

EMOJIS AND AI TO COMMUNICATE NON-VERBAL EXPRESSIONS OF EMOTION:

IN PREPARATION FOR THE DIGITALIZATION OF DOCTOR-
PATIENT CONVERSATIONS

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INTRODUCTION

ABOUT THE PROJECT

Looking forward to near future communication of emotion and empathy in healthcare, particularly, digital communication whilst not being able to see the other person. This specificity of empathy stemmed from researching about communicating emotion. Communication is essential for our day-to-day lives, but empathy is what gives nuances of saturation to the story of those communicating. Empathy is able to bring the emotions to of which the other person is expressing to life. It creates connectedness between people; with empathy, you have the ability to feel and understand what someone else is going through.

In healthcare services, the ability to express emotion and empathy brings great impact to both the doctor and patient. The Association of American Medical Colleges (1998) expressed this by stating that “physicians must be compassionate and empathetic in caring for patients, and must be trust worthy and truthful in all their professional dealings” (Association of American Medical Colleges, 1998, p. 4). The initial research to this project looked to investigating how perceiving the element of empathetic communication effects patient satisfaction in current face-to-face healthcare situations (Chiu, 2018). This leads to understanding the need and value of ensuring the ability for doctors and patients to be able to express emotion and empathy in the coming five to ten years of healthcare communication development.

As technology and digital communication is rapidly developing into new areas of society, healthcare communication will one day be bound to be highly dependent on digital communication. Healthcare conversations today is still highly dependent on face-to-face conversations between doctors and patients.

ABOUT THE COMPANY

MIRABEAU | *

A Cognizant Digital Business

Mirabeau is a digital agency founded in Amsterdam, 2001, and was acquired by the global leader in business and technology services, Cognizant, late 2016. Mirabeau strives to create the best digital experience possible. The core of the company evolves around strategy, design, development and growth.

I would like to give a special thanks to my company supervisor at Mirabeau, Peet Sneekes, for helping and supporting me, providing me with necessary resources, and giving me the creative freedom to shape this project to what it has become.

Mirabeau's success lies in their deep insight and understanding of people, combining different disciplines to create solutions geared towards the need of the client/customer. Emphasis is put on people's ever adapting behavior and expectations from the digital world that is rapidly moving forward. Projects are compassed around human centered design, understanding human perspective to create a flawless connection between people and companies. Mirabeau is also engaged in many emerging technologies in which they believe are thriving or will grow tremendously in the future. They seek to create projects utilizing these technologies to create contexts and situations where it induces interest, creativity and fun (Mirabeau, 2017).

I received the opportunity to execute my graduation project at this company with the guidance of my company supervisor, Peet Sneekes. Mirabeau offered me opportunities to network and create connections that were meaningful to the subject of my project. I had access to people with great knowledge and skills in areas that I was not familiar with; this includes other interaction designers, founders of companies, people working in the healthcare industry, customer care specialists in healthcare insurance companies, insights specialists, and many more.

DESIGN BRIEF

BACKGROUND CONTEXT

In healthcare, communicating empathy is important to creating a better doctor-patient relationship (Stewart M. A., 1995; Stewart, et al., 2000; Wilmer, 1968). A relationship was found between empathy, proxemics, trust and patient satisfaction through the research question "How does recognizing signs of empathy exhibited by a healthcare professional attribute to the patient's overall satisfaction of the service?" (Chiu, 2018). The results show that when a patient perceives specific signs of empathy exhibited by the doctor that creates positive conversational proxemics and atmosphere, it positively influences the patient's trust in the healthcare service and is more likely to increase patient satisfaction. Current healthcare conversations between doctors and patients dominate through face-to-face situations, and occasionally through vocal based technologies such as phone calls. These situations allow patients and doctors to perceive signs of real time verbal and non-verbal reactions given by the other person to better determine how they should respond appropriately.

As digital communication is rapidly developing in our society, more industries are adopting this as a new communication method, including healthcare. In near future, healthcare will likely have fully adopted digital communication as their main communication method with between doctors and patients. Digital communication can be categorized into two forms: synchronous and asynchronous (Chin, 2016). Synchronous, such as video chats or live chats, indicate communication that happens real-time, whereas asynchronous, such as text messaging or emails, indicate all parties engaged in the conversation do not have to be active at the same time.

While near future digital healthcare communication could take form in both options, this project will place its focus on asynchronous communication, namely text messaging, for several reasons. Along with video chats comes the benefit of being able to perceive more elements of verbal and non-verbal cues. This requires both participants to be fully available and active for the duration of the conversation. In service, this suggests that there must always be someone available, which when it's not the case may easily affect patient satisfaction negatively. This argument to not consider video chats also applies to live chats (Donohue, n.d.). Although live chats may often be perceived similar to

text messaging, the results of text messaging used in providing customer service transcends that of live chats (Gahagen, 2017). Being asynchronous, text messaging gives patients a different set of expectations. Patients should knowingly enter the conversation expecting a response within a certain time frame and not have it to be immediate, although this can be possible if circumstances deem to be right. When this happens, text messaging can become near-real-time conversations. According to the CEO and founder of BeterDichtbij, one of the few companies that offers a text messaging app for doctors and patients in the Netherlands, since implementing the app the frequency of patient's contacting their doctors has increased but the accumulated duration of all interaction has halved (Bogaerts, 2018). Text messaging provides more flexibility to when, where and how (i.e. the possibility of multitasking between conversations or whilst retrieving relevant information) doctors respond. However, with text messaging there is a gap between the need to retain verbal and non-verbal cues in the conversation. This is considering how modern day text messaging is highly dependent on expressing verbal cues digitally.

Aside from researching about empathy in healthcare, the potential of emojis was researched through the research question "To what extent can emojis compensate for verbal and non-verbal cues in non-face-to-face communication?" (Chiu, 2018). Emojis are a fast growing phenomenon in digital communication. While there are different ways in which it is currently being used in different cultures or demographics, this project focuses on emoji uses that can communicate emotion and empathy. Emojis are already an existing tool used to express emotion, concepts, and many other things which are usually expressed through non-verbal communication in a face-to-face conversation (Jibril & Abdullah, 2013; Riva, 2002). Studies show that messages that contain emojis are found to be more meaningful than traditional text messages (Novak, Smailović, Sluban, & Mozetič, 2015; Zareen, Karim, & Khan, 2016). They possess these capabilities, but they have not yet adopted an intentional use of expressing and understanding emotion to benefit digital communication in the service industry, such as healthcare. The potential that emojis hold makes it relevant to explore the use of emojis in the design phase of this project.

PROBLEM STATEMENT

The importance of doctors showing signs of empathy will still exist remain when doctor-patient conversations move into a digital space in the near future and transitions into text messaging. Current text base messages limits the doctors to only receiving what would be verbal communication cues in a face-to-face setting. In order to be able to give an empathetic response, there must be emotion present to be empathetic towards. The extent of using words to replicate verbal communication is not yet able to fully translate an emotion as you would experience it face-to-face. The intensity and impact conveyed to the doctor when a patient states "I'm angry" in a text message has a considerable difference to when the patient broadens their shoulders, stiffens up the body, tightens and furrows their brows, lowers the tone while saying "I'm angry" in a face-to-face conversation. Text messaging, as it currently is, limits the doctors ability to be able to take all of the information that he/she would normally have access to in a face-to-face conversation into account in his reaction or response.

GOAL

The range of information that digital messages currently expresses is increased and communicates more non-verbal information. Emotion is expressed to communicate an area of which patient's want to draw the doctor's attention to so they can tend to their underlying need as a response. The initial goal is for doctors to have more necessary information at hand to make the best decision in how to respond. Their response resonates empathy towards the patient, enabling patients to feel all the benefits of empathy (Tayal, Michelson, & Tayal, 2017). Eventually, more research could be conducted into seeing how doctors can utilize the benefits of emojis by incorporating them into their responses. In turn, this could lead to an overall improvement of a two-way digital textual communication in healthcare.

VISION

The quality of healthcare services through digital platform in the future is improved due to the transparent expression of emotion. The high fidelity of face-to-face communication in a digital space allows clearer communication, better understanding, and thus a better chance for empathetic communication. Patient's trust in the healthcare service increases, and thus so will patient satisfaction. I envision the use of emojis in professional conversations to not be seen as inappropriate in the future due to how fast it is currently emerging into different sectors of communication already.

TARGET GROUPS

patients

Patients need to be able to fully express their concerns, experience, emotion and questions to their doctors. Currently, healthcare is in the process of introducing digital communication such as text messaging to allow doctors and patients to communicate outside of consultations. In the near future, roughly in five year's time, text messaging will be more highly accepted as a method of healthcare communication for certain situations. This project focusses on patients who are seeking help with a situation or question, of a non-emergency nature, regarding their own health. This project does not include procedural requests, such as requesting for new prescriptions, making new appointments, etc. They enter the conversation with a doctor knowing that doctors may not immediately reply, and that there is a standard period of time in which the doctor will definitely respond within. Patients must be able to disclose information and details regarding their problem to the doctor. Being able to express emotion may allow the doctor to have insight to relevant information to better help the patient.

This project is considering patients who have competent communication abilities. The patient must have a proficient level of listening, speaking and writing in the language of communication in the conversation (European Union, 2013). They must generally also have the ability to determine an emergency situation from one that is not. Of course, this may not always be accurate. The scope of this project only allows for consideration of patient's with the most common physical abilities to express non-verbal communication.

doctors

Doctors, in near future digital healthcare communication, must still try to meet the expectations of what is considered as medical professionalism. Empathy is one of the core competency to medical professionalism; it is perspective taking, compassionate care, and standing in another's shoes (Hojat M. , 2016). To be able to show empathetic in the doctor's response, information such as the patient's emotion in their questions or descriptions of the problem must be readily available to them. Knowing the patient's emotions can affect the approach that the doctor takes in their response, their choice of words, their medical decisions, etc.

However, there are often other individuals who also come in contact with patients often, and similarly have the same need and expectation to reach medical professionalism. These individuals can be assistants, nurses, receptionist, specialised help, etc. They are also a part of this target group.

This project considers doctors and other individuals who have the medical skill and knowledge to be able to help the patient, or have resources to be able to refer them to. The doctors must also have advanced language skills in the language of conversation.

DESIGN CHALLENGE

How might we induce a more empathetic response from doctors by strategically adding elements of expression, such as emojis, to convey emotion in the digital messages that patients send to their doctors, and what additional elements of technology might we add to the information that the doctor receives to aid them in giving a more considered empathetic response. The design should allow a range of personal and expressive ways for patients to convey underlying intent to the doctor, which would be perceivable in face-to-face conversations as a combination of verbal and non-verbal cues. The doctors are not yet required to utilize emojis to convey empathy in their responses.

DESIGN REQUIREMENTS

conversation context

- Two people taking part in the conversation: doctor and patient.
- The people taking part in the conversation cannot see the other person.
- The people taking part in the conversation cannot hear the other person.
- The conversation input from both doctor and patient is in the form of digital text messaging.

elements of expression

- The added elements of expression must express verbal and/or non-verbal signs that suggest specific emotions.
- The added element of expression can also represent things, behavior, feelings, metaphors, physical changes, etc. commonly associated with specific emotions.
- The use of elements of expression by the patients is a conscious one.
- The patient's use of the added elements of expression is a choice and is not mandatory.
- Different elements of expression can be combined and used simultaneously in a message.
- The added element of expression by the patients should look, feel and sound the same across all devices and operating systems.
- If emojis are used as an element of expression, the patient's emoji selection is limited to Appendix 1.
- The patient must use at least one emoji throughout the whole conversation.
- The patient should be encouraged to use the element of expression, e.g. emojis.

emotion detection

- Emotion can be detected from the added element of expression, the added element of technology, or both.
- At least one emotion should be detected with every complete text message that covers the patient's entire concern or inquiry whether or not this is in one message bubble or multiple bubbles.

elements of technology

- The added elements of technology should recognize communicated non-verbal signs that suggest specific emotions.
- The added elements of technology should be able to measure non-verbal signs of emotion; the ability to measure indicates that data can be collected, documented and analyzed. For example, quantifying facial expressions, tone intonations, pitch etc. into numerical data.
- The added element of technology can be used together elements of expression.
- The added elements of technology does not have to be used together with elements of expression.
- The added element of technology should be based on an existing technology and its functions and features.
- The functions and features of the added element of technology does not have to currently exist or be fully functional for the proposed design in spring 2018.
- The patient must be notified prior to the very first conversation with the doctor on the messaging platform of the information and data of which the added element of technology can take and use.
- The information and data of which the added element of technology takes and uses is strictly used only between that patient and the doctor or healthcare individuals who have the authorization to be in that conversation.
- There should be no signifier to indicate to the patient that the added element of technology is active and in use.

information display

- The information displayed should present processed data of verbal and/or non-verbal signs detected through both the elements of expression and elements of technology if applicable.
- The processed data from added element of technology should make non-verbal cues visible by communicating it in a visual manner to the doctor.
- The information display should indicate suggestions, approaches or directions of how the doctor should respond.
- The patient should not be able to see the information that the added elements of expression and technology takes, processes and displays to the doctor.
- The doctor must be aware of what information displayed is expressed and sent by the patient.
- The doctor must be aware of what information displayed is processed by the added element of technology.
- The information display is updated real time to the data collected from the patient's most recent expression.
- There must be a signifier to indicate an updated change in information display.
- The information displayed is based on a data processing algorithm.
- The doctor should be able to recognize and learn patterns of the patient's emotion and the response suggestions with time and experience with this interaction.
- The doctor should be able to turn the learnt patterns of the patient's emotion and the response suggestion into intuition triggered by the information display.

data processing

- Data collected from the elements of expression or elements of technology should be able to be processed into a response suggestion independently.
- Data collected from the elements of expression and elements of technology should be able to be processed into a response suggestion collectively.

complete interaction

- All interaction, activities and events that occurred within the conversation are recorded and stored and made available to the doctor after the conversation has ended.
- The information and data of the conversation and of which the added element of technology takes must adhere to the European General Data Protection Regulation (GDPR)
- The doctor response after seeing the information display should be more empathetic than if the doctor had responded without seeing the information display.
- The patient should prefer the response the doctor gave having seen the information display over a response that the doctor would have responded without seeing the information display.
- The patient's preferred response should promote an increase in patient trust in the doctor and/or healthcare service.
- This patient's preferred response should promote an increase in patient satisfaction.

DESIGN PROCESS

RESEARCH BY DESIGN



The topic of this project evolves around designing for near future healthcare communication. While this project allows for use of technology that already exist, but do not have to be fully functional or widely accepted today, it is uncertain and can be risky. This goes for both the technological innovation and societal impact and acceptance of the technology. Implementing technology which is not an average societal norm may induce aversion if not done so carefully. The same applies for the use of emojis; it is currently used in casual industries or private uses, but not widely accepted as professional.

Taking on the approach of research by design allows this project to identify imperative interactions and design areas relevant to creating an improved experience for both doctor and patient. Driven by research, the goal of the design process such as ideation, selection, iterations, user research, user testing, etc. is all executed with the goal of answering individual sub-research questions.

This project aims to answer the following research question: how does being able to perceive additional information that communicates expressive signs of emotion, consciously and unconsciously by the patient, effect the empathy level in the doctors response? How can this be utilized to creating responses in which patients have a preference for over a response generated without the knowledge of these additional information.

Through taking approach research by design, this project has taken upon an explorative research and design process. The intention is to understanding the field of topic and the people in it. As illustrated above, each part of the process involved researching existing literature and theories. This was taken into the continuous process of testing and bringing it into design.

One thing to take note of is that the approach of research by design in an explorative manner helped gain insights within a topic that has a lot of ambiguity to it. Research activities in this project were mainly focused on qualitative approaches. The results provided insights to the topic, however due to the small amount of population tested on, it is not possible generalize the results and draw concrete conclusions

Throughout this research, I refer to the two target groups as doctors and patients. Please note that when I say doctor, this also includes all other individuals within the healthcare industry who often come in contact with patients and also have the knowledge and skill to help the patient with their inquiry, or have resources available to refer them to.

deconstruction of the problem

The design problem and challenge communicated in the design brief above, focuses on four main elements:

1. The patient's message to the doctor must be able to communicate more than verbal expression of emotion; it should communicate non-verbal expressions of emotions too.
2. Added elements of expression
3. Added elements of technology
4. Having access to more information regarding the communicated emotion should promote a more empathetic response from the doctor.

This was used as a foundation to structure the execution of the project.

PART I.
ELEMENTS OF EXPRESSION
AND TECHNOLOGY

Delving into elements of expression and technology, the most important question to be asked is what effect it has on the response. Elements of expression and elements of technology both stem from a slightly different nature, and thus has been separated in research method and processes.

The elements of expression explore the possible ways in which patients deliberately chooses to express themselves. They can make use of different tools, which is explored below, but they are not required to.

The elements of technology, however, explores the data in which technology can recognize, measure, and process. The data is collected through the technology based off the patient's output of behavior, tone, temperature, etc., but they are not physically choosing to send this data over to the doctor.

The results of both studies will ultimately be combined and integrated into the interaction flow later in this project.

INITIAL EXPLORATION

I started off this project by immediately diving into idea generation activities with the goal of understanding the interaction between doctor and patient and how information is transferred. Though it was a small activity, it showed to be crucial to this project.

I began by breaking the interaction down into four areas of research and design. Only two are relevant at this stage: the message that the patient sends, and what the doctor receives. Using generative and explorative research and design activities such as brain writing, brain drawing, and analogies, I was able to determine a design direction. The area with most space for innovation and research is 'what doctors receive'. It also highlighted the element of measurable expressions, such as movement, volume, speed, pauses, etc. in which could be valuable to the doctor in understanding the patient's emotions.

insights

- The elements of expression must first be tested before diving further into ideating specifically on how they are used. The elements of expressions where focus will be put on in this project are emojis, emoji terms, and both.
- The interesting part regarding non-verbal communication is not just the expression of an emotion that should be focussed on, but more importantly *'the change of'* non-verbal expressions. For example, everyone has different facial features and ways in which they express emotions based on facial features. Someone that always looks angry may in fact not be angry at all. Instead of looking at their facial expression, their change in movement can tell us more about their emotional state rather than assuming on first glance. In further chapters, Ekman's research of facial expression in correlation with emotions is studied. This is where it is important to note that it's not that everyone with tense eyebrows pointed downwards is angry, but there research shows that there is a commonality in how certain movements in facial expression indicates emotion. Think of the person with a neutral face that always looks angry, you will know he is angry when his forehead scrunches up even more and his eyebrows furrow even more.
- When expressing an emotion, whether intentionally or subconsciously through non-intentional use of emotional words or non-verbal cues, this is the person expression the emotion calling out for something to be done. I refer to this as a *call for action*. You are drawing attention to expressing the emotion you are feeling and possibly attributing it to the other topic of conversation.

ELEMENTS OF EXPRESSION

EMOTION EXPRESSION

One of the main elements to this design project is emotion expression. While ideally the project solution will make use of tools, such as emojis, to better express emotion, there was an itch to first understanding the question: *How do people choose to express their emotions visually and freely (without being limited to emojis)?* It was made explicit to participants that their expressions of emotions should not be illustrated in words. I hope to explore the communication of non-verbal signs of emotion knowing that further research will be conducted on emotion terms and that I see the use of words as a direct interpretation of verbal communication. This generative research aims to gain insights into people's behaviors, needs and opinions when expressing emotion.

