Pain Communication

Prototype Testing and User Feedback

Design 159 | Design for Understanding
Daniel Daquigan & Keaton Kenel

When experiencing pain, at what point do you decide to go the hospital?

When it is unbearable and doesn't go away

8/10

When experiencing pain, at what point do you decide to go the hospital?

when the pain doesn't go away after a day or if the pain becomes worse. If it heavily affects my daily habits

8 or 9

When experiencing pain, at what point do you decide to go the hospital?

when I can see skin in the cut or my breath/parents tell me to.

Part 1

Draw Your Pain

MY LEG

Part 1

Draw Your Pain

1

back

2

head

3

body

KEY

= pain

Part 1

Draw Your Pain

When experiencing pain, at what point do you decide to go the hospital?

I decide to go to the hospital when the pain is unbearable & I can't relieve on my own.

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Introduction

Identifying the Problem

The project started out of a desire to design things that can make a meaningful difference.

We narrowed our scope to three options: Grad Student Posters, Pain Scales/Pain Communication, and ways to the navigate campus.

Of the three proposals, we found most interest in the idea of redesigning the pain scale and looking at how people communicate pain.

(Above) Scan of sketchbook showing initial thoughts and questions.

What Already Exists

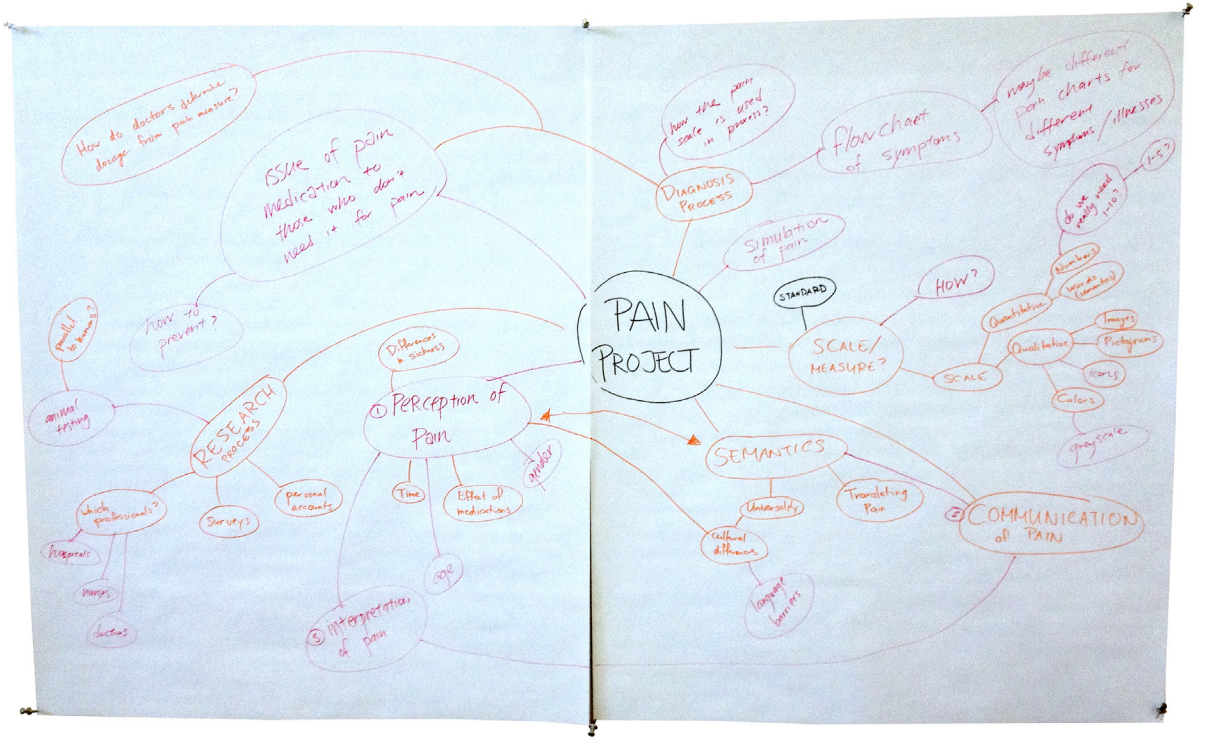
In answering the question "why are the current methods a problem?", we quickly identified one of the main issues:
there is no universal written or visual language for pain.

