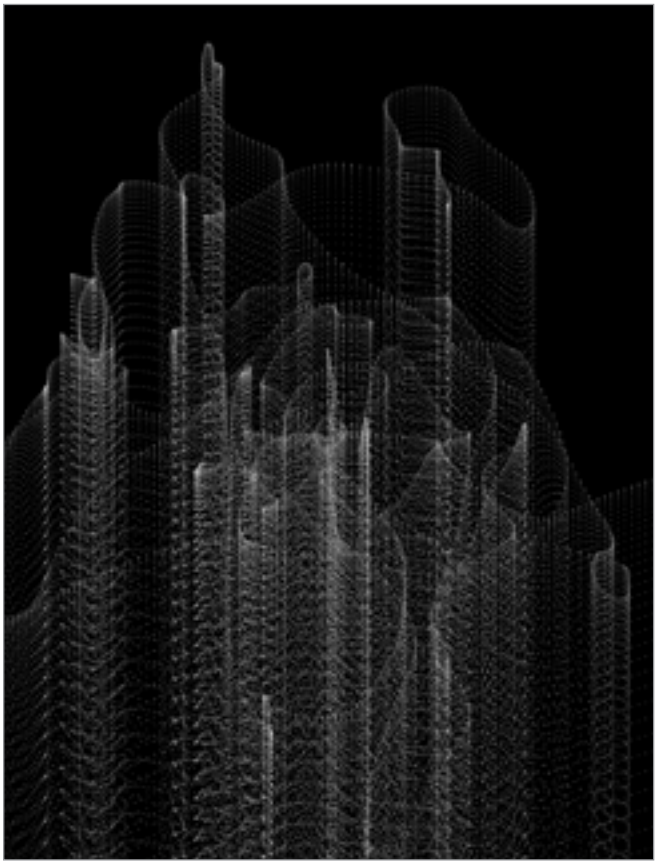
A moss generator that uses perlin noise to form moss-like textures procedurally.

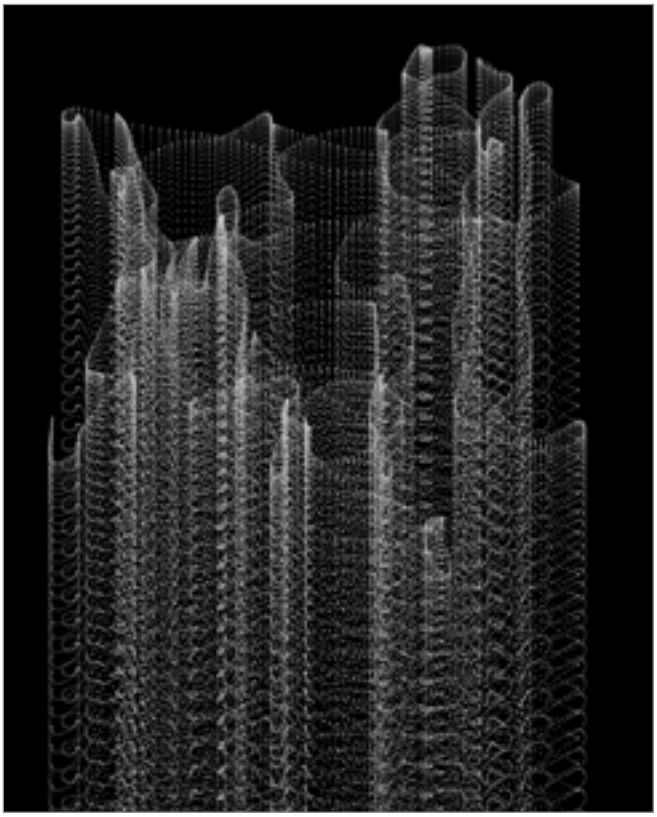




A microscope simulator that shows you thousands of free-moving particles if you zoom in.

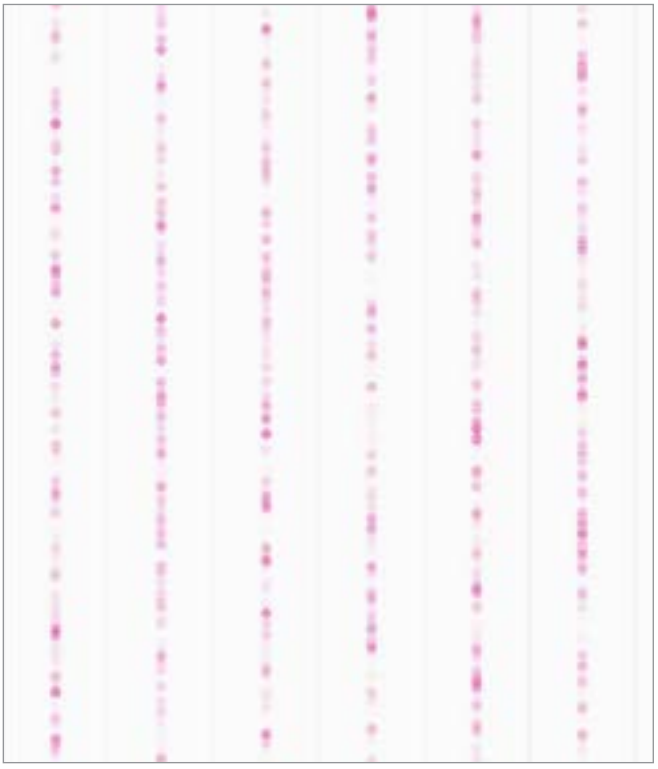






Cityscapes generated using a free-moving particle.

Galaxy of flowers generated using squares.



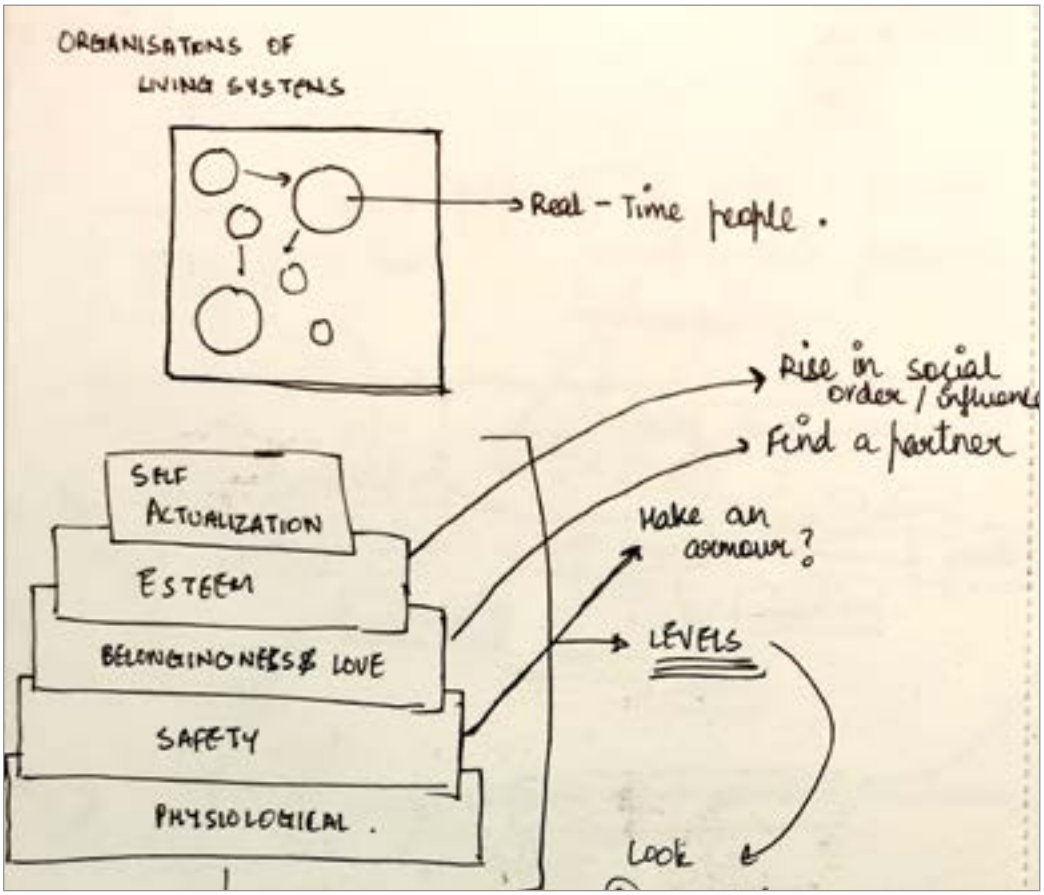
Computer simulations to test whether the computer has a favourite number when picking a random number between 0-10.

This period of study, play and experimentation rejuvenated me. I went back to look at the problem with a fresh perspective and convinced myself to do something exciting.

Of course, this worked.

5.3 What if I could make a game out of Maslow's Heirarchy?

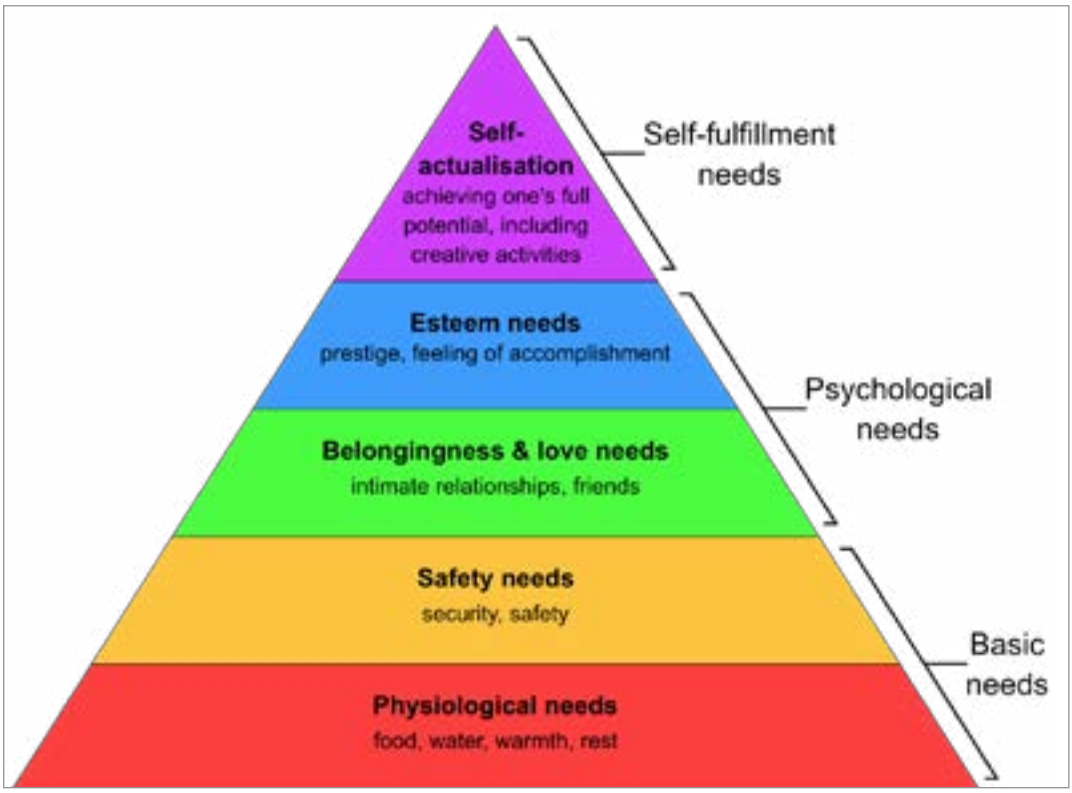
As I thought more about the "organisations of living systems", I wondered whether a system of living beings (on the screen) could be motivated by human needs. Saibal had earlier suggested the idea of a game/storytelling experience to communicate something similar and it felt like an exciting idea.



In my literature review (discussed in section 4.1), I had observed that Maslow's hierarchy was considered a pioneer in human motivation theories. He himself stated that, (due to the lack of sound facts in the field) *"the present theory then must be considered to be a suggested program or framework for future research"* (Maslow, 1943). Most theories of human motivation after this were either extensions or refutations of the same.

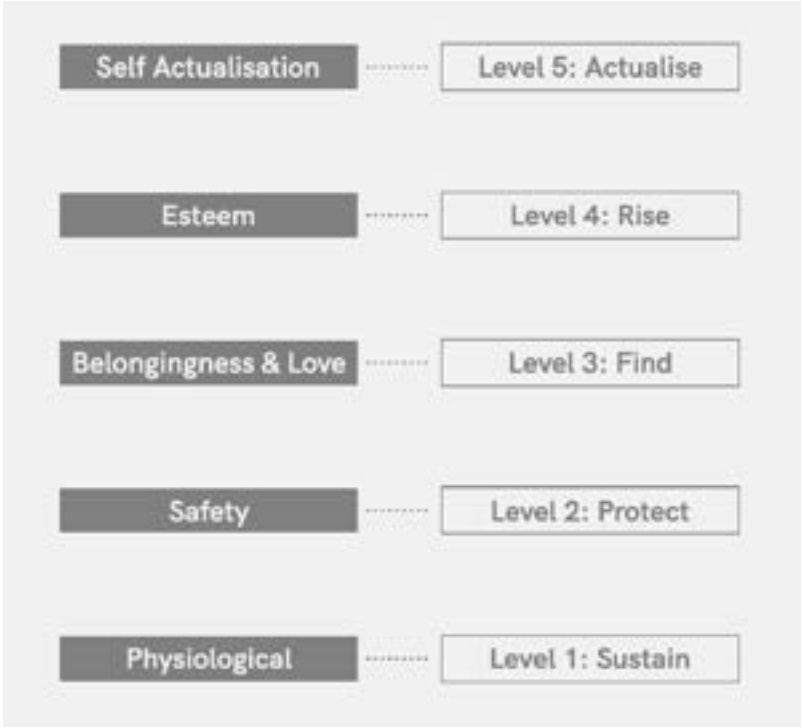
A rule hierarchy is observed in Maslow's Theory of Human Needs (Alderfer, 1969). In his paper, he suggests that to move to higher order needs, one must satisfy lower order needs (Maslow, 1943); a claim later contradicted in *An Empirical Test*

of a New Theory of Human Needs (Alderfer, 1969) and the SDT theory (Deci and Ryan, 2000).

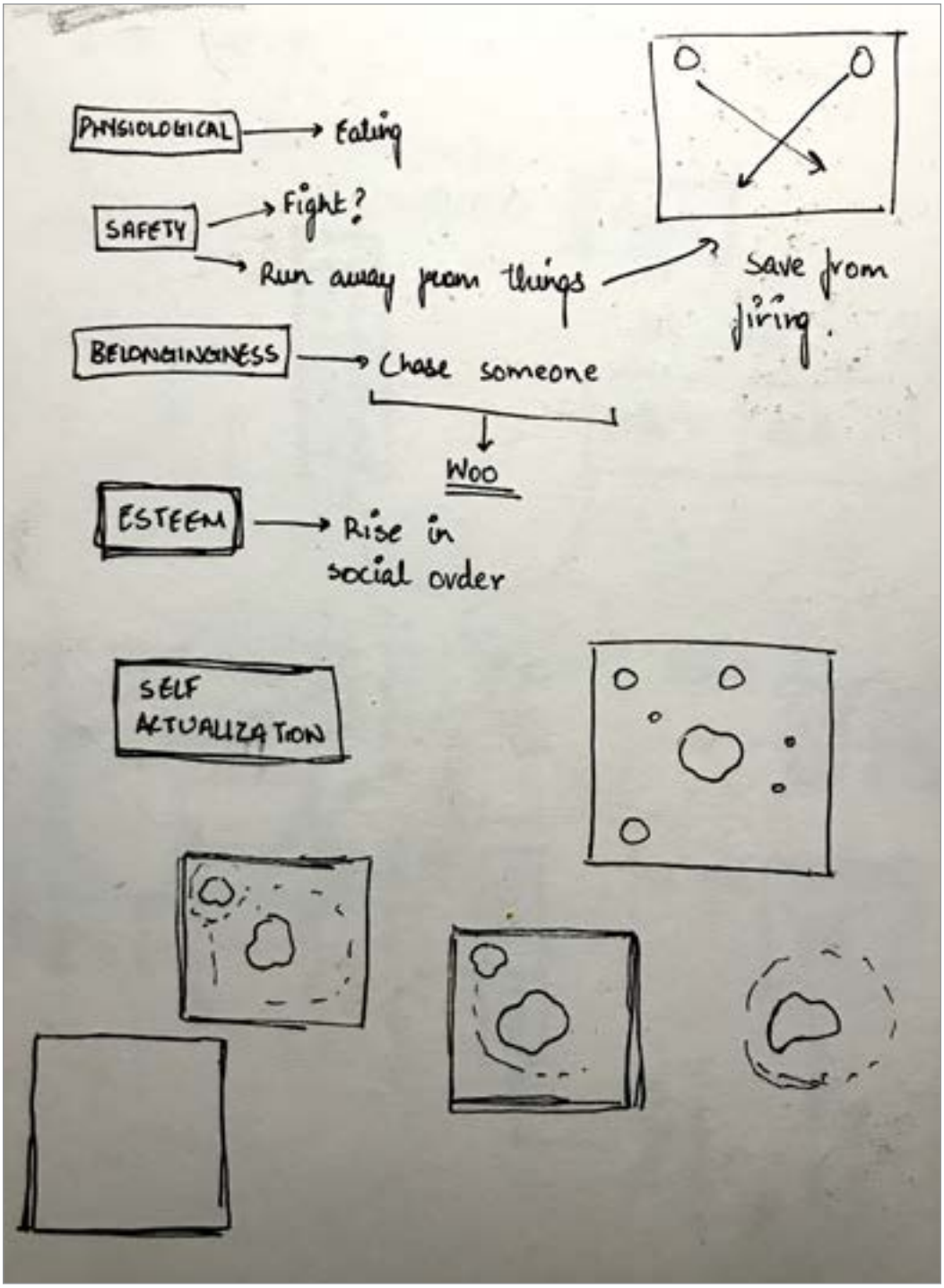


Maslow's "hierarchy" of human needs; source: WikiMedia Commons.

However, this made for a good underlying system for a game. Each hierarchy could be thought of as a 'level' that players must cross in order to move on to the next level; ultimately reaching self actualisation.



Through the medium of a game, people may understand a theory of human needs in a gamified manner. This became my primary idea and was developed while writing my next two project proposals.



Page from my journal highlighting a brainstorming session around this concept.

6. Conceptualisation

The major conundrum while conceptualising was to think about the depiction of human needs in a digital environment with respect to an object. Human needs are extremely complex and an abstraction had to be made in order to arrive at something that was feasible for me to develop with my limited programming knowledge (further expanded upon in chapter 7).

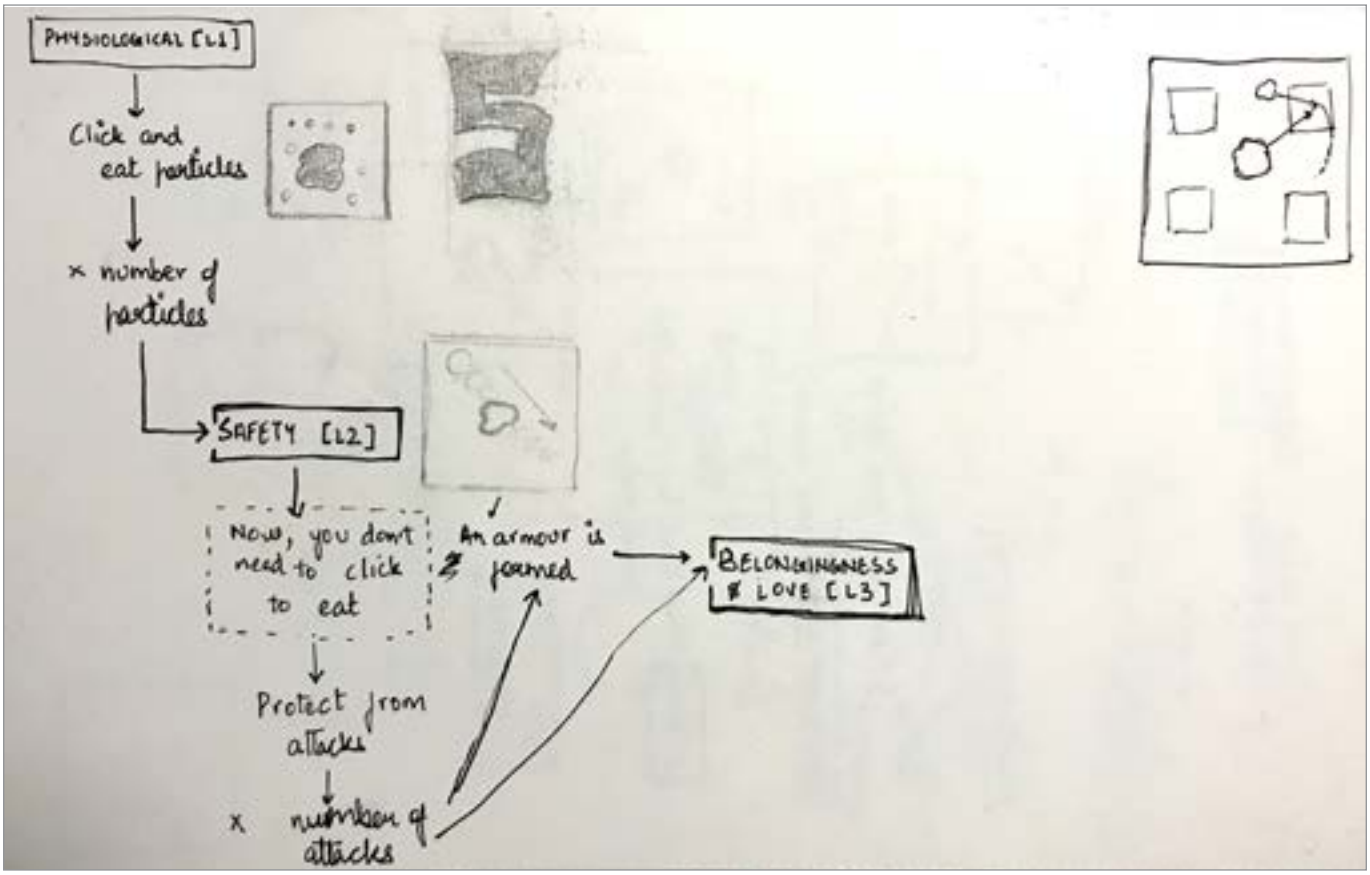
For example, Maslow (1943) defines the physiological needs as *needs that are essential for homeostasis**. In the same paper, he refers to Cannon who describes homeostasis as "the process for maintaining normal state for "(1) the water content of the blood, (2) salt content, (3) sugar content, (4) protein content, (5) fat content, (6) calcium content, (7) oxygen content, (8) constant hydrogen-ion level (acid-base balance) and (9) constant temperature of the blood. Obviously this list can be extended to include other minerals, the hormones, vitamins, etc" (Maslow, 1943).

Moreover, Maslow (1943) goes on to say that, "we can not identify all physiological needs as homeostatic. That sexual desire, sleepiness, sheer activity and maternal behavior in animals, are homeostatic, has not yet been demonstrated. Furthermore, this list would not include the various sensory pleasures (tastes, smells, tickling, stroking) which are probably physiological and which may become the goals of motivated behavior".

As made evident by the text above, it became imperative to boil down each hierarchy to its core action in human life. Also, the core action should be translated to a digital particle as this was one of the core ideas in this project: to apply something so complex such as human needs to a minuscule entity such as a particle.

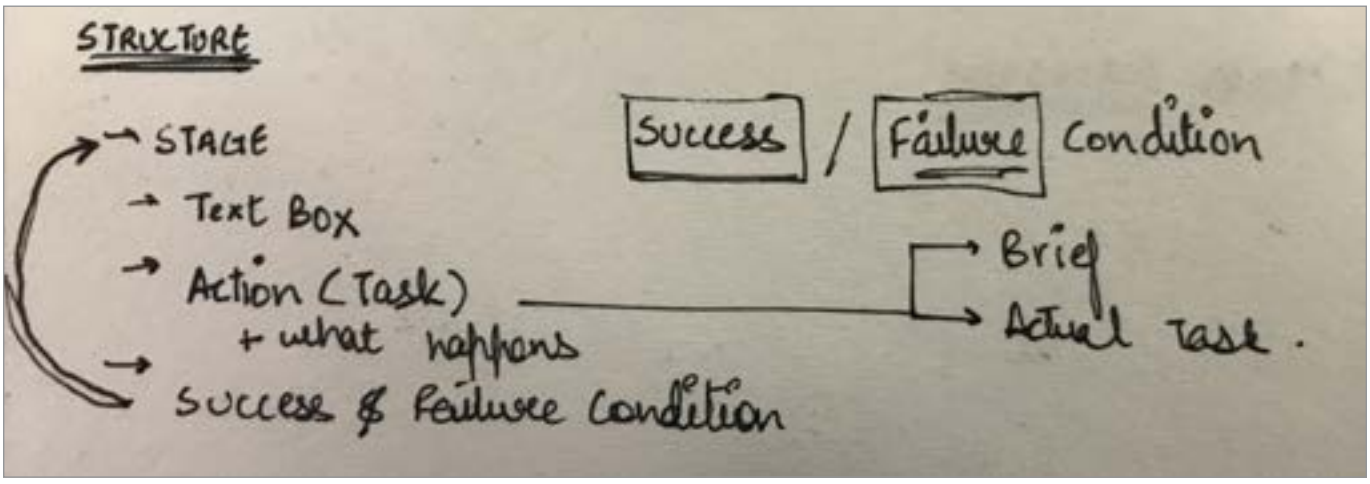
This resulted in a lot of deliberation, the formation of an artistic intent (thanks to Shaunaq) and iterations.