A separate brainstorm session was hosted to explore bringing emojis and emotion into the physical world. Details to this brainstorm session can be found in this chapter's Elements of Technology, Making non-verbal communication physical as it was geared towards design requirements under elements of technology. Two results from that brainstorm, however, deemed suitable for this generative research: totem pole of emotions and color as explicit expression.

method

The emotional totem-ball pole is an exercise where three participants were asked to create their visually expressive emotion diary. The totem pole concept allows participants to have a good overview of their emotions throughout their day. Participants were asked to express their emotions 6-7 times throughout the day. They were provided with color markers, but they were also given their own creative freedom if they wish. Their use of colors must be explicit. After the completion of this exercise, each participant was emailed an additional exercise to express those 6-7 emotions with emojis.

results & conclusion

The one participant who expressed single emotions rather than expressing what influenced their current emotion, was experiencing a struggle in which she focused her expressing her emotions on.

This difficulty was expressed by one participants which can be seen in Appendix 2, and may cause frustration.

Emotion is a complex experience. They consist of an array of external influencing factors such as context, environment, people, weather, etc. When expressing emotions, sometimes these external factors become more prominent, and have been expressed as the emotion itself rather than something that plays a part in causing the emotion to be felt.

This is important to take into consideration when encouraging patients to express their emotions with emojis. If they are unable to put a finger on the emotion they are experiencing, asking them to express it in emojis will be a difficult challenge. This could likely cause ambiguous and uncertain expression of emotion, in turn may hinder the doctors in understanding the patient.

New design requirement: elements of expression

Patients must be aware of the emotion they are experiencing and be able to express it in a clear way.



THE EFFECT OF EMOJIS ON THE RESPONSE

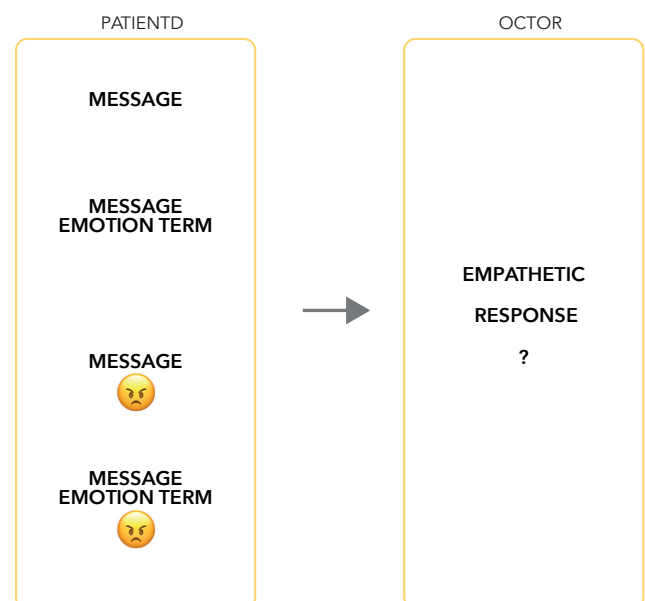
Research has shown that emojis theoretically hold the potential of communicating emotion efficiently and triggering empathy through its facial mimicry effect it has, similar to empathy's mirror matching mechanism (Churches, Nicholls, Thiessen, Kohler, & Keage, 2014; Hojat M. , 2016; Tariq, 2017). A key element to this design challenge is to research what effect this has on those reading the messages in real life situations. We must understand the effects of emojis or other elements of expression before designing conditions to how patients can use it. The specific design of input (such as making emojis mandatory, having emoji suggestions based on the words used in the text, emoji timeline, etc.) is excluded from this study. Focus will just be put on including the elements of expression that give the desired results.

The elements of expression to be tested were identified through a short interview with 10 participants. The participants were asked to recall how they would deliberately tell someone about their emotions over text messaging with the intention of gaining an empathetic response from the other person. This did not have to be in the context of healthcare. The results showed that they most often used punctuation and deliberately use terms related to certain emotion. Research surrounding emotion terms is discussed in more detail in Part 2. Context and Emotion Response. American linguist, researcher and adjunct professor, Geoffrey Nunberg, expressed that punctuation has shown to be an "unsystematic and deficient means for present spoken-language intonation" (CSLI Publications , n.d.; Nunberg, 1990). Punctuation is excluded from the selected elements of expression to be tested due to its overlapping adjunct nature to emojis.

A controlled experiment conducted through user research provides the ability to segment the independent variables to explicitly see the effect of the dependent variable. This allows comparative analysis to draw in on conclusions.

testing elements

- Main topic text - controlled variable
- Emission terms - independent variable (essential to conveying emotion through text)
- Emojis - independent variable (adjunct to expressing emotion)
- Emojis & emotion terms - independent variable
- Empathy response - dependent variable



research question

How does the element of expression emojis affect the empathetic response in relation to explicit emotion terms as an element of expression essential to traditional the expressing emotions?

patient message

Initially, a focus group with doctors and patients who currently use text messaging as one of their forms of communication with each other was planned. The goal of this focus group was to gather information regarding the type of inquiries that are communicated through text, and how these messages are constructed. Additionally, this would provide the opportunity to understand what information doctors focus on from the patient's text message, and what information they require to confidently give the most suitable response. However, due to the circumstances of being unable to obtain participants, this was unable to be executed. Instead of practical research and results to creating these research items, the research turned towards a theoretical approach.

For doctors to be able to respond with empathy, patients must provide empathetic opportunities in their text messages. Research has shown that the majority of patient conversations include one or more empathetic opportunities (Bylund & Makoul, Examining empathy in medical encounters: an observational study using the empathic communication coding system, 2005). Three different types of empathetic opportunities presented by patient statements have been developed (Easter & Beach, 2004; Bylund & Makoul, Examining empathy

in medical encounters: an observational study using the empathic communication coding system, 2005; Bonvicini, et al., 2009; Foster, et al., 2014). Statements are only categorized as one of these three empathetic opportunities if patients are explicit, clear and direct of emotion, progress or challenge in their statements (Bylund & Makoul, 2002; Makoul, 2001).

Patients need to be able to fully express their concerns, experience, emotion and questions to their doctors. Currently, healthcare is in the process of introducing digital communication such as text messaging to allow doctors and patients to communicate outside of consultations. In the near future, roughly in five year's time, text messaging will be more highly accepted as a method of healthcare communication for certain situations. This project focusses on patients who are seeking help with a situation or question, of a non-emergency nature, regarding their own health. They enter the conversation with a doctor knowing that doctors may not immediately reply, and that there is a standard period of time in which the doctor will definitely respond within. Patients must be able to disclose information and details regarding their problem to the doctor. Being able to express emotion may allow the doctor to have insight to relevant information to better help the patient.

Patients need to be able to fully express their concerns, experience, emotion and questions to

	DESCRIPTION OF PATIENT CREATED EMPATHETIC OPPORTUNITY
EMOTIONAL FEELING STATEMENT	An emotional feeling statement is one where the patient describes him or herself feeling an emotion. This emotion should be one that is being felt at the present time. The emotional statement may be related to a physical problem ("My knee really hurts and I'm worried that it might be bone cancer."), a psychosocial concern ("I am scared that I am going to be laid off from my job" and may be either negative as in the above examples or positive ("I am so proud of myself for quitting smoking."))
PROGRESS STATEMENT	A progress statement is an explicit statement that the patient makes about a positive development in physical condition that has improved quality of life, a positive development in the patient's life, or a recent, very positive, life-changing event. Examples include, "By following that diet, I've gotten my weight down pretty good," "I just retired."
CHALLENGE STATEMENT	A challenge statement is an explicit statement that the patient makes about the negative effect a physical or psychosocial problem is having on the patient's quality of life, or a recent, devastating, life-changing event. Examples include, "My arm hurts so bad, I can't do my work very well," "My husband and I decided that we are going to get divorced."

From "Empathic communication coding system: Audiotapes and transcripts," by Bylund, and Makoul, 2004, Unpublished Coding Manual

their doctors. Currently, healthcare is in the process of introducing digital communication such as text messaging to allow doctors and patients to communicate outside of consultations. In the near future, roughly in five year's time, text messaging will be more highly accepted as a method of healthcare communication for certain situations. This project focusses on patients who are seeking help with a situation or question, of a non-emergency nature, regarding their own health. They enter the conversation with a doctor knowing that doctors may not immediately reply, and that there is a standard period of time in which the doctor will definitely respond within. Patients must be able to disclose information and details regarding their problem to the doctor. Being able to express emotion may allow the doctor to have insight to relevant information to better help the patient.

As this project is focusing on patients seeking help, focus of patient statements are laid on emotional feeling and challenge statements. These provide more opportunity to connect challenges and emotions with how doctors can respond empathetically towards and help in other ways, whereas progress statements don't require as much further action. Thus based off of emotional feeling statements and challenge statements, four different basic topic statements were created and modified for each element of expression to be tested: controlled main text message, text message with emotion terms, text message with emojis, and text message with emotion terms and emojis. With each topic statement, a variation is made with the use of another element of expression. These statements can be seen in fig.xxx below. The variations will be tested separately. This is further discussed in research set-up of this paragraph.

VERSION A	I wish these thoughts will just go away. It's always just a mad cycle.
	The exercises aren't helping anymore and it's just getting harder to breathe. 😞
	My arm hurts so bad. It annoys me because I can't do my work very well because of it.
	I'm so worried about this biopsy next week. I'm scared. 😟
VERSION B	I'm so worried about this biopsy next week.
	I wish these thoughts will just go away. It's just a mad cycle. 😞
	I'm upset that these exercises aren't helping anymore and it's just getting harder to breathe.
	My arm hurts so bad. It annoys me because I can't do my work very well because of it. 😞

empathy response

Many studies looking into doctor communication behavior, including doctor empathy, uses single evaluation methods such as self-reporting. This method has found to be often inaccurate (Hulsman, Ros, Winnubst, & Bensing, 1999; Waitzkin, 1985; Laidlaw & et al., 2004; Bonvicini, et al., 2009). Instead, a measure of Empathetic Communication Coding System (ECCS) was developed. ECCS is a systematic and hierarchical method to categorize doctor responses towards the empathetic opportunity presented by the patients.

EMPATHIC COMMUNICATION CODING SYSTEMS (ECCS) OF PHYSICIAN RESPONSES.

DESCRIPTION OF PATIENT CREATED EMPATHETIC OPPORTUNITY

LEVEL 6
SHARED FEELING OR
EXPERIENCE

A response should be categorized in this level if the physician makes an explicit statement that he or she either shares the patient's emotion or has had a similar experience, challenge, or progress

LEVEL 5
CONFIRMATION

Responses in this level convey to the patient that the expressed emotional feeling, progress or challenge is legitimate. This can be done in several different ways depending on the empathic opportunity. For example, this type of response may be a congratulatory remark, an acknowledgment that the challenge the person is experiencing is difficult, or a statement legitimizing the patient's emotion. Also, by making a statement that others have experienced this same emotion, progress or challenge, the physician is providing confirmation. A physician's statement that he or she understands a patient's emotion also fits in this category.

LEVEL 4
ACKNOWLEDGEMENT OF
PATIENT STATEMENT WITH
PURSUIT

This level is characterized by the physician's acknowledgment of something that the patient has either said explicitly or that the physician has inferred from the patient's statement. Often the response is a restatement of what the patient has said. In addition, the physician pursues the topic with the patient by asking the patient a question, clearly elaborating on a point the patient has raised, or trying to comfort the patient.

LEVEL 3
ACKNOWLEDGEMENT
OF PATIENT STATEMENT
WITHOUT PURSUIT

This level is also characterized by the physician's acknowledgment of something that the patient has either said explicitly or that the physician has inferred from the patient's statement. However, level 3 is distinct from level 4 because the physician does not pursue the topic with the patient.

LEVEL 2
IMPLICIT RECOGNITION OF
PATIENT PERSPECTIVE

This level contains responses that do not explicitly recognize the central issue in the empathic opportunity, but focus on a peripheral aspect of the statement. These statements tend to be more content-based, or focused on the biomedical issue, not dealing directly with the progress, challenge or emotion. These may also include questions or advice.

LEVEL 1
PERFUNCTORY
RECOGNITION OF PATIENT
PERSPECTIVE

This level is characterized by a physician's automatic, scripted-type response (back-channeling cues) to a patient's statement. These are minimal responses that do not truly acknowledge that the patient has been heard.

LEVEL 0
DENIAL OF PATIENT
PERSPECTIVE

This response is characterized by the physician either ignoring the patient's empathic opportunity or by making a disconfirming statement.

From "Empathic communication coding system: Audiotapes and transcripts," by Bylund, and Makoul, 2004, Unpublished Coding

Although the ECCS items are presented in seven levels of empathetic response, Bylund and Makoul express that this is not in the sense of a normative hierarchy (Bylund & Makoul, 2002). The different levels are conceptually and practically different; the levels do not indicate that one level is 'better' than the other. Literature suggests that communicating shared feelings (level 6) may in fact convey more empathy than a confirmation statement (level 5).

However, it is important to note that there is no evidence of patient preferences or health outcome associated with these different levels of responses (Bylund & Makoul, 2005).

The dependent variable, empathy response, will be coded and analyzed based on the ECCS responses derived for each topic statement.

6. I know how that feels, I've been there before. It just feels like you're constantly hitting a brick wall, just to get up and walk into it all over again.
5. I know that's not an easy situation you're in and it's very frustrating.
4. I see you're having a hard time with this whole situation. What kind of things do you do to try help yourself when you find yourself in that situation?
3. I see you're having a hard time with this whole situation.
2. When was the last time you spoke with your therapist?
1. I see.
0. You're fine.

6. That sometimes happens. My child also slowly developed a tolerancy to the exercises recently which felt like it was not even worth the while to try if he's suffering just as much.
5. That's very troubling having a solution not work anymore.
4. You say the exercises aren't helping anymore. Let's see if there are other ways to help eliviate your trouble with breathing.
3. I see, that must be troubling especially if it's your breathing.
2. I suggest you make an appointment with a specialist.
1. That's too bad.
0. It's probably temporary because of season changes.

6. I know how frustrating that is. I broke my finger last week and I couldn't type up any of my daily reports.
5. That must be frustrating indeed.
4. Sounds like a struggle. Can you show me what arm movement gets in the way during work?
3. Sounds like a struggle.
2. Mobility is important. What do you do for work?
1. Take a paracetamol for the pain. If it still bothers you in 2 weeks then be sure to come back.
0. You shouldn't be working if it hurts so much.

6. I can understand how scary this is. My husband recently had a biopsy and we were also really worried.
5. That must be scary indeed.
4. Sounds like it's been hard for you. Worrying is very common, could you tell me a little more about how this is affecting you?
3. Sounds like it's been hard for you.
2. Health procedures like these are complicated. Did you read the booklets we provided you with?
1. That's normal. It'll be over before you know it.
0. Is there a question to that?

RESEARCH SET-UP

Two questionnaires were distributed at random to 54 respondents. Each questionnaire contains four item question, each one on a different subject topic. Each item contains a different element of expression to cover all four patient statement construction: controlled main text message, text message with emotion terms, text message with emojis, and text message with emotion terms and emojis.

Using a Likert scale from very unlikely (1) to very likely (6), respondents are asked to rate their likelihood of responding to the patient statement with each of the 7 response items developed based on the ECCS and the topic at hand. In order to reduce the chances of respondents recognizing a pattern of style of response through the 7 hierarchical empathetic response type, the response item was shuffled with each opened link.

Lastly, respondents were asked to express what type of responses they would generally want to hear from their doctor. The results to this question is used in Part 2. Context and response, Suggested Response.

Patient-Doctor Responses

I am currently researching the type of responses given based on the way the message is formulated. Thank you for sparing a few minutes of your time to complete this survey!

* Required

Imagine that you are a doctor and your patient has just sent you a message. What are you likely to say to your patient?

* Please note that the medical content below is not accurate and/or provided by a medical professional.

1. "I'm so worried about this biopsy next week. I'm scared. 😭" *

Mark only one oval per row.

	Very unlikely	Unlikely	Slightly unlikely	Slightly likely	Likely
Sounds like it's been hard for you.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sounds like it's been hard for you. Worrying is very common, could you tell me a little more about how this is affecting you?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can understand how scary this is. My husband recently had a biopsy and we were also really worried.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is there a question to that?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health procedures like these are complicated. Did you read the booklets we provided you with?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
That's normal. It'll be over before you know it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
That must be scary indeed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RESULTS

Two questionnaires were distributed at random to 54 respondents. Each questionnaire contains four item question, each one on a different subject topic. Each item contains a different element of expression to cover all four patient statement construction: controlled main text message, text message with emotion terms, text message with emojis, and text message with emotion terms and emojis.

Using a Likert scale from very unlikely (1) to very likely (6), respondents are asked to rate their likelihood of responding to the patient statement with each of the 7 response items developed based on the ECCS and the topic at hand. In order to reduce the chances of respondents recognizing a pattern of style of response through the 7 hierarchical empathetic response type, the response item was shuffled with each opened link. The raw data can be found in appendix 4. The results were translated into the increase and decrease of likelihood for the ECCS statement to be given, and comparison with the other versions of statements. This can be seen in below

Lastly, respondents were asked to express what type of responses they would generally want to hear from their doctor. The results to this question is used in Part 2. Context and response, Suggested Response.

What could be observed here is that most of the results indicate an unlikelihood of giving one of these ECCS statements as a response. The only ones in the averaged likelihood of giving the terms, are acknowledgement (with or without pursuit), and implicit statements (asking questions related to the topic but not directly targetting the main topic in question). This illustrates that regardless of whether it is on or off topic, the effort put into asking more questions shows the patients that action is being taken.

Another interesting insight is the type of answer given based on the type of patient statement. In general, emojis bring in more room for interpretation than a using specific emotion terms. The results show that when an emotion word is used, patients want something to be done about it in a more immediate fashion with clear direct questions, while with emojis they can tolerate an approach where the doctor is not as rushed to jump into actionable conclusions, taking their time to ask more questions to understand.

+😎 TO ORIGINAL MESSAGE	REPLACE EMOTION TERMS WITH 😎	+😎 TO EMOTION TERMS	ADD 😎 AND EMOTION TERMS TO ORIGINAL MESSAGE	+EMOTION TERMS TO ORIGINAL MESSAGE	+EMOTION TERM TO 😎
↓	↑	↑	↓	↓	↑
↑	↑	↑	↑	↓	↑
↑	↓	↓	↑	↑	↓
↑	↑	↓	↓	↓	↓
↑	↑	↓	↓	↑	↓
↓	↓	↑	↑	↓	↑
↑	↓	↓	↑	↑	↓

ELEMENTS OF TECHNOLOGY

MAKING NON-VERBAL COMMUNICATION PHYSICAL

An brainstorm session was hosted with six participants. Emojis are largely something that exists only in the digital world. There are some exceptions such as the emoji movie leading to merchandise and physical emoji products to appear, or service rating signs you see at restaurants or shops. This brainstorm session focussed on bringing emojis into the physical world. This approach was to trigger creativity to understand what elements are important to emojis or what emotion expression is important to. The goal was to generate insights to ideate methods to test emojis as a form of emotion expression physically. Approaching something from a contrasting perspective, such as digital and physical, might help in how we might make something not seen and translated by technology, into something visible through technology.

The two-hour brainstorm session consisted of five activities to explore the research question "How might we bring emojis into the physical world? And how can emojis, a digital product, be used in a physical context?". We first created a mind map to come to an agreed understanding of emojis and explore what it is; brainstorming context and physical use; affinity diagrams to cluster and categorize ideas; brainwriting and minddrawing; and a voting session. The complete planning can be found in Appendix 5.

The brainstorm shed light onto the elements that can be measured from expressions of emotions. These may be beneficial when ideating towards the elements of technology.

- language
- speed
- volume
- rythm
- pauses
- melody
- word selection/use
- languages
- culture
- temporary country
- pitch
- major/minor

The brainstorm also resulted in interpretative expression of emotions with

- color
- sound
- animals
- dance
- weather
- visual speed and intensity
- totem pole



TECHNOLOGY EXPLORATION

Artificial intelligence is currently on the rise. Whether we know it or not, it can quite often be found in our day to day activities and interactions. Examples can range from chat bots, voice activated assistants, Netflix automated suggestion, to systems in which can recognize people, names, age, emotion, features such as hair style, body hair, and emotion.