To get an idea of how we represent pain visually, we searched "pain" on the Noun Project site (pictured left). We noted the wide array of icons and were particularly interested in the pill icon and broken heart icons. The wide variety of icons supported our theory that pain is hard to represent and thus is a challenge communicate.

Source: http://thenounproject.com/search/?q=pain

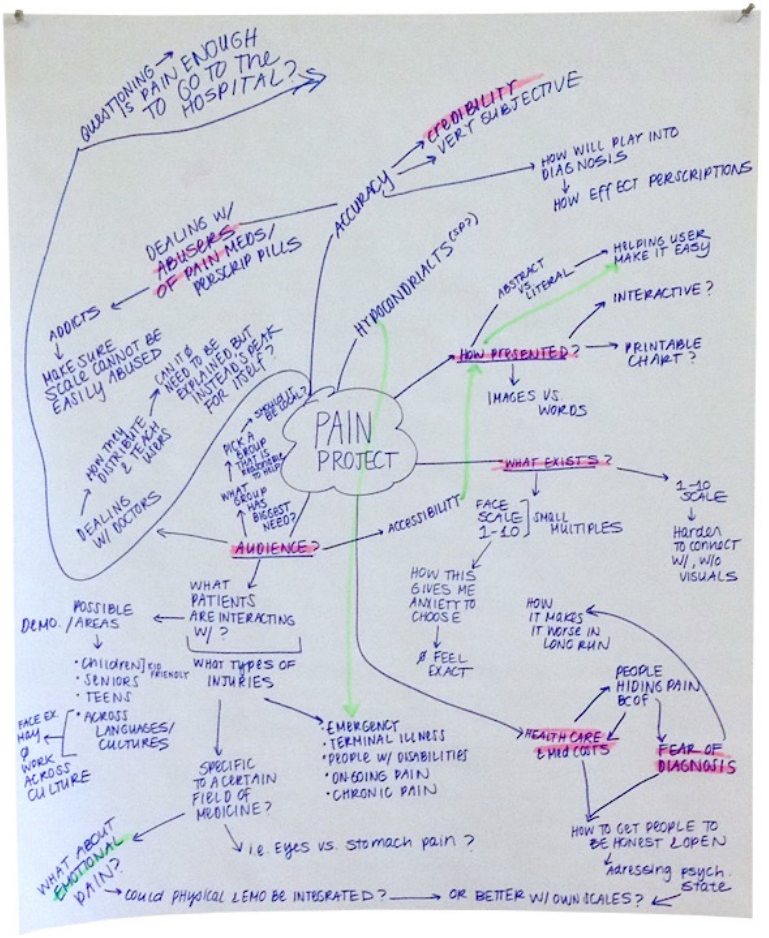
Identifying the Need

To tackle the large issue ahead of us we broke up into groups of 2-3 to create mind maps with any and all of the ideas we could come up with related to pain scales and communication.



Mind map completed by Daniel and 2 other classmates.

Identifying the Need



Mind map completed by Keaton and 1 other classmate

Take-Aways from this exercise

Assessing both emotional and physical pain is too much.
Address physical pain exclusively.
Identify audience and cater to them.
Explore variety of ways/ formats pain diagnosis could be administered.

It became obvious that there many factors, along with many questions and gray areas contributing to this issue. That being said, it was obvious that there is a need for improved pain scales and new methods on pain communication.

While still unclear about **how** we wanted to address the need, this exercise helped us to get a big picture of what we could look at. By getting a big picture, we were then able to identify the areas we were most interested in and research them further.