* Homeostasis is defined as any self-regulating process by which an organism tends to maintain stability while adjusting to conditions that are best for its survival.

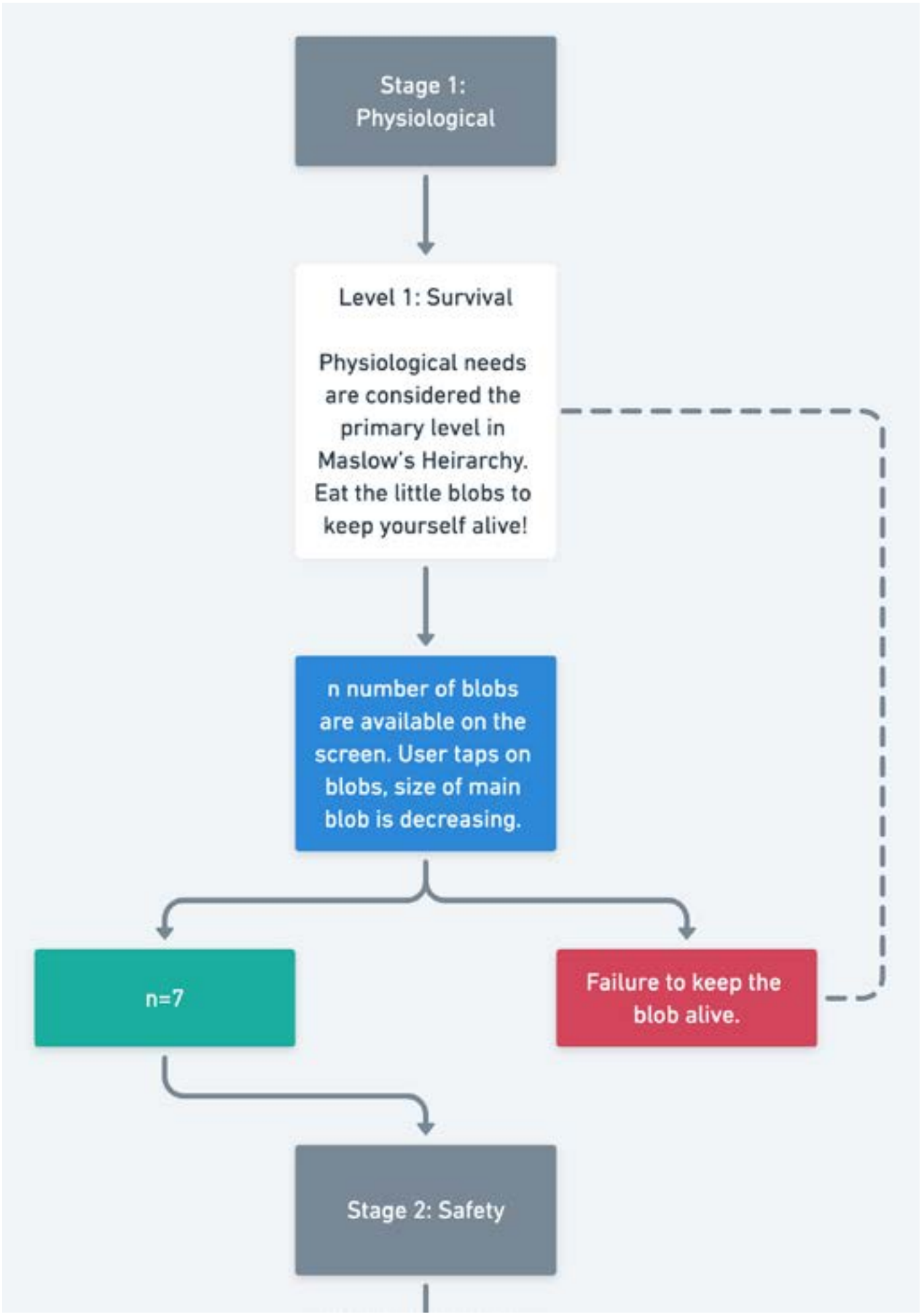


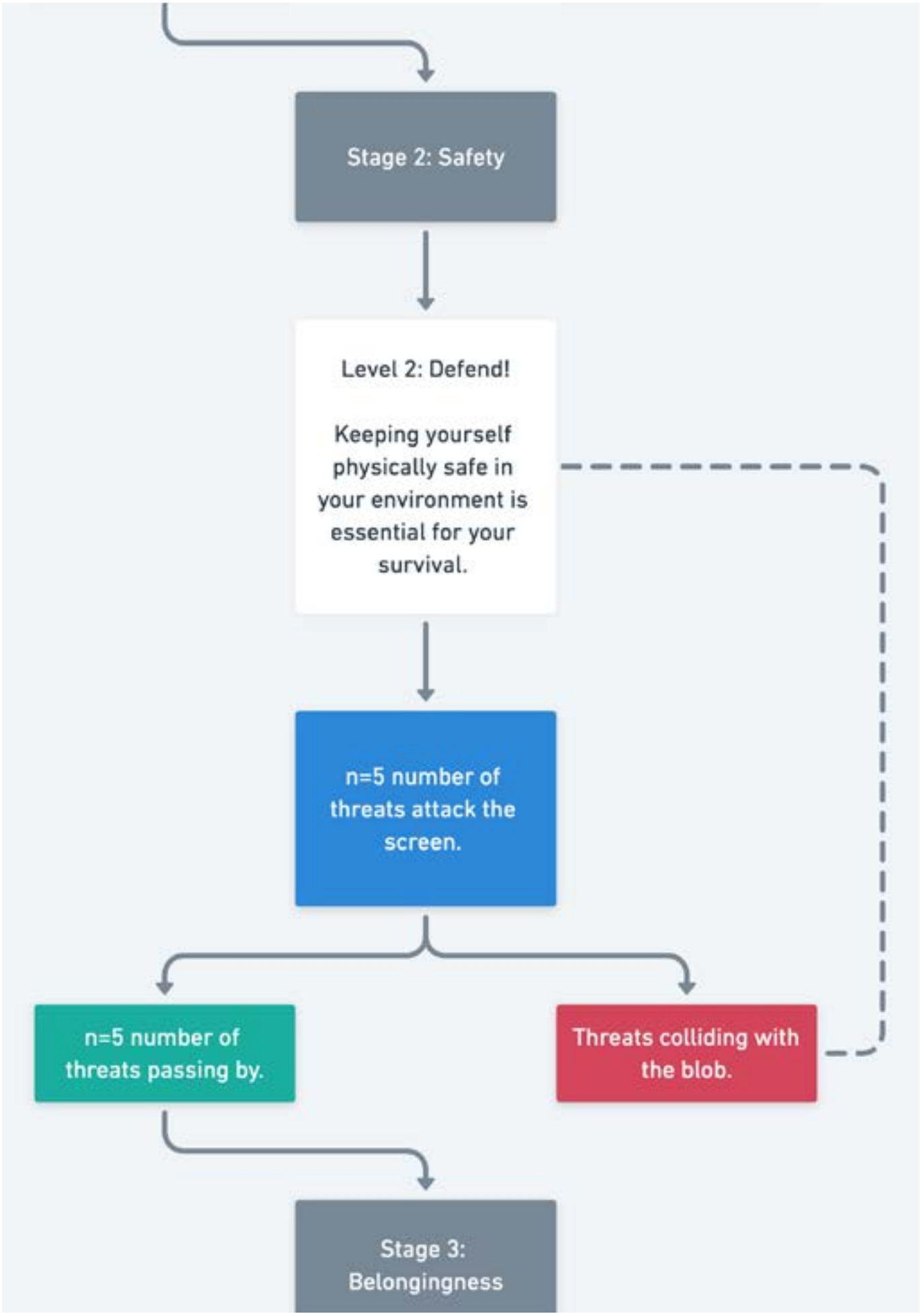
6.1 Deciding the flow of the Game

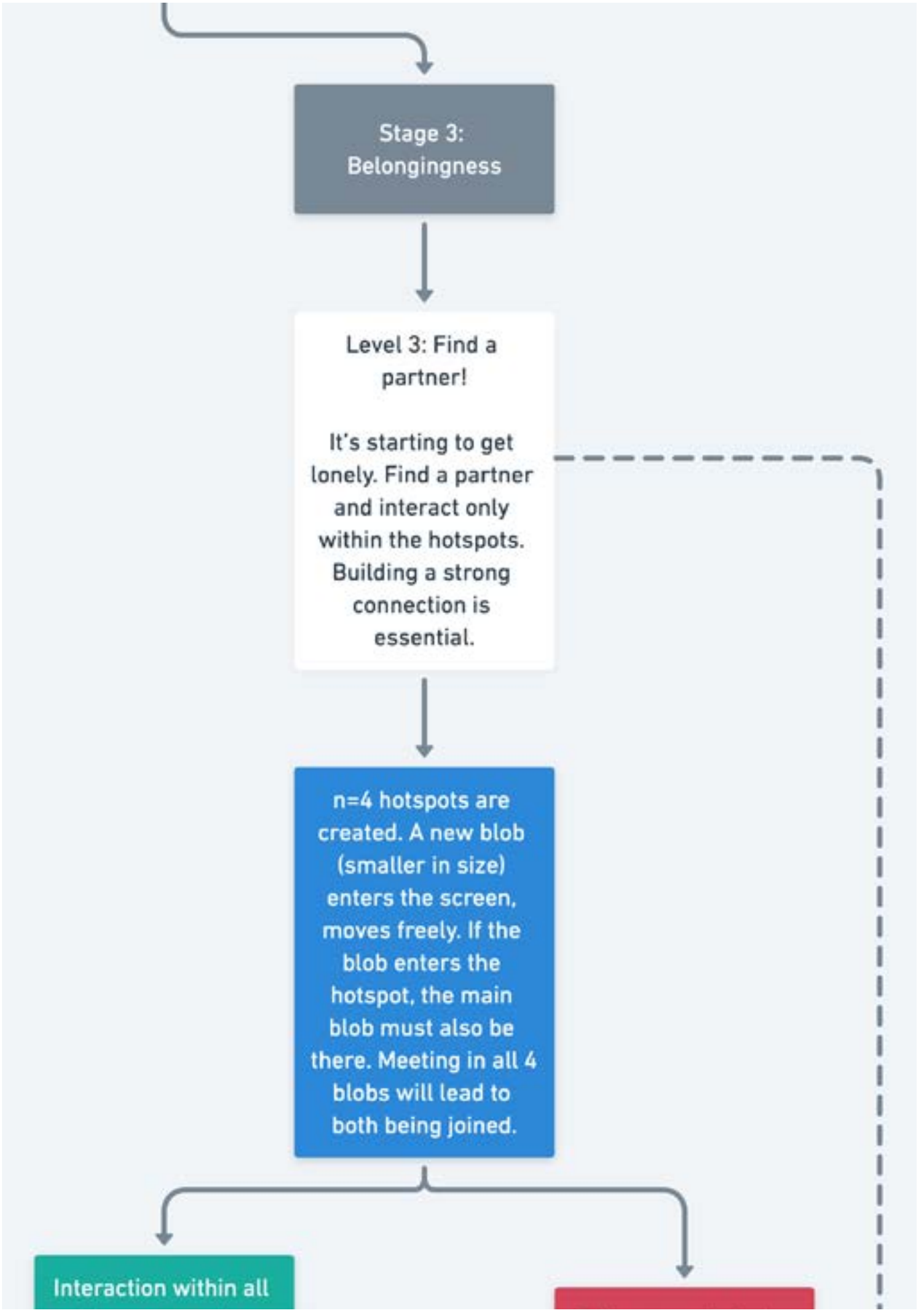
Once I froze on the depiction in collaboration with my mentors (Shaunaq, Madhushree, Vasudha and Saibal), an overall flow of the game was to be set in order to see the bigger picture.

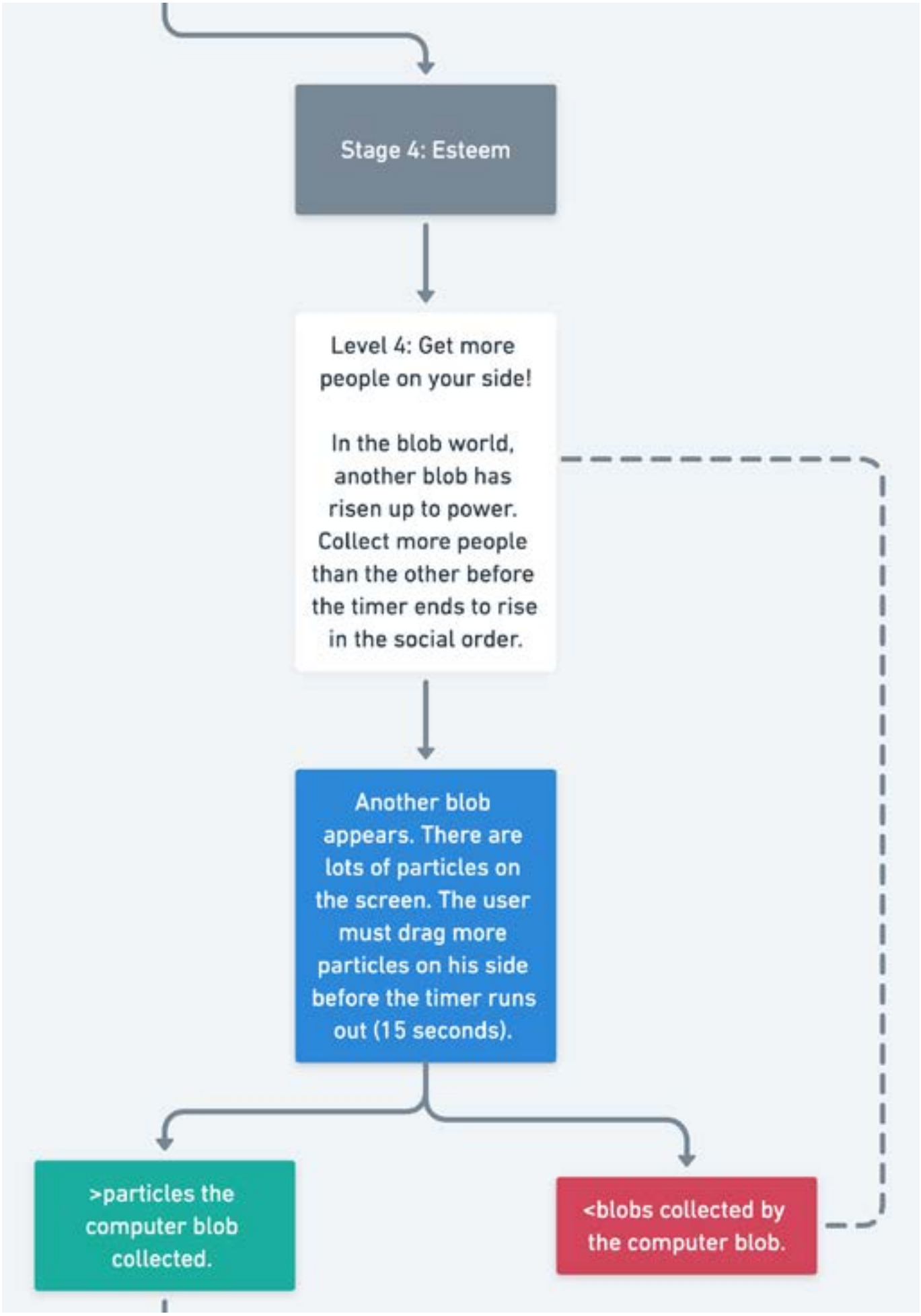


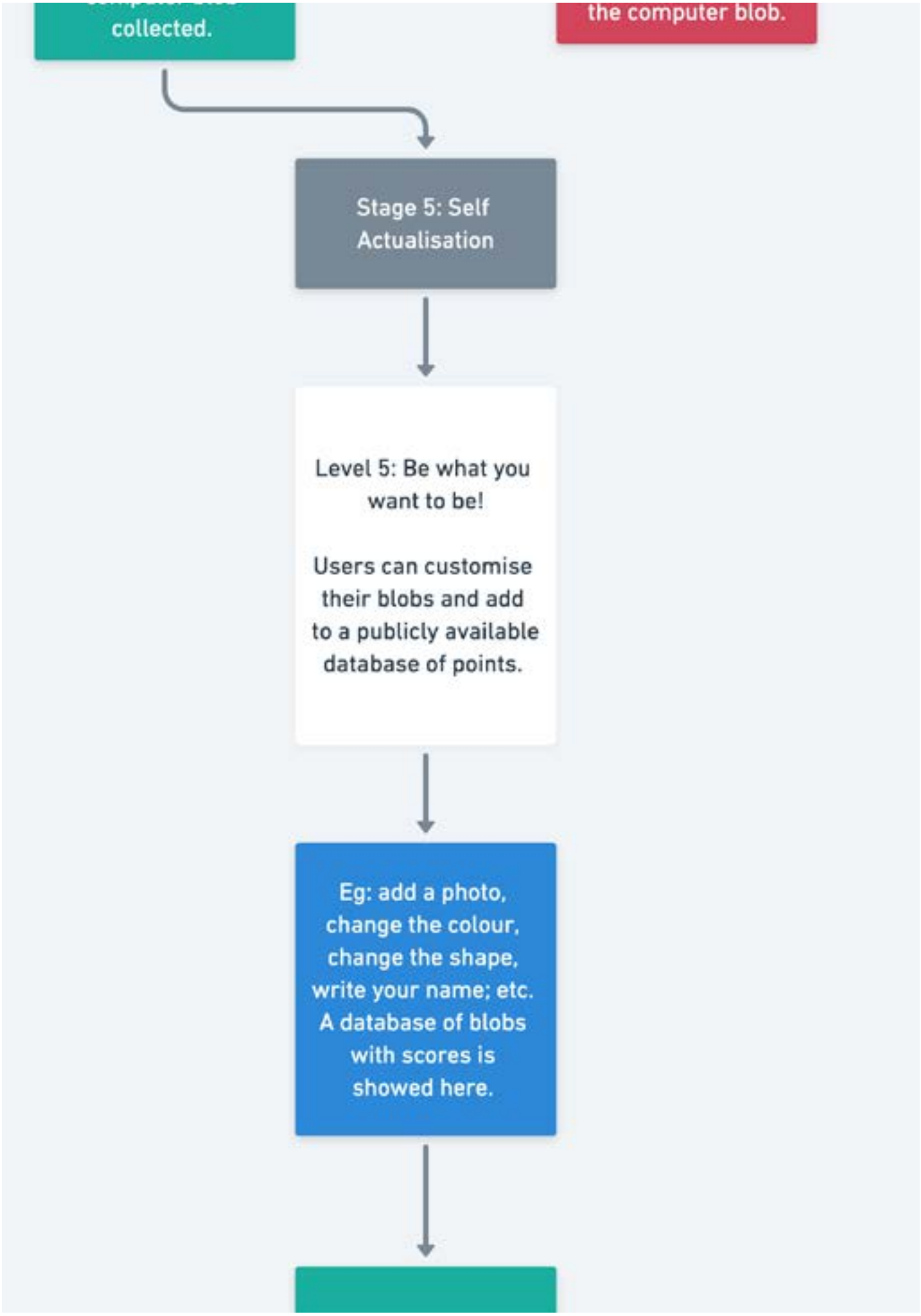
Rough brainstorm of the structure of each individual stage and progression.


Stage 1:
Physiological
Level 1: Survival
Physiological needs are considered the primary level in Maslow's Heirarchy. Eat the little blobs to keep yourself alive!
n number of blobs are available on the screen. User taps on blobs, size of main blob is decreasing.
n=7
Failure to keep the blob alive.
Stage 2: Safety


Stage 2: Safety
Level 2: Defend!
Keeping yourself physically safe in your environment is essential for your survival.
n=5 number of threats attack the screen.
n=5 number of threats passing by.
Threats colliding with the blob.
Stage 3: Belongingness

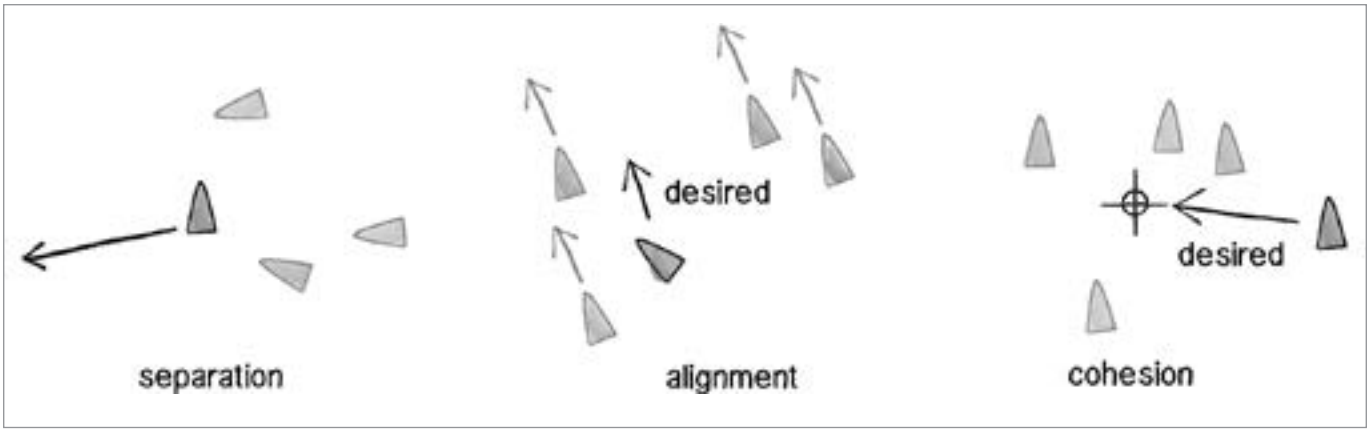

Stage 3:
Belongingness
Level 3: Find a partner!
It's starting to get lonely. Find a partner and interact only within the hotspots. Building a strong connection is essential.
n=4 hotspots are created. A new blob (smaller in size) enters the screen, moves freely. If the blob enters the hotspot, the main blob must also be there. Meeting in all 4 blobs will lead to both being joined.
Interaction within all


Stage 4: Esteem
Level 4: Get more people on your side!
In the blob world, another blob has risen up to power. Collect more people than the other before the timer ends to rise in the social order.
Another blob appears. There are lots of particles on the screen. The user must drag more particles on his side before the timer runs out (15 seconds).
>particles the computer blob collected.
<blobs collected by the computer blob.


collected.
the computer blob.
Stage 5: Self Actualisation
Level 5: Be what you want to be!
Users can customise their blobs and add to a publicly available database of points.
Eg: add a photo, change the colour, change the shape, write your name; etc. A database of blobs with scores is showed here.

It must be noted that the flow of the game was initially meant to be linear. However, Madhushree pointed out that life doesn't usually follow a linear narrative. While Maslow's hierarchy of human needs functioned on a concept of pre-potency, a claim later rejected by empirical data (Alderfer, 1969), life for most people functions on the co-existence of these needs. This was adopted while making the game.

Shaunaq suggested the concept of an "ecosystem" as proposed by Daniel Shiffman in his book, *The Nature of Code*. He proposed a world of autonomous creatures* that function on certain rules which ascertain their survival or death, much like in the real world (Shiffman, 2012).



An example of a complex ecosystem, albeit not entirely autonomous, is a flocking simulation. Agents follow certain rules as specified in the image. Source: *The Nature of Code* (Shiffman, 2012).