Cognitive services, such as Microsoft Azure, is an emotion API in which takes facial expression in images or videos, quantifies the facial expression and cross references this with specific emotions: anger, contempt, disgust, fear, neutral, happiness, sadness, and surprise.

There is also machine learning technologies which are required to train from scratch, such as Tensor Flow. You can train them to recognize objects, but they are also capable of recognizing facial expression as emotion. Because existing cognitive services such as Microsoft Azure, it will be easier and more convenient to use that instead. It was advised to me by a colleague who has experience with working with tensor flow, that deep learning for facial expression and emotions are not really necessary when you can use pre-existing models.

Keeping measurable items in mind, I chose to only focus on using technologies that use facial feature recognition data. The reason for this is to match the benefits of text messaging with doctors mentioned in the design brief.

Why did I choose only facial expression? Voice does not allow doctors or patients to easily access the conversation for review, evaluation, or reference purposes as easily. While contact frequency with doctors using the BeterDichtbij app has increased, the total duration of conversational time has decreased. Text messaging allows the flexibility to multitask, or even just to easily access the conversation for the first time or to review the chat history really fast. Including other elements such as voice will lose all of these benefits. While facial expression is visual, and the method of displaying and representing facial expression to doctors will also likely be visual due to the nature of the means

of communication, it will be easier to associate with the emotion. Translating a non-visual non-verbal communication sign such as voice and tone, will be much more complex if the goal was for doctors to be able to immediately see, interpret and train an intuition to certain types of response.

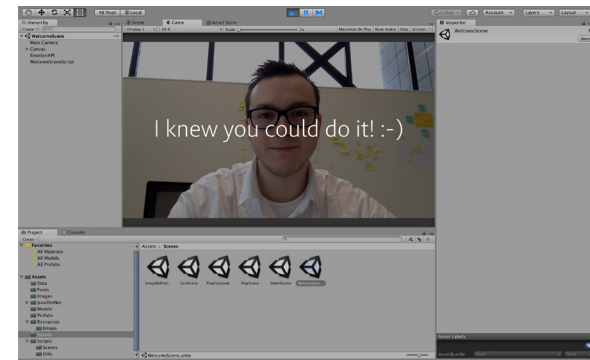
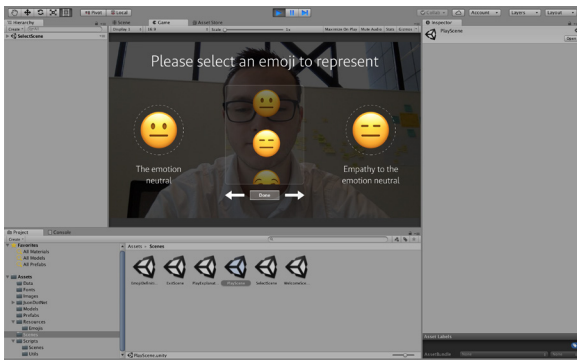
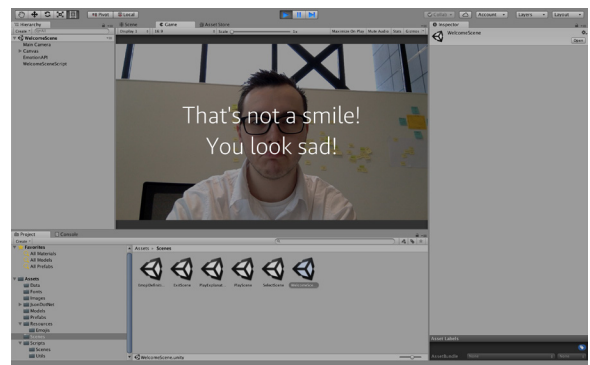
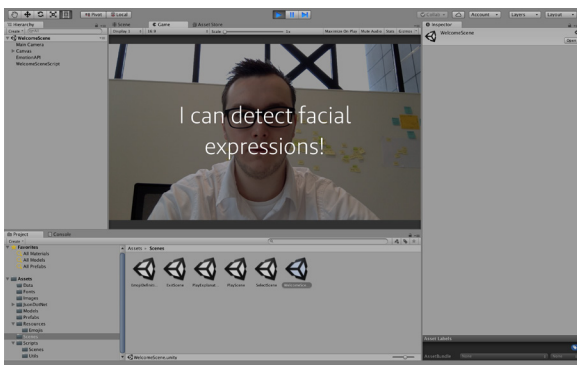
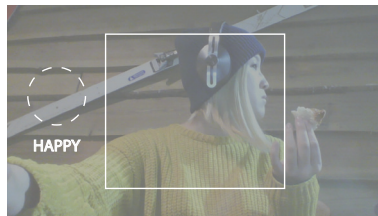
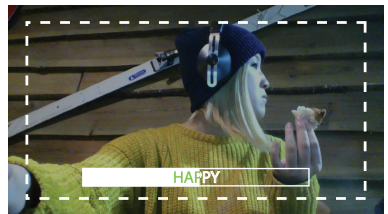
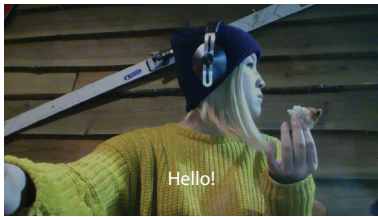
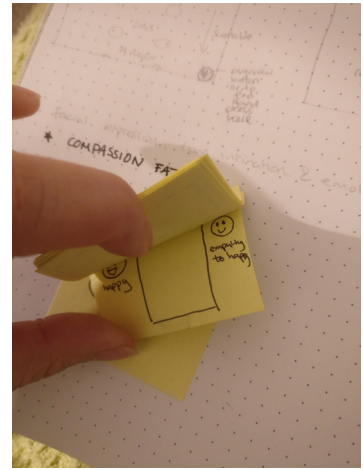
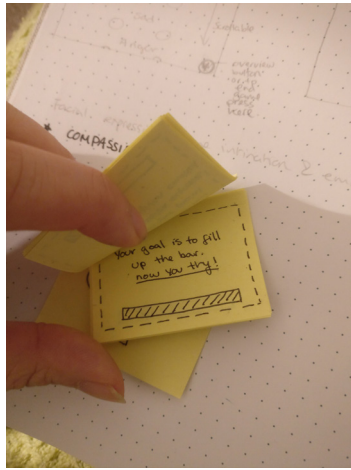
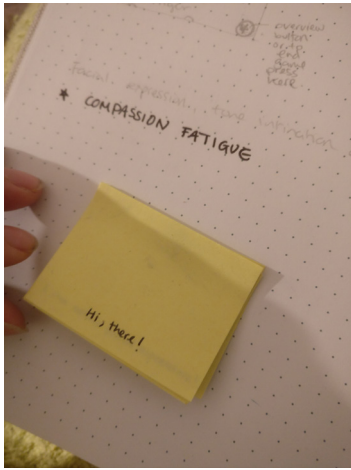
EMOJI-EMOTION GAME

Emotion recognition through facial expressions is something that I saw beneficial to expression non-verbal communication of emotion to text messaging. It has the potential to act as an added element of technology to enhance doctors information on the patient's emotions. One of the available technologies that can achieve this is Microsoft Azure's Emotion API. It is capable of detecting the same emotions that I will be using throughout this project: anger contempt, disgust, fear, happiness, neutral, sadness and surprise.

When ideating with AI, there was always the question of safety, security and privacy. AI is a growing technology, and it is slowly penetrating our day to day lives whether we know it or not. If people and users deflect the idea of technology detecting, storing, and using data that can be seen as very personal, then that will raise considerations to whether or not this technology is fit for the purpose of this project. This activity intends to explore the possibility of emotion recognition as an element of technology.

Together with a colleague intern, we created an emoji emotion game. I rapidly ideated on interaction concepts, created mockups, and had him code it to the best of his ability. Because our resources were limited, he was not able to meet all of the design elements and interaction elements in the proposal that I presented to him. Nonetheless, it was still able to be completed, presented to people and test it on them. This was researched was executed through observation while the participant was experiencing playing the game, and a short questionnaire thereafter.

ELEMENTS OF TECHNOLOGY	
The added elements of technology should recognize communicated non-verbal signs that suggest specific emotions.	
The added elements of technology should be able to measure non-verbal signs of emotion; the ability to measure indicates that data can be collected, documented and analyzed. For example, quantifying facial expressions, tone intonations, pitch etc. into numerical data.	
The added element of technology can be used together elements of expression.	
The added elements of technology does not have to be used together with elements of expression.	
The added element of technology should be based on an existing technology and its functions and features.	
The functions and features of the added element of technology does not have to currently exist or be fully functional for the proposed design in spring 2018.	
The patient must be notified prior to the very first conversation with the doctor on the messaging platform of the information and data of which the added element of technology can take and use.	
The information and data of which the added element of technology takes and uses is strictly used only between that patient and the doctor or healthcare individuals who have the authorization to be in that conversation.	
There should be no signifier to indicate to the patient that the added element of technology is active and in use.	
EMOTION DETECTION	
Emotion can be detected from the added element of expression, the added element of technology, or both.	



PART 2.

EMOTION & RESPONSES

The word emotion can often be easily thrown around casually and deemed as 'important' in many situations, not just healthcare communication. To understand how the patient's expression of emotion can impact the doctor's response, it is first necessary to research the implications of different emotions, what this means to the person feeling the emotion, and what this means to the person perceiving the experienced emotions. This is done through conducting literature research on the basic emotions, how its categorized in order to understand its characteristics, its form of expression, and underlying needs. Response suggestion looks into a part of the previously conducted questionnaire in Element of Expression and literature research to gather information on response approaches and its goals based on the emotion it is responding towards.

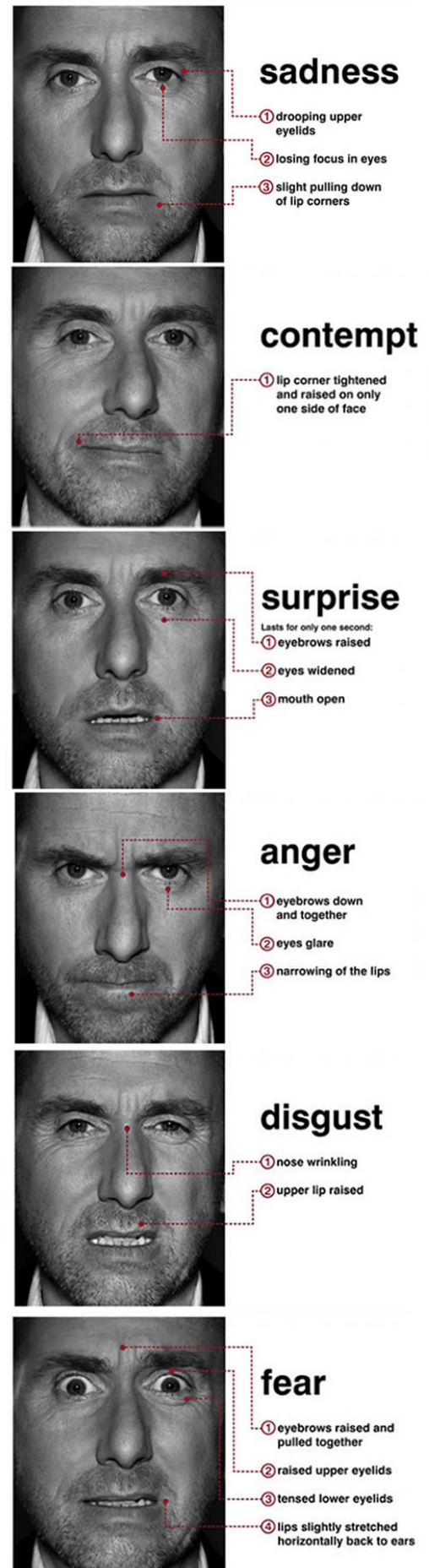
BASIC EMOTION

There are many researches that have a different interpretation of what the basic emotions are. Two popular definitions of basic emotions are by Ekman (1975), i.e. anger, disgust, fear, happiness, sadness, and surprise and Plutchik (1991), i.e. joy, sadness, anger, fear, trust, disgust, surprised, and anticipation. Plutchik's theory of trust being one of the basic emotions contradicts the findings of the initial research to this study. The initial study presented trust as a result of feeling from the induced emotions the patients feel from the doctor communicating empathy to the patient (Chiu, 2018). Trust was not seen as an emotion in itself. Therefore, when discussing the basic emotions in the continuation of this project, I will be referring to Ekman's theory of emotions.

Ekman (1992) distinguishes the six basic emotions from one other through nine considered characteristics. Each of these basic emotions is not "a single affective state but a family of related states" (Ekman, *An Argument for Basic Emotions*, 1992, p. 172; Ekman & Friesen, *Unmasking the face: A guide to recognizing emotions from facial cues*, 1975). The family of emotions consists of emotions that share commonalities in expression, physical reactions, appraisal process and/or the nature of event that triggers the emotion.

Ekman (1992) presents a problem with positive emotions in his study. He uses the term 'enjoyment' to categorize the family of positive emotions, such as amusement, relief, sensory pleasure, pride, thrill of excitement, satisfaction, contentment, etc. Between each of these positive emotions, there are no distinctive physical signals (Ekman & Friesen, 1982). There are vocal distinctive signals between these emotions, however he raises the question of its relevance to survival other than knowing that it is of positive valence. Similarly, positive emotions also have little relevance and impact in the communication of empathy in healthcare in comparison with anger, fear, disgust or sadness. Expressing emotion in a conversation is often associated with the hopes and intention of receiving words, action or behavior aimed towards the emotion from the other person. This was theorized during the Deconstruction of the Problem, and referred to as a call for action. Negative emotions have a call for action similar to the nature of survival; if not addressed, it can hinder patient health, situation, satisfaction, etc. When positive emotions are not addressed, it does not have this level of impact on the patient. This project will therefore only take negative emotions into consideration. This is not to say that positive emotions are irrelevant.

The value of distinguishing these basic emotions from one another truly emphasizes on viewpoints and approaches towards the emotion (Ekman, *An Argument for Basic Emotions*, 1992). Each basic emotion family has different characteristics, so naturally the approach to response will differ from one another



Ekman, 1992, *The Six Basic Emotions*

EMOTION FAMILIES

Within the families of basic emotions created by Ekman (1975) there are many emotions and terms related to emotion. There are many more emotional terms and words than there are basic emotions.

While they must have commonalities with the emotion family, there are no limits to how many basic emotions it can belong to. This illustrates the possibility of blended emotions, or emotions that are expressed rapidly after each other. Scorn is an example of this; it falls into both enjoyment and disgust.

Emotional terms can be seen as moods. Apprehension, dysphoria, euphoria and irritation are some examples of moods. They are highly saturated with one or a blended emotion, but they can be distinguished from emotion through trigger event, time course, appraisal, etc. (Ekman, Moods, Emotions, and Traits, 1994). Although there is no consensus on the duration of an emotion, moods are generally longer lasting.

Certain emotion terms can be considered as emotional attitudes. They also typically are longer lasting and involve more than one emotion. Examples of emotional attitudes are love or hatred.

There are emotion words that differ in its complexities. Ekman (1992) calls this emotional plots. They convey much more specific information about settings and stories in which the emotions occur. For example, grief indicates death, whereas sadness only indicates the loss of something.

PLOTTING EMOTIONS

All types of emotions, regardless of their emotion family or the intent and information it provides, can be visualized through various models. The most common approach is determining valence, dominance and/or arousal. Valence determines if it is a positive or negative emotions. Dominance describes the approach of control in experiencing the emotion. Anger, for example, is high in dominance, an emotion that has more control, or need for action from the person themselves, etc. Fear however, is more submissive taking in the control and action from someone else. Arousal describes the energy level of the emotion. Hatred is high in energy, as you are actively feeling this emotion and put a lot of effort into it whereas sadness is the opposite. Dominance and arousal is interesting as sometimes it makes it easier to recognize emotions with higher dominance and arousal than it is with submissive and low dominance emotions. A number of visualized emotion graphs can be found in Appendix 8.

empathy response

Roseman's study revealed relevant cognitive determinants of emotions relevant to understanding implications of certain emotions (Roseman, 1979). The cognitive dimensions are a set of appraisals of events, categorizing external information regarding the emotion. The relevant cognitive dimensions to this project are probability (certain/uncertain), Legitimacy (deserved/undeserved and strong/weak) and agency (circumstance/other/self). These all give insight to the patient's perspective of the situation causing the emotion.

Probability distinguishes events behind the emotion as definite (certain) or possible (uncertain). For example, if it is possible that there will be negatively impacting results patients are likely to feel distress, whereas if it is certain that the outcomes are bad patients will instead feel fear. Legitimacy indicates the viewpoint the patients have towards the situation. If they believe that the negative outcomes are deserved (or at least not undeserved), they are likely to feel distress, sorrow or fear. If the patients do not comprehend why they are experience these bad outcomes and perceive the situation as underserved, they are more likely to feel frustration. Agency gives insight to the attributed cause of emotion. If the event is based on circumstances, the patients may feel frustration whereas if other individuals are the cause of the event, they would feel anger instead. If they hold themselves accountable, then the emotion they experience is regret.

Examples of emotion terms and their meaning, message or identifiable trait can be found in Appendix 3.

		Positive		Negative	
		Rewarding Present	Punishing Absent	Punishing Present	Rewarding Absent
Circumstances	Certain	Joy	Relief	Distress	Sorrow
	Deserved*	Hope		Fear	
	Uncertain				
	Undeserved*	Hope		Frustration	
	Uncertain				
Others	Certain	Liking - Love		Dislike - Hatred	
	Deserved				
	Uncertain			Anger	
	Undeserved				
Self	Certain	Pride		Guilt	
	Deserved				
	Uncertain	Guilt		Regret	
	Undeserved				

Figure 1.1 Hypothesized structure of the emotion system (1979). Asterisk refers to the obtained outcome, positive or negative, being deserved or undeserved.

		Positive		Negative		
		Motive-Consistent Appetitive	Motive-Consistent Aversive	Motive-Inconsistent Appetitive	Motive-Inconsistent Aversive	
Circumstance-Caused	Unknown	Surprise				
	Uncertain	Hope		Fear		Weak
	Certain	Joy	Relief	Sorrow	Discomfort, Disgust	
	Uncertain	Hope		Frustration		Strong
	Certain	Joy	Relief			
Other-Caused	Uncertain	Liking		Disliking		Weak
	Certain			Anger		Strong
	Uncertain					
	Certain			Anger		
Self-Caused	Uncertain	Pride		Shame, Guilt		Weak
	Certain			Regret		Strong
	Uncertain					
	Certain			Regret		

Figure 1.2 Hypothesized structure of the emotion system (1984).

SUGGESTED RESPONSE

Earlier in Part 1. Elements of Expression and Technology, Elements of Expression, data was collected from the questionnaire regarding what type of responses patients want to hear from their doctor. The results are shown in Fig. X below. The prominent results show that they'd likely want their doctors to give advice, ask questions, clarify, offer their help, acknowledge their problem and emotion, and reassurance. These results are commonly found in listening response techniques. An example of this created by Fu (n.d.) can be seen in Appendix 6.

The listening responses are based on techniques that range from taking a directive or reflective approach. The approach is selected based on the circumstance and goal of the conversation. The approach taken should always be flexible. For example, Yates (n.d.) names a few reasons for selecting a reflective response approach:

- ° When there is a need to understand the other person more
- ° When you sense that the other person is not fully transparent with their thoughts and feelings about the situation
- ° When you sense that the other person is uncertain of their true feelings

These response approaches can also be highly influenced by emotion. It was previously theorized that explicitly expressing an emotion, regardless of its expressive form of emotion such as using emotions terms, emojis, facial expression, body language, intonation, etc., is a call for action. It is drawing attention to the specific emotion with the intention of having something to be done about it. Each emotion has its own specific characteristics and general underlying needs. Tayal, et al. (2017) created tools to help determine the underlying needs of specific emotions. The tools, which can be seen in Appendix 7, was created to encourage doctors to listen to their patients with empathy (Tayal, Michelson, & Tayal, 2017). Their driving factor for creating this tool for doctors is to save time, communicate more effectively, and improve patient and provider satisfaction. An examples of this is shown in fig. xxx.