Mission Statement

Mission Statement

Objective

With pain analysis being a pivotal part of the health diagnosis process, the objective of this project is to create an effective procedure of communicating pain between the patient and the doctor.

Strategy

Because this project can take many different directions in creating a more effective pain communication procedure, we along with our group members wanted to start off with researching the general scope of pain communication: previous and current methods, best and worst practices, pain research studies, visual representation of pain, and so on.

From our collective research, we would be able to identify problem areas, and areas of improvement and innovation for pain communication procedures.

Target Audience

In identifying problem areas, and areas of improvement and innovation for pain communication procedures, the target audience that we focused on in our research were hospital patients, individuals with chronic pain, and people who feel they do not have the right tools to effectively communicate their pain.

Research

Primary Research

Dividing into groups

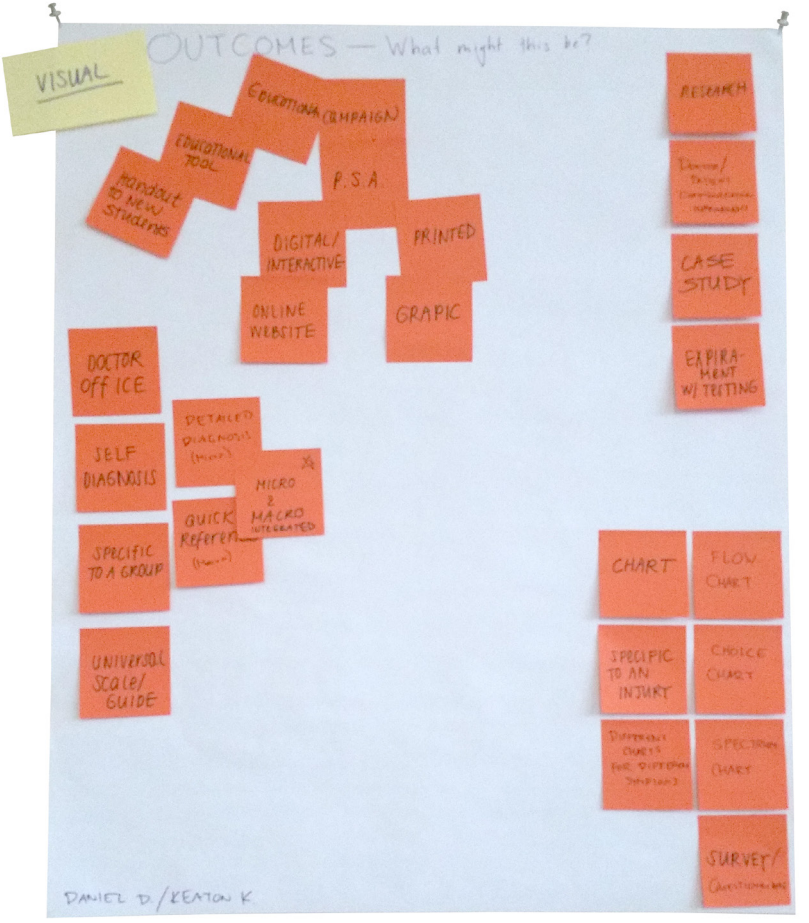
After our initial mind maps, we divided our group of six into three pairs. Each group had specific interests to guide our research and final projects. We made sure to communicate across groups so that everyone was working on/contributing different aspects to the larger problem.

Initially, Vivian/Mandy were interested in creating tests for specific age groups, Hellen/Christie were interested in patient anxiety and we were interested in word choice and the power of visual aid.

Working as a pair

Beginning our work together, we each had specific interests we wanted to address. Daniel was interested in the semantics of pain communication whereas Keaton was interested in how to marry word and image as tools for pain diagnosis.

We brainstormed a list of possible outcomes on sticky notes. This allowed us to move the ideas around and group them in categories. By completing this exercise we were able to get a clear, complete and realistic view of how we could materialize our interests into a final project. Ultimately, we wanted to create a new form of test that incorporated a macro/micro diagnosis of pain in one test.