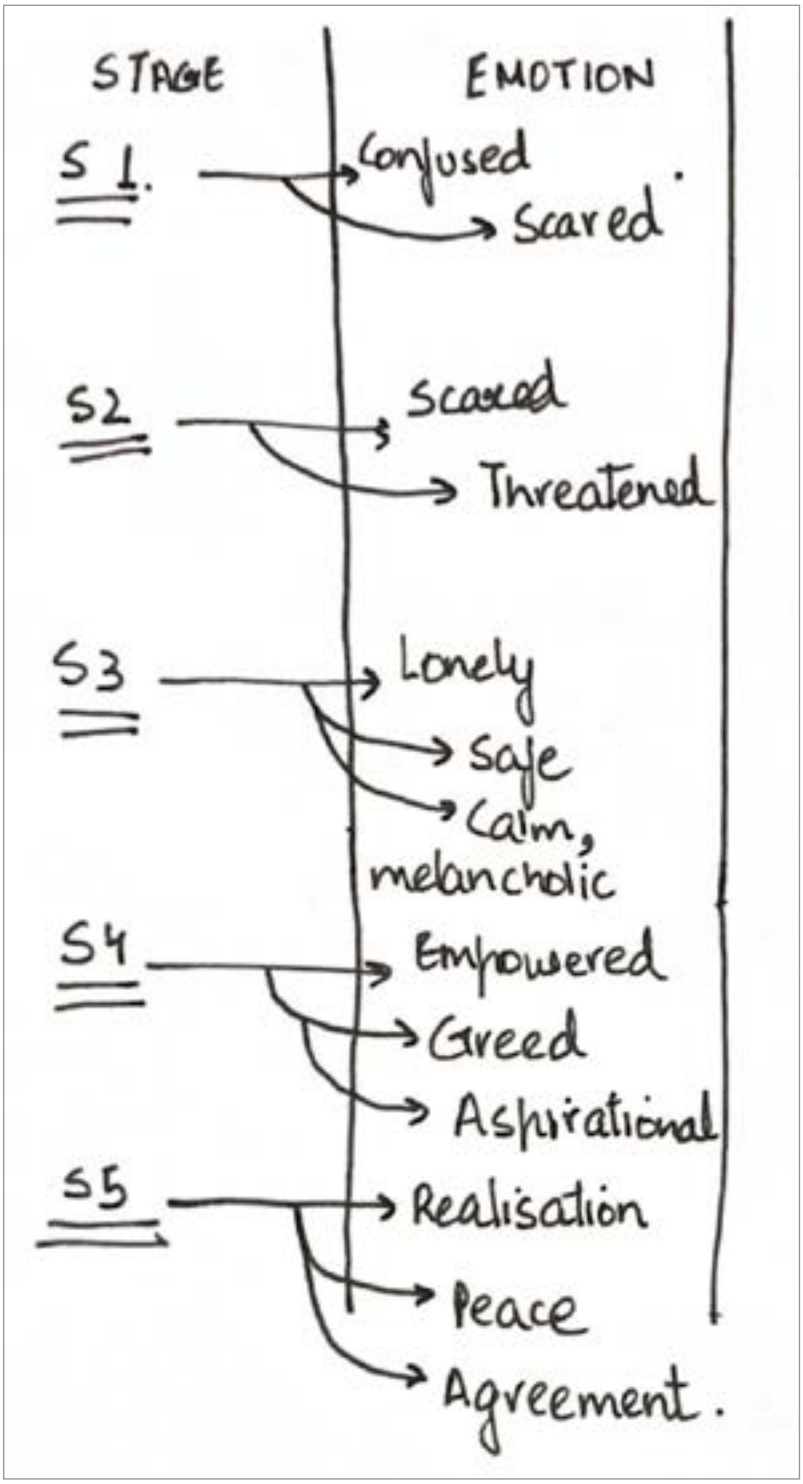
As the player is new to human needs and the underlying theory, I had to include some sort of linearity in order to progressively disclose information. In the later stages of the game, however, the concept of an ecosystem exists and objects function on certain rules to either die or survive. This was a nice middle ground to arrive at: start with linearity and then include everything at once.

* Autonomous creatures or "agents", here, refers to an entity that makes its own choices about how to act in its environment without any influence from a leader or global plan (Shiffman, 2012).

6.2 Forming a narrative

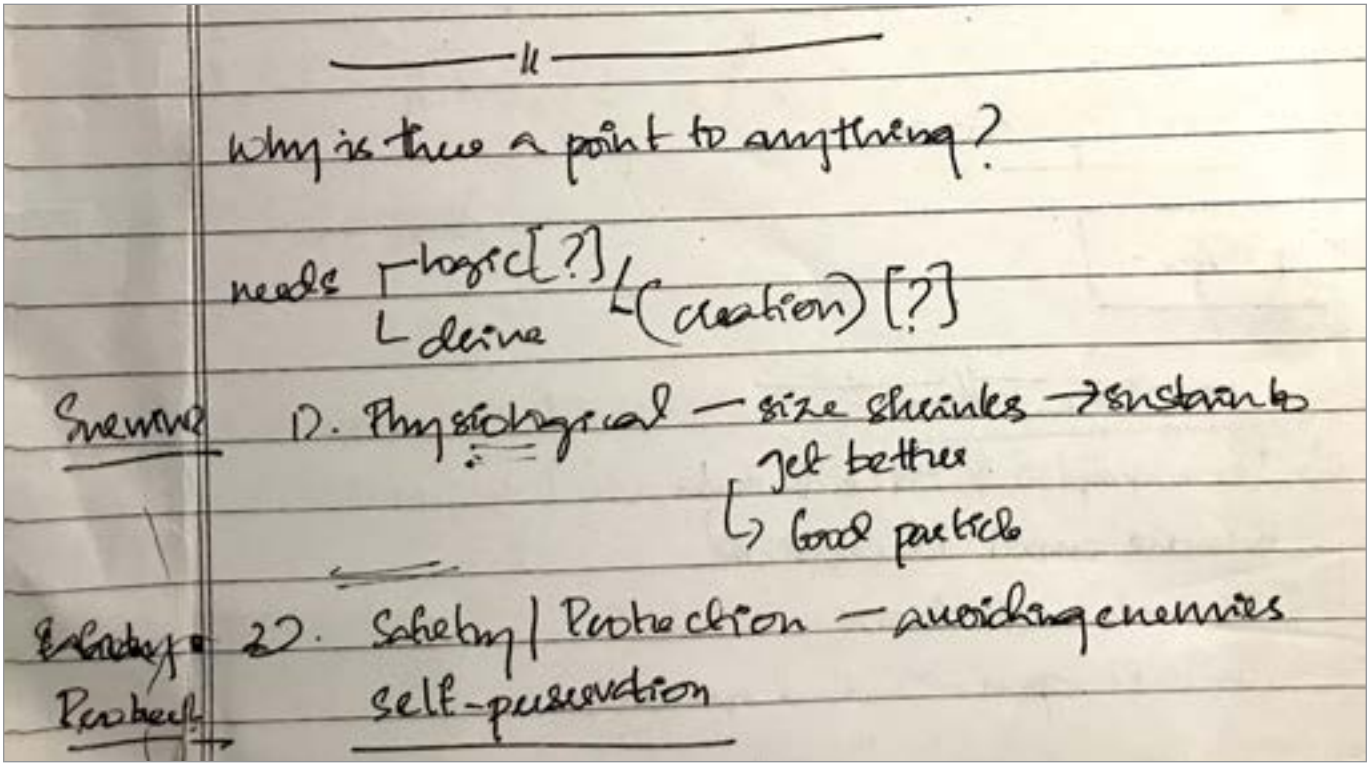
Saibal suggested the incorporation of a storyline to create a narrative for the game. Initially, I had trouble understanding the value of a storyline but it was later evident. The different stages of the game needed to have a thread that wove everything together. I struggled to come up with one.

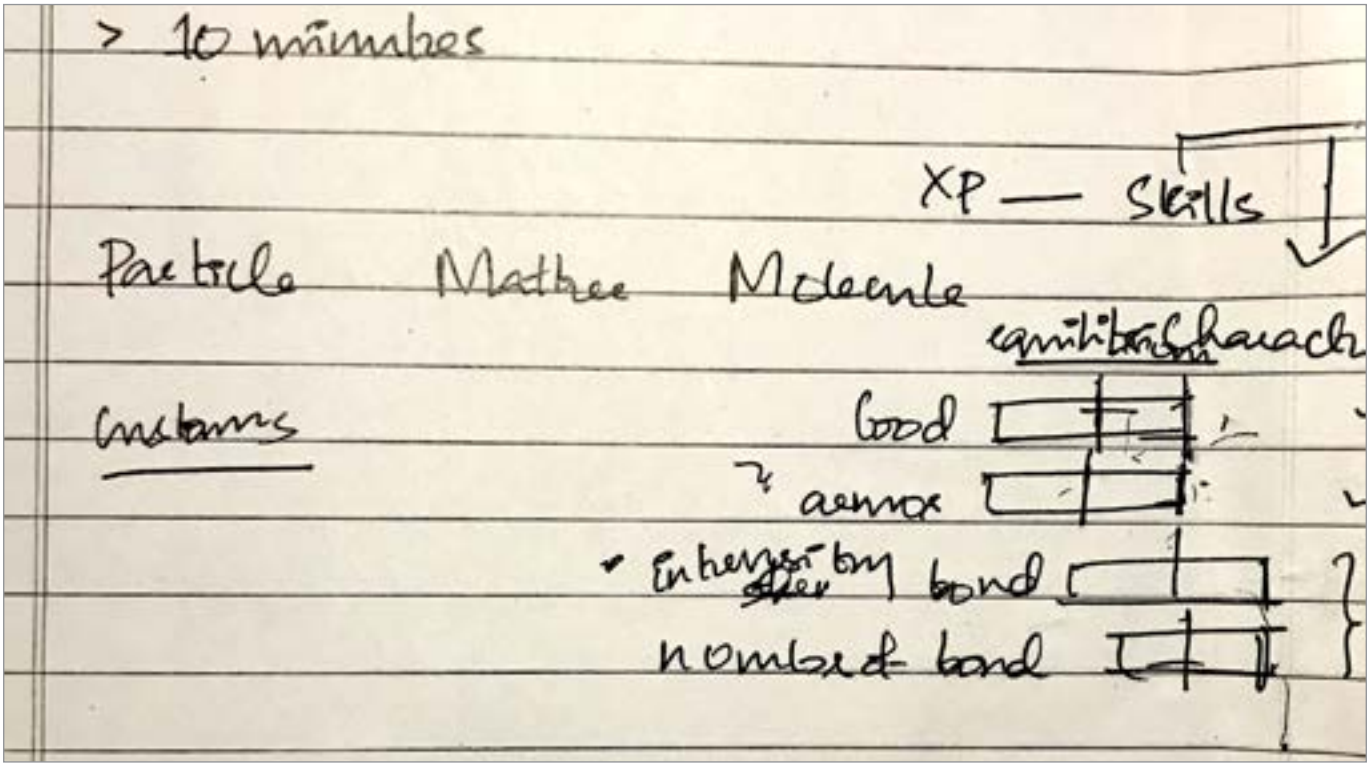
In order to make this easier, I broke down the relevant emotions that I wanted a player to feel during each stage. In my mind, I thought that this would help me come up with dialogues for the same.



I struggled to write a storyline and ended up writing multiple drafts but freezing on none. My friend, Alina, also helped write a storyline but nothing seemed fit.

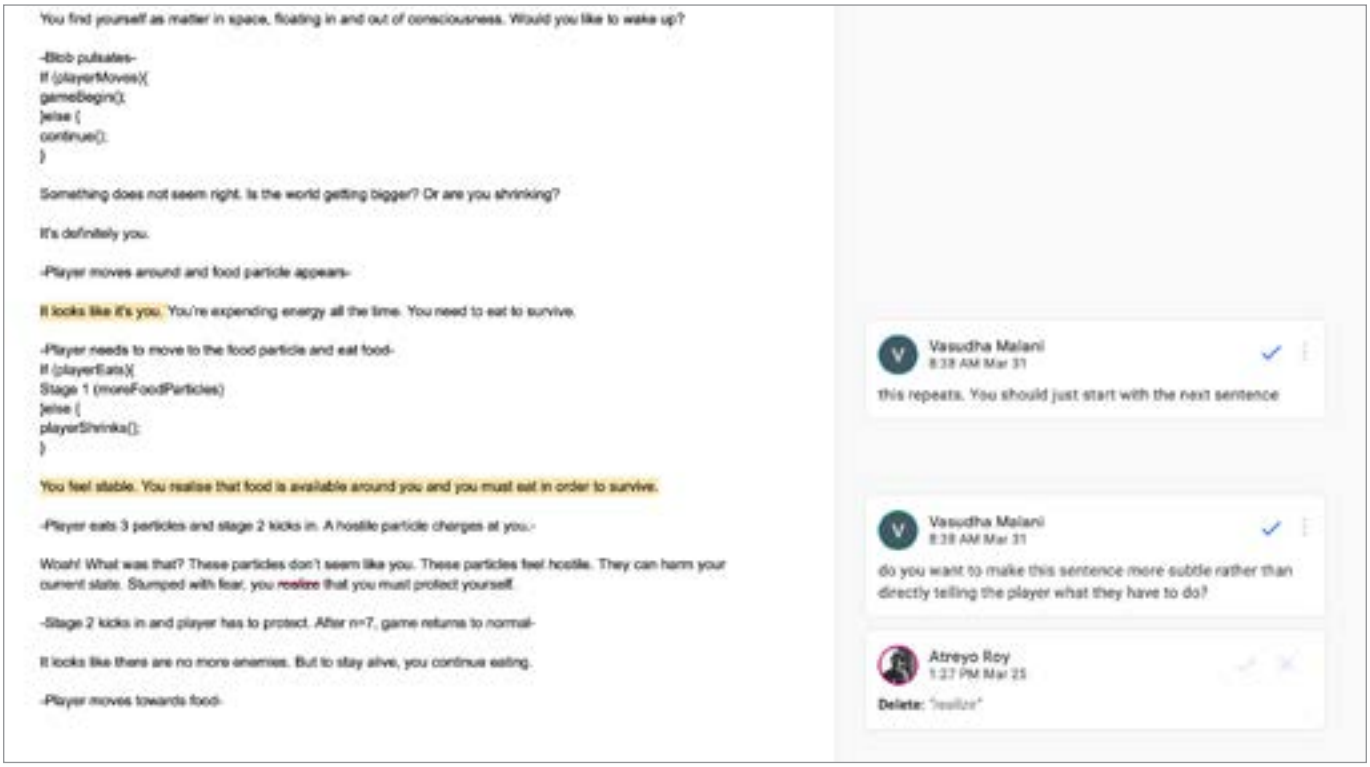
Thankfully, I had the chance to discuss my idea with Gayatri*. She helped me come up with a structure for the storyline and also helped solidify other parts of the game that were weak. Additionally, she pointed out that the game had to be unique and highlight the irony of life.





She also helped me figure out a suitable beginning and end for the game, something that is explained later in this document (in section 7.5).

I ended up writing multiple drafts of the storyline and incorporated feedback from various people.



Comments on a draft of the storyline. You can find all drafts here: https://docs.google.com/document/d/1vb42ylc4ggkHWPrNpzsKe4hCyEomSBUbfGM78iGtV-c/edit?usp=sharing

7. Development

I wanted to go beyond merely conceptualising an idea. At the end of my project, I wanted a tangible experience that people could interact with instead of coming up with a hypothetical version of the same. This meant that I had to develop the entire game and I did.

The game was programmed in p5.js* to make it suitable for playing over the web. An interesting fact is that I'd never worked with p5.js before and had resorted mostly to Processing**. Thankfully, Shaunaq was confident that I'd be able to take the leap and I did.

He suggested that I start working on individual game mechanics since each hierarchy is abstracted into a level. Once I'd developed all of them, I could simply bring them together into one single file. This is what I did.

* p5.js is a free and open-source JavaScript library for creative coding, with a focus on making coding accessible and inclusive for artists, designers, educators, beginners, and anyone else.

** Processing, however, is a flexible software sketchbook and a Java library for learning how to code within the context of the visual arts. Java doesn't work well over the web.

The logic and algorithms form a huge chunk of this project. While not everyone will find chunks of code fascinating, it is imperative to understand the formation of the underlying logic systems in the game. Therefore, I have resorted to a pseudocode explanation for the same. I was first introduced to this concept in the book *Aesthetic Programming* by Winnie Soon and Geoff Cox (Soon and Cox, 2020).

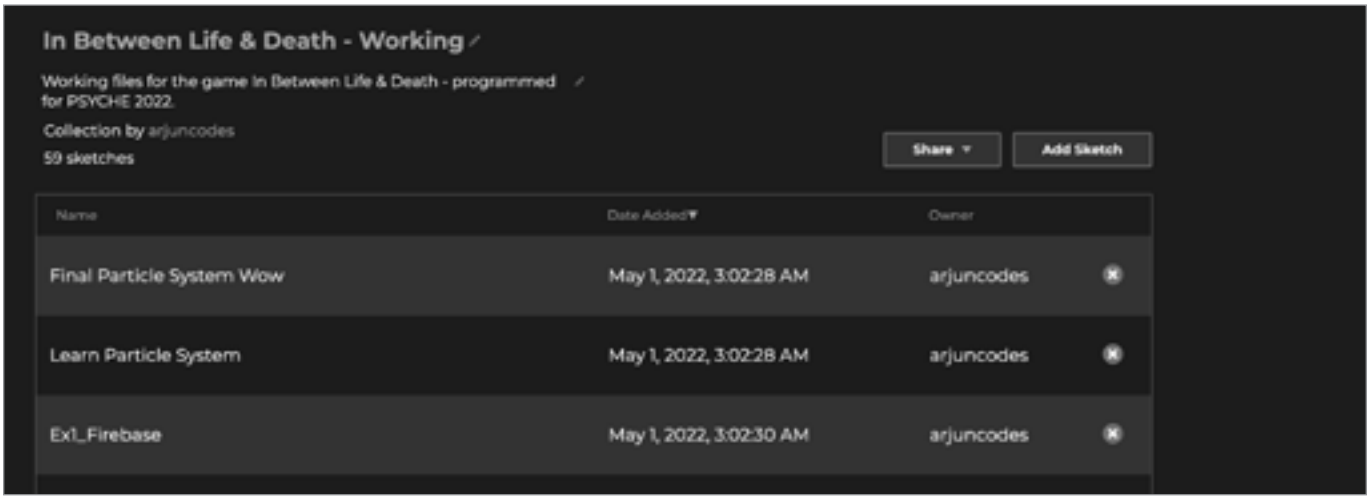
https://github.com/arjuncreates/InBetweenLifeAndDeath

Here is an example taken from the book. You might want to say “if I am hungry, I should eat some food, if I am thirsty, I should drink some water, otherwise, I will just take a nap”. In pseudocode, it can be referred to as this:

```
if (I am hungry){
eatSomeFood;
} else if (I am thirsty){
drinkSomeWater;
}else {
takeANap;
}
```

While none of this would work in case you feed it into a computer system since it does not follow the correct syntax needed to speak to a computer, you can easily understand the logic behind the algorithm. In case you’d like to view the actual code in my explanations, GitHub/p5.js links will guide you to the actual files.

Keep in mind that these did not just strike me in the first go. They took quite a lot of iterations, all in all about 59 of them, and many hours of racking my brain.



All working files are saved in a p5.js collection: https://editor.p5js.org/arjuncodes/collections/DN8GBte3W

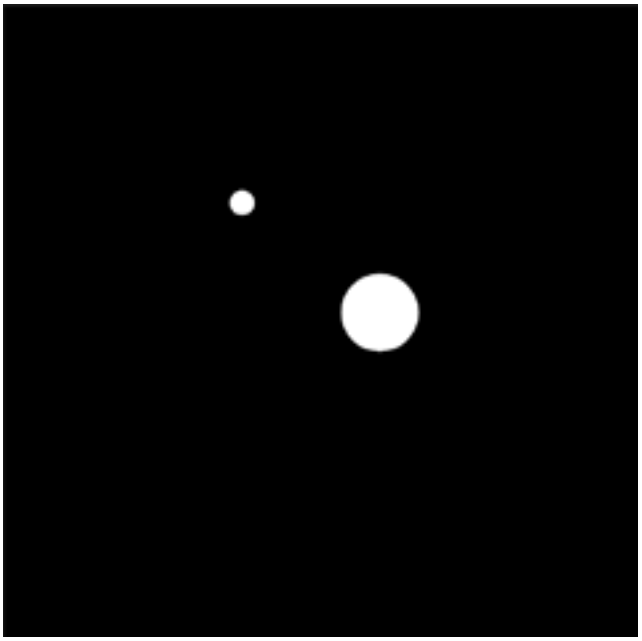
7.1 Stage 1 - Hero object and eating food

First was the creation of a hero object, something that could be user-controlled and would react to everything else in the environment. I decided to go with a blob as initially inspired by the game: agar.io. Each circle has an x & y coordinate as based in a cartesian coordinate system. The x & y positions are controlled by the mouse. Therefore, the hero object would essentially look like this:

```
heroObject (mouseX, mouseY, radius);
```

The movement in this case was quite monotonous because whenever you move the mouse, the object moves with you. Hence, I decided to use linear interpolation* to ease the movement and make the object feel a little more animated.

```
heroPosition = lerp(initialPosition, newPosition, amountOfInterpolation);
```



Next, we needed food to be created at a randomised position within the canvas (the active area of a user's screen). This was easy as p5.js has a random() function that utilises a random number generating algorithm within a user-specified range.

Here, I referred to object-oriented programming using Daniel Shiffman's lessons on YouTube. Essentially, you could treat a group of digital objects with similar characteristics as a class of objects and each class could have a certain function. For example:

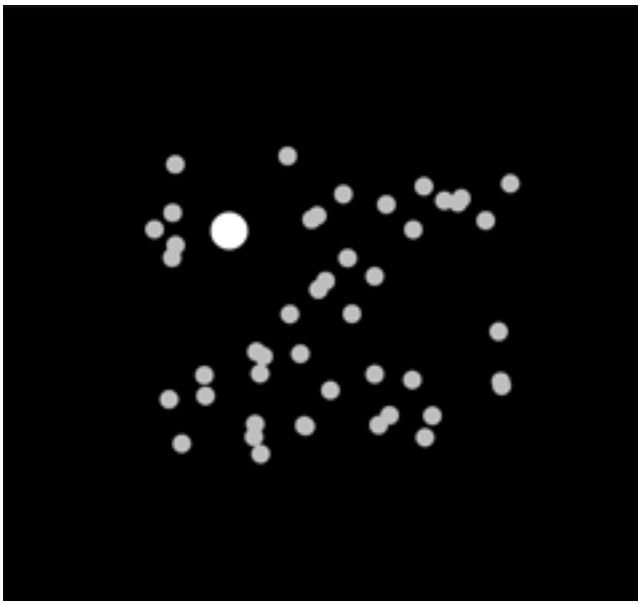
* Linear interpolation calculates a number between two numbers at a specific increment to ease the transition between the two numbers. More information can be found here: http://paulbourke.net/miscellaneous/interpolation/

```
class Food {
objectProperties{
size, colour, position
}

eatenStatus{
if (eaten==true){
foodDoesNotExist();
}else {
foodExists();
}
}
```

Food also had to be created at different intervals of time. Here, I referred to the time the program had been running for, and at specific intervals (for example, every 5 seconds), the program added a new food particle. This was done using the modulo operation. A modulo (%) returns the remained after one number is divided by another. For example, 5%2 would result in 1 (as 2 goes into 5 twice and 1 is leftover). Therefore, you can easily use this to map intervals in time by referring to the frameCount()* variable in p5.js. Therefore, to create new food, you can do something like this:

```
if (frameCount%60==1){
addNewFood();
}
```

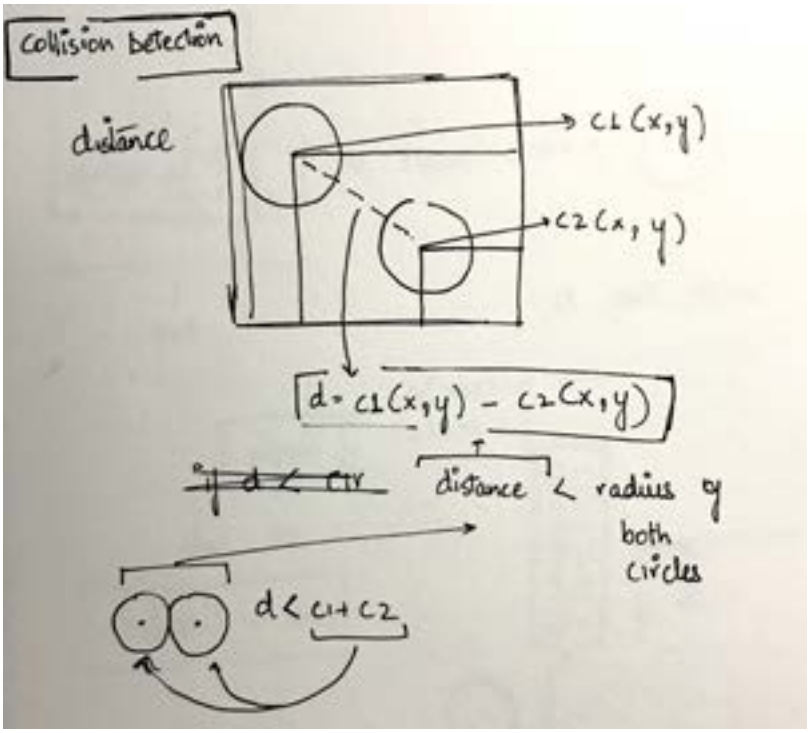


* *The frameCount variable contains the number of frames that have been displayed since the program started.