DISCUSSION

The research and data shown in Appendix 3, Appendix 6 , and Appendix 7 should be incorporated into the algorithm for the specific response approach and suggestion appropriate to the emotion. This project scope does not touch upon designing the algorithm for the technological events within the interaction.

PART 3.
INFORMATION DISPLAY

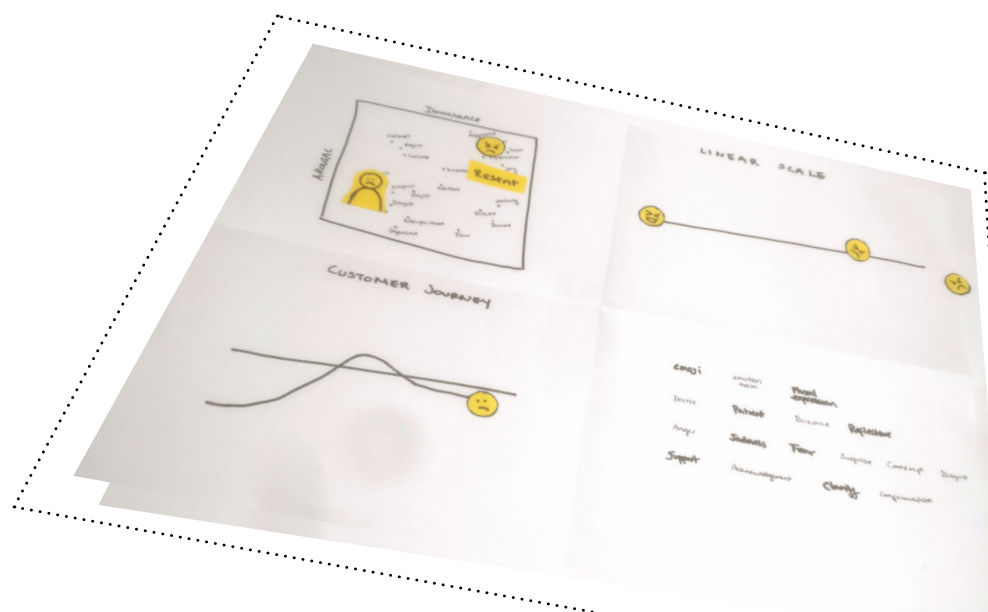
The goal of this project is to increase the information that doctors receive regarding patient's verbal and non-verbal communication of emotion. This part of the project evolves around empirical research by design methodology focusing on the sub-design challenge: how might we visually present data gathered regarding suggested response approach (as seen in part 1 and part 2, so that doctors can readily recognize and understand the patients expressed and technologically determined emotions, needs and intentions.

available data to be processed

- ° Patient text
- ° Patient emotion terms
- ° Patient emoji
- ° Emotion family
- ° Emotion type (moods, attitudes, etc.)
- ° Emotion specific
- ° Emotion evaluation
- ° Emotion specific implication
- ° Emotional need
- ° Patient's cognitive perspective the event causing the emotion (possibility, legitimacy, agency)
- ° Response urgency
- ° Response goal
- ° AI detected change of facial expression

ideation

- ° 2D graph
- ° 3D graph
- ° linear scale
- ° toggle boxes
- ° highlighted word suggestions
- ° customer journey
- ° avatar figure



desirability testing

The most important part of visualizing and displaying the processed information is for doctors to be able to understand the information presented to them. The ideas were formed into paper prototypes to be used in a desirability testing. The goal of this testing is to see what type of information presentation style participants gear most towards. They must make sure that they understand the message, but also being sensitive to what type of information can be trained over time to become intuitive towards.

The participants were selected at random, with one criteria of currently attending or have obtained tertiary education. The information display should be

easily understood most importantly by the doctor. The selection filter of tertiary education background allows for a more universal solution to be understood by more than just doctors and healthcare professionals, but also by people with some basic logic, knowledge and intelligence that is assumed with any tertiary education.

10 random participants were asked to review all prototypes and place 3 votes on what feel is the most effective way of conveying information or what information they would only want to see. Along with that, they would explain verbally why they did or did not choose certain prototypes.

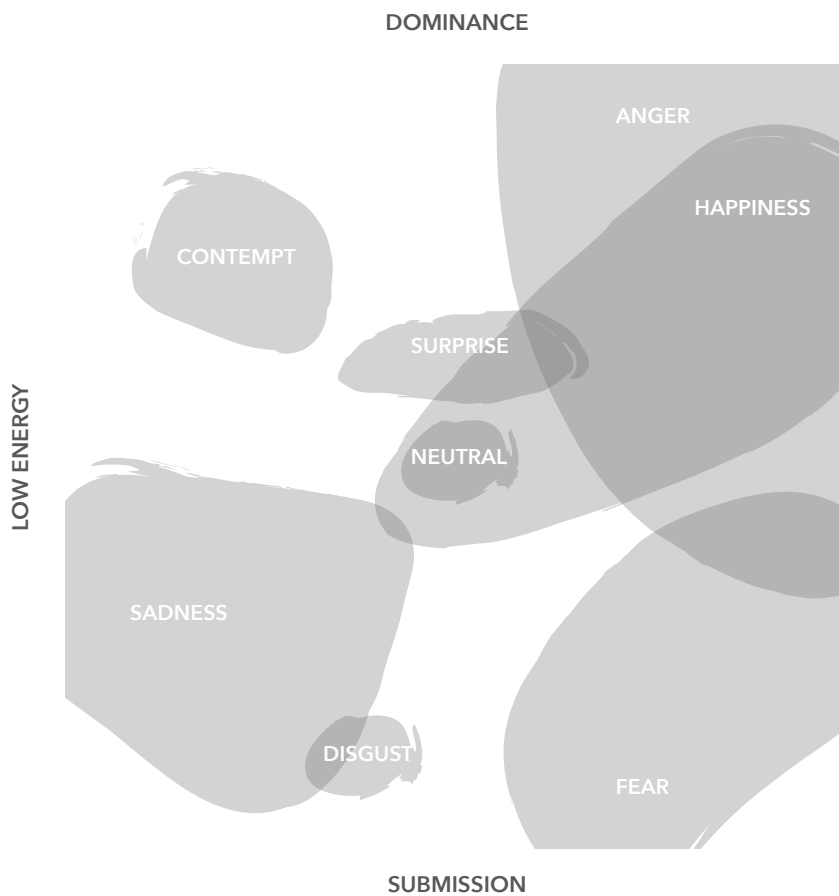
PROTOTYPE	VOTES	TOP COMMENTS/OBSERVATIONS
2D graph	13	It might take a while to learn and get used to, as people do not naturally think of emotion in terms of dominance and arousal. Also, too messy with all of the emotions plotted. Interesting how it could potentially corresponds with a response axis.
3D graph	0	Gets too complicated in a 2D plane to have 3D graph plotting.
linear scale	3	Emotion is not linear, especially because the ones named are all negative. Most basic axis would be valence but even that's not super informative.
toggle boxes	7	It's nice that it is customizable to what each person would like to see. They can determine what is important themselves.
highlighted words	3	Too cluttered, too many things to read through. It's very clear once they put in the effort to read but with every text message, that is a lot of extra work.
Customer journey	2	The emotions are easily recognizable as positive and negative, and the 'goal' is visually there. If the emotion is under the line then they know that they have to work harder to improve the patient's emotion. Again, other than positive or negative, it doesn't tell them much more information.
Avatar figure	2	More fun and visual, the facial expression stands out as something that is not just data but could be real. Again though, not efficient in letting them know how to proceed.

Based on the results and discussions with the participants, it was clear that the 2D graph was an interesting approach. The reason being that the axis can be interchanged from not just plotting the emotion, but that there might be a relationship between how to approach the plotted emotion based on the axis. Dominance and arousal level of an emotion can tell you quite a bit on the patient

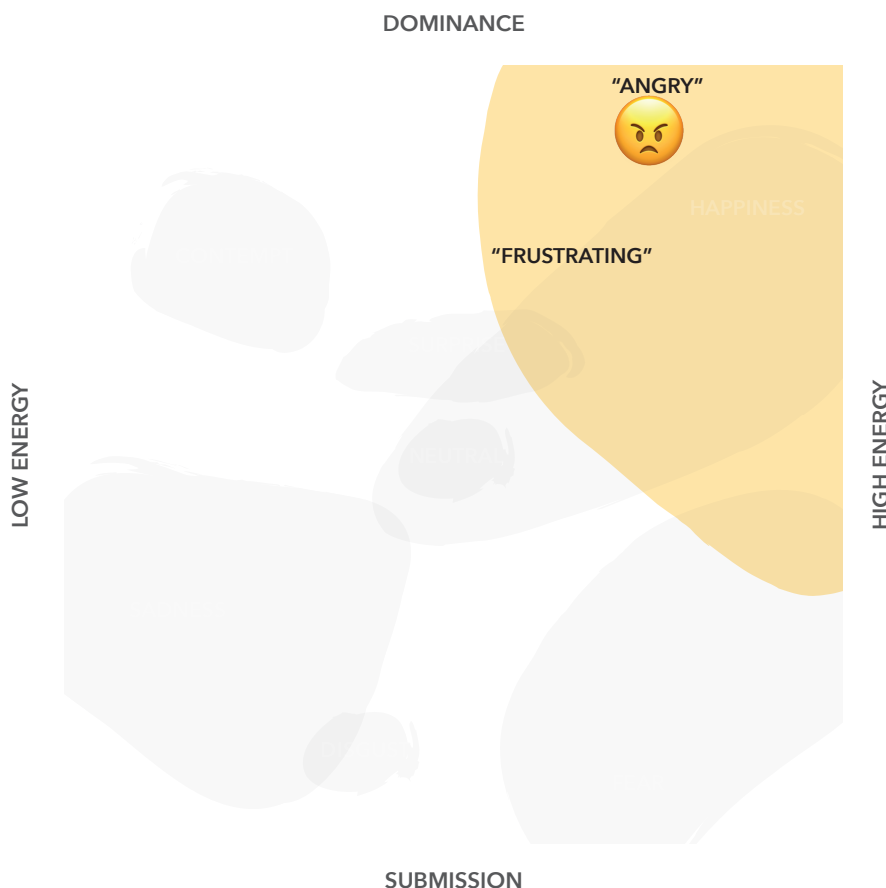
state, which makes it interesting to see if there is a counter axis.

Just the graph is not as informative though. The participants express that it would be useful to have a few guidance words. They suggested combining it with another idea: the toggle box.

GRAPH DEVELOPMENT



Going into a more digital approach, the following two graphs were developed. The idea is that this first graph is only shown during the training period, and also whenever the doctor choses to display it by hovering or clicking the graph once below (with the yellow highlighted emotion expressed by the patient). If the doctor clicks on one of the gray areas of emotion graph then what also appears is the single individual emotions, plotted within this family group.



- One graph to display with the basic emotions on display.
- When doctors see this, after time they will naturally learn where the different areas of each emotion is.
- Being able to selectively see all bubbles at once allows more focus on the highlighted emotion based on the emoji, emoji term or facial expression.
- The ability to choose when to show all emotion areas versus not showing them allows doctors to have a more personalised learning process. Everyone has a different need and learning pace. If seeing all emotions helps you make a decision then you are able to. but if now, then you can standardly choose not to view the entire emotion distribution on the graph.

USABILITY TEST #1

The information display is now a digital prototype, with some interactive elements. The participants are presented with the information display, and asked to complete some tasks. While doing so, they must also think aloud with every decision and thought they go through.

1. Determine the basic emotion family of the emoji.
2. Determine the basic emotion family of the emotion word.
3. Determine the basic emotion family of the change of facial expression.
4. Find suggestion descriptions
5. Toggle urgency display off

Random students (3) & Radboud Uni med students (2)

Think out loud: do they understand the graph & information? can they complete the tasks?

- ° Don't name all the emotions on the graph, it's too messy. Find a way for the doctor to still know where what emotion is generally.
- ° The three elements (emoji, emotion and facial expression) is not super obvious. It doesn't stand out enough, especially if there is a change of data and the elements move within the graph
- ° Stick to one graph. (I showed 2 graphs, one of emotion, and one with the axis of approach). Find a way to train them beforehand, or just state the approach on the side.
- ° Valence (positive or negative emotion) is confusing because they're all present in that one emotion graph without distinction. This drastically changes the approach that the doctor should take, if its positive or negative. So make this visible somehow!

USABILITY TEST #2

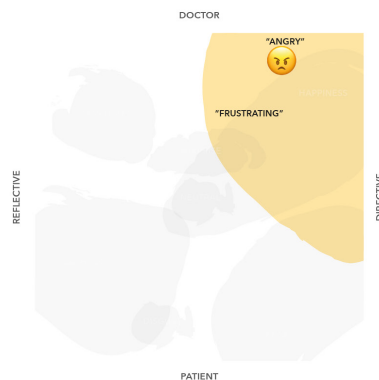
With an updated version of the graph based on the feedback from the first usability test, I tested it yet again with medical students. The improvements on the graph itself were displayed, but also an additional bar of information as response suggestions. This was previously not tested.

I explained to them what this information is meant to indicate, and how it has come to be so that they know that it is a valid selection of approach rather than a random one. Trust of the information is key.

Maastricht med students (2):

- ° 2 participants
- ° 30 minutes each
- ° run through the revised interaction flow
- ° it summarizes considerations without going through everything in your head (which can be really draining in the beginning). Compared to driving. When you first learn, you're constantly thinking blinkers, rear mirror, side mirror, blind spot, gears, turn. You must consciously go through each step. But through practice, it becomes instinct. The same is with these conversations. They pretty much have to go through of checklist considerations. These highlights what is important to the patient (to be discussed) rather than trial and error, and evoking more unnecessary negative emotion.
- ° "It's like a cheat sheet"
- ° Placing the facial expression emotion in the graph is interesting, but not as powerful as it could be. It's processed data and now static in the graph. The power of facial expression IS the immediacy. Could you somehow represent this "change of" so that it's not just the graph giving an indication of how to approach the response, but that seeing that change makes them naturally more engaged into reacting to it? E.g. static button vs blinking button: blinking button catches the eye faster.

GRAPH DEVELOPMENT



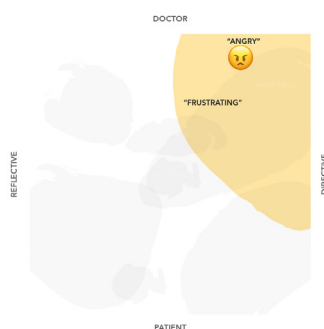
DOCTOR-DIRECTIVE

★
★

**ACKNOWLEDGE
EMOTION & PROBLEM**

PERSONAL
EXPLICITLY OFFER TO HELP
CLARITY
ACTION FOCUSED

This final graph is a both the visual display of a graph and suggested key words of what approach the doctors should take with responding, and what type of activities build upon that approach.



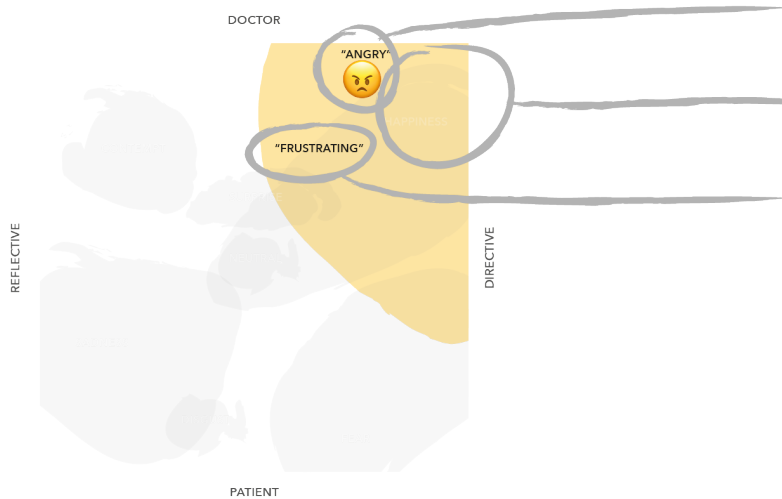
DOCTOR-DIRECTIVE

★
★

**ACKNOWLEDGE
EMOTION & PROBLEM**

PERSONAL
EXPLICITLY OFFER TO HELP
CLARITY
ACTION FOCUSED

I changed the axis of the graphs into a doctor directive representation rather than dominance and arousal. Dominance and arousal is a way to categorize and plot emotions. Although this graph and suggestions are still based on this, presenting this to the doctor does not bring much added value other than knowing this in the back of their minds. Instead, what the participants from the testing expressed was that they can learn the dominance arousal meaning behind each emotion, but what is visually more immediate to indicate what they should do is by demonstrating the doctor-directive graph that I presented to them. This graph indicates who the focus should be on, doctors action or patients, and whether the type of response should be reflective in asking questions and taking time to allow more understanding for both doctor and patient, or with a more direct approach with a clearer goal in sight by taking that action.



This is a display of what the patient puts into the text in which the text analysis technology can pick up, and also plotting the change of facial expression that the emotion recognition technology sees.

DOCTOR-DIRECTIVE

★ ACKNOWLEDGE EMOTION & PROBLEM ★

PERSONAL
EXPLICITLY OFFER TO HELP
CLARITY
ACTION FOCUSED



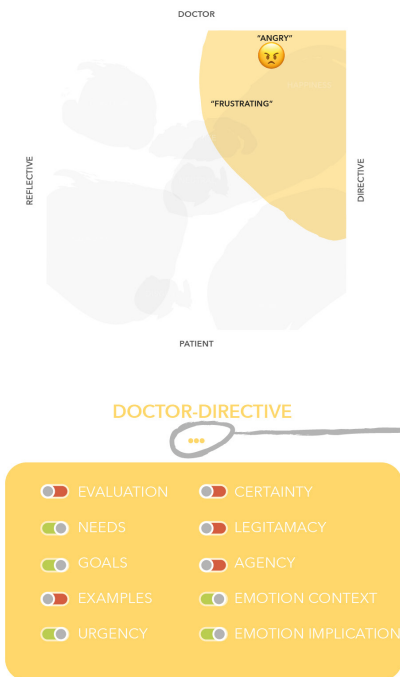
This is the ability to reveal individual emotions in the emotion family to understand the landscape of it all. For example, there is naturally a difference between dislike and resentment. To be able to visualize how this is plotted in the graph, the doctor can better understand the emotion indicated by the patient or emotion recognition technology.

DOCTOR-DIRECTIVE

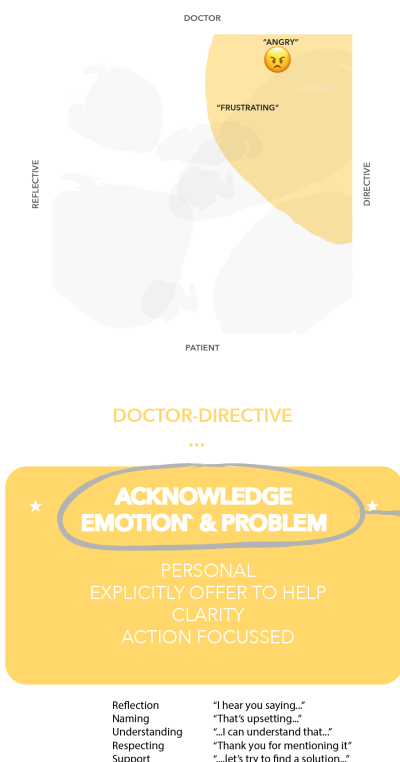
...