Inspiration from previous experience

Recalling our experience in Design 115, typography, we remembered the kerning game. In particular, we remembered how much we enjoyed the amount of user control (e.g. the ability to slide each letter around) and how the user could actively interact with the program.

Inspired by the idea of live interaction, we pushed ourselves to see how we could incorporate this idea into our pain scale.

Primary Research

Type Studies

This exercise had all six members of our group individually create 9 expressive type studies from a word list of 14 (used in a prominent existing test). We found this to be the most inspiring for our final outcome: this will be discussed in greater detail in the next section. Pictured above are Keaton's nine examples.

(Cramping) Illustrated idea that the same word can have a variety of feelings/interpretations. This ability to choose your specific interpretation of the word became a guiding concept for prototype creation.

(Itchy grouped) People noted how some interpretations could make them feel the meaning of the word, e.g. "I can't look at the bottom left without feeling itchy".

(Sharp grouped) Although some words had a wide variety, others like sharp all had similar qualities. As a result, we started noting any commonalities in portrayal of pain is found to see if we can create some form of standard.

Secondary Research

We started our secondary research by establishing a base-line; looking at what already exists so we can assess what works and what does not.

The Wong-Baker FACES scale is the most common pain scale used today. It uses a series of faces paired with a scale 1-10 to label your pain level.

When talking with users, they commonly noted how much they disliked this scale.

In particular they mentioned anxiety about having to pick a whole number or if they did not match the number well enough to both the description and image.

Source:
http://www.wongbakerfaces.org

Secondary Research

The Pain Exhibit

An online, visual art experience for people to depict their pain through art/ self expression. Source: http://painexhibit.org/en/

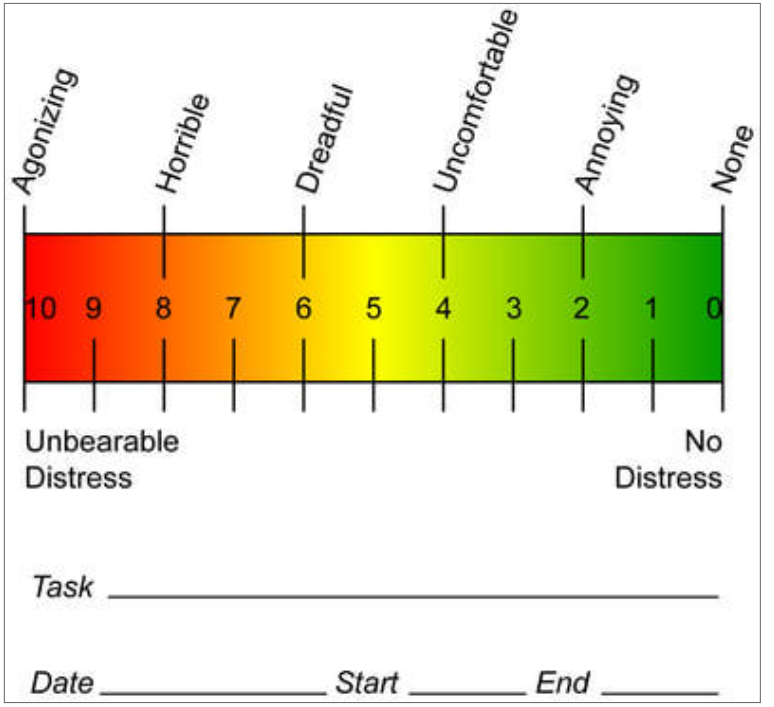
NY Times wrote article that argued for the ability of a drawing to communicate in a way that words cannot
Source: http://well.blogs.nytimes.com/2008/04/22/pain-as-an-art-form/?_php=true&_type=blogs&_r=0

Inspired idea to include free/form artistic aspect as part of test. Done with interest in seeing how people draw pain without directions as well as to allow users to document things that words cannot.