Next, the computer had to know if the food was being eaten. For this, I utilised what is referred to as a collision detection algorithm. Both particles (the heroObject and the food) have a radius. Quite simply, if the distance between the two is lesser than the radius of the object you're measuring from, it means that they're intersecting. Further, I added a toggle that enabled users to click and eat the food particle (later removed).

https://editor.p5js.org/arjun-codes/sketches/GwOgDwaZx

```
d = distance between heroObject and food particle [i*]
if (d<heroRadius & mouseIsClicked){
foodParticleEaten
}else {
foodParticleNotEaten
}
```



I'd like to point out one by-product here. Food was essentially an array* of many objects, say for example 30 at one point in time. This means that all 30 food particles were checking whether they were being touched by the heroObject. This checking was done using a for() loop. Essentially a for loop runs through every single iteration of an object. For example:

* An array is a list of data. Each piece of data in the array is referred by an index number which represents its position in the array, starting from 0. An index number is specified within square brackets such as [x].

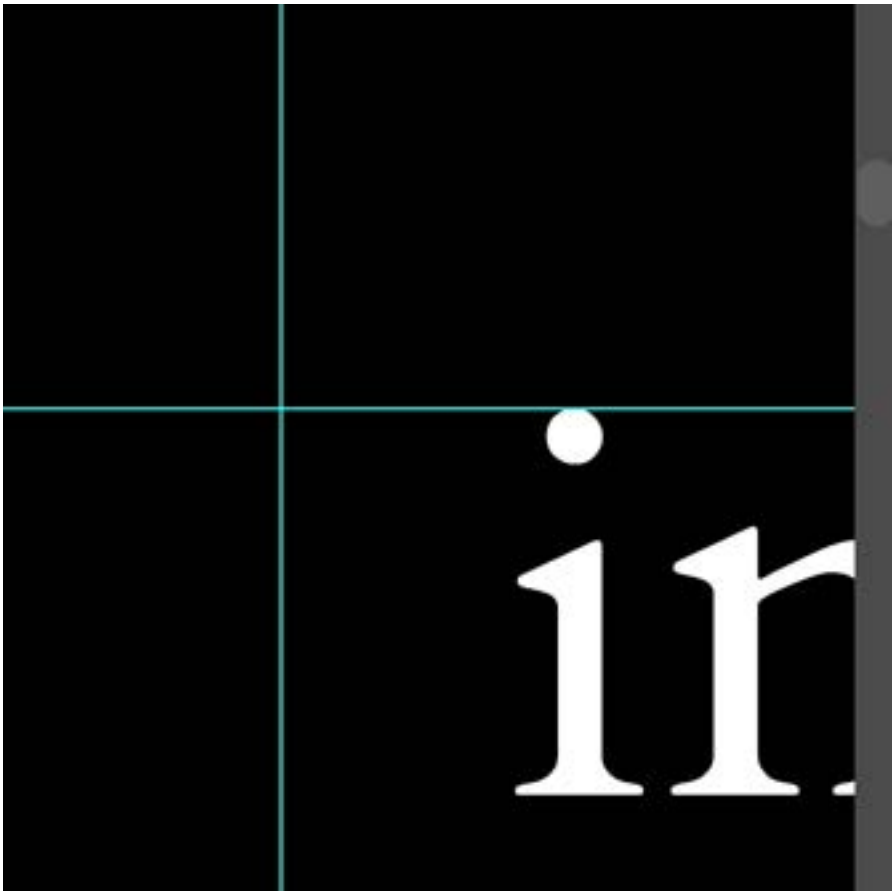
```
for (i=0; till i<numberOfFood; increment i by 1){
checkHeroObjectDetection of food[i];
}
```

7.2 Stage 2 - Enemies

https://github.com/arjuncreates/InBetweenLifeAndDeath/blob/main/enemies.js

Enemies were a separate class of objects. They were similar to the heroObject (in order to maintain visual consistency) but differed in colour and functions. Enemy objects had to enter from a specific point in the canvas and travel across the length of the canvas while constantly checking it had collided with the heroObject.

I'll address the movement first. Each enemy object was born at a random location at the top of the canvas. If you remember, p5.js treats canvases as an inverted cartesian coordinate system. This means that the top left of the screen is 0, 0.

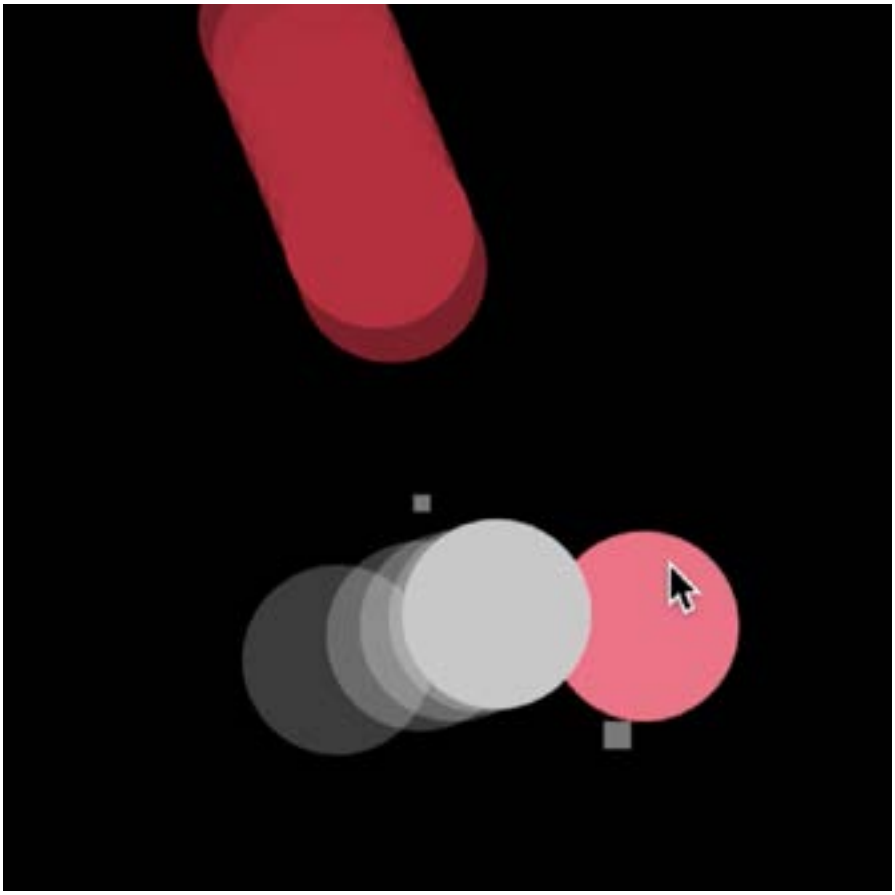


The intersection of the two lines from the x & y axis would intersect at the top left (0, 0).

Once the object is born, it is assigned a destination in the form of random x & y coordinates within a 100px margin of the canvas in order to prevent them from going off-screen. As I wanted there to be some sort of variability and randomness to the hostile particles, objects are also assigned a random speed between a specified range. This speed is then what carries the enemy particle to the new destination (which goes off the screen, i.e >height of the canvas).

In order to make them feel more threatening, apart from the color, a trail was also added to these objects. This acted as a

visual representation for motion blur (something I remember from animation class at IIAD). This was particularly challenging to execute.



An example of the motion blur from the final game.

In order to achieve this, I had to store the history of positions of the moving enemy object and then remove them as the object moved. For example:

```
history = an empty array [];
history.push (enemyObjectPosition);
if (history>8){
remove history [1];
}
```

The trail also had to fade away as the object moved. This was done by using a variable for transparency. Essentially each object started at 255 and slowly faded out as time progressed.

```
let transparency = 255;
enemy.fill (red, transparency);
transparency - -;
```

A similar collision detection algorithm, such as the one employed in the food stage, was utilised here. One additional feature was that if the heroObject collided with the enemy object, the game would end.

7.3 Stage 3 - Companion

This was the hardest individual stage to tackle out of the 4. There were a variety of complications that arose and I realised that as I moved up the hierarchy of human needs, it started becoming more complex. A lot of thought went into an accurate depiction of needs, both literally and culturally.

For example, the belongingness and love stage could be viewed from a variety of perspectives. Maslow himself states that this could be friends, a sweetheart, a wife, or children (Maslow, 1943). As the needs got more abstract in nature, it called for an individual interpretation since no global interpretation was possible. Here, Shaunaq helped me form my own artistic intent and I realised that no matter how objective you may want to be, a creative project is always subject to the creator's interpretation (of the data, in this case).

I decided that I wanted to tackle love from a companion perspective and have the heroObject make friends in the next stage as it signified esteem in society. My plan for this was quite clear: there'd be a free moving particle and the heroObject would have to somehow 'court' it. Here, Shaunaq suggested I also look at societal norms and this made a lot of sense to me. I decided to include an element of consent within this stage, i.e if the method of approach is incorrect, the other particle would be repelled by the heroObject.

Firstly, there needed to be a free-moving particle. As the companion object is born, it is assigned a random speed in order to add variability to the game every time a user plays it.

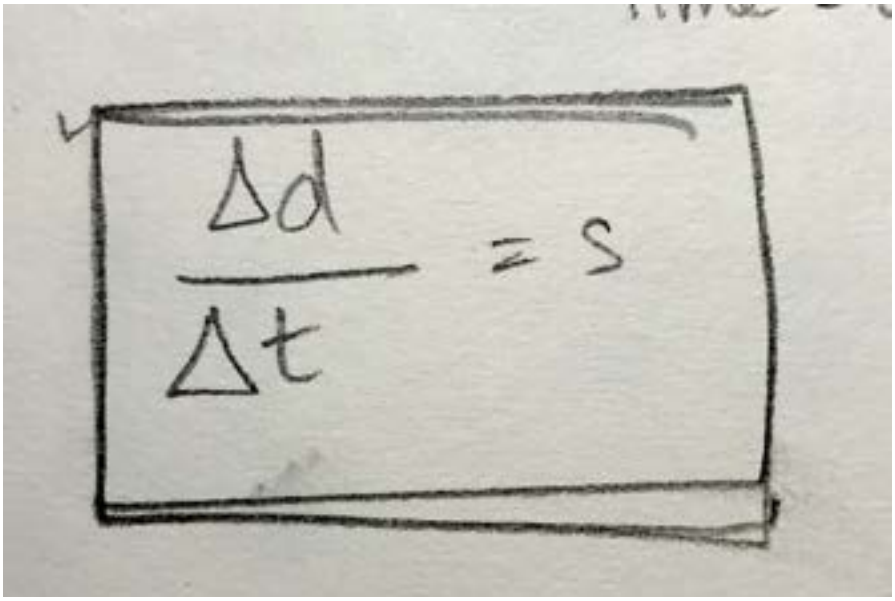
```
companionObject.positon = companionObject.position + companionSpeed
```

The companion object in the actual game.

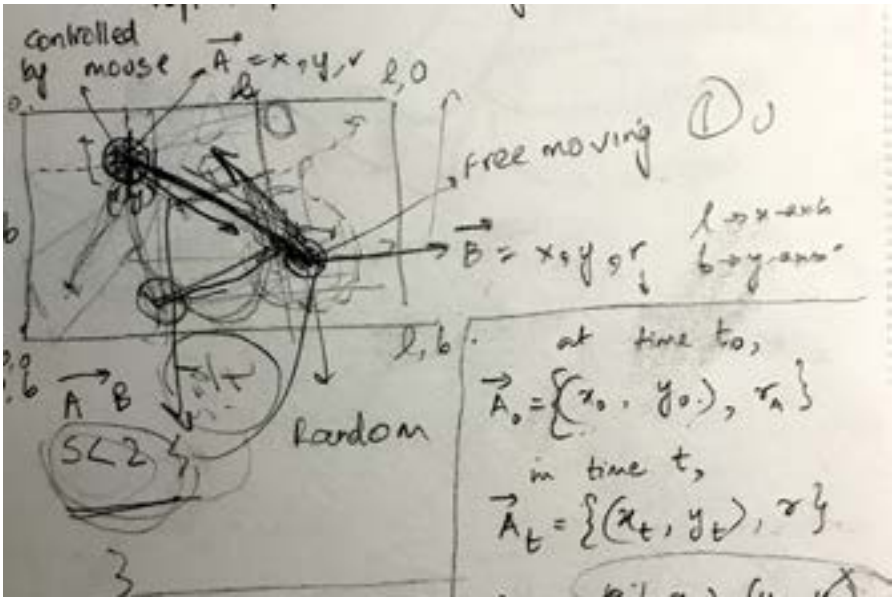
However, this means that the companion object could easily go off the screen. I needed to make the object move to the other side in case it reaches either ends on the horizontal plane or on the vertical plane. This was done by inverting the speed by negative 1.

```
  if (companionObject.x<0 | companionObject.x> width) companionObject.xSpeed =
companionObject.xSpeed * (-1)
  if (companionObject.y<0 | companionObject.y> height) companionObject.ySpeed =
companionObject.ySpeed * (-1)
```

The toughest part of the problem was to ascertain the speed of the heroObject moving towards the companion object in order to enforce an algorithm for consent. I struggled for quite a while with this problem. From elementary physics, we can recall that speed is the distance travelled upon the time taken to travel that distance.



Now, there are a variety of problems to address here. Firstly, there is no way to ascertain whether the heroObject is actually moving towards the constantly moving companion object. Therefore, I had to initially create a zone (variable in the code is named leeway) and check whether the mouse was directed towards the companion object.



One of the many notebook scribbles in order to work out this problem. This one included me & Samyukta arriving at a solution in a pizza shop!

https://editor.p5js.org/arjun-codes/sketches/les74HbzJ

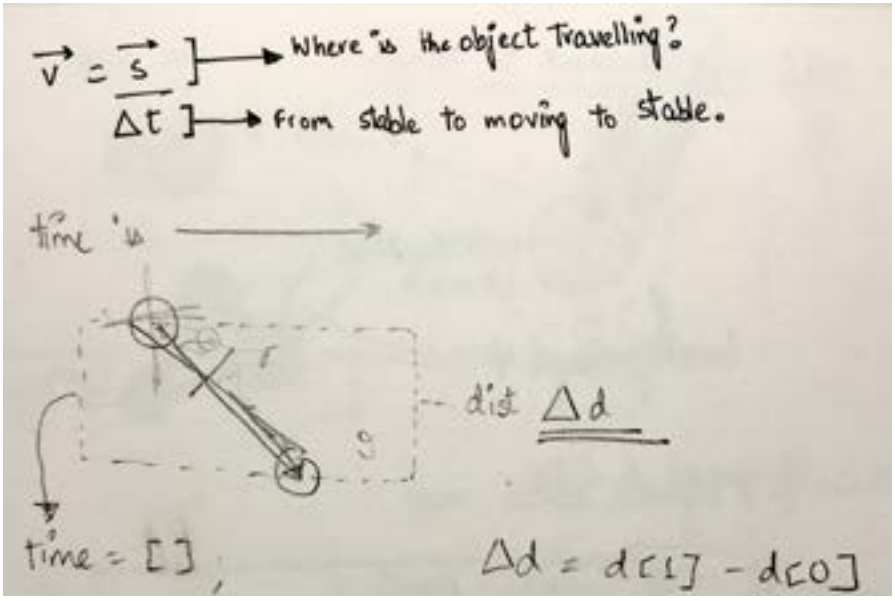
To detect whether the mouse was moving towards the other object, we can use something like this:

```
detectMouse(){
if (mouseX < companion.x + companion.r/2 + leeway)&
    (mouseX > companion.x - companion.r / 2 - leeway) &
    (mouseY < companion.y + companion.r / 2 + leeway) &
    (mouseY > companion.y - companion.r / 2 - leeway){
mouseOnTarget = true;
} else {
mouseOnTarget = false;
}
}
```

With this, I could know whether the heroObject was moving towards the companion object. Next, I had to ascertain the speed. Measuring distance was easy. Constantly, the computer is aware of the distance between the heroObject and the companion object using the distance() function.

```
let d = dist(heroX, heroY, companionX, companionY);
```

The problem became time. When do you start measuring time and when do you end it? For this, I used a boolean state called ‘moving’ which was true every time the detectMouse function (explained earlier) was true. Every time that moving is true, the program starts to add 1 unit to a time variable. This time variable is stopped when your mouse touches the companion object. The computer can now ascertain the speed of the heroObject moving towards the companion object.



This was expressed using something like this:

```
if (moving=true){
time = time+1;

timeTaken = time [most recent] - time [0]
speed = distance / timeTaken

}else {
time = 0;
timeTaken = 0;
speed=0;
}
```

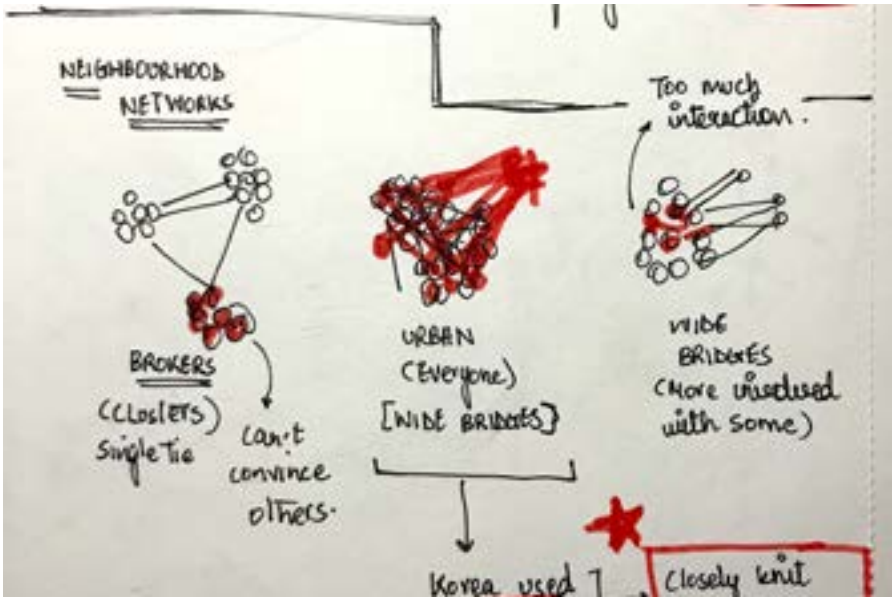
The next part was to output whether the companion would accept the heroObject or be repelled by it. This was done by placing a speed threshold (for example 1 unit). However, the failure of this algorithm is that the speed threshold in no way correlates to the distance between them. This means that if objects are in close proximity, there is no scope of the companion repelling the heroObject. This was not something I was able to account for.

Finally, if the heroObject approached the companion under the speed threshold, they would be joined as one organism and dependent on each other. This was easily done by making the companion object's properties equal to that of the heroObject.

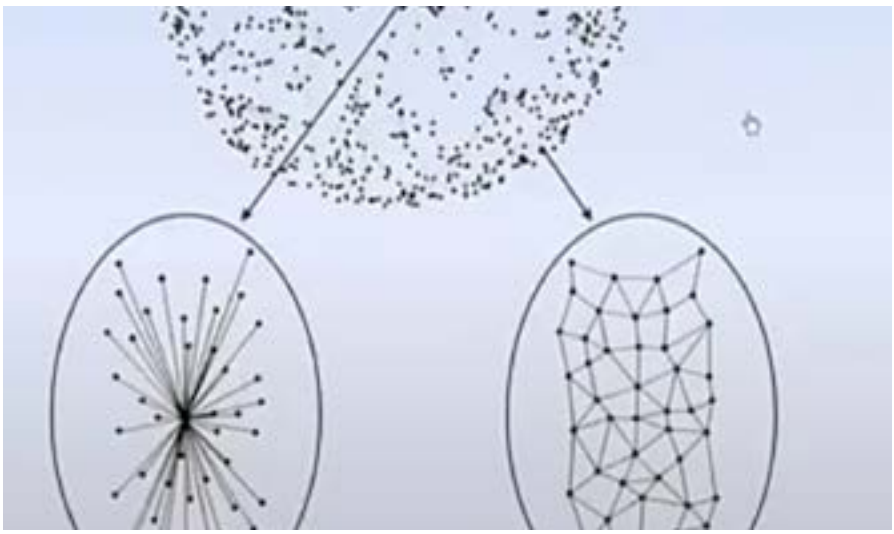
7.4 Stage 4 - Friends, network and society

The fourth stage in Maslow's hierarchy highlighted the idea of a society and one's place within it. The interpretation I moved ahead with was equating one's esteem to being connected to a certain number of people and being responsible for their well being.

While watching a lecture by Damon Centola, titled The Network Dynamics of Social Change (Science Gallery Bengaluru, 2021), early on in my research, I was introduced to something known as a social network graph. This type of graph contains nodes that represent people and lines drawn to connect nodes to represent relationships or social connections between the people.

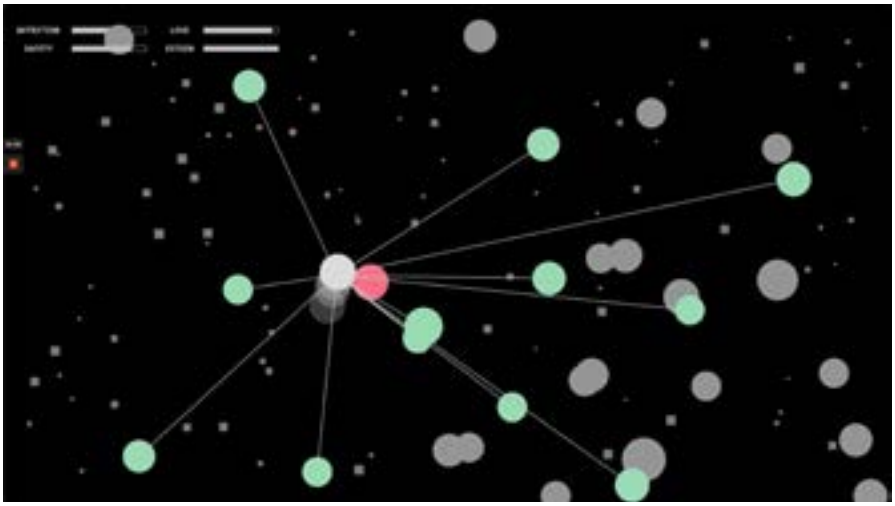


My notes from Centola's lecture on The Network Dynamics of Social Change.



Examples of social network graphs; source: Science Gallery Bengaluru, 2021.

I deemed this to be an appropriate visualisation for the esteem stage. All this while, the player has existed in an environment all by themselves. However, the outside world is unlike this. We live in a matrix filled with other individuals with similar properties. Here, I built up from the companion object and added a line whenever the heroObject collided with any of the friends.



A screenshot of Stage 4 from the actual game.

One interesting part about this stage was that all of the friend objects existed as autonomous agents, i.e they were eating and dying if their nutrition needs weren't met; along with being free moving. This went in line with the ecosystem I was trying to build in the first place. To get 30 friend particles to act autonomously was an incredible challenge.