★ ACKNOWLEDGE EMOTION & PROBLEM ★

PERSONAL
EXPLICITLY OFFER TO HELP
CLARITY
ACTION FOCUSED



Combining these suggestions with the ability to toggle certain information on and off allows the doctor to receive a more personalised information reception to his/her own advantage.



Because the suggested approach is presented with key words, it may be possible that the doctor does not know what to do with this information. Hovering or clicking the mouse can help doctors better understand what to do with definitions, examples, models of approaches, reasoning for this type of approach, etc.

PART 4

COMPLETE INTERACTION

USABILITY TEST

Hi doctor. My finger has not improved since the last visit. I dont think you **understand** how severe this allergy is. It's really affecting my daily life to the point where I'm just **angry** at everything because of it.

It's the same medication over and over again, and it's not helping whatsoever. This is really **frustrating** that it seems that I have no **choice** but to live with it forever.

Hi doctor. My finger has not improved since the last visit. I dont think you **understand** how severe this allergy is. It's really affecting my daily life to the point where I'm just **angry** at everything because of it.

It's the same medication over and over again, and it's not helping whatsoever. This is really **frustrating** that it seems that I have no **choice** but to live with it forever.



NEEDS EMOTIONS EMO?IS

--DETECTED--

UNDERSTAND
ANGRY

CHOICE
FRUSTRATING

3:1

VALENCE	NEUTRAL
EMOTION CATEGORY	ANGER
EMOTION EVALUATION	NEGATIVE, FRUSTRATING
URGENCY	NO
NEEDS	UNDERSTAND, CHOICE
GOAL	GET WHAT I NEED, DON'T GET WHAT I WANT

"NAMING THE EMOTION"

+

" " " " "

3:1

PRIORITIZE ACKNOWLEDGING THE EMOTION

"I/WE" STATEMENT

PERSONAL

+

SLOWLY PURSUIT

TEXT ANALYSIS

EMOTION CERTAINTY	YES
AGENCY	PERSON, OTHER

DIRECTIVE PURSUIT

Δ FACIAL EXPRESSION

--DETECTED--

BROW FURROW

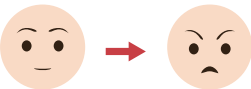
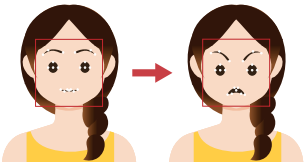
LID TIGHTEN

MOUTH OPEN

LIP CORNER

DEPRESSOR

UPPER LIP RAISE



ANGER

QUADRANT 1
DOCTOR-DIRECTIVE
ACKNOWLEDGEMENT
OFFERS HELP
CONSIDERATION
CHOICE
RESPECT
CLEAR OPTIONS



Another usability test was conducted, but this time on the information processing part.

In order for the information display to have effect on the patient giving a better response is that the doctors trust this information.

I broke down the technological interaction within receiving the message to displaying the graph and response suggestion. This was tested with one dermatologist and three medical students.

results

The participants expressed that they can clearly follow the logic behind this graph. This graph was based on one example, and using this example to see how following this logic of explanation how they would then choose to respond.

ANGER

HIGH PRIORITY
QUADRANT 1
DOCTOR-DIRECTIVE
ACKNOWLEDGE
PURSUIT
TAKE ACTION

A/B TESTING

without added elements of expression and technology

Hello (patient name),

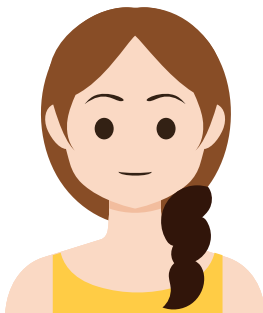
I'm sorry to hear your finger is not getting any better with the current treatment I assigned. If you could come by for another consultation perhaps we can discuss alternative treatments you could try.

Best,
Dr. (doctor name)



Hi doctor. My finger has not improved since the last visit. I don't think you understand how severe this allergy is. It's really affecting my daily life to the point where I'm just angry at everything because of it. 😡

It's the same medication over and over again, and it's not helping whatsoever. This is really frustrating that it seems that I have no choice but to live with it forever.



with added elements of expression and technology

Hello...

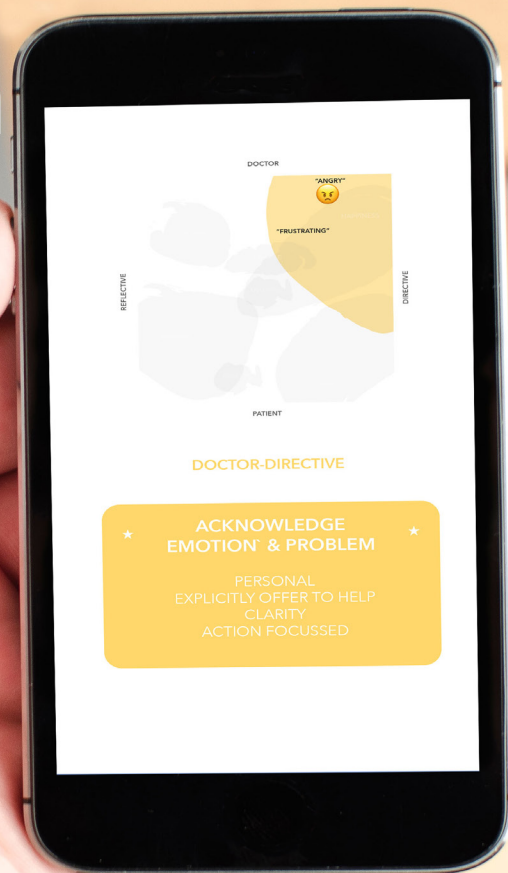
I can understand your anger and frustration that your finger is not getting any better. We have done a lot of tests, but did not find any direct cause. I recognize that this is a chronic disease, and I hope you understand that it cannot be cured but we can try to keep it under control. I want to help you do this. If you could come by for another consultation we can sit down and discuss what alternative options are best suited for you.

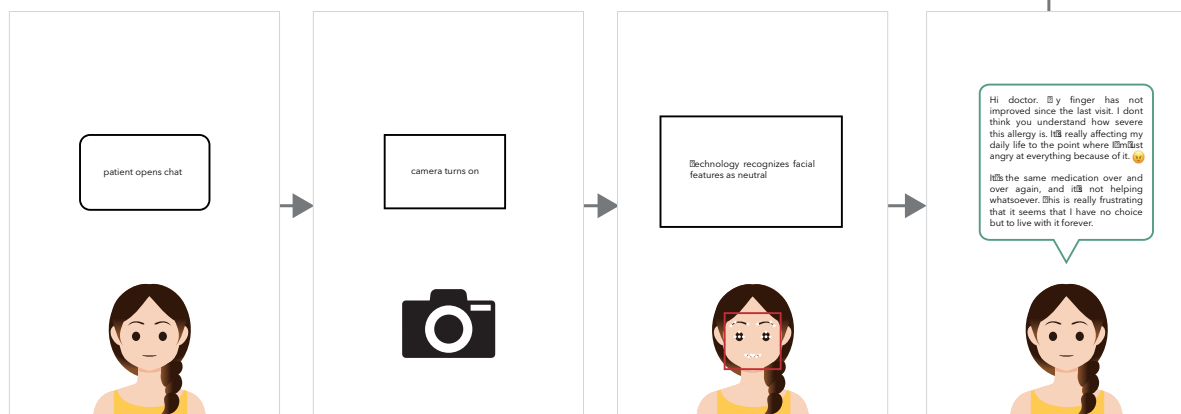
Best,
Dr. ...

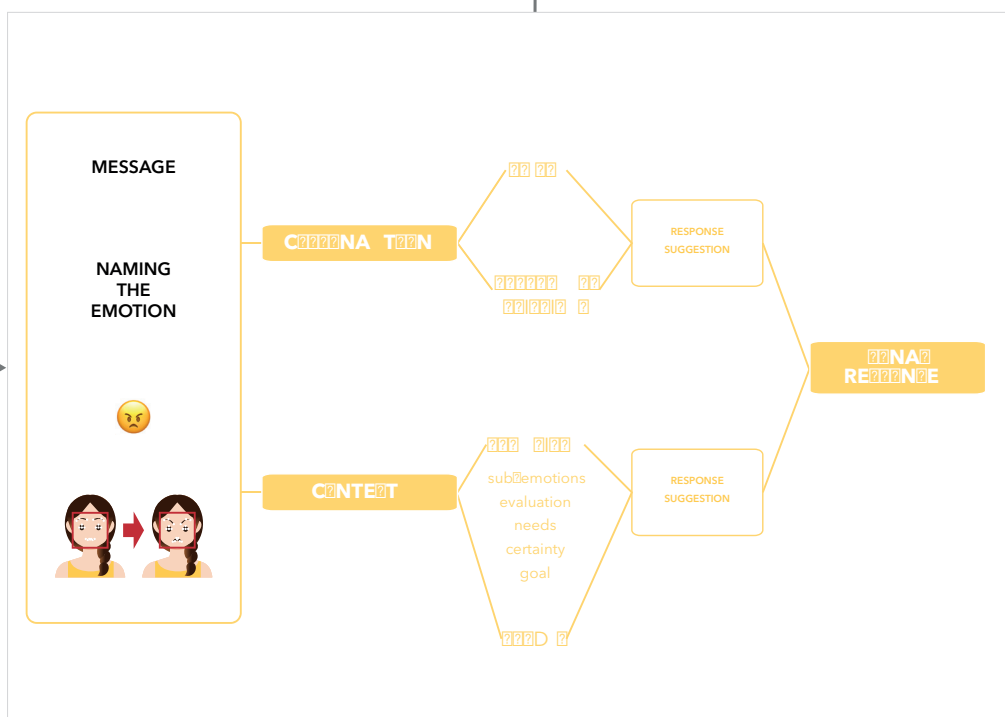


FINAL INTERACTION

Information Display









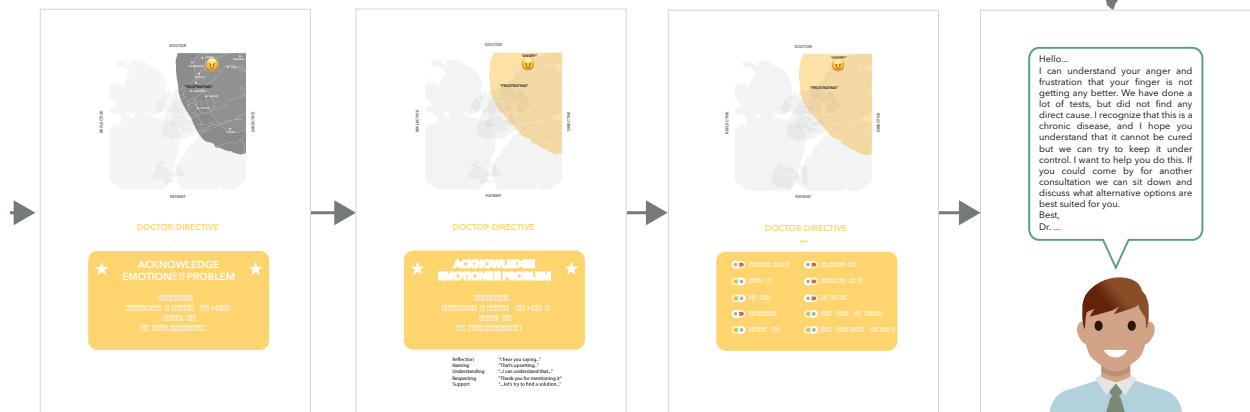
ER

EFFECTIVE
 ENGAGEMENT
 HELP
 INFORMATION
 E
 CT
 IONS



ER

URITY
 NT 1
 EFFECTIVE
 EDGE
 T
 ION



UPDATES IN THE TARGET GROUPS

doctors

Doctors, in near future digital healthcare communication, must still try to meet the expectations of what is considered as medical professionalism. Empathy is one of the core competency to medical professionalism; it is perspective taking, compassionate care, and standing in another's shoes (Hojat M. , 2016). To be able to show empathetic in the doctor's response, information such as the patient's emotion in their questions or descriptions of the problem must be readily available to them. Knowing the patient's emotions can affect the approach that the doctor takes in their response, their choice of words, their medical decisions, etc.

However, there are often other individuals who also come in contact with patients often, and similarly have the same need and expectation to reach medical professionalism. These individuals can be assistants, nurses, receptionist, specialised help, etc. They are also a part of this target group.

This project considers doctors and other individuals who have the medical skill and knowledge to be able to help the patient, or have resources to be able to refer them to. The doctors must also have advanced language skills in the language of conversation.

This interaction focuses on doctors and healthcare individuals who do not have much experience in doctor-patient conversations. For example, this may be new medical students, residents, or doctors. This makes it easier for them to immediately navigate what kind of response the patient needs most.

Although doctors of experience may have developed a natural instinct of how to respond best to patients, this information can bring other values to their experience. While doctors are human too, personal emotions can interfere with the way they approach things. For example, if the doctor is not in a good mood and somehow reflects this on the patient, it is unfair to the patient. Especially in this case, the patient cannot see the doctor is not doing well personally, as yet again, they are communicating through a medium that is not transparent with emotions yet. However, if the unhappy doctor has

the urge to answer in a certain way, but sees that this visual display of a tailored response to the patient is the complete opposite, it can make them think twice about their response.

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APPENDICES

APPENDIX 0

REFLECTION

From the very beginning of not just this graduation project, but of my journey into IDE, I was always especially driven by one thing: people. I am not talking about individuals, but about understanding people, recognizing how real something should feel to people, and how to use this to create something meaningful. This was also my starting point to this graduation journey. This project allowed me to break down one relevant form of human interaction, and explore it in detail with the numerous types of method involving design and research.

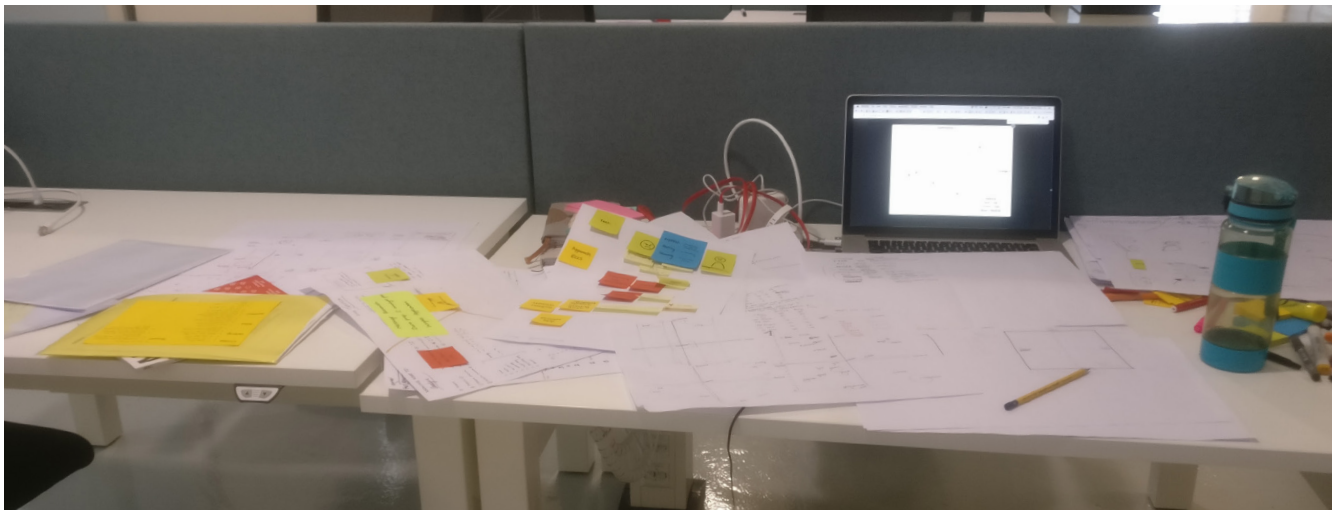
Establishing the topic in itself, made me struggle with how to narrow it down the scope, target group, context, etc. As I think any project regarding a general interaction within society, there is always the challenge of it being a part of a bigger interaction, or that it is built up from even smaller elements of interaction that should be explored. It was not any different with this project. Once narrowing it down to healthcare and pin pointing the scope in user, target, etc. I dove into exploring research and design. There were constant instances where I'd run into a problem, thinking that this part of the interaction is super relevant for another part to make sense, so I should do something about it. These all built up upon multiple mini research and design events in my project, but due to lack of time and resources these insights are not as saturated in data enough to draw conclusions from. This is why, multiple times in this project I had to say to myself, "This is relevant, but not something that I can achieve at this point. If I want this project to work in the future, someone will **have** to look into this problem."

Even after I established the focus of my project, I struggled a lot with explaining my project to other people. It is easy to feel like I am fabricating a lot of the connections I am making from my research and that the idea that this project should work is all in my head. I can research and state that **theoretically** my results should improve doctor reaction, be a preferred response by the patient, improve communication efficiency, shorten the time and questions required for the doctor to understand

the situation, have the patient feel comfortable and feel empathy from the patient to the point where they feel comfortable communicating openly disclosing more relevant information, building trust and increasing satisfaction etc. My experience of truly realizing what impact all of my research has in the real world is just point blank sharing it with others, not worrying about their expectations of what a normal design project is. I received opportunities to be able to talk about my project, share my insights whether it was through one of the user involvement activities or actually giving a presentation to companies such as BeterDichtbij and their partner doctors. Doing this helped me realize that this is really relevant to them. Although I cannot implement my final results due to societal acceptance and technological development, presenting my research and results can open their eyes to acknowledging this problem. Acknowledgement is the first instance of something to be done about it. This was also reflected in the patient's response preference as it showed that there it is a true thing. As communication evolves in healthcare, this project will be a wakeup call to doctors that you cannot treat digital healthcare communication the same as you treat a face-to-face consult. They must recognize that information is missing. Often time this is hard as if there is new information, you can easily identify it as unusual as it is visibly there, but with missing information there is no indicator or sign flashing at you because it means that the information is not present and there. While I am not able to bring them a concrete solution, what comes out of my project highlights the importance of emotion because of the additional information that it can communicate to us, how relevant this is in the way communication is in society but how if this is not acknowledged and recognize, we may risk communicating too much being relied on assumptions as the information is not being provided to us. Doctors should not treat communication in the future the same way they treat doctor-patient conversations today.

From the very beginning, I was well aware that my project consist of small research activities, building up towards a bigger part of interaction, which is a part of an even bigger and more general interaction in healthcare. This made it a challenge for me to understand how to communicate this other people. I struggle with mental organization, and knowing this from the beginning I put extra effort into doing things that may make things easier for me. I tried taking the approach of frequent documentation of things so I can look back, but one of the problems I ran into was that I couldnt easily track back where it was. This happens both with digital and physical notes, but mostly physical since it was also a method of me to first understanding the problems and insights by writing everything down. This meant that I would carry around at least 20 pages of A3 paper, where most of the time my table looked like this:

This greatly affected me when writing this report. I did not get as much detail and insights as I wanted to. But from the very beginning, I knew this would be a challenge. It got away from me when I highly underestimated the time of documenting all of the insights, thoughts and ideas that I have in my mind in a structural way where someone random could understand this project. I have come to realize the impact and importance of the topic that I am researching, I only hope that if given the opportunity to complete this project again I can figure out a visual story structure of my project from the very beginning, and adjust it when necessary. This may help in knowing how to communicate my project to other people whenever and wherever I am in the project at that stage.