Secondary Research

At Home Pain Tracker

Simple scale designed to track everyday chronic pain at home. Thought this artifact was interesting due to the numbers paired with the describing words and color scale. May be too much, but idea of integration of word/image inspired prototypes. Source: http://ergonomics.about.com/od/ergonomicbasics/ss/painscale.htm



Secondary Research

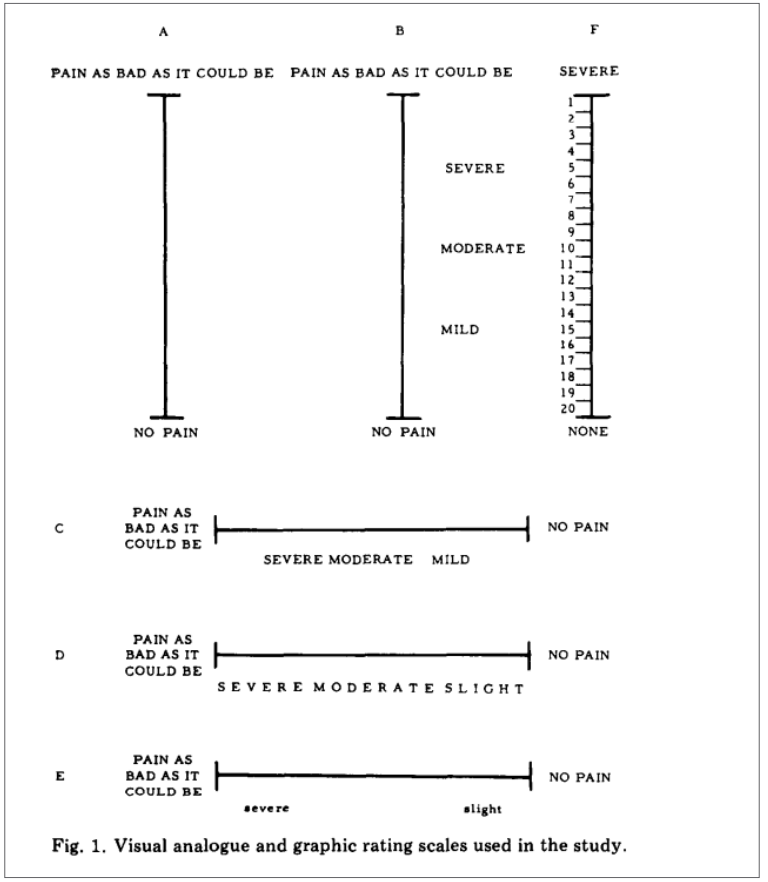


Fig. 1. Visual analogue and graphic rating scales used in the study.

Historical Example

This is a snippet from a 1976 article on pain scale research. While the whole article had a lot to offer, we were most interested in the idea of exploring different formats for the scale, e.g. flipping it vertical.
Source: J Scott, E C Huskisson, "Graphic representation of pain"
St. Bartholomew's Hospital, London EC 1 Great Britain
Pain (Impact Factor: 5.64). 07/1976; 2(2):175-84. DOI:10.1016/0304-3959(76)90113-5.

Secondary Research

Inventory: Measuring methods of Adult Pain

Created inventory of existing pain scales. Found useful to have a complete list to reference/ note what has been done. In particular, what has been successful and what has not. Ideally, the end product would incorporate all positive aspects into one ultimate design.

Visual Analog Scale for Pain (VAS Pain)

Numeric Rating Scale for Pain (NRS Pain)

McGill Pain Questionnaire (MPQ)

Short-Form McGill Pain Questionnaire (SF-MPQ)

Chronic Pain Grade Scale (CPGS)

Short Form-36 Bodily Pain Scale (SF-36 BPS)

Measure of Intermittent & Constant Osteoarthritis Pain (ICOAP)

Source:
http://onlinelibrary.wiley.com/store/10.1002/acr.20543/asset/20543_ftp.pdf;jsessionid=66F8EB4682D5E322A3EEB507EFBDBB4A.f02t04?v=1&t=hv4oq9fe&s=cb411c01e8c27f78d137bf85ca91202787d38c76