For example, if I wanted to get all of them to eat food, I had to essentially employ the same algorithm as the heroObject but for 30 objects at the same time. I used a for loop to iterate through every iteration of the friend object and check whether it was 'colliding' with a food particle. I also ran another for loop to check whether the food particles (say 30 at a point) were colliding with the friend objects. As I would later find out, this ended up placing a lot of computing stress.

```
for (let i =0; i<numberOfFriends; i++){
for (let j = 0; j<numberOfFood; j++){
if (food[j].contains(friendPosition[i])){
friend[j].radius = friend[j].radius + food[i].radius;
food.remove (i);
}
}
}
```

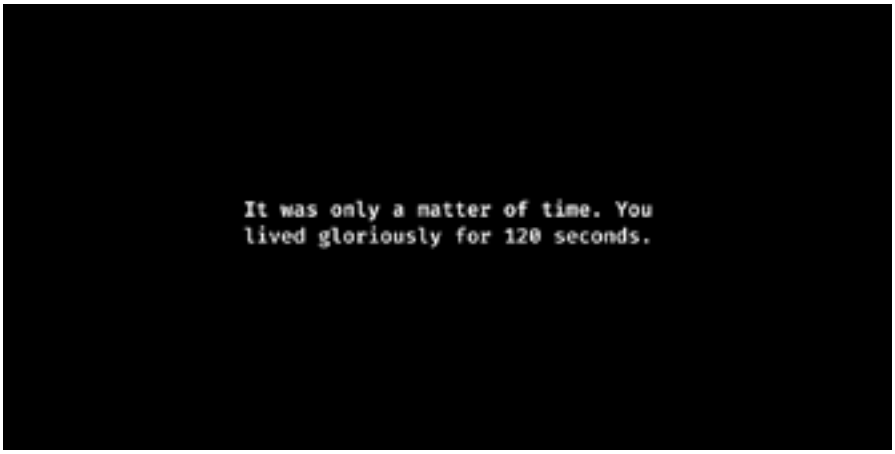
The friend objects also died and were reborn if their nutrition needs weren't met. Therefore, if the player reached stage 4, they could witness an ecosystem of autonomous agents and make a network of these friends.

7.5 Stage 5 - The Probability to Die

The last piece of the puzzle was to figure out an ending. Gayatri suggested that this 'game' must be different from all the other games and highlight the irony & randomness of life. I agreed.

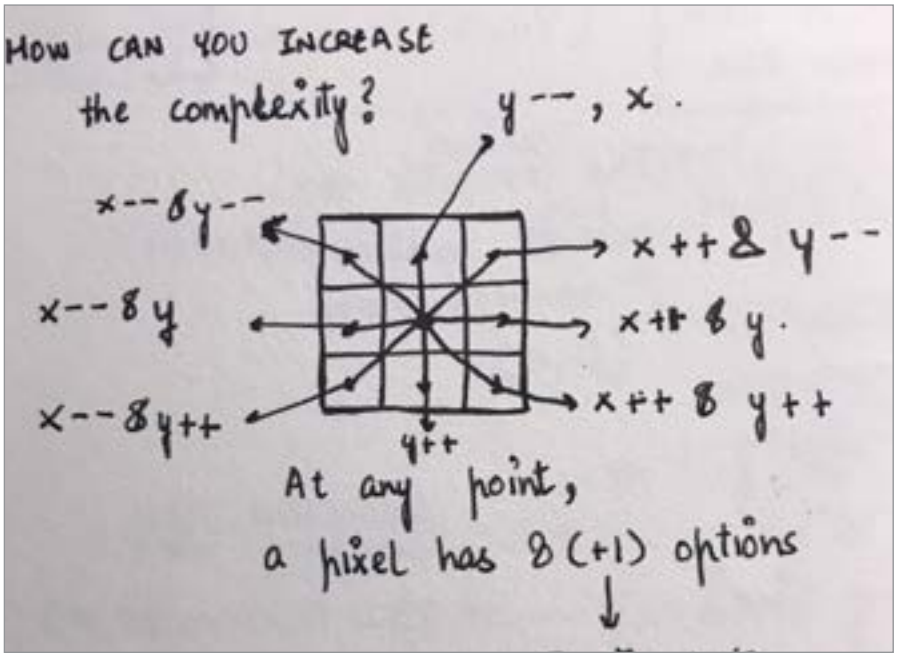
If you look at a game, players move on through stages to achieve some sort of reward at the end. Virtually every game functions on a reward system of some kind that motivates the player to go ahead. However, in this particular game, I wanted players to be driven by their curiosity towards the grand ending of life but be met with absolute banality.

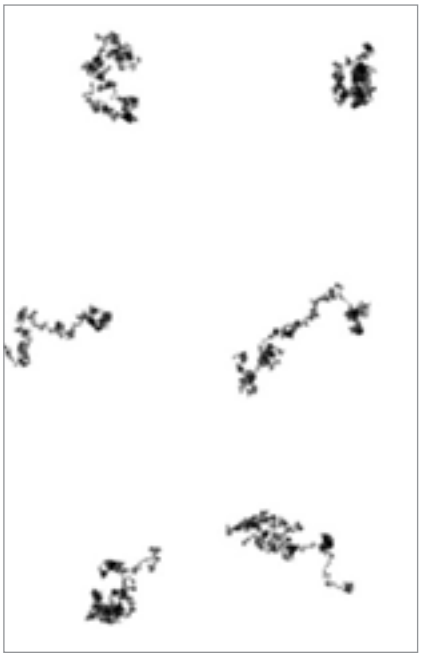
Come to think of it, we can never hope to self-actualise and while this was a topic of hot contention during the conceptualisation of the game, I developed and stuck to own interpretation of self-actualisation: If one does manage to fulfil their creative potential, one will not chase anything more. Therefore, we're all striving to self-actualise but we may never end up doing it. Unexpectedly, death enters the picture.



The message displayed in the game if you die in the end.

I wanted to program some sort of random killing probability. I was first introduced to the concept of programming probability in the Nature of Code book (Shiffman, 2012) while building a random walker (images on the next page).





The random walker made with 8 probabilities.

Therefore, when a player reaches this stable state, they are unknowingly simply willing to die. At every frame, the computer picks a random number between 1 & 10. If the number is >7, the player dies and is greeted with the end screen.

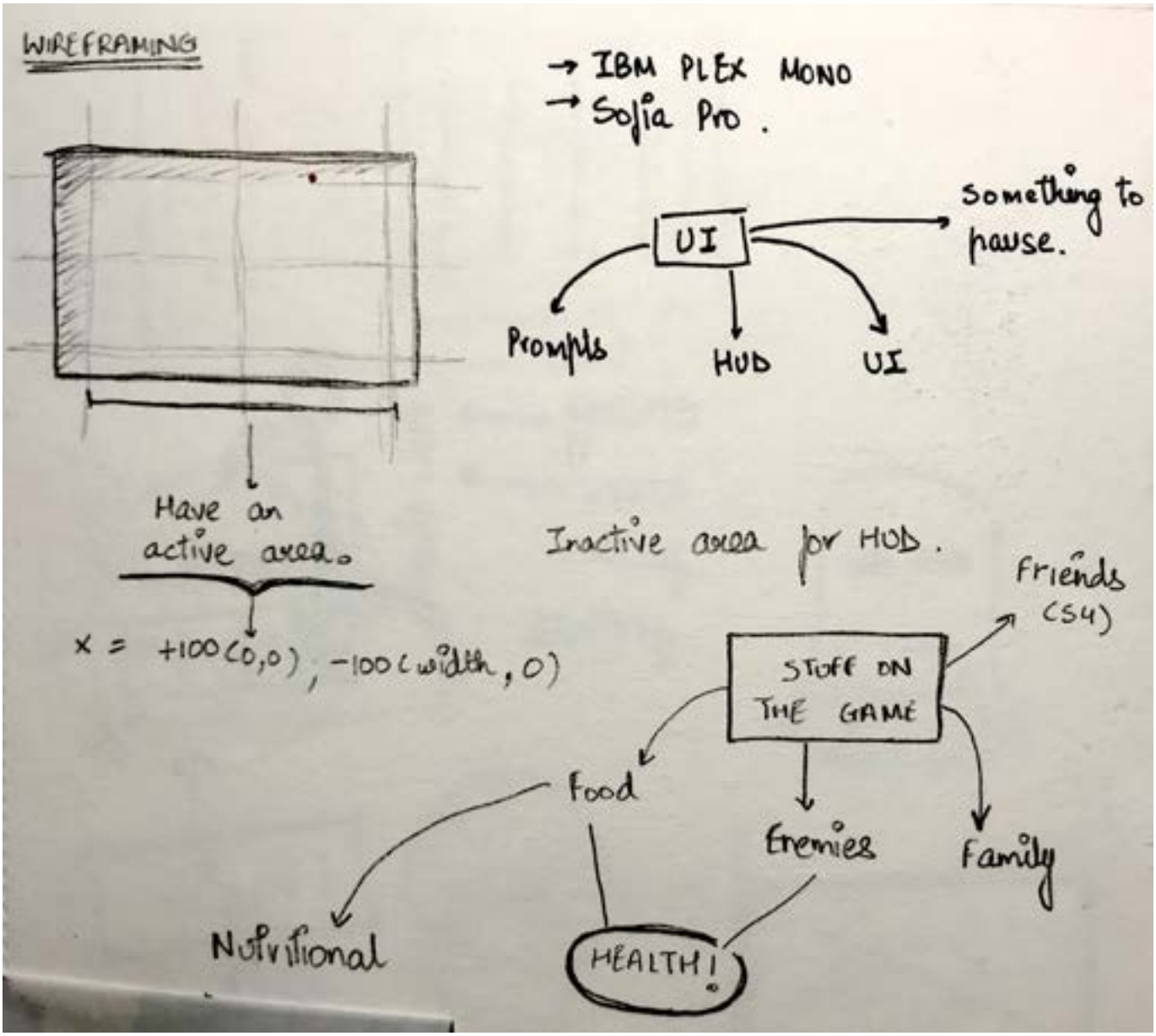
8. Designing the interface & experience

I had never designed a game nor was it something that was a part of the academic curriculum at IIAD during my time as an undergraduate student. Adding to my nonexistent knowledge was the fact that I was not an ardent 'gamer'. Hence, designing the interface for the game can be considered exploration into a foreign land.

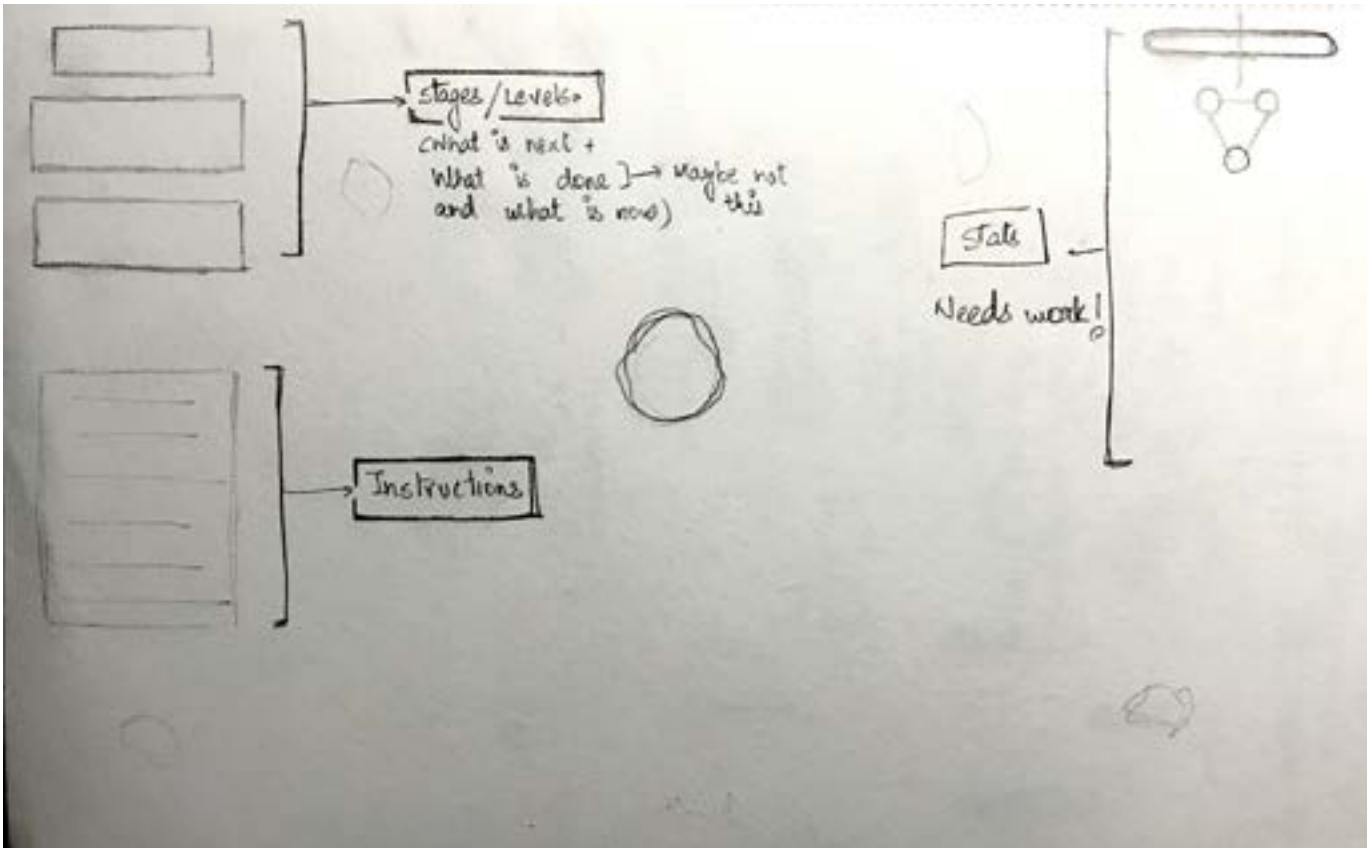
Articles on designing Game UIs were easy to find. This snippet is from a graphic by Toptotal.

8.1 The HUD

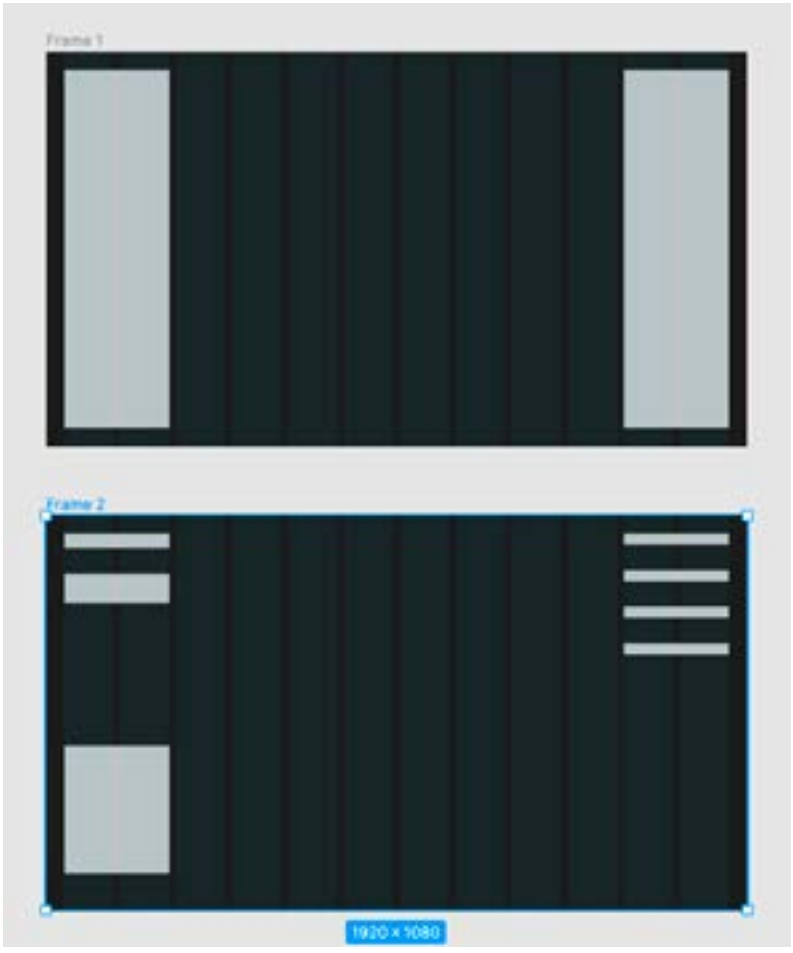
The main chunk of the interface was the HUD. Since I was in a time crunch, I resorted to a rather simple interface that communicates the necessary information but does not seep into the experience of the game. There is already a lot going on due to the fast-paced nature of the game and the HUD needs to be able to communicate necessary information to the player, all with a quick glance.



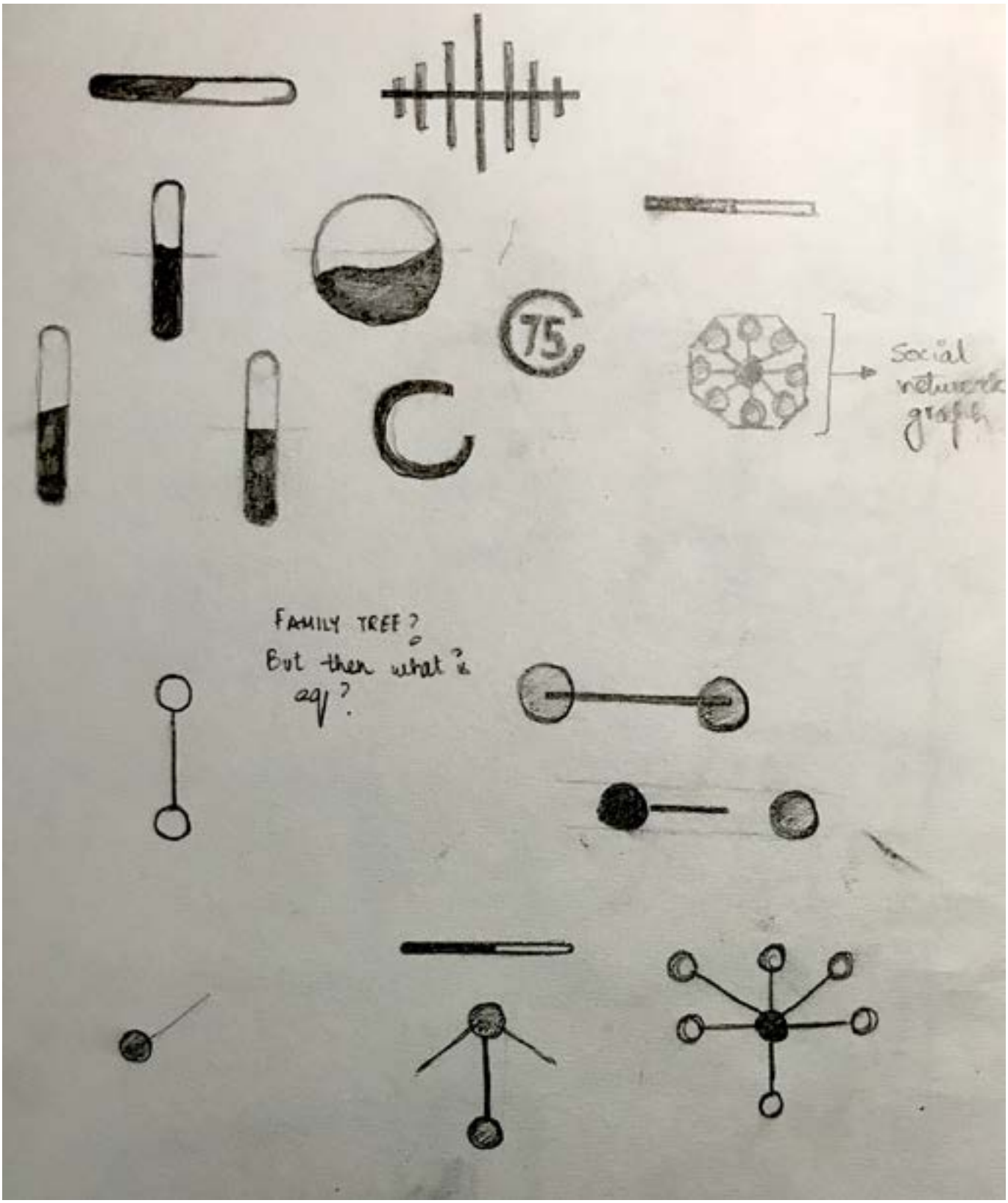
The HUD had to be unobtrusive and away from the active area but show a bunch of important stats.



The chosen wireframe after much deliberation.



The two most important parts of the HUD were the statistic bars (food, friends, etc) and the typography of the prompts. Initially, I was exploring different kinds of bars to communicate the statistics. However, in the interest of time, I resorted to the simplest one to execute as I had to write everything in code as well.



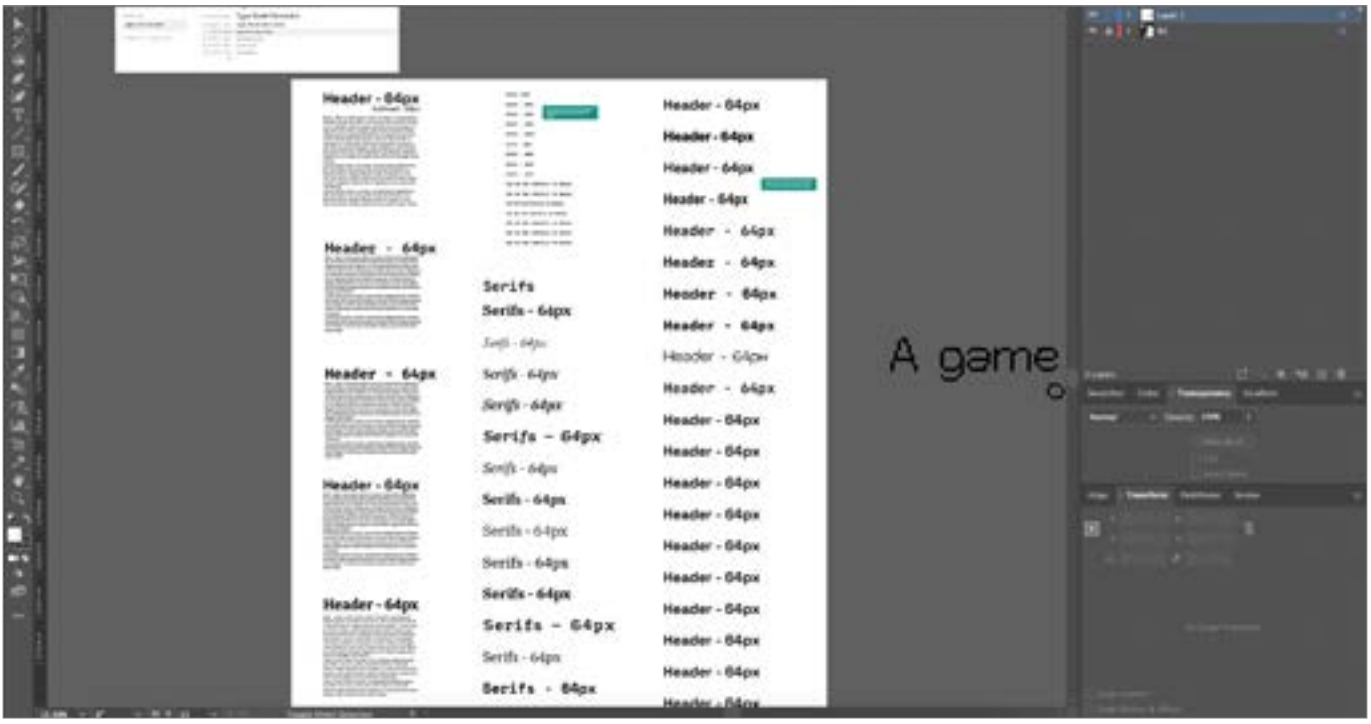
Discarded stat icons.

Final HUD. I also went against the idea of having stages clearly visible. The entire game functioned on a story communicated through prompts.