APPENDIX I

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APPENDIX 2

User Testing – Emotion visualization

Candidate 1

The basic info you requested

Date: Sun 12 November 2017

Who are you: Director at Mirabeau, usually a happy person who sees the positive side of life

Creative person: yes, I find myself a creative person in finding solutions to complex problems; I'm not necessarily the best one in expressing my thoughts through pictograms :-)

Visually expressive: No, I'm not very crafted in translating thoughts the beautiful drawings.

Description per ball (filenames of the pictures are numbered in the right order):

Ball 1: Although the outside weather was mainly cloudy, in my head I was feeling happy (hence the blue sky). I did some physical exercising and that made me feel full of energy (yellow) 💪☁️

Ball 2: My family of four (2 adults [the pink dots], 2 children [the blue lines]) had a lovely breakfast together with lots of conversation. This made me feel very lucky and full of love (red) for my family ❤️☐👨👩👧👦 (←looks different!! 🍷👨👩👧👦)

Ball 3: I helped a friend with some computer work. This turned out to be quite frustrating as the thing we tried to accomplish didn't work out and took a lot of time. 💻😞😓💧

Ball 4: Back home I played with some electronics (my hobby) and this made me feel very much alive and happy. The items on the ball are examples of electrical components and a happy me 😊😎

Ball 5: My wife made a lovely dinner which tasted wonderful and made me feel very good 🍷😊

Ball 6: Together with friends we had drinks after dinner discussing all kinds of subjects with good laughs 🍷🍷🍷☐☐😂

Ball 7 (I did the extra one as well): I felt happy and relaxed when going to bed. zzz

it was not so easy to describe the emotions with emoji's. I had to search quite a bit.

I always needed multiple emoji's and I'm not sure if anyone would understand what I tried to express

APPENDIX 3

The Scientific Basis for This Work

The Atlas of Emotions is based on a consensus among scientists as determined by a survey (in the choice of the five emotion continents and the relationship of emotions to moods, personality and psychopathology), the work of a few scientists who have focused on the naming of states within emotions, dictionary definitions, theory and best guesses about the actions for each state and whether they are constructive, destructive or ambiguous. For more information, see [“What Scientists Who Study Emotion Agree About,”](#) by Paul Ekman (Perspectives on Psychological Science, 2015).

The survey was emailed in mid-June of 2014 to 248 scientists who had frequently published quantitative research on emotion.

88%	There are universal emotions
80%	There are universal facial signals to emotion
91%	Anger is a universal emotion
90%	Fear is a universal emotion
86%	Disgust is a universal emotion
80%	Sadness is a universal emotion
76%	Happiness is a universal emotion
66%	There are universal triggers to emotion
51%	There is universal physiology of emotion
49%	There are biologically discrete, separate emotions
11%	Emotions are constructed by social factors
3%	Emotions are both biologically separate and socially constructed

The existence of “compelling evidence for universals in any aspect of emotion” was endorsed by 88% of the respondents. The evidence supporting universal signals (face or voice) was endorsed by 80%. There was less agreement about whether there is compelling evidence for universals in the events that trigger an emotion (66%), physiology (51%), or appraisal mechanisms (44%). Thus, Darwin’s claim in 1872 and the more recent work of Ekman and Friesen (1969) and Izard (1971) regarding the universality of some facial expressions were supported. In response to the question “Which of the following best captures your orientation toward emotion in your research?,” 49% chose “Discrete emotions (anger, fear, etc.) combining both biological and social influences,” 11% chose “Emotions as constructed, either socially or psychologically, to fit current conditions,” and 30% indicated they used both approaches.

The respondents were asked whether the evidence for each emotion was compelling. There was high agreement about five emotions (all of which were described by both Darwin and Wundt): anger (91%), fear (90%), disgust (86%), sadness (80%) and happiness (76%). Shame, surprise and embarrassment were listed by 40% to 50%. Other emotions, currently under study by various investigators, drew substantially less support: guilt (37%), contempt (34%), love (32%), awe (31%), pain (28%), envy (28%), compassion (20%), pride (9%) and gratitude (6%).

Partially Charted Emotions

Half or less than half of emotion scientists believe there is convincing evidence that each of the following is an emotion.

LOVE	A strong attachment to another person, typically parent toward child and child toward parent, but also between those romantically committed. Within loving relationships, anger, fear, sadness, disgust and enjoyment can all be experienced.
SURPRISE	The briefest emotion, surprise is triggered by the sudden occurrence of an unexpected event. It is often a way station that leads, after more appraisal, to any of the other emotions.
JEALOUSY	An emotional storyline involving three people: the desired person, the person afraid of losing the commitment of the desired person, and the rival. During jealousy, anger, fear, disgust, sadness or surprise may be felt by any of the three people.
ENVY	Although often misused as a synonym for jealousy, envy involves resenting and wanting what another person possesses. When a person feels envy, anger, contempt or sadness may also be felt.
HATE	Enduring anger focused on a particular person or group of persons. Over time hatred may generate the personality trait of hostility.

EMBARRASSMENT	Self-conscious distress or awkwardness. Often activated by praise from another, or by a faux pas. It has no vocal signal, but may cause a blush that is visible only in light-skinned people.
SHAME	An expectation that others would be disgusted if they knew what the person was thinking of or had done. It motivates a strong wish to prevent others from learning what the person has done or thought.
CONTEMPT	The last emotion to appear in child development, it is a feeling of moral superiority to the target. Often mixed with enjoyment.
GUILT	Regret about a past action, which motivates the wish to confess the wrongful action, hoping for forgiveness.

Signal and Message

The signal of an emotion describes the universal ways that emotion is displayed in the face and/or voice. There can also be other vocal tone changes and body language indicators, but these are not included here because they are often culturally informed and learned as opposed to universal.

The message is what the emotion is telling us. All emotions have a message that is a response to the world around us.

ANGER	Signal	In the voice, anger generates a roar if not controlled; when anger is controlled, the voice may have a sharp edge that is very detectable. In the face, the signal includes glaring eyes, lowered brows and narrowed, tightened lips. When people hear or see an angry signal, they are typically hurt just by the perception of the signal, and may retaliate with angry actions.
	Message	The message of anger is “get out of my way.” Anger can carry a message ranging from dissatisfaction to threat.
FEAR	Signal	Common signals are very wide open eyes, horizontally stretched lips and raised, drawn together eyebrows. There may be movement away from the target. Screams may accompany intense fear. Lesser fear signals can include heavy breathing, a head position slightly

		backwards and away, and horizontally stretched lips accompanied by tightened neck muscles.
	Message	The message of fear is “help me”; it can range from showing low-level concern to conveying panic.
DISGUST	Signal	There are three facial expressions associated with disgust. The first is sticking the tongue out as if the person is getting something out of their mouth. The second is raising the upper lip, but it is relaxed and not tense, which can display gums and teeth depending on the shape of the mouth. The third is wrinkling of the nose and raising of the nostrils. These expressions can occur separately or in unison.
	Message	The message of disgust is “get away from this.” It can show others that the target of disgust is to be kept away from or that the target is unclean, dirty or socially/morally reprehensible.
SADNESS	Signal	The signals of sadness include a frown (lower lip pushed up slightly and lip corners pulled slightly down), the inner corners of the eyebrows drawn up and together in the center of the forehead, raised cheeks and tears. The vocalization of sadness can include sobs and heaving and quavering of the voice.
	Message	The message of sadness is “comfort me.” It encourages, or intends to encourage, empathy from others.
ENJOYMENT	Signal	Enjoyment signals include the Duchenne (authentic) smile, activation of a smile (lip corners pulled obliquely up), and activation of the orbital eye muscles that tighten the lower eyelid and create wrinkling around the outer eye corners (especially with age). Enjoyment also includes vocal signals such as the sound of

		relief (a sigh or exhalation) and the sound of amusement (laughter or giggling).
	Message	The message of enjoyment is “this feels good.” It encourages engaging in social interaction

Moods

Moods are longer-lasting cousins of an emotion that cause us to feel the related emotion repeatedly without any clear trigger.

IRRITABLE	Predisposed to becoming angry, easily provoked.
APPREHENSIVE	Anxious that something bad will happen, on edge.
SOUR	Generally repulsed.
DYSPHORIC (OR FEELING BLUE)	An enduring feeling of discouragement or disappointment.
ELATED	A long-lasting, generalized good feeling.

Personality Trait

Certain personality traits are related to specific emotions.

ANGER	A hostile person is often angry and is known to others for the frequency of anger responses to the world. Often anger occurs with any frustration; the threshold for frustration is low. Hostile people may experience regret afterward and apologize for their anger, but nevertheless continue to respond angrily. Sometimes hostile people express their anger in a nasty way, using words to demean and cause psychological pain to others.
FEAR	A shy or timid person. This personality type is likely to avoid risks and uncomfortable situations. Timid people may perceive the world as full of difficult situations.

DISGUST	A person who often feels disgusted by others may have an inflated sense of self-worth and a hyper-aversion toward others. Someone who is disgusted or dissatisfied with everything can be unpleasant to be around.
SADNESS	A somber person who is often feeling low may have clinical depression or may simply have more frequent feelings of sadness. This person may hold the perspective that life is hard and difficult.
ENJOYMENT	A cheerful person may also be thought of as optimistic. This person sees the world in positive way and can easily be made to laugh and feel enjoyment.

Psychopathology

Each emotion relates to distinct psychopathologies, which describe persistent behaviors that interfere with one's ability to function.

ANGER	A tendency to cause physical or verbal harm in inappropriate contexts. Anger may be out of control, or passive but persistently preoccupying.	
	Intermittent Explosive Disorder	Impulsively aggressive and assaultive behaviors out of proportion to triggers.
	Oppositional Defiance Disorder	A pattern of defiant, disobedient and hostile behavior in children or teens toward parents and people in authority, beyond normal age-appropriate misbehavior.
	Antisocial Personality Disorder	Characterized by a pervasive pattern of disregard for the rights of other people that often manifests as hostility and/or aggression. Deceit and manipulation are also central features.
	Disruptive Mood Dysregulation Disorder	Severe recurrent temper outbursts manifested verbally (e.g., verbal rages) and/or behaviorally (e.g., physical aggression toward people or property) that are grossly out of proportion in intensity or duration to the situation or provocation.
FEAR	Anxiety states involve prolonged fear without knowledge of the source of the threat, and incidents of panic (episodic attacks of severe anxiety).	

	Social Anxiety Disorder	A persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. The individual fears that he or she will act (or show anxiety symptoms) in a way that will be embarrassing and humiliating.
	Post-Traumatic Stress Disorder (PTSD)	A mental health condition that's triggered by an often overwhelmingly terrifying event — either experiencing it or witnessing it. Symptoms may include flashbacks, nightmares and severe anxiety, as well as uncontrollable thoughts about the event.
	Avoidant Personality Disorder	Characterized by a pervasive pattern of social inhibition, feelings of inadequacy and a hypersensitivity to negative evaluation. People with this disorder are intensely afraid that others will ridicule them, reject them or criticize them.
	Generalized Anxiety Disorder	An anxiety disorder that is characterized by excessive, uncontrollable and often irrational worry and apprehensive expectation about events or activities.
	Obsessive-Compulsive Disorder (OCD)	An anxiety disorder characterized by intrusive thoughts that produce uneasiness, apprehension, fear or worry (obsessions); repetitive behaviors aimed at reducing the associated anxiety (compulsions); or a combination of both obsessions and compulsions.
DISGUST	The psychopathology of disgust includes feelings that prevent everyday interaction with the world, the self or others. Disgust can be a paralyzing feeling that makes simple interactions (such as eating) extremely painful if not impossible. Disgust and fear are both thought to contribute to various phobias, such as fear of small animals.	
	Anorexia Nervosa	A distorted self-image that may be maintained by various cognitive biases that alter how the affected individual evaluates and thinks about their body, food and eating. People with anorexia nervosa often view themselves as disgusting, overweight or “big” even when they are underweight.
	Body Dysmorphic Disorder	A body-image disorder characterized by persistent and intrusive preoccupations with an imagined or slight defect in one's appearance or a feeling of disgust with one's appearance.

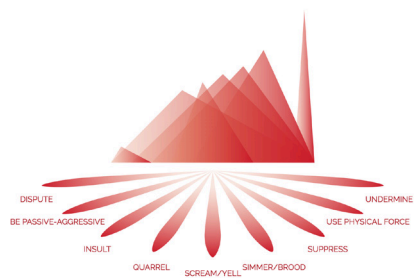
	Bulimia	A disorder characterized by repeated bingeing on large quantities of food followed by induced vomiting; both the bingeing and purging may be accompanied by feelings of self-disgust.
	Sexual Aversion Disorder	Characterized by disgust, fear, revulsion or lack of desire in consensual relationships involving genital contact.
SADNESS	<p>Depression is a well-known type of psychopathology that is reported to affect over 25% of the population. Depression interferes with daily life and causes pain for both the sufferers and those who care about them. Depression is a common but serious illness.</p>	
	Major Depressive Disorder	Also known as clinical depression, major depression or unipolar depression, this is a mental disorder characterized by a pervasive and persistent low mood that is accompanied by low self-esteem and by a loss of interest or pleasure in normally enjoyable activities.
	Dysthymia	Sometimes also called neurotic depression, dysthymic disorder or chronic depression, this is a mood disorder consisting of the same cognitive and physical problems as depression, with less severe but longer-lasting symptoms.
	Bipolar Disorder	Also known as bipolar affective disorder (and originally called manic-depressive illness), this is a mental disorder characterized by periods of elevated mood and periods of depression.
ENJOYMENT	<p>Unlike with other emotions, it is hard to imagine enjoyable emotions contributing to challenges in managing our everyday relationships, work and ability to meet our basic needs. However, pathological enjoyment is quite serious; hyper-elevated states of enjoyment can cause delusions in addition to feeling good, which can lead to destructive behaviors.</p>	
	Mania/Manic Episode	Mania at its extreme is commonly characterized by frenzied, ungovernable exuberance — essentially elation not grounded in reality. Frequently, confidence and self-esteem are excessively enlarged, and grand, extravagant ideas are expressed; this is called “grandiosity.” Mania is often part of bipolar disorder.

	Cyclothemia	This is characterized by moods that shift noticeably up and down from a person's baseline. The person may feel on top of the world for a time, followed by a low period when their feeling is somewhat blue. Between these cyclothymic highs and lows, the person may feel stable and fine.
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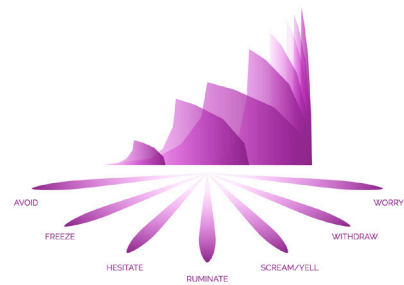
Intrinsic or Intentional Actions

Actions can be intrinsic (without conscious intent) or intentional (an active attempt to enact change), or both.		
ANGER	Intrinsic	Quarrel, Insult, Undermine, Dispute, Scream/yell, Use physical force, Simmer/brood, Be passive-aggressive
	Intentional	Set limits, Be firm, Withdraw, Take a time out, Breathe, Practice patience, Reframe, Distract, Avoid, Remove the interference
FEAR	Intrinsic	Withdraw, Avoid, Hesitate, Freeze, Scream/yell, Ruminant, Worry
	Intentional	Reframe, Be mindful, Breathe, Distract
DISGUST	Intrinsic	Withdraw, Avoid, Vomit, Dehumanize
	Intentional	Withdraw, Avoid
SADNESS	Intrinsic	Seek comfort, Withdraw, Mourn, Protest, Feel ashamed

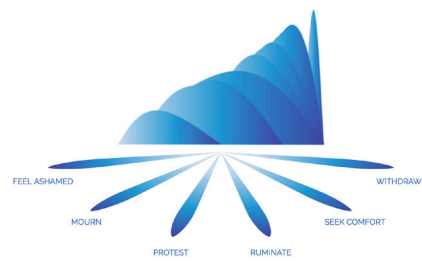
	Intentional	Withdraw, Distract
ENJOYMENT	Intrinsic	Seek more, Maintain, Exclaim, Engage/connect, Savor, Indulge
	Intentional	None



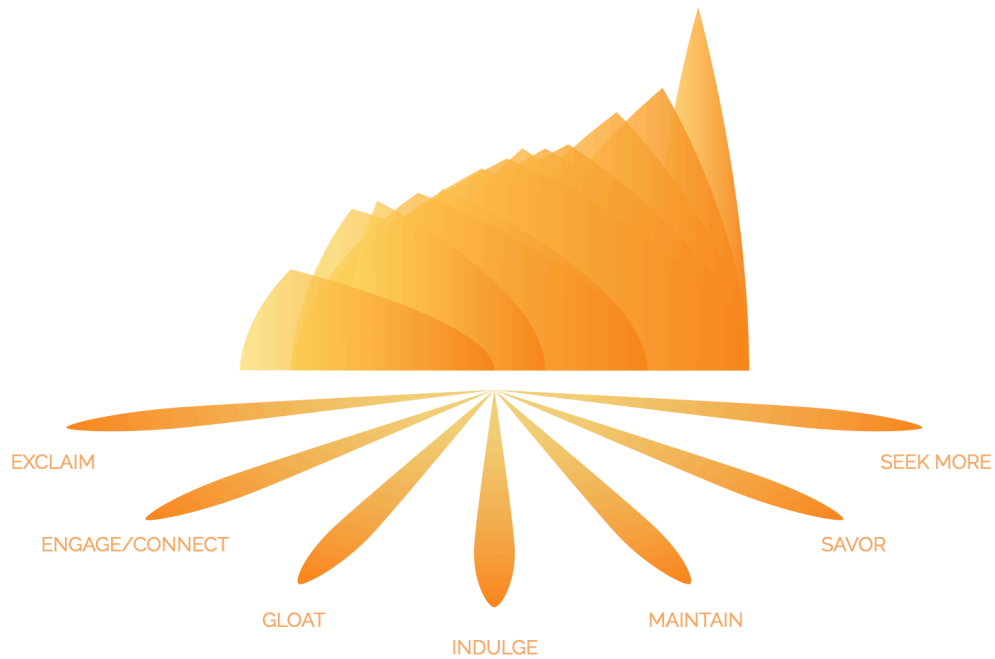
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ALL ANGER FEAR DISGUST SADNESS **ENJOYMENT**

<http://sourcesofinsight.com/action-signals-use-negative-emotions-as-a-call-to-action/>

Shaver et al. (2001)

Primary emotion	Secondary emotion	Tertiary emotions
Love	Affection	Adoration, affection, love, fondness, liking, attraction, caring, tenderness, compassion, sentimentality
	Lust	Arousal, desire, lust, passion, infatuation
	Longing	Longing
Joy	Cheerfulness	Amusement, bliss, cheerfulness, gaiety, glee, jolliness, joviality, joy, delight, enjoyment, gladness, happiness, jubilation, elation, satisfaction, ecstasy, euphoria
	Zest	Enthusiasm, zeal, zest, excitement, thrill, exhilaration
	Contentment	Contentment, pleasure
	Pride	Pride, triumph
	Optimism	Eagerness, hope, optimism

	Enthrallment	Enthrallment, rapture
	Relief	Relief
Surprise	Surprise	Amazement, surprise, astonishment
Anger	Irritation	Aggravation, irritation, agitation, annoyance, grouchiness, grumpiness
	Exasperation	Exasperation, frustration
	Rage	Anger, rage, outrage, fury, wrath, hostility, ferocity, bitterness, hate, loathing, scorn, spite, vengefulness, dislike, resentment
	Disgust	Disgust, revulsion, contempt
	Envy	Envy, jealousy
	Torment	Torment
Sadness	Suffering	Agony, suffering, hurt, anguish
	Sadness	Depression, despair, hopelessness, gloom, glumness, sadness, unhappiness, grief, sorrow, woe, misery, melancholy
	Disappointment	Dismay, disappointment, displeasure
	Shame	Guilt, shame, regret, remorse
	Neglect	Alienation, isolation, neglect, loneliness, rejection, homesickness, defeat, dejection, insecurity, embarrassment, humiliation, insult
	Sympathy	Pity, sympathy
Fear	Horror	Alarm, shock, fear, fright, horror, terror, panic, hysteria, mortification
	Nervousness	Anxiety, nervousness, tenseness, uneasiness, apprehension, worry, distress, dread

Tony Robbins

1. **Uncomfortable** – Impatient, uneasy, distressed, mildly embarrassed.
2. **Fear** – Concern, apprehension, scared, terrified.
3. **Hurt** – Sense of loss.
4. **Anger** – mildly irritated, resentful, livid, rage.
5. **Frustration** – held back or hindered in the pursuit of something.
6. **Disappointment** – sad, defeated.
7. **Guilt** – emotions or regret.
8. **Inadequacy** – less than or unworthy.
9. **Overloaded** – overwhelmed, hopeless, or depressed.
10. **Loneliness** – apart or separate from.