Secondary Research

3 Types of Pain Scales

Source: http://pain.about.com/od/treatment/f/pain_number_scales.htm

Quantitative

Measure pain, a marker
ex. Numerical, Wong-Baker

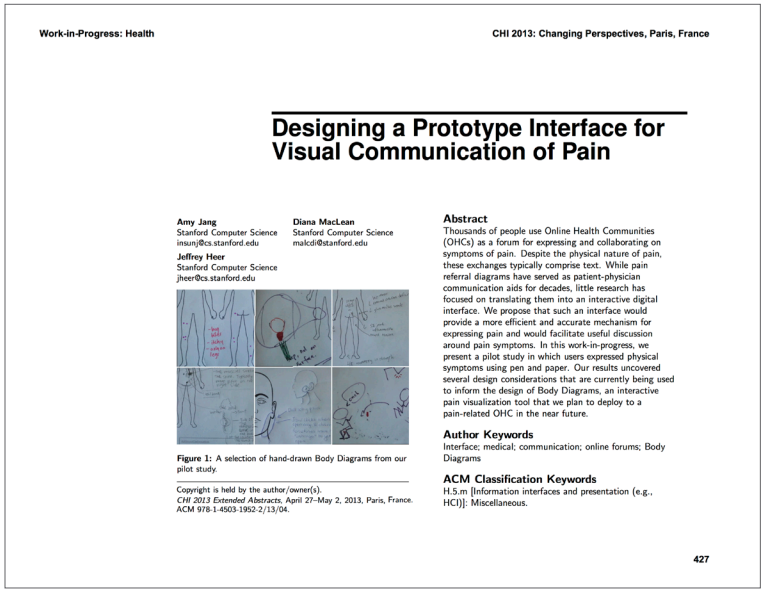
Qualitative

Describes pain, how it feels
ex. McGill Pain Questionnaire

Hybrid

Idea of blending the two serves as backbone for final project idea. Want to ensure both can be assessed in our test.
ex. Memorial Pain Assessment Card, Brief Pain Inventory

Secondary Research



Work-in-Progress: Health CHI 2013: Changing Perspectives, Paris, France

Designing a Prototype Interface for Visual Communication of Pain

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Abstract
Thousands of people use Online Health Communities (OHCs) as a forum for expressing and collaborating on symptoms of pain. Despite the physical nature of pain, these exchanges typically comprise text. While pain referral diagrams have served as patient-physician communication aids for decades, little research has focused on translating them into an interactive digital interface. We propose that such an interface would provide a more efficient and accurate mechanism for expressing pain and would facilitate useful discussion around pain symptoms. In this work-in-progress, we present a pilot study in which users expressed physical symptoms using pen and paper. Our results uncovered several design considerations that are currently being used to inform the design of Body Diagrams, an interactive pain visualization tool that we plan to deploy to a pain-related OHC in the near future.

Figure 1: A selection of hand-drawn Body Diagrams from our pilot study.

CHI 2013 Extended Abstracts, April 27–May 2, 2013, Paris, France.
ACM 978-1-4503-1952-2/13/04.

Author Keywords
Interface; medical; communication; online forums; Body Diagrams

ACM Classification Keywords
H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