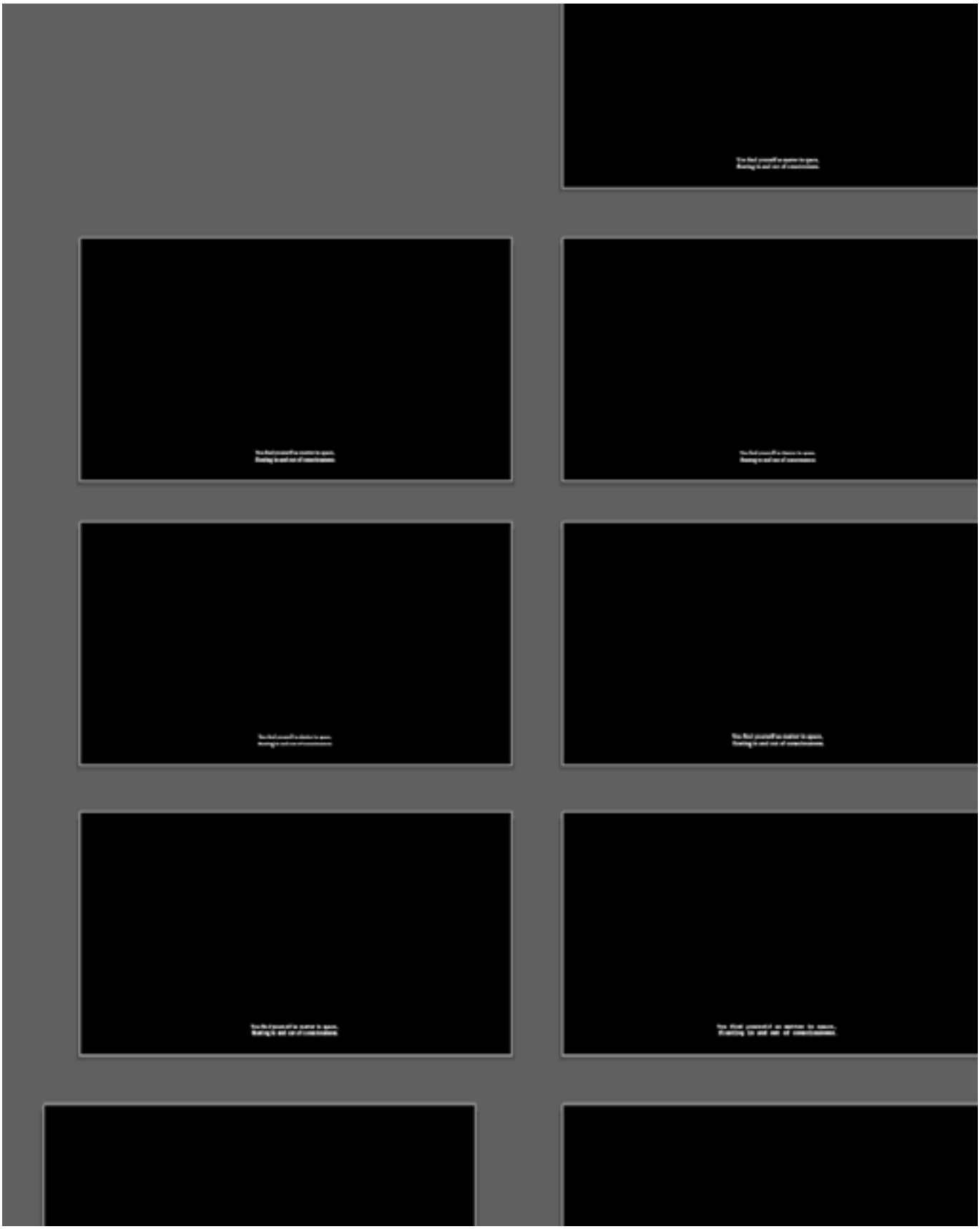
A screenshot of the UI on the actual game.

8.2 Typography

While thinking about the design of the game, I understood how all the different elements could come together to create a more visceral experience. This meant that all elements needed to add to the experience I was trying to create. Since the interface was rather simple, attention had to be spared to the tiniest of elements. Typography was something I deliberated on quite a lot.

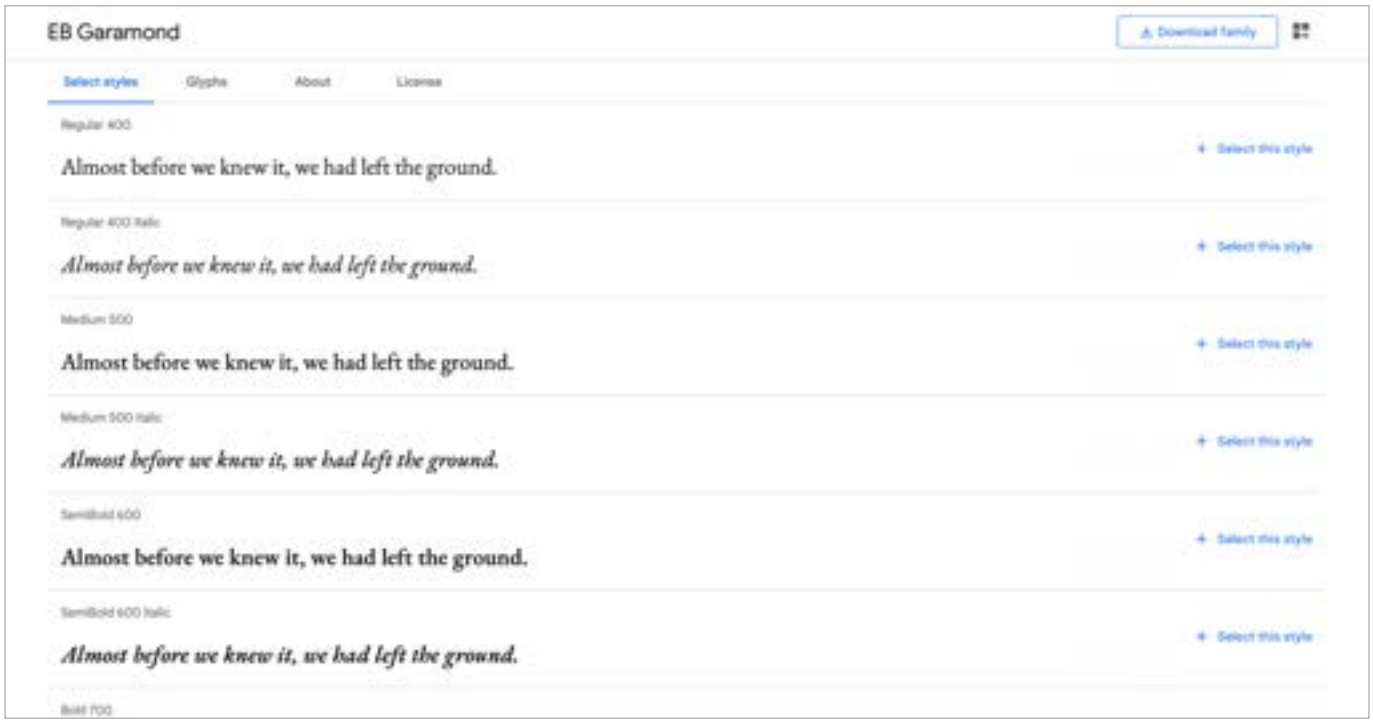


The entire experience was rather poetic. Therefore, I wanted the typesetting for the storyline (that came in the captions) to feel that way as well.



I tested all typefaces in isolation using a black background to simulate how it'd be on the actual game itself.

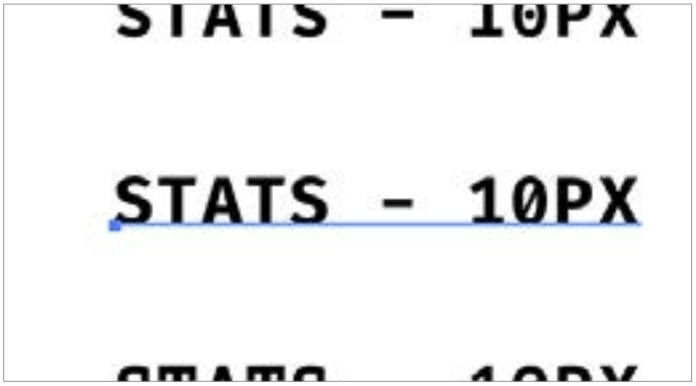
After quite a lot of deliberation, I stuck to EB Garamond. It was easy to read in small sizes over the screen, although it's not the most readable font for screens in any way, and captured the essence of the experience I was trying to create.



EB Garamond weights; source: Google Fonts.

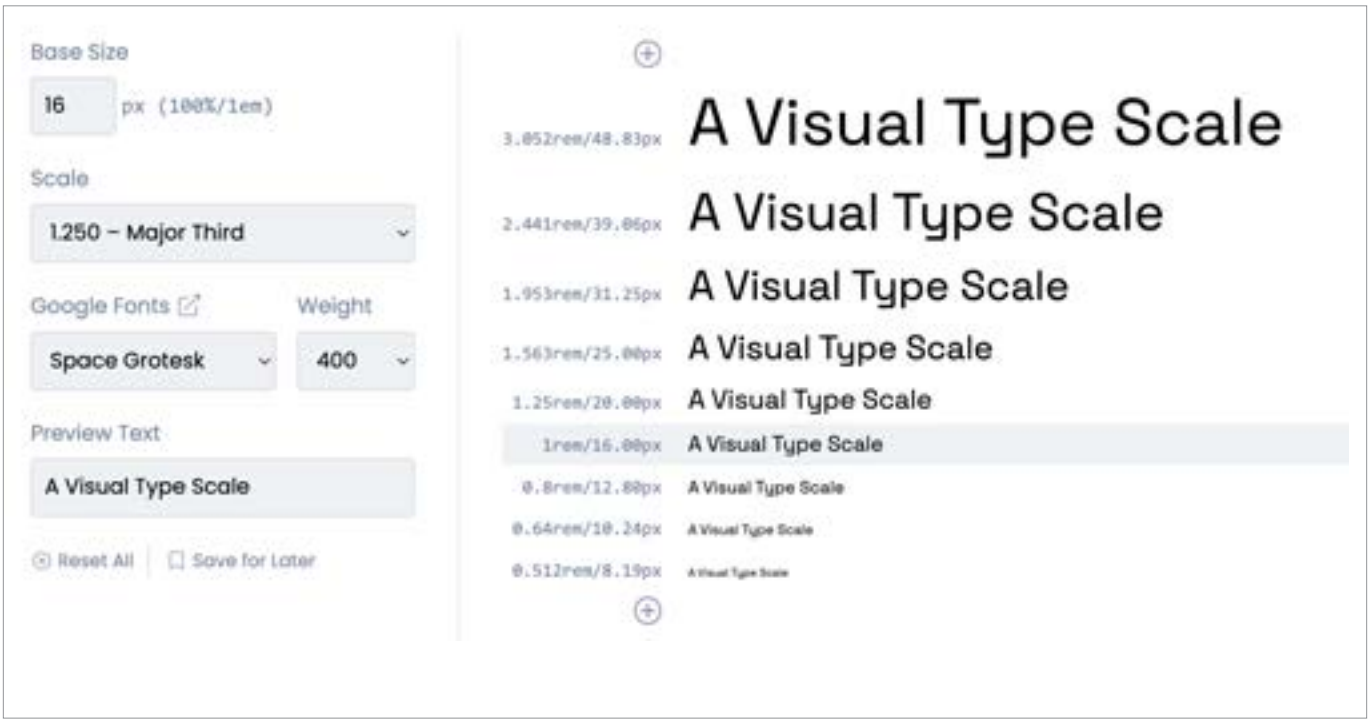
Next, I needed something for the stats as well as the end screen; should a player die. I needed a closely tracked typeface that was extremely readable on screens as players would want to check their stats quickly. I went ahead with choosing monospaced typefaces that worked well in relatively small sizes (12-14px).

To serve this purpose, I chose Fira Code. The Fira Code glyphs were easy to distinguish between one another and worked well in uppercase as well. A lot of the monospaced typefaces featured a dot in the bowl of certain characters such as '10'. This was something I needed to avoid as it could cause confusion in small sizes. This limitation ruled out a lot of popular monospaced typefaces.



Fira Code in action.

Type sizing was also something I pondered over and attempted to use a type scale calculator for the same. Towards the end, however, I decided on the type sizes manually by testing the game on a variety of computer screen sizes.



Type scale calculated with a base size of 16px on https://type-scale.com/

8.3 Colours

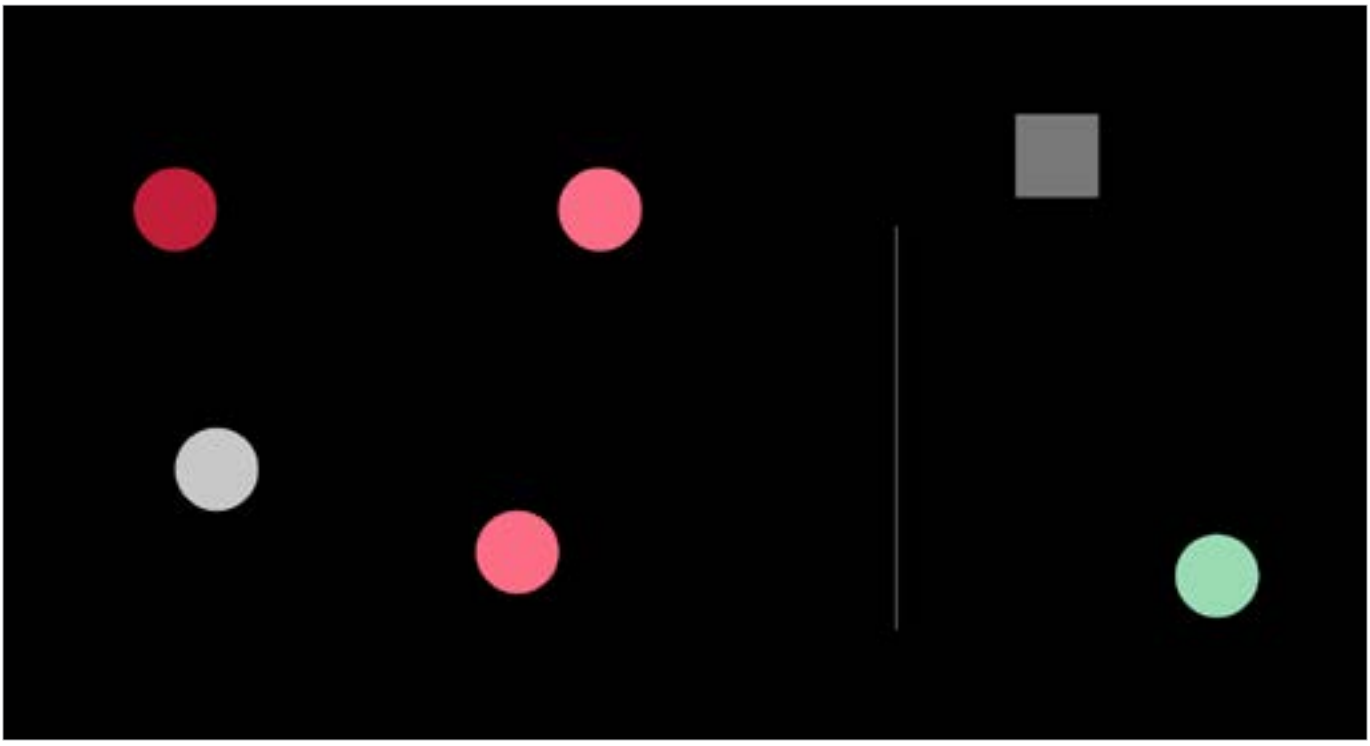
I was aware that Science Gallery Bengaluru attracts a global audience. While I used Maslow's theory as the underlying narrative, which by itself is meant to be a globally accepted theory, adding colour to the game was a more sensitive task.

Different colours have different associated emotions to them and these vary with culture. I came across an interesting study that explored the findings of the International Colour-Emotion Association Survey (Mohr et al. 2018) wherein participants were asked to assign a degree of emotion to a particular colour, thereby making it a trustworthy source for a general co-relation between colour and its associations.

I decided to keep things simple as I already had too much on my plate. The background was black in order to communicate the feeling of it being infinite space (corresponding to my storyline, expanded upon in section 6.2). The heroObject was a shade of light grey as white was too striking on the eye for a long duration of time. The colours of the other objects were taken from the findings of this survey (Mohr et al. 2018).

Color term	Associated emotions	Average %	Color term	Associated emotions	Average %
Red	Love	68%	Pink	Love	50%
	Anger	51%		Joy	41%
	Pleasure	33%		Pleasure	40%
	Hate	29%		Amusement	36%
Orange	Joy	44%	Purple	Pleasure	25%
	Amusement	42%		Interest	24%
	Pleasure	33%		Pride	24%
Yellow	Joy	52%		Admiration	24%
	Amusement	40%	White	Relief	43%
	Pleasure	32%		Contentment	30%
Green	Contentment	39%	Grey	Sadness	48%
	Joy	34%		Disappointment	41%
	Pleasure	34%		Regret	31%
	Relief	33%	Brown	Disgust	36%
	Interest	31%	Black	Sadness	51%
Blue	Relief	35%		Fear	48%
	Contentment	34%		Hate	41%
	Interest	27%		Anger	32%
Turquoise	Pleasure	35%		Guilt	30%
	Relief	34%			
	Joy	32%			
	Contentment	31%			

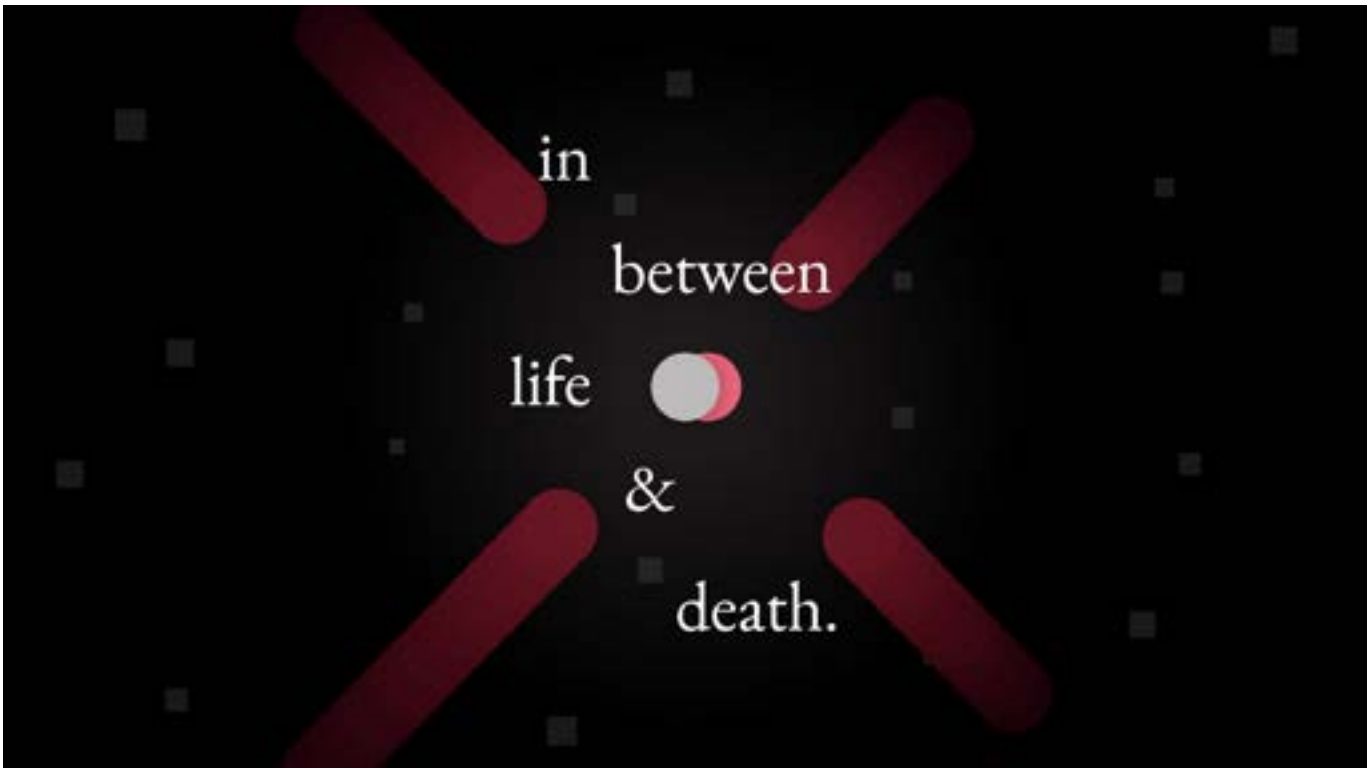
Most frequent color-emotion associations in 30 countries. Percentages show how many people chose each association. Source: PsychologyToday.



All the colours in my game.

Pink was used for the companion object, red for the enemies, grey for other particles, a dark grey for food particles and a mint colour for friends that you make in the game.

Although the lack of colour in the game bothered me when I first pushed the project out, I later found out that it actually helped to aid the experience. A participant who played the game in one of my community playing sessions (see sections 11.1 and 12.2) said, “the game felt meditative and I felt reconnected to primal human desires”. Maybe the lack of colours helped the concept to stand out more than the gimmicks of a pretty interface.



The main visual of the game.

8.4 Sound

https://github.com/arjuncreates/InBetweenLifeAndDeath

I remember experiencing ‘The Boat’ by SBS Studios, an interactive graphic novel on the web. Sound played a crucial part in the entire experience. It was clear that the channels of communication at my disposal were largely visual & auditory, and this called for the creation of a soundscape.

A large chunk of my learning here at the SGB revolved around the myth of the “self-made man”. I realised that I do not have to do this entire project alone and decided to reach out for help.

Atreyo, a friend and junior at IIAD, offered to help. We discussed the storyline in detail and mutually agreed upon the emotions that each stage needed to communicate. He worked on a soundscape which included sound effects and the main score.

This really aided the experience and the soundscape was appreciated by many in the community playing sessions (see section 12.2).

9. Putting it all together

All developments up until this stage happened simultaneously (design + development) but individually. As the launch date came closer, I had to bring everything together into one file. The plan was to take all of the individual game mechanics (expanded upon in chapter 7), connect them together with stages, display dialogues of the storyline and have it all sit on top of the pretty little interface discussed in the previous chapter. If it wasn’t clear already, this was a mammoth task.

I started working in sprints, most of which would last the entire night.

During this phase, I recalled something that I'd learnt during my internship at Canonic. I decided to adopt a 'scrum' process for this entire phase.

A scrum process features a backlong of issues / tasks that you pick up by grouping similar ones together in a sprint. I used Jira to manage the KanBan board.

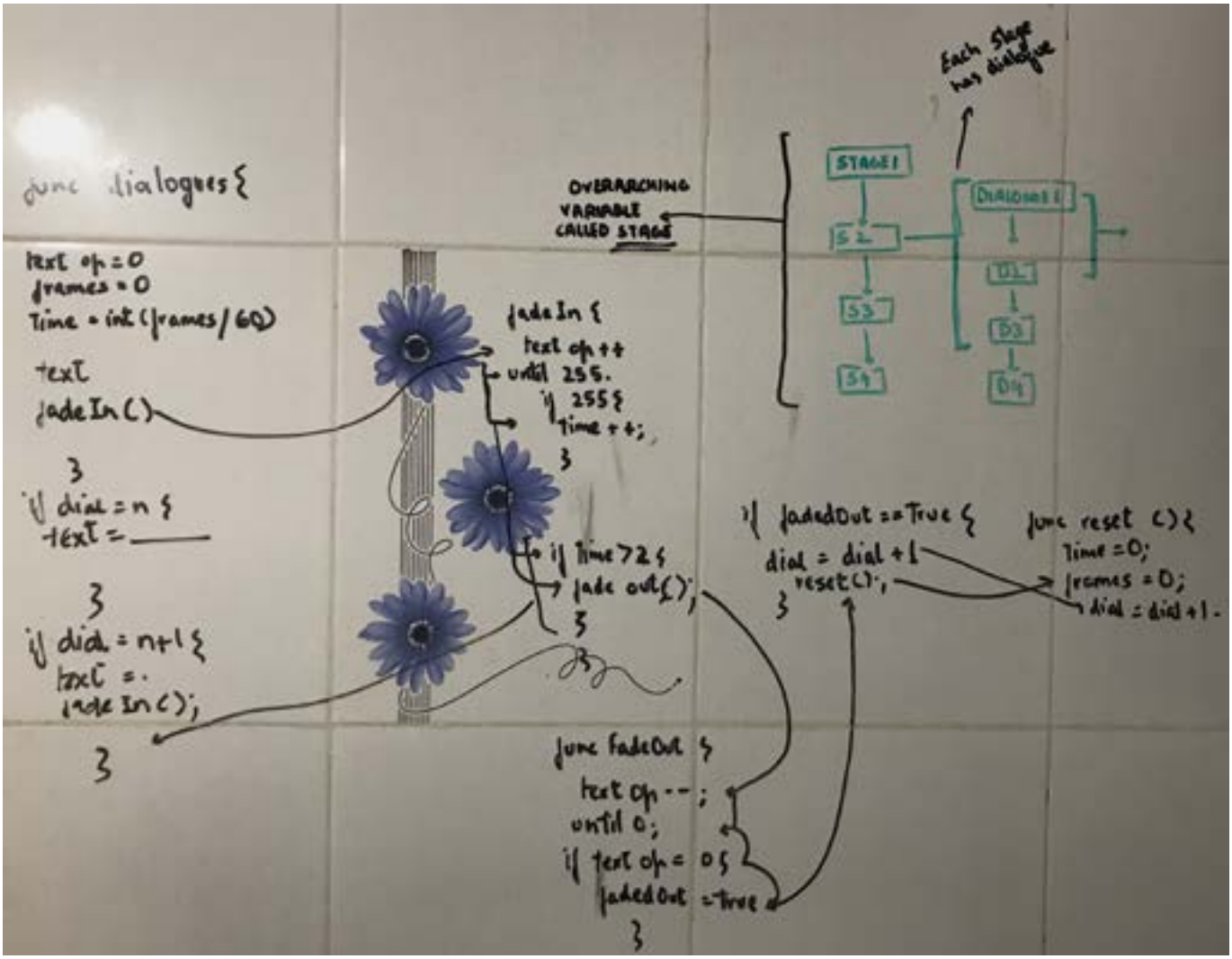
Initially, I started adding all of the files into one single file but soon realised that this would be extremely hard to manage. Programmers often use what is called a 'module', essentially breaking down larger pieces of code into smaller chunks. This is the technique I utilised as well.