<https://myvocabulary.com/word-list/adjectives-of-emotions-vocabulary/>

Alphabary for Adjectives of emotions (252)

- A) Accepting, Accommodating, Afraid, Aggressive, Agitated, Alarmed, Amazed, Amused, Antagonistic, Anxious, Apathetic, Apprehensive, Arrogant, Astonished, Astounded, Attentive
- B) Blase, Bold, Bothered, Brave
- C) Calm, Capable, Casual, Charming, Cheerful, Cheery, Churlish, Collected, Comfortable, Competitive, Composed, Compulsive, Concerned, Confident, Conflicted, Conscientious, Conservative, Considerate, Conspicuous, Contemptible, Content, Convivial, Cool, Courageous, Covetous, Creative, Critical, Curious, Cynical
- D) Dazzled, Debilitated, Defensive, Dejected, Delighted, Demeaned, Depressed, Destructive, Devious, Devoted, Dictatorial, Diffident, Disdainful, Distracted, Distraught, Distressed, Downcast
- E) Earnest, Edgy, Elated, Empathetic, Enthusiastic, Euphoric, Exhausted, Expectant, Explosive, Exuberant
- F) Ferocious, Fierce, Flabbergasted, Flexible, Focused, Forgiving, Forlorn, Frightened, Furtive
- G) Gloomy, Good, Grateful, Grouchy, Guilty
- H) Happy, Harassed, Heroic, Hesitant, Hopeful, Hostile, Humble, Humorous, Hysterical
- I) Idealistic, Ignorant, Ill-tempered, Impartial, Impolite, Imprudent, Indifferent, Infuriated, Insightful, Insulted, Intense, Intimidated, Intolerant, Irascible
- J) Jealous, Jolly, Jovial, Joyful, Jubilant, Jumpy
- K) Kind
- L) Languid, Liberal, Loving, Loyal
- M) Magical, Magnificent, Malevolent, Malicious, Mysterious
- N) Needy, Negative, Neglected, Nervy
- O) Opinionated
- P) Panicky, Passionate, Patient, Perturbed, Petrified, Petulant, Placid, Pleased, Powerful, Prejudicial, Prideful
- Q) Quarrelsome, Queasy, Quivering
- R) Rancorous, Rational, Reasonable, Reckless, Reflective, Remorseful, Repugnant, Resilient, Resolute, Resourceful, Respectful, Responsible, Responsive, Restorative, Reverent, Rude, Ruthless
- S) Sad, Safe, Scared, Scornful, Seething, Selfish, Sensible, Sensitive, Serene, Shaky, Shivering, Shocked, Sickly, Simple, Sober, Solemn, Sombre, Sour, Speechless, Spooked, Stern, Successful, Sullen, Superior, Supportive, Surly, Suspicious, Sweet, Sympathetic
- T) Tactful, Tenacious, Tense, Terrific, Testy, Thoughtful, Thoughtless, Timorous, Tolerant, Tranquil, Treacherous, Trembling, Truthful
- U) Ultimate, Uncivil, Uncouth, Uneasy, Unethical, Unfair, Unique, Unmannerly, Unnerved, Unrefined, Unruffled, Unsavory, Unworthy, Uplifting, Upset, Uptight
- V) Versatile, Vicious, Vigilant, Vigorous, Vile, Villainous, Virtuous, Vivacious, Volatile, Vulnerable
- W) Warm, Wary, Waspish, Weak, Welcoming, Wicked, Wild, Wise, Wishy-washy, Wistful, Witty, Woeful, Wonderful, Worrying, Worthy
- X)
- Y) Youthful
- Z) Zany, Zealous

APPENDIX 5

Brainstorm session Tuesday 31 Oct 2017

Amsterdam – Bell

Peet Sneekes, Hayo Rubingh, Nadine Popping, Akshay Dharap, Shawny Perrier

Research Question	<i>How does the use of emojis affect the customer's ability to express emotion in their requests for a better understanding of their needs and provide the desired automated service?</i>
Focus	Methods to test emojis as a form of expression (Also, what type of contexts is this useful in? e.g. doctors survey of pain expression?)
Goal	Testing plan ideation (design vision/preliminary requirements)
Basis	Emotion mimicry
Unknowns	Culture Personality Generation groups
Organization	<ul style="list-style-type: none">• Book a room• Take pictures!• Time keeper• Materials (Paper, whiteboard?, post-its, pens, markers)
Time (hh:mm)	Activity
00:10	Explain project & Research Question (pre-prepare post it notes and mind map out where I am in my research)
00:02	Explain goal & focus of this brainstorm session
00:02	Delegate roles (time keeper) & no judgement...go wild
00:10	Mind map (do they have things to add on, what can we focus on, etc.)
00:15	Brainstorm 1 – “how might we” questions & paper rotations
00:05	Cluster/categorize
00:15	Brainstorm 2 – trigger method
00:07	Personas (difference between people who uses/does not use emojis?)
00:15	Storyboarding – how to test it
00:10	Any last comments/suggestions

How might we use bring emojis to the physical world?

APPENDIX 6

1 COMM 121 – Interpersonal Communication: Listening Responses

Listening Responses	
	<div> <div>Silent Listening</div> <div>Questioning</div> <div>Paraphrasing</div> <div>Empathizing</div> <div>Supporting</div> <div>Analyzing</div> <div>Evaluating</div> <div>Advising</div> </div> <div> <div>More Reflective Less Directive</div> <div>Less Reflective More Directive</div> </div>
Listening Response	Overview
Silent Listening Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Being attentive and non-verbally responsive without offering verbal feedback. Non-verbal Responses include nodding your head, providing eye contact, facial expressions. Short encouraging sounds such as mmm-hmm are used to help assure the speaker they are being listened to. Uses: When the best response is to say nothing.
Questioning Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Using questions while listening to gather additional information. (Uses) Reasons to ask questions include: <ul style="list-style-type: none"> To clarify meanings. To learn about other's thoughts, feelings and wants. To encourage elaboration. To encourage discovery. To gather more facts and details. Keep in mind that not all questions are genuine requests for information. Be sure that your intentions are genuine by avoiding: questions that lead or trap the speaker, questions that make statements, questions that carry hidden agendas, questions that seek correct answers, and questions based on assumptions.
Paraphrasing Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Feedback that restates what you think the speaker said using your own words. Paraphrasing responses include: <ul style="list-style-type: none"> Changing the speaker's wording. Offering an example of what you think the speaker is referring to. Reflecting the underlying theme of the speaker's message. Uses: When you want to know if what the speaker said is actually the message that they intended, when you may want additional information from the speaker and when you are in a heated discussion and you want to demonstrate that you are listening to the speaker. You can paraphrase factual information or you can paraphrase the speaker's thoughts, feelings or wants.
Empathizing Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Responses that demonstrate you identify with the speaker. Responding with empathy requires perspective-taking and genuine concern for the speaker. Types of responses may be brief (such as, "My goodness!" or "Wow") or expressed in statements (such as, "I can see that really hurts" or "I can tell you are really excited about that.") Be cautious and avoid these non-empathizing behaviors: <ul style="list-style-type: none"> Denying others the right to their feelings. Minimizing the significance of the situation. Self-defending or avoiding blame. Raining on the speaker's parade. Uses: When you want to identify with the speaker and make them feel like they are not alone.
Supporting Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Responses that demonstrate the listener's support for the speaker's situation. Types of Supportive Responses include: Agreement, Offers to Help, Praise, Reassurance, and Diversion. Uses: When you know the speaker requires emotional and mental support. Be aware that some people may not be ready for the different types of supportive responses. When providing support be sure to be sincere and focus on the present.
Analyzing Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Responses that offer an interpretation of a speaker's message for the purpose of helping the speaker see other alternative meanings of a situation. Guidelines for Analyzing: <ul style="list-style-type: none"> Offer your interpretation in a tentative way because you don't know for sure if you are correct. Your interpretation should be reasonably correct or don't offer an interpretation until you have more info. Make sure the person is seeking alternative meanings to a situation otherwise they may get defensive.
Evaluating Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Responses that evaluate the speaker's thoughts or behaviors in a favorable or unfavorable way. These types of responses are also known as constructive criticism. Before providing an evaluative response determine if the speaker have requested an evaluative response from you. If you don't they may get defensive. Be sure to be sincere and truly constructive in your response.
Advising Your Rating: <input type="checkbox"/> Skilled <input type="checkbox"/> Average <input type="checkbox"/> Needs Practice	Responses that offer the speaker a resolution to their problem or situation. Advising is the most common listening response but should generally be used only when: <ul style="list-style-type: none"> The speaker asks for advice by asking a question or when they announce a problem. The speaker is willing to listen and consider your advice. You are confident in the advice that you are giving. You won't be blamed if the advice taken doesn't work out as planned.

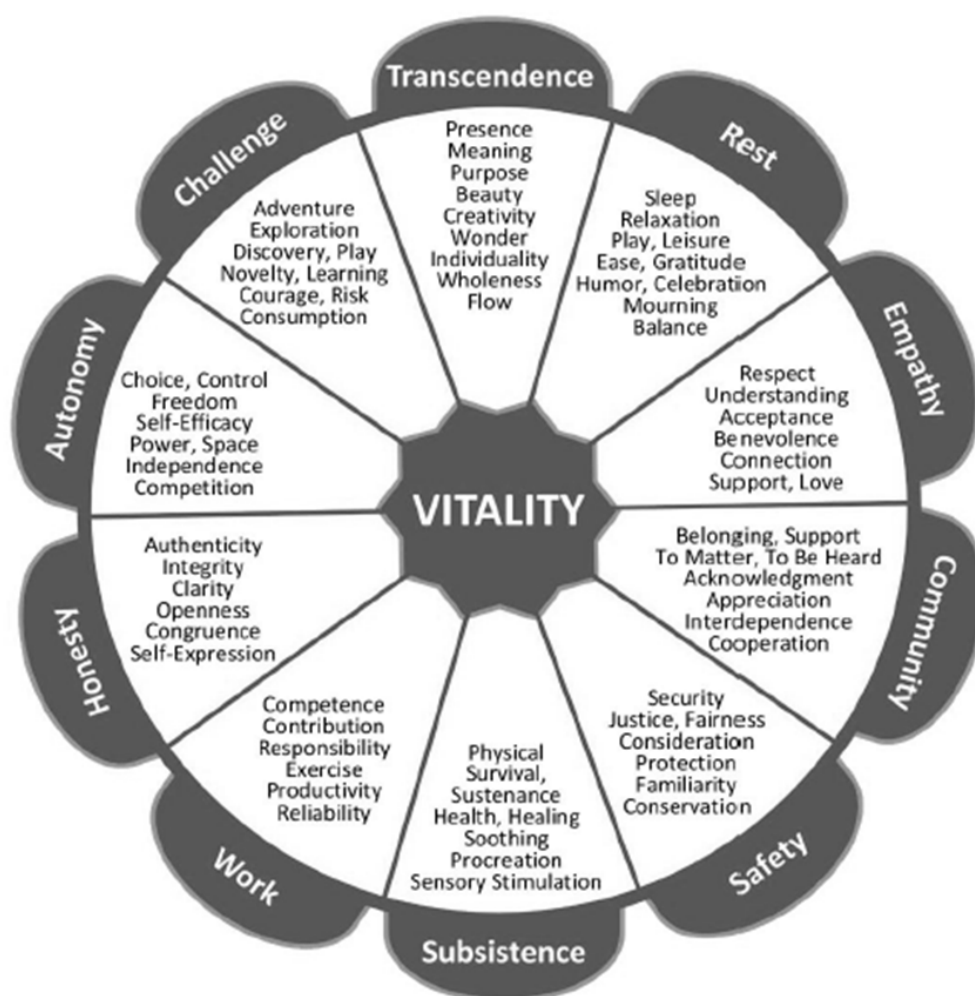
APPENDIX 7

Identifying underlying needs

This tool will help you gain a deeper understanding of the underlying needs we all have but may not openly or knowingly express. Needs make no reference to any specific person doing any specific thing. Needs can also be referred to as values, desires or aspirations.

The Wheel of Universal Human Needs is a visual representation of a person's overarching needs (outer ring of petals in dark gray) with words commonly used to describe them listed in the center. You may notice a speaker use these words when you are listening with empathy, or you may intuit these needs from what they are saying. Page 2 of this handout is designed to help you check your understanding of what's important to the speaker.

The Wheel of Universal Human Needs



Inspired by the work of Manske J, Manske J. 2005. <http://radicalcompassion.com>. Accessed May 16, 2016.

Rosenberg M. Center for Nonviolent Communication. 2005. <http://www.cnvc.org>. Accessed May 16, 2016.

Max-Neef M, Ekins P, eds. *Real-life Economics: Understanding Wealth Creation*. London, UK: Routledge; 1992.

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Jeff Brown, Certified Trainer with the Center for Nonviolent Communication (www.evolutionaryorganizations.org)

Expressing needs in natural language

The following list gives examples of how needs may be expressed in conversational language. As written, these questions might be used to check a listener's understanding of a speaker's needs. They can also be used as a springboard to further discussion. Think about a patient who starts asking questions about a mammogram in an angry voice. The clinician guesses that what's important to her is autonomy. He might ask, "Would it help to know that you really have a choice in whether to undergo this test?" In this example, the clinician translates the word "autonomy" into the word "choice" and then uses it in conversation.

Underlying need	Possible questions to elicit underlying needs
AFFECTION	Do you want to be close?
APPRECIATION	Do you want to know that what you did is important?
AUTHENTICITY	Do you want to say what's really in your heart?
AUTONOMY	Would you like to choose what to do?
CELEBRATION	Would you like to show how happy you feel?
COMPANIONSHIP	Would you like some company?
COMPASSION	Do you want to be heard about how special or hard this is for you?
COMPETENCE	Do you want to really know, or show me, that you can do it?
CONSISTENCY	Do you want to be able to count on this happening the same way each time?
CONTRIBUTION	Would you like to be able to help or share?
COOPERATION	Do you want everyone to work together as a team?
CREATIVITY	Do you want to explore what you can create?
EFFECTIVENESS	Do you want to be able to make things change?
EQUALITY	Do you want the same for everyone?
FREEDOM	Do you want to decide, by yourself, what is good for you?
HONESTY	Do you want to trust that what is said is true?
IDENTITY	Do you want to find out what you like? Do you want to try different things and have the freedom to decide in another way if you didn't feel comfortable with it?
INCLUSION	Would you like to be a part of what's happening?
MOURNING	Do you want to show how sad you feel?
MUTUALITY	Do you want to share the same ideas or beliefs?
ORDER	Do you want to find things easily? Do you want to know what's going on around you?
PARTICIPATION	Do you want to have a say in what we do?
PEACE	Do you want quiet? ...or calm? ...or an easy time?
PURPOSE	Would you like something important to do?
RECREATION	Do you want to have any time without a schedule?
SECURITY	Do you want to know that you're going to be ok?
STIMULATION	Are you looking for fun, or for something new to do?

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[Compassionate Communication Center of Ohio](http://CompassionateCommunicationCenterofOhio.org)

Source: AMA. *Practice transformation series: listening with empathy*. 2016.

Identifying underlying feelings

This tool will help you gain a deeper understanding of the underlying feelings a speaker may be expressing to help you listen with empathy more effectively.

Feelings that we experience emotionally

The feelings we experience emotionally differ based on whether our needs are or are not being fulfilled.

When Needs Are Being Fulfilled	When Needs Are Not Being Fulfilled
GLAD, happy, excited, hopeful, joyful, satisfied, encouraged, confident, inspired, relieved, touched, elated	SAD, lonely, helpless, overwhelmed, dismayed, discouraged, disheartened
PEACEFUL, calm, content, absorbed, expansive, loving, blissful, satisfied, relaxed	SCARED, fearful, terrified, nervous, horrified, anxious, lonely
LOVING, warm, affectionate, tender, friendly, sensitive	MAD, angry, aggravated, furious, resentful, disgusted, irritated, annoyed, disappointed
PLAYFUL, energetic, invigorated, refreshed, stimulated, alive, eager, giddy, adventurous, enthusiastic	CONFUSED, frustrated, troubled, torn, embarrassed, uneasy, worried, concerned
RESTED, relaxed, alert, refreshed, energized	TIRED, exhausted, fatigued, indifferent, weary, overwhelmed, helpless, heavy
THANKFUL, grateful, appreciative	UNCOMFORTABLE, pained, uneasy, hurt, miserable, embarrassed

Evaluations: indirect expression of feelings

The following expressions can be considered evaluations rather than feelings. These words say more about what we interpret or judge another person as doing. Use the chart below to help you access the deeper feelings and needs of the speaker while listening with empathy. Note: This list is not designed to be complete or authoritative.

When you say or hear this evaluation	You might be feeling	You might be needing
Abandoned	Lonely, terrified, hurt, sad, frightened	Connection, belonging, support, caring, nurturing
Abused	Angry, frustrated, frightened	Caring, nurturing, support, consideration, physical wellbeing, respect
Attacked	Scared, angry	Safety
Belittled	Angry, frustrated, tense, distressed	Respect, autonomy, to be seen, acknowledgement, appreciation
Betrayed	Angry, hurt, disappointed, enraged	Trust, dependability, honesty, honor, commitment, clarity
Blamed	Angry, scared, confused, antagonistic, hostile, bewildered, hurt	Accountability, causality, fairness, justice
Cheated	Resentful, hurt, angry	Honesty, fairness, justice, trust, reliability
Coerced	Angry, frustrated, frightened, scared	Choice, autonomy, freedom
Criticized	Scared, anxious, frustrated, angry, embarrassed	Understanding, acknowledgement, recognition, accountability, acceptance
Disrespected	Embarrassed, frightened, frustrated, hurt, irritated, angry	Respect, appreciation, acknowledgment, consideration, to be seen and valued
Ignored	Lonely, scared, hurt, sad, embarrassed	Connection, belonging, inclusion, community, participation
Incompetent	Frustrated, disappointed, worried	Proficiency, success, competence,

		effectiveness, development
Insulted	Angry, embarrassed	Respect, consideration, acknowledgment, recognition
Interrupted	Angry, frustrated, resentful, hurt	Respect, to be heard, consideration
Intimidated	Scared, anxious	Safety, equality, empowerment
Manipulated	Angry, scared, powerless, frustrated	Autonomy, empowerment, trust, equality, freedom, connection, genuineness
Misunderstood	Upset, angry, frustrated, discouraged	To be heard, understanding, clarity
Pressured	Anxious, resentful, overwhelmed	Relaxation, clarity, space, consideration, ease
Put down	Angry, sad, embarrassed	Respect, acknowledgement, understanding
Rejected	Hurt, scared, angry	Belonging, inclusion, closeness, to be seen, acknowledgement, connection
Threatened	Scared, frightened, alarmed, agitated	Safety, autonomy

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[Compassionate Communication Center of Ohio](http://www.compassionatecommunicationcenterofohio.org)

Source: AMA. *Practice transformation series: listening with empathy*. 2016.