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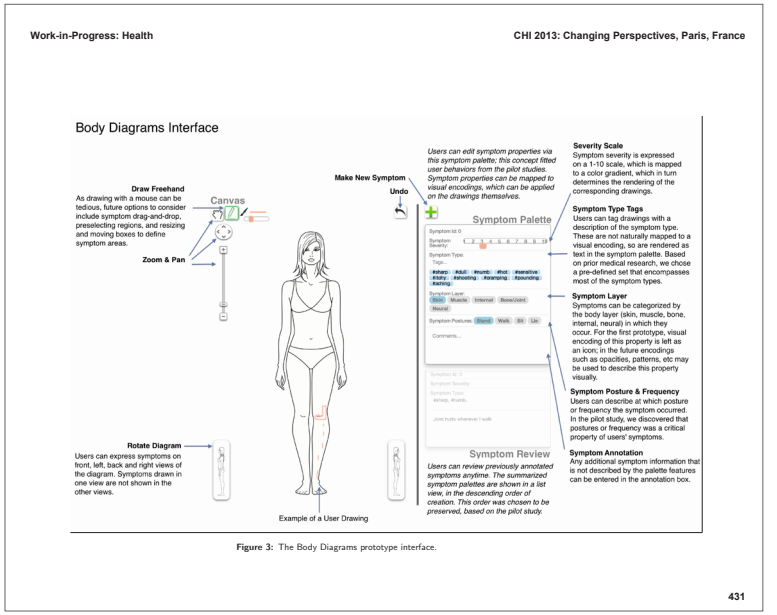

Work-in-Progress: Health CHI 2013: Changing Perspectives, Paris, France

Figure 3: The Body Diagrams prototype interface.

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Stanford CS Study on Pain Identification

Daniel found scholarly article outlining a Stanford study on how to depict and diagnose pain. They began with hand drawings and noted patterns.

They then transitioned their findings to a digital interface. What we found particularly interesting is that they delivered their findings in terms of next steps instead of simply explaining what they had done. This also informed us that more data either existed or was currently being recorded.

Secondary Research

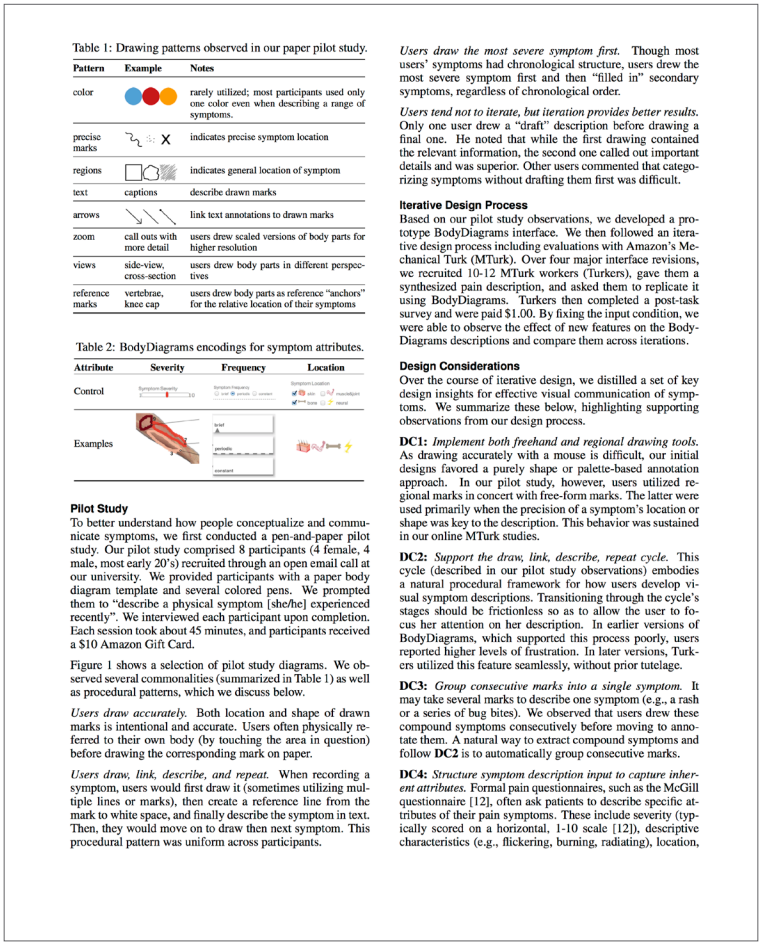


Table 1: Drawing patterns observed in our paper pilot study.

Pattern	Example	Notes
color		rarely