Each object in the game had a separate file. These objects were then displayed at appropriate times using a stage variable. Each stage had certain variables within it such as dialogues and statistics for different stats that were displayed as you progressed through the game.

Here, I'd like to point out one incident. The morning when I was supposed to submit this project, my algorithm broke. Everything was dependent on everything else and somewhere in the code, they stopped working in sync. I was heartbroken.

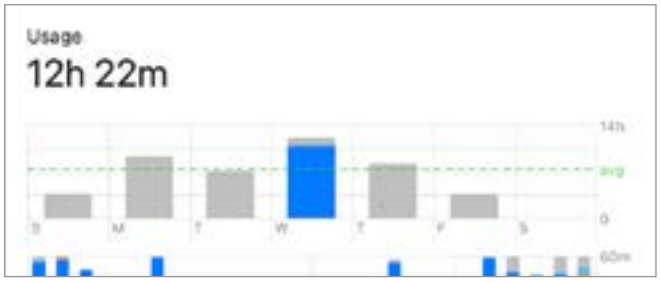
I think I was extremely close to giving up on the project simply because it was too much for one person to do. Conceptualise, design and develop an entire game with roots in science within the span of a month? No way that this was an easy task. However, I just couldn't. I couldn't give up and no matter how much I tried to take a break, countless solutions bounced around in my head. Luckily, one of them made sense.

Funnily enough, I didn't have a whiteboard and ended up using my bathroom wall to whiteboard the 'master algorithm'.



I broke down the game into more sub-parts but this time ensured that the main controller was the stage algorithm. Everything else happened within the stages. In order to accommodate this change, I had to rewrite the entire game from scratch.

Luckily, it worked. 1500+ lines of code and I had a fully-fledged game in my hands that people around the world could play. Further additions included animation for the text (fading in & out), a death screen, an alive time counter that was displayed if one reached the end and the inclusion of the soundscape & fonts.



Ever programmed for 12 hours straight? I did.

“It is 3:21 am on the night of 31st March, 2021. My project will go live tomorrow. I cannot begin to comprehend that it happened. I made the damn thing. I managed to code an entire f*cking game. More than 1500 lines of code and everything’s suddenly just worked. “

Excerpt from my reflective log.

10. Testing and Bug Fixing

If you design something to the point of conceptualisation, something that we tend to do in digital product design courses, you often tend to skip user testing. Even if you do conduct one, it’s largely simulated, since you do not have an actual prototype ready.

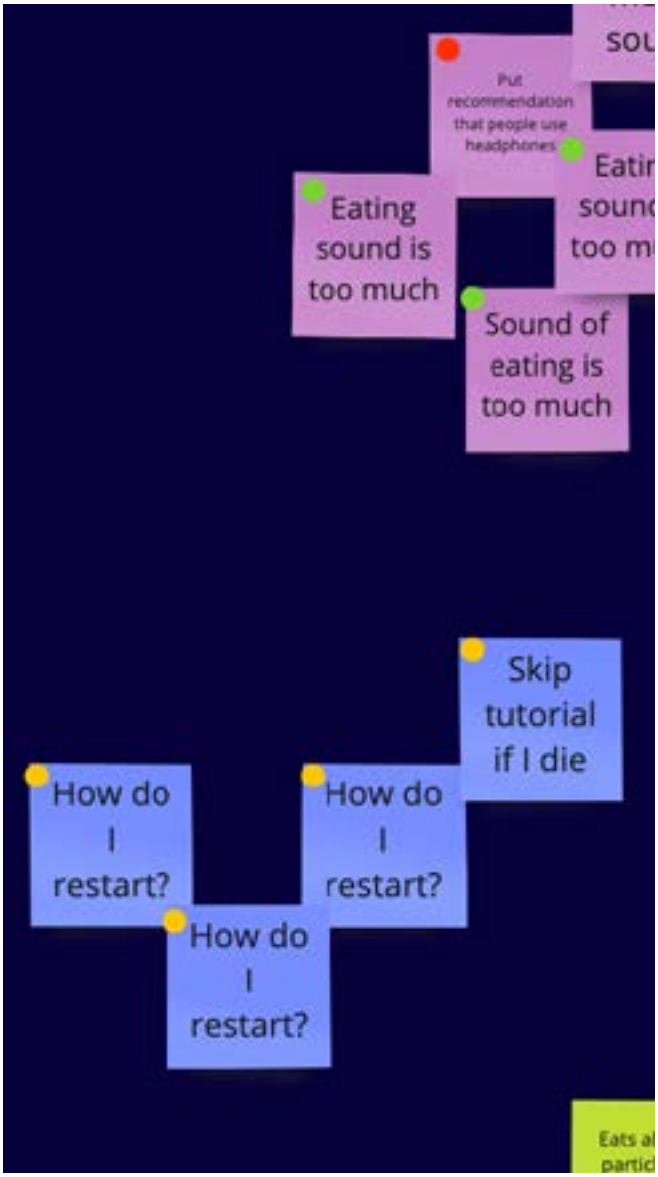
However, in this case, user testing was essential not just to identify design flaws but to also identify bugs and other issues that people may have while playing the game on their own devices.

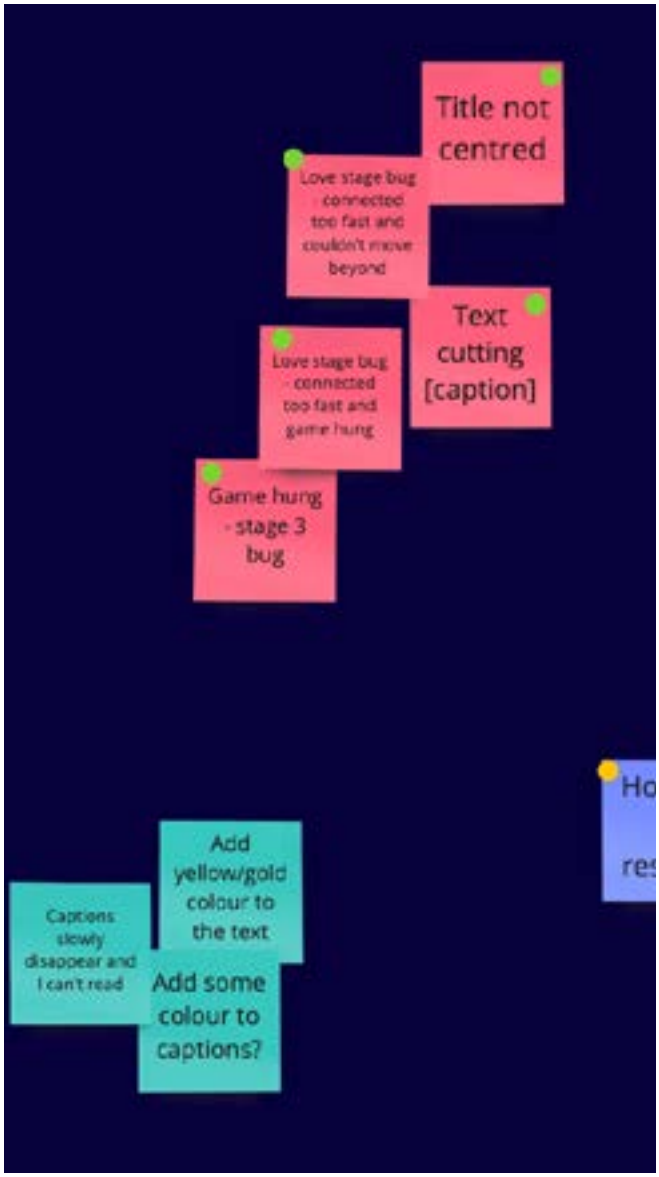
10.1 Collecting Feedback

I used a combination of friends and team members of the SGB (a total of 10 people) in order to test the game. Over three days, I collected feedback and mapped them onto a Miro Board and prioritised them categorically. Initially, I wanted to use a feedback grid (as the one suggested in the IBM Design Thinking Toolkit) but decided against it. Categorisation allowed me to understand what parts of the experience needed more work.

All feedback collected is in the image on the following page.


Collecting Feedback [categorised using a key]
Key
Audio
Restart?
Good things


Put recommendation that people use headphones
Eating sound is too much
Sound of eating is too much
Skip tutorial if I die
How do I restart?
How do I restart?
How do I restart?


Title not centred
Love stage bug connected too fast and couldn't move beyond
Text cutting [caption]
Love stage bug - connected too fast and game hung
Game hung - stage 3 bug
Add yellow/gold colour to the text
Captions slowly disappear and I can't read
Add some colour to captions?

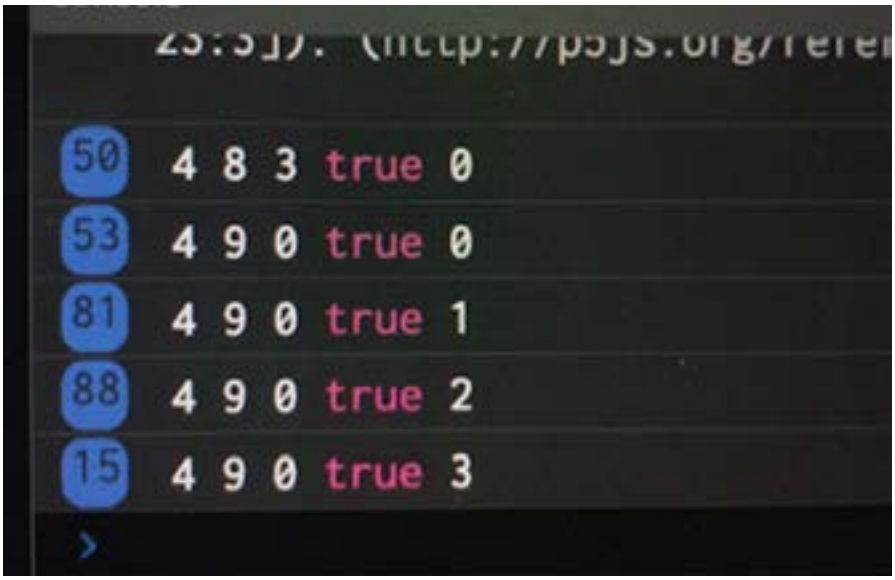
10.2 Sound Issues

When making and testing the music, Atreyo & I used headphones. However, when the audience was playing the game, they may not be using headphones. Therefore, a lot of adjustments to the volume were made and these were validated by testing across a variety of devices.

10.3 Restart Button

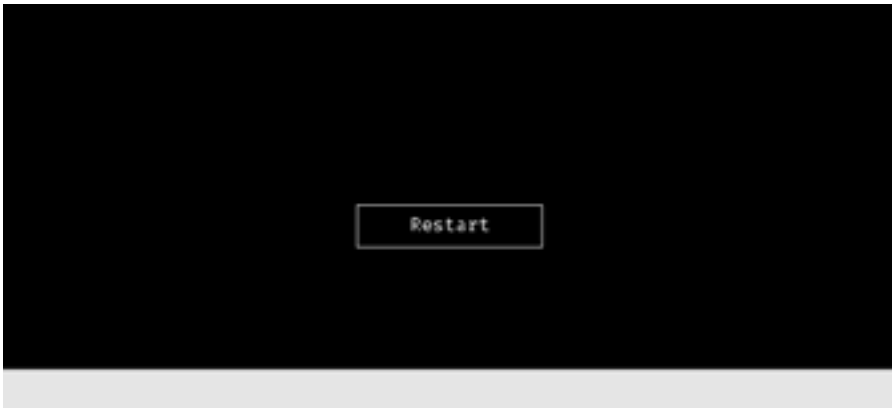
Almost everyone who played the game wanted a restart button. I'd initially assumed that it would be obvious to refresh the webpage and begin from scratch since it was meant to be a game of life, of sorts. During testing, however, the need for a restart button became evident. This problem took a while to solve simply because of the way I had coded the game.

Firstly, the game has three distinct components that allow players to progress: stages, dialogues and player-done actions. All 3 work in close relationships with one another. So I can't just tell the computer that I'd like you to go to Stage 3 as the dialogue might be of an earlier stage. Therefore, first I had to find a stable state to return to.



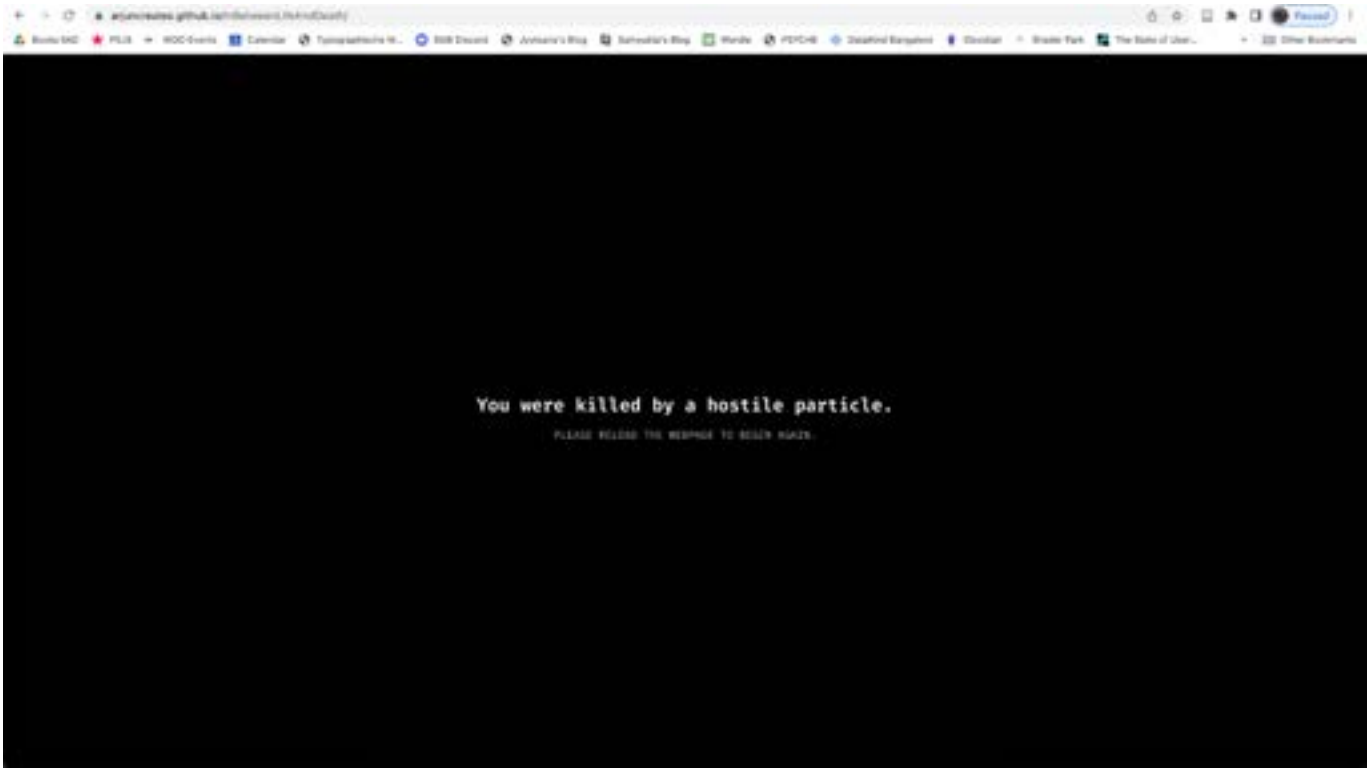
The stable configuration identified was 2, 6, 0, false, 0.

Next, I made the button.



However, there was a problem that I had not anticipated. Elements of the game and storyline were brute-forced as I lacked the technical knowledge to make a smooth and efficient program. Therefore, if a player died and went back to the stable state using the restart button, the later stages would be messed up. I tried a bunch of workarounds but they just didn't follow through.

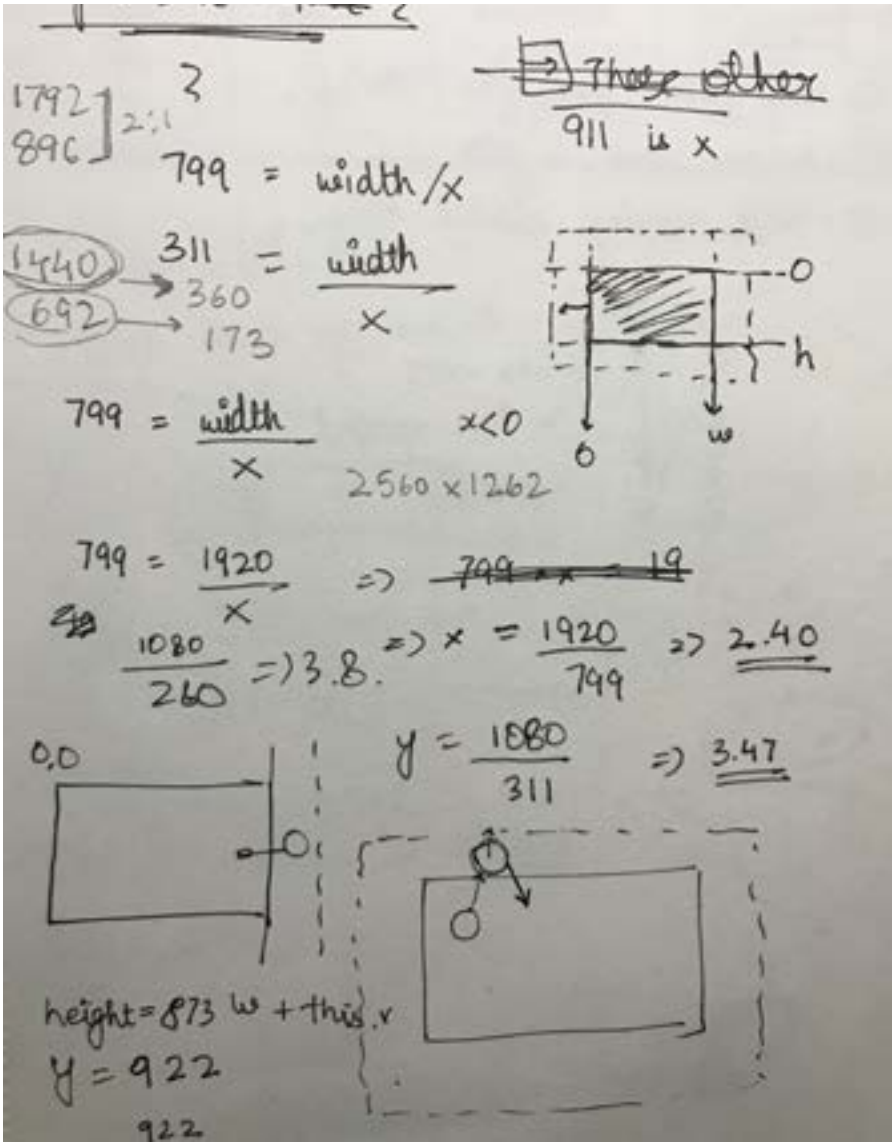
I couldn't make a restart button but had to allow users to move past the introduction to the game. Therefore, a compromise was forged. I added a prompt to skip the introduction using the 'S' key on the keyboard and a prompt to refresh the webpage every time a player dies. This was, a returning player could skip past the introduction and play the game from the stable state.



The solution worked and, in the circumstances, was probably the best one.

10.4 Text positions

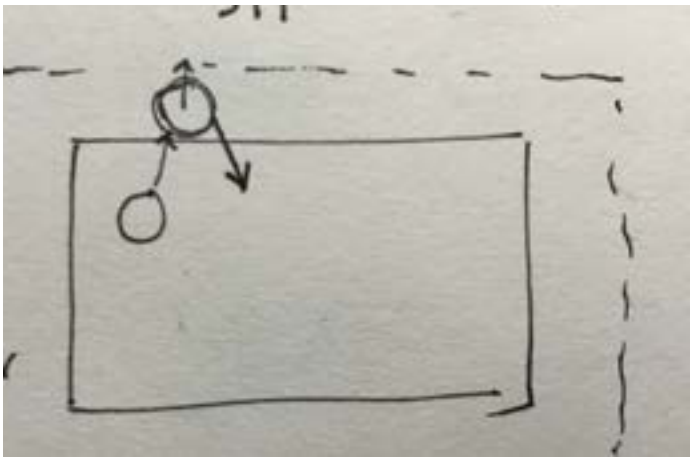
Everything in the game was flexible and not absolute. This means that all positions for elements were calculated upon the height and width of the user's browser window. However, there were discrepancies in the calculations for the title text. This was solved by arriving at a common ratio after testing with different screen sizes.



Once I figured out the ratios, it was easy to fix this bug.

10.5 Companion stage

The companion stage had a lot of bugs. Firstly, the particle would bounce off the screen if the heroObject interacted with it close to the edge of the canvas. This was solved by bringing it back to the center and resuming its free movement.