Deflective listening

Understand and overcome barriers to empathy

Here are some common forms of communication that hinder empathy by taking the focus away from the person who is speaking. To be clear, these are not incorrect ways of speaking, but they are not demonstrations of empathy. Possible alternatives are suggested; notice how these responses keep the attention on the speaker. A group exercise to practice overcoming barriers to empathy can be found after the table.

Communication form	Action	Example	Possible empathetic alternative
Giving advice/fixing	Telling the other person what you think they should do.	<i>"I see people in my clinic every month with shingles, and sometimes it's severe. I think you should get the vaccine."</i>	<i>"I can see that you're concerned about the safety of the shingles vaccine."</i>
Analyzing/diagnosing	Interpreting or evaluating a person's behavior.	<i>"You spend so much time taking care of your husband that you don't prioritize your own health."</i>	<i>"It sounds like you'd like someone to understand how time-consuming it is care for your husband after his stroke."</i>
Storytelling	Grabbing the focus away from another person and placing it back on your own experience.	<i>"I had another patient who's older than you are, and they were back on their feet in no time."</i>	<i>"It sounds like you're worried, and you don't trust that your body will be able to recover from the surgery."</i>
Pity/sympathy	Feeling sorry for someone, or sharing your own feelings about what they said.	<i>"Oh, you poor thing... I feel so sad for you."</i>	<i>"I heard you didn't get that job you were so excited about. How are you feeling today?"</i>
Reassuring/consoling	Trying to make someone feel better.	<i>"You might be upset now, but I'm sure you'll feel better soon."</i>	<i>"You look really upset. Would you like to talk about it?"</i>
Shutting down	Discounting a person's feelings and trying to shift them in another direction.	<i>"Consider yourself lucky. It could have been much worse than this. We got the stent in before you had a heart attack."</i>	<i>"It's common for people to feel worried after a heart procedure. How is this affecting you?"</i>

Changing the subject	Avoiding an uncomfortable moment that you don't know how to deal with, and changing the course of the conversation.	<i>To a co-worker who says, "_____ is so lazy! She never does her job!": "I'm sorry but I need to get going to see this next patient right now."</i>	<i>"Are you frustrated with how the work load is shared in the clinic?"</i>
Interrogating	Using directed questions to expose a person's behavior or to provoke guilt.	<i>"So why aren't you following the diet that our diabetes educator provided?"</i>	<i>"You seem overwhelmed with managing your diabetes."</i>
Commiserating	Agreeing with the speaker's judgments of others.	<i>"Oh, I took care of that patient on service last month and he is a manipulative drug-seeker."</i>	<i>"I bet it's frustrating to be that patient's physician when you are not sure if you can trust him."</i>
One-upping	Convincing the speaker that whatever they went through, you had it worse.	<i>"You think you're tired? They hadn't passed work-hour restrictions yet back when I was a resident."</i>	<i>"I imagine you're exhausted and just want some sleep!"</i>

"I imagine you might feel..."

"I am wondering if you are feeling..."

"You sound..."

"You seem..."

"Is it important to you that...?"

"Let's see if I have this right..."

Tony Robbins

1. **Uncomfortable** – When you feel uncomfortable, this is a signal to change your state. Clarify what you want, then take action in that direction.
2. **Fear** – Fear is a signal to prepare ourselves or get prepared. Get yourself prepared to deal with something that's about to come. If it's beyond your control, then change your perception and let it go.
3. **Hurt** – Hurt is a signal that you have an expectation that's not being met or you have a sense of loss. Evaluate whether there really is a loss. Next, change your perception or change your way of communicating your needs or change your behavior.
4. **Anger** – This is a signal that an important rule that you have in your life has been violated by somebody else or maybe even you. Clarify your rules or adjust them. Your rules might not match other people's rules so if you don't change them, you might be angry the rest of your life.

5. **Frustration** – The signal is you're doing the same thing over again and expecting a different result. You need to change your approach to achieving your goal.
6. **Disappointment** – This is a signal that you need to realize that an expectation or an outcome you had won't happen, and you need to change your expectation. For example, maybe your timeframe was too short.
7. **Guilt** – Guilt is a signal that you violated one of your own standards. Don't stay in guilt, but don't deny it. Make things right when you screw up. When you can't change the past, change your present and future behaviors. Recognize when you're feeling guilty when you shouldn't be, change your perception, and let it go.
8. **Inadequacy** – This is a signal that you need to do something to get better. Get up and do something to get better or change your criteria. Maybe your rules are too harsh. You don't have to be perfect – you simply need to start taking action, such as go practice, to improve at whatever it is.
9. **Overloaded** – This is a signal to reevaluate what is most important to you in this situation. Distinguish between what is a necessity versus what is a desire. Prioritize your list. Take the first one on your list and do something about it. Do something to take control of events instead of let them control you. The simplest way is to chunk it down, take one thing, and act on it.
10. **Loneliness** – The signal is we need a connection with people. Clarify what kind of connection you need: basic friendship, somebody to laugh with, somebody to listen to you, etc. Then change your approach or change your perception..

Deflective listening

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		<i>don't prioritize your own health."</i>	<i>care for your husband after his stroke."</i>
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Group exercise: Overcoming barriers to empathy

This can be done with a group of three to 12 people.

1. Group sits together; each participant receives a copy of the Deflective Listening table.
2. One participant volunteers a brief situation from work or home life for this exercise and provides one to two sentences of background.
3. Other participants take turns responding to the speaker using forms of deflective listening (e.g., giving advice/fixing, analyzing/diagnosing, storytelling, etc.)
4. Next, participants take turns practicing listening with empathy. Each participant tries to infer a value and/or feeling, and address this in their response to the speaker.
5. Debriefing: the initial speaker has an opportunity to express how it felt to receive the deflective listening responses, and how it felt to be listened to with empathy when the focus was on values and feelings. Give other participants have an opportunity to share their reactions.

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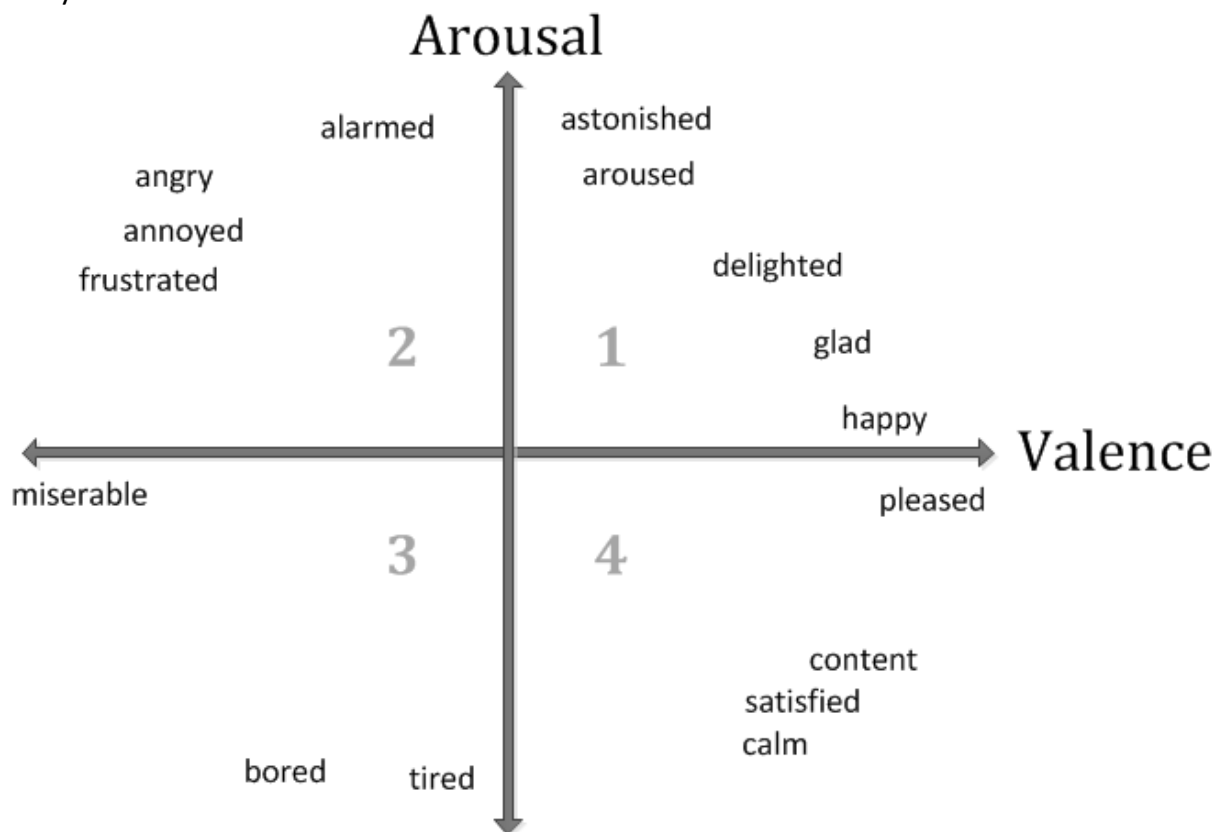
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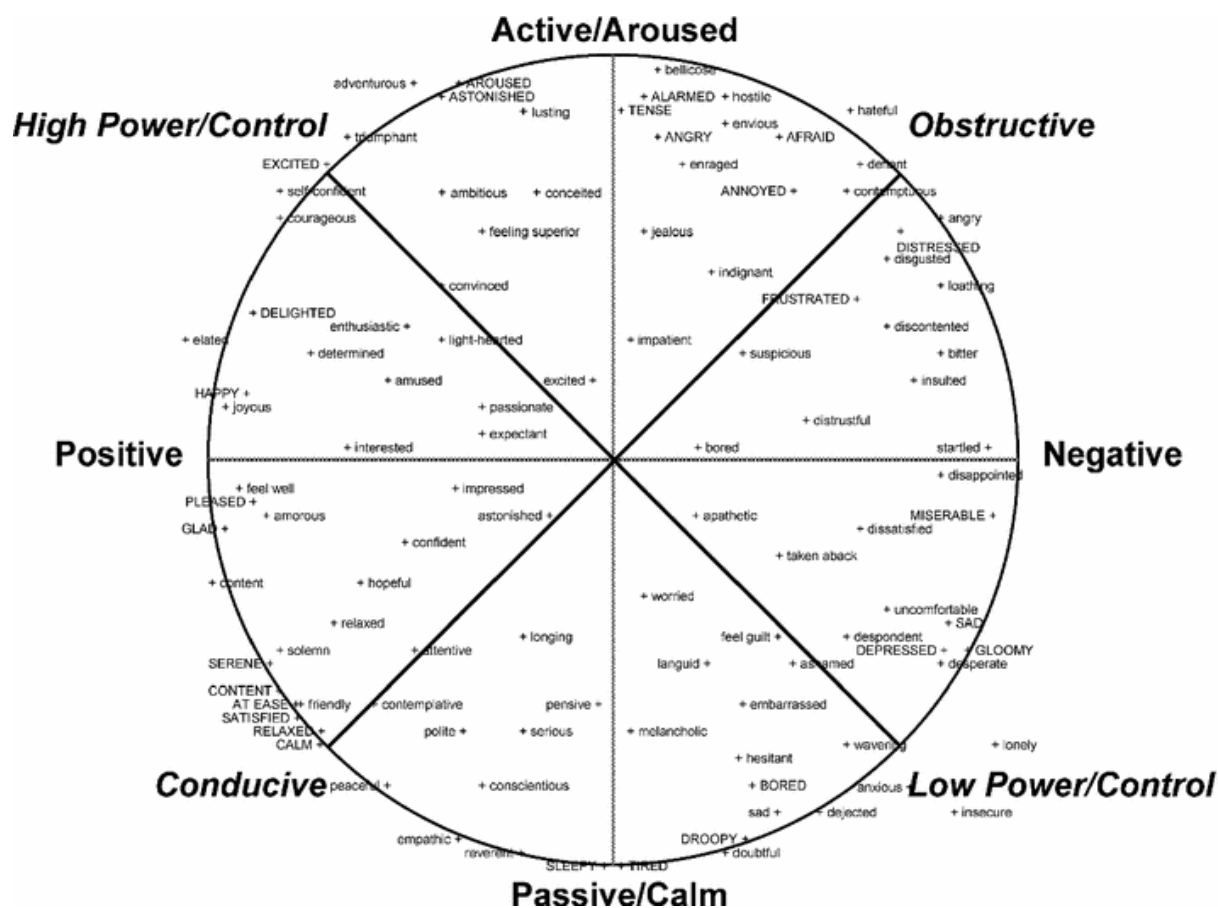
APPENDIX 2

Thayer's emotion model



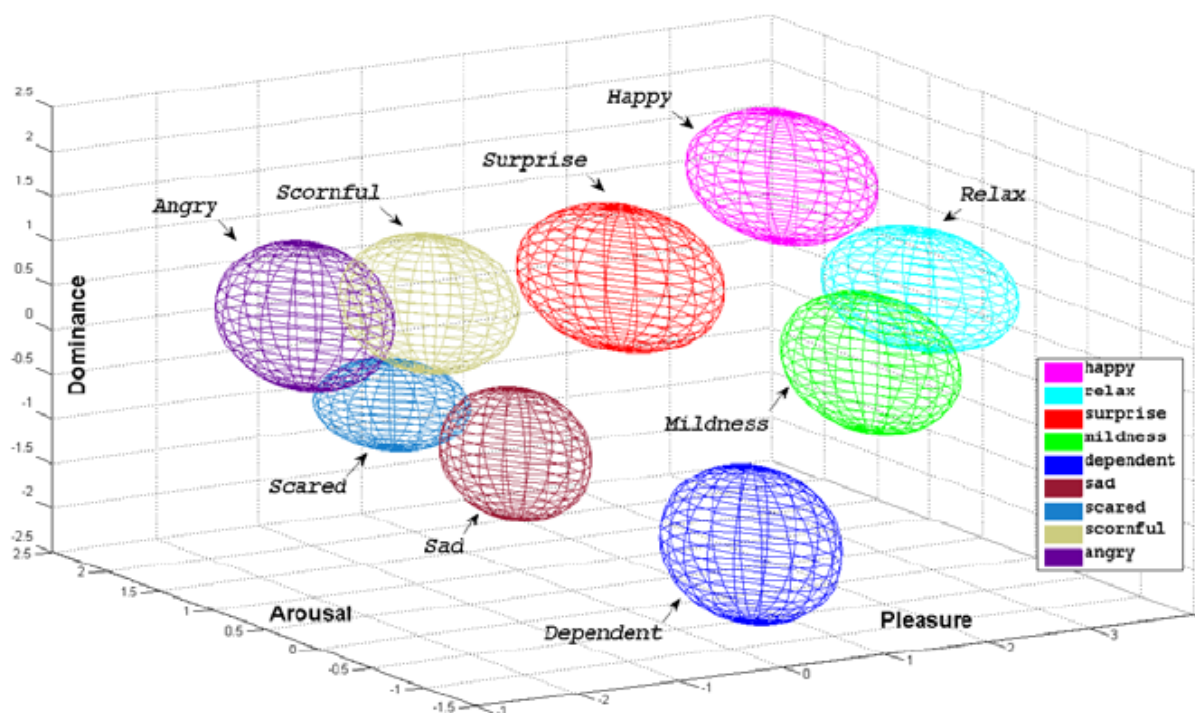
What are emotions? And how can they be measured?

Klaus R. Scherer

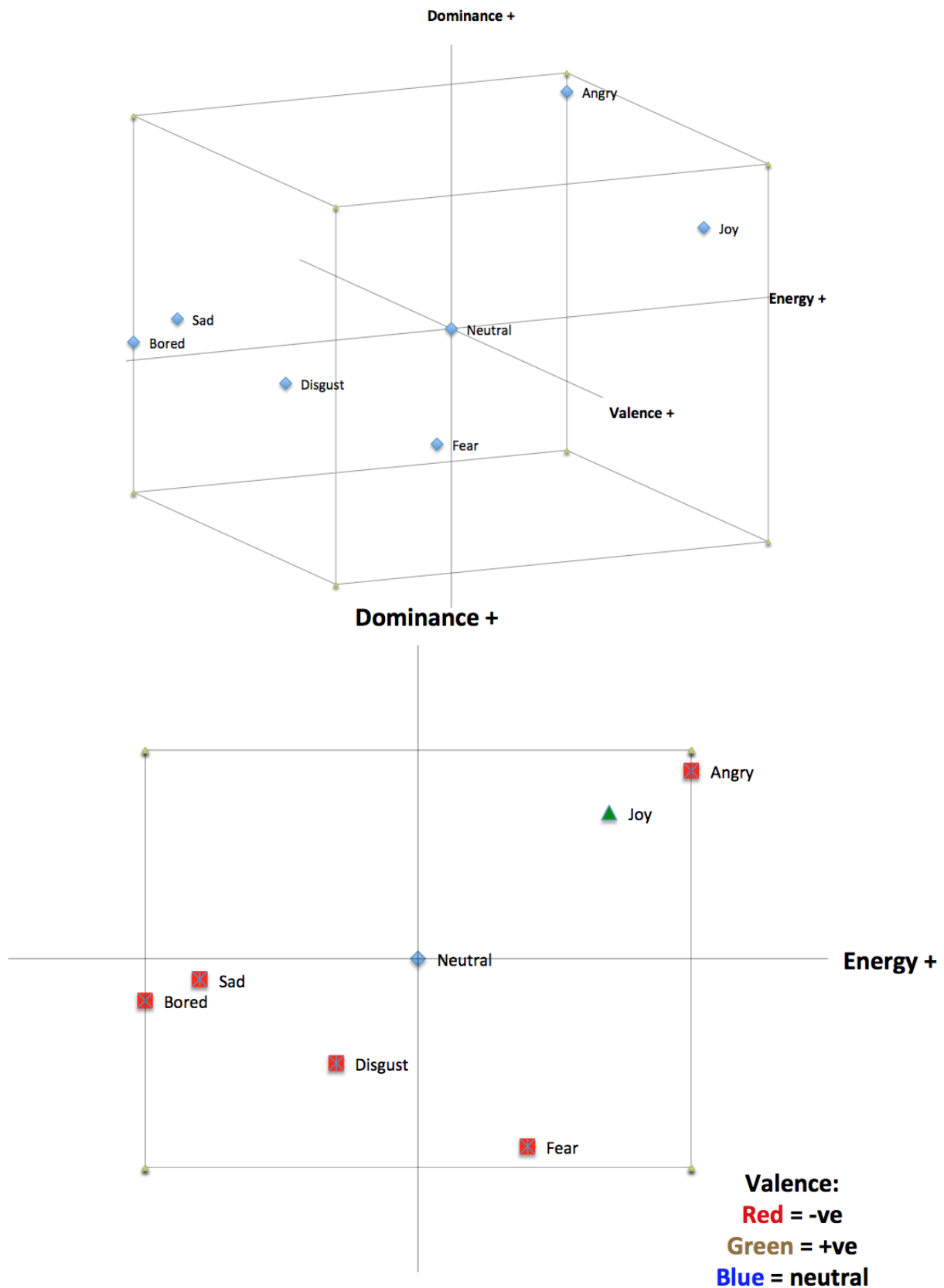


Shen zhang, Zhiyong Wu, Helen M. Meng, Lianhong Cai
 Facial Expression Synthesis Based on Emotion Dimensions for Affective Talking Avatar

PAD emotional state model (Dominance, arousal [energy], and pleasure [valence])



Simon Lui
 Defining the Dominance Axis of the 3D Emotional Model for Expressive Human Audio
 Emotion



Fontaine, J., Scherer, K., Roesch, E., & Ellsworth, P. (2007). The World of Emotions is not Two-Dimensional *Psychological Science*, 18 (12), 1050-1057