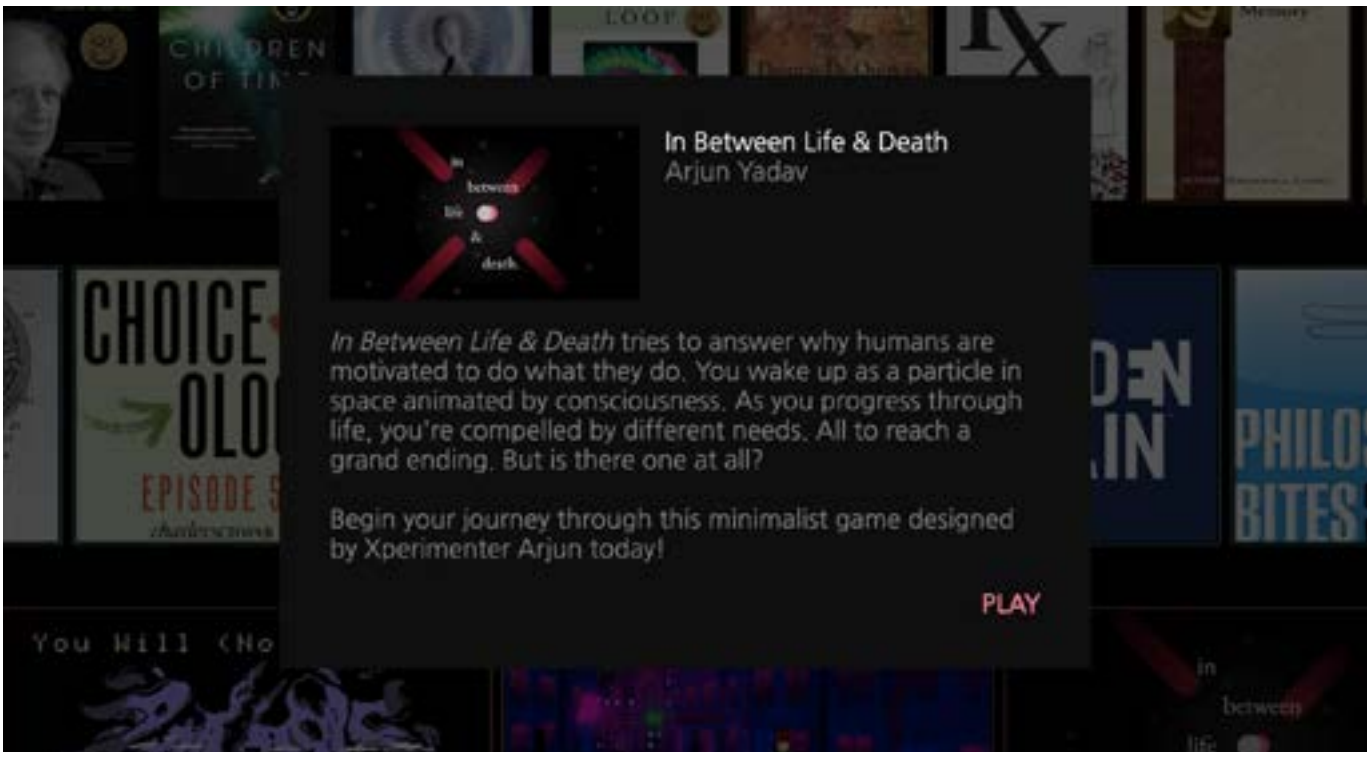
Another problem was that the game would be stuck in a loop if the heroObject and the companion were connected to each other before the dialogue faded out. This was solved by restricting the ability to detect collision if the dialogues were still not over.

https://arjuncreates.github.io/InBetweenLifeAndDeath/

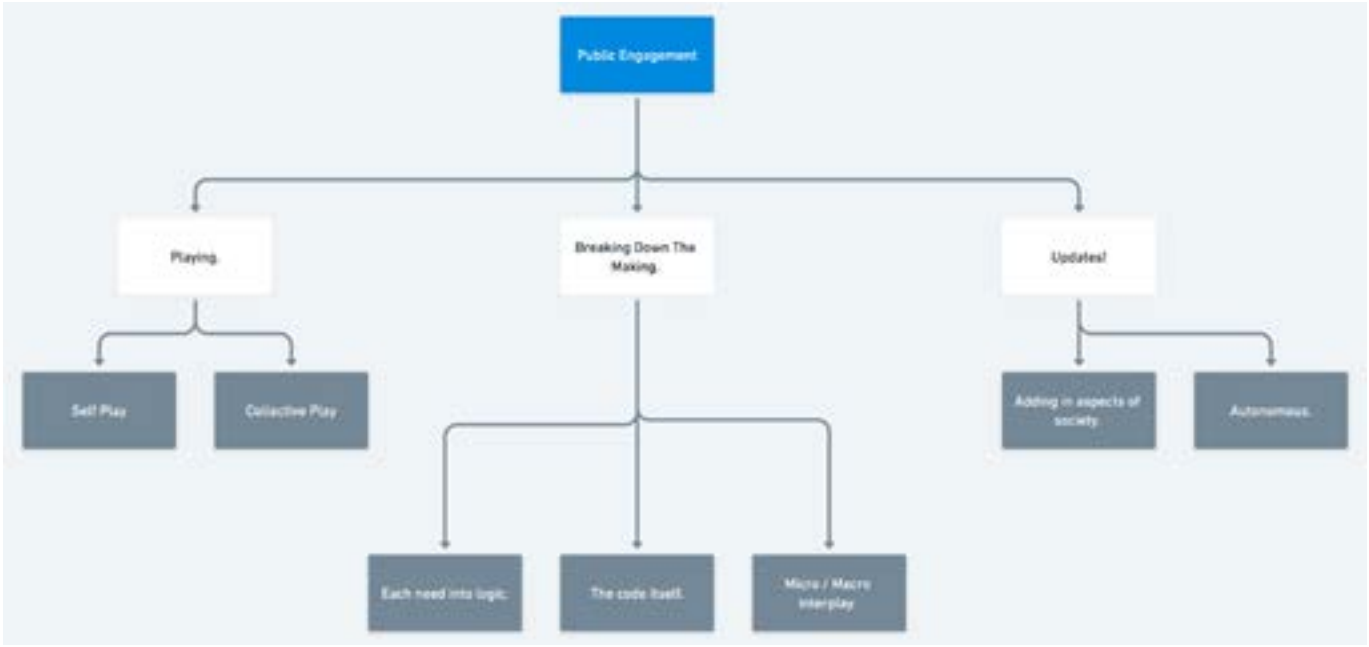
11. Outcomes

The game was launched on April 7th in the Media Lounge along with 10 other games created by famous game designers/ studios. It was a rather proud moment to see my little creation along with the likes of Nomada Studio, Gav Sarafian, Infinite Fall and others.

You can find the game here: https://psyche.scigalleryblr.org/media-lounge



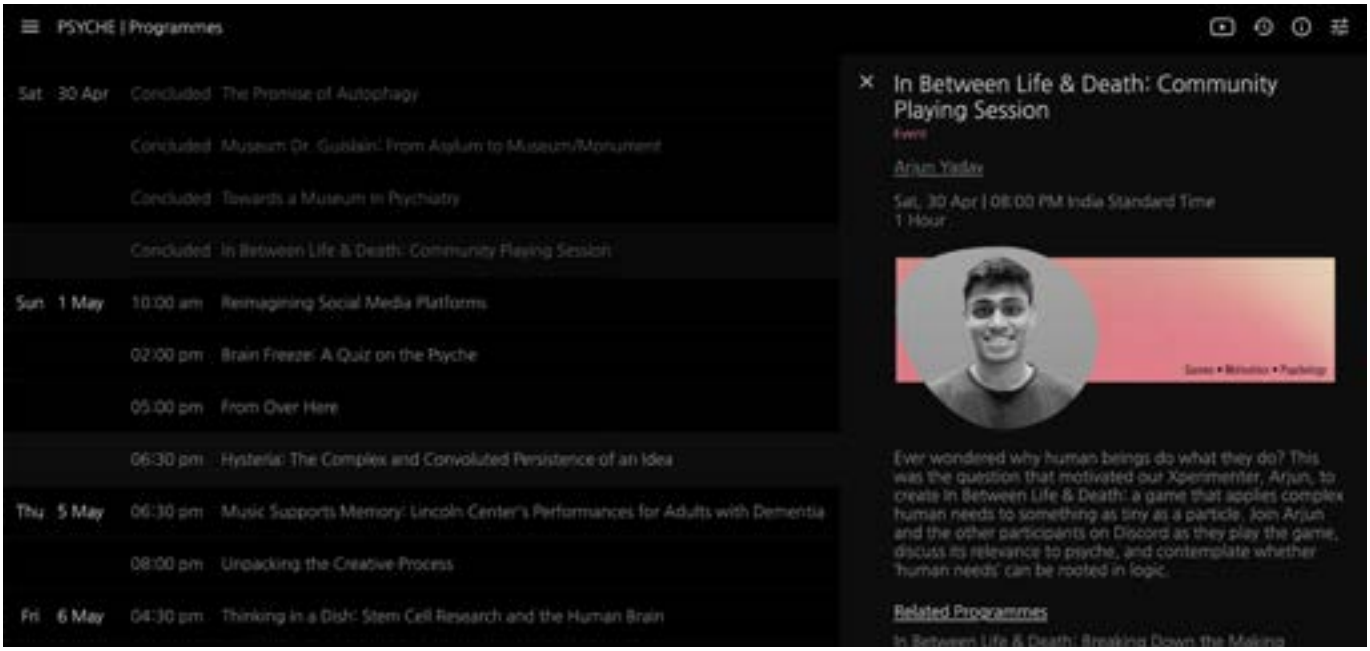
Along with the game, I had also planned public engagement programmes around it since the theories in the game by itself might be a little hard to grasp.



The public engagement plan was threefold.

11.1 Community playing sessions

I conducted two 1-hour long community play along sessions (on 23rd April and 30th April) using Discord. In these sessions, participants were first introduced to a little bit of context for the game, then they played the game and we ended with fruitful reflective sessions talking about Maslow's Hierarchy and its connection to the game.

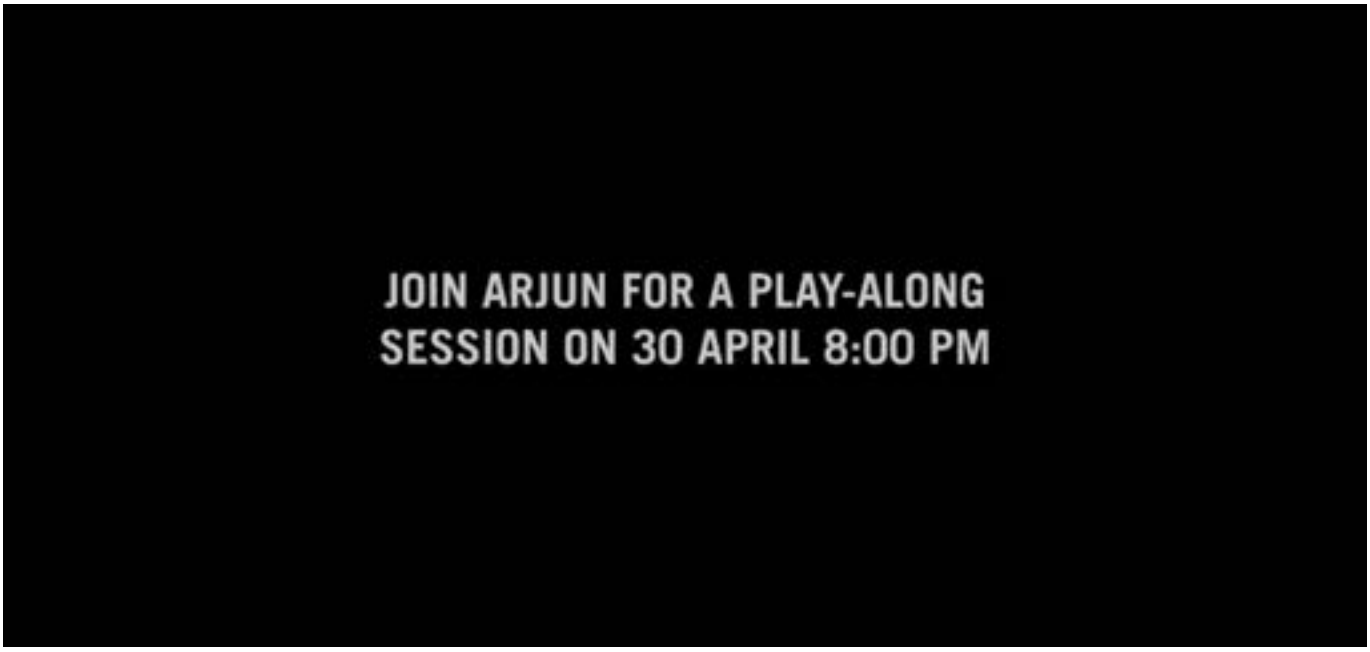


From the Psyche programmes page: https://psyche.scigalleryblr.org/programmes?p=PE_O2_PSY

In order to promote the game, I also made a short trailer to display the different stages of the game.

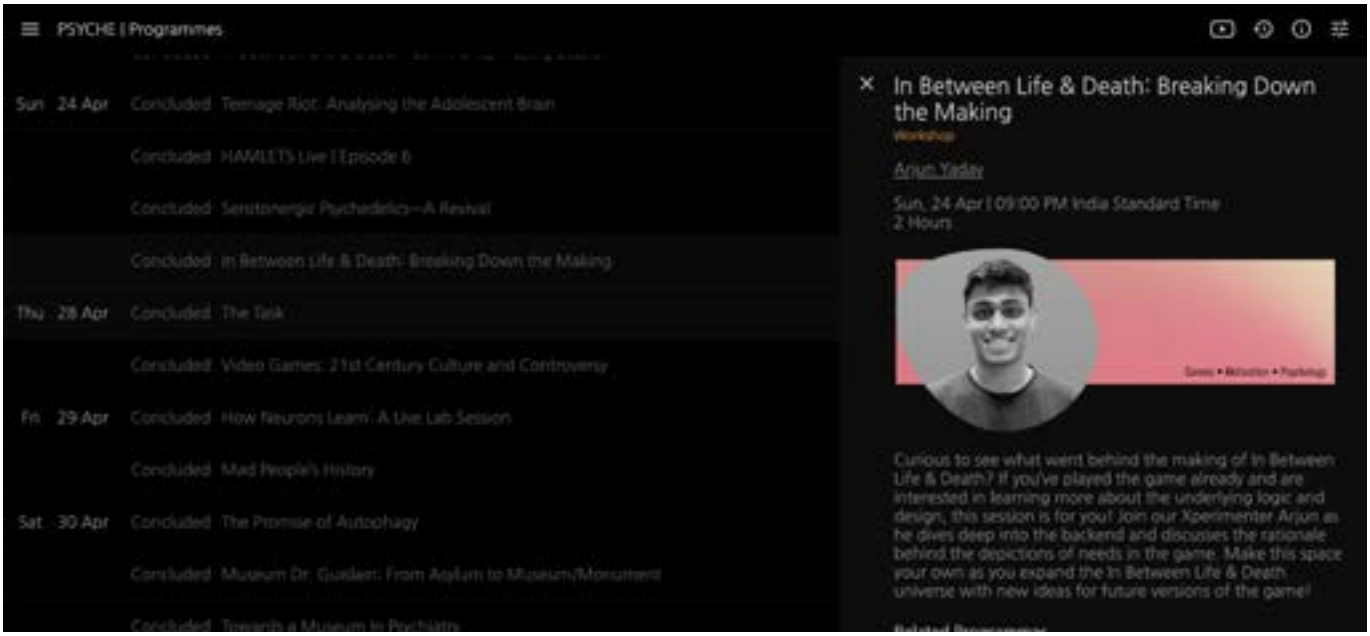
You can view it here: https://www.linkedin.com/posts/arjunyadav1310_psyche-activity-6925418786812555264-_OhG?utm_source=linkedin_share&utm_medium=member_desktop_web

https://psyche.scigalleryblr.org/programmes?p=PE_O2_PSY



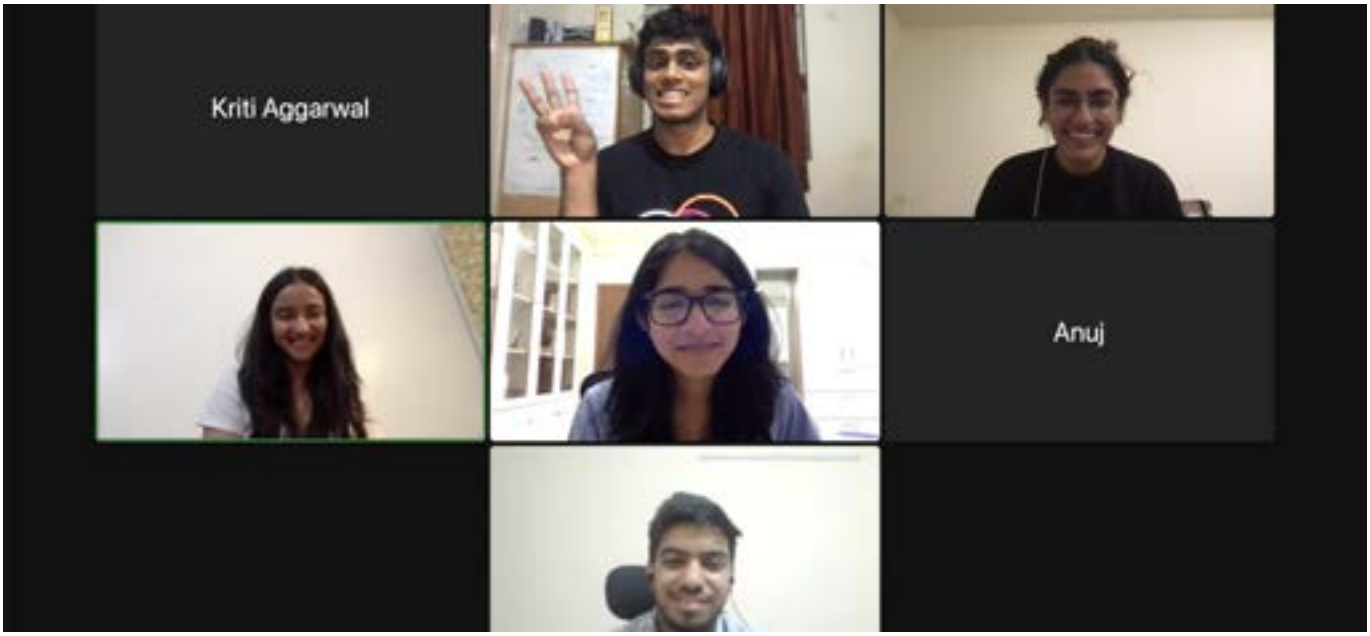
11.2 Breaking down the making sessions

These were two 2-hour long workshops that I conducted on 24th April and 07th May. In the workshop, I introduced participants to my thought process behind the game and we arrived at a common understanding of human needs through discussion.



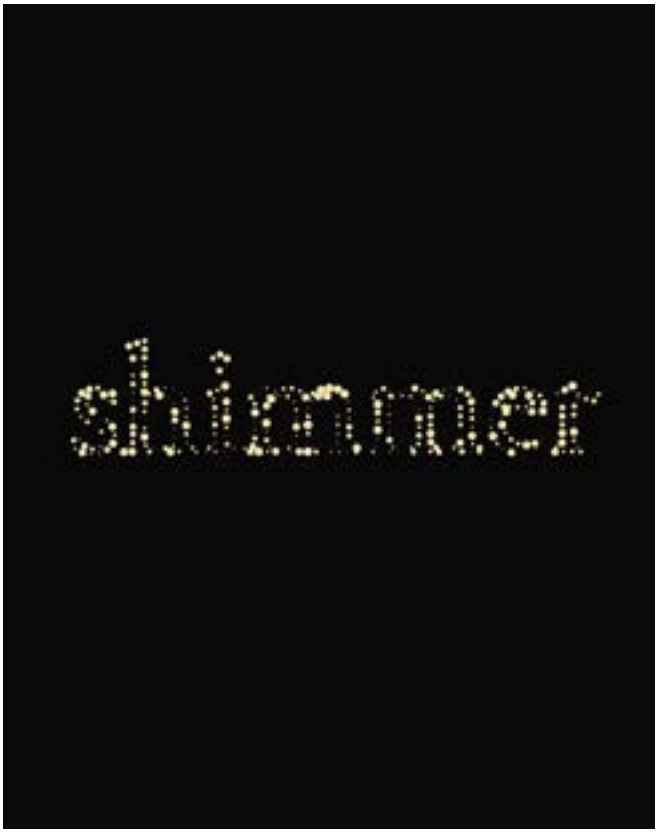
From the Psyche programmes page: https://psyche.scigalleryblr.org/programmes?p=PE_O2_PSY

Furthermore, we explored if these needs could be converted into systems of logic and looked at how one can convert these into code. Then, I helped participants understand the open-source code available on GitHub.



A screenshot from one of the sessions, with most of them being my friends.

In order to market this programme, I also explored interesting social media post options. I had been making graphic tools using the textToPoint function on p5.js.



I used the self created tool to come up with rather cool social media posts for this programme.

12. Impact

When the game was released, I didn't know how to feel about it and convinced myself that it was a failed project.

"What now? Is that it? Ironically enough, this 'end' is so underwhelming; much like the game. I don't know what I quite expect. Do I desire praise? Or approval? Or criticism? Or anything real? What do people feel about it irrespective of their relationship to me?

You're searching for the truth and all you get are statements that mildly touch the surface."

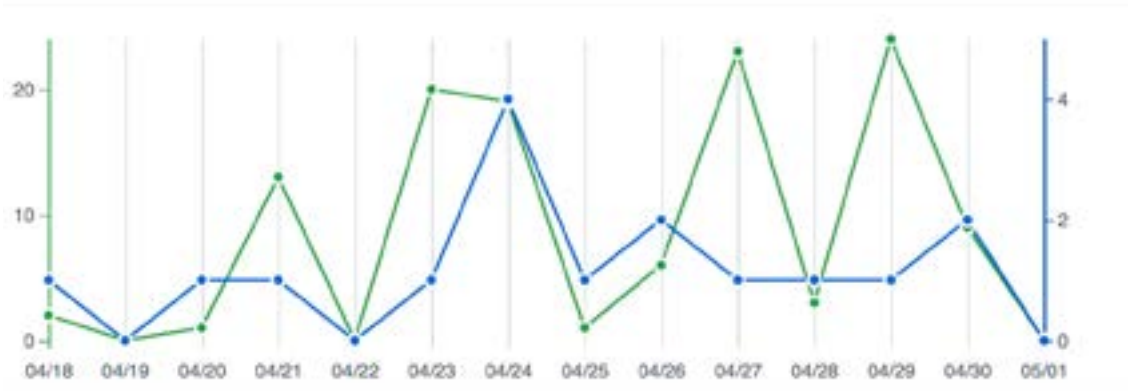
Excerpt from my reflective log.

However, as the days passed by, and I got the chance to interact with people who played the game, I realised that it wasn't a failure. I had expected more numbers but the truth was that Psyche, itself, saw less participation since it was an online exhibition during a time when everything had opened up.

Nonetheless, in retrospect, I am extremely proud of the little impact that I was able to create with a project that no one believed I could pull off; including my mentors at IIAD.

12.1 Numbers

The media lounge saw 308 views and 153 users till 30th April. My game was played 121 times at the time of writing this document (viewed on GitHub Traffic Stats).



My workshops witnessed a total audience of 49 people (playing: 16 & breaking down the making: 33).

In the workshops, I mentioned that the code was open-source and my repository saw 6 visitors and the game was cloned 7 times. Hopefully, they're working on cool variants of the game and I can't wait to see what those will turn out to be!

12.2 Statements

Since my workshops and events were interactive, a lot of people said statements that really made the project worthwhile. In this page and the following page, I'll add in some quotes from the sessions that participants said / wrote back in the form of feedback.

"The experience of the game felt meditative and brought about a rather primal human desire from within me."

"I later realised that we don't have to eat all the food available and I was able to survive for longer. Interesting how this correlates with the concept of greed."

"Learning to code really does empower you in more ways than one."

“Your blog comes closest to what I really want Open Notebooks to look like!”

“I had a vague memory of Maslow’s pyramid from a class I took, and it was interesting to see the concept turned into a game!”

“Love how the game has been able to start very different conversations!”

“Coding does not seem to be as hard as I thought it would be.”

12.3 What could have been done differently?

First was the exhibition itself. Early on in my time at the SGB, I pointed out a list of 8 issues and 6 additional suggestions to the PSYCHE website. However, by that time, it was too late.

https://arjunsnotion.notion.site/Psyche-Viewer-Evaluation-Suggestions-R1-3ec39cf315fc475db-810c30c772732b4

People found it hard to navigate through the exhibition and the reminder emails for programmes often resulted in people not showing up to the events. These were problems that impacted the numbers of the exhibition.

Next, the code of the game. In some of my sessions, by the fourth stage, the game would sometimes hang. This was due to the complexity in the code which required high computing power(expanded upon in section 7.4). I wish I had a developer who helped me make my code a little more efficient.

While there are issues that I can identify now, they are unfixable simply because the current structure of the game is dependent on these bad practices. Elements are brute forced into the game which also reduces the unpredictable nature of the game.

I would have definitely liked to explore the design of the game, especially the objects within it. Due to my time crunch and commitment to develop the game & push it out in time, the design of the game was restricted to what I could make in the given duration instead of what worked best.

Other suggestions arose in my workshops. People interpreted the theory differently and questioned my interpretation of the same. I realised that this is where the beauty lied. Everyone interpreted a foundational theory of human motivation differently which is quite fascinating if you think about it. At the end of the day, maybe we all need the same things but we want them differently.

13. Conclusion

https://arjunsnotion.notion.site/Why-weren-t-we-taught-communication-in-communication-de-

My goal at the SGB was to execute a public engagement programme that was rooted in science. If people who engaged with it took back scientific knowledge and it changed their perspective of life, irrespective of the amount of change, I believe I had a successful project.

And by looking at the data and statements (see section 12.1 and 12.2), I can confidently say that I was largely successful.

Before moving to Bangalore to pursue this wild project, and even while making it, many of my mentors asked me to rethink my decisions. Their fear was natural. The open-ended nature of this project, the amalgamation of disciplines other than design and my fixation to not only design but develop an entire game without any formal training in computer science were huge risks that I undertook; that too with bizarre confidence when viewed in hindsight.

These risks add to the personal satisfaction of this project. During the time I spent making this, I learnt in a truly accelerated manner and that too things that I would have never thought of diving into. From science, psychology, logic, computer science, biophysics (who would've thought!) and a multitude of other learnings, I'm glad I took this risk.

It's a hard pill to swallow, knowing that jurors might not consider many contents of this project "visual design". However, I would strongly argue against this proposition. During my project at the SGB, I questioned design and the design process far too much and, by the end, arrived at my own meaning for the same. Ironically, this was a question posed by the faculty during the end of my foundation year: how do you define design for yourself?

While human-centered design as a methodology already has a trailing fandom, the definition of "design" largely refers to the end visual outcome. However, a simple Google search would tell you that communication design is concerned not only with the representation of the message, but of the formation of the message itself.

So often, we put out messages in beautifully decorated containers, while the contents are devoid of any substantial meaning. When I look back on this project, I'm proud to not only have shaped the vessel in which it went out to the people but define the content as well.

The research, translation to logic, communication, organisation of words & visuals all came together to create some sort of

measured impact on the people of this world. Moreover, the direction of the project was chosen by the target audience themselves, forming the human-centered nature of this project.

In the end, there was a problem and I offered a solution that solved the problem in my own little capacity. Isn't this as designed as it gets?

"It's not the numbers but the quality of engagement that matters. Impact one person's life, but do it well."

In a dialogue with Jahnavi Phalkey, when discussing the impact of my project.

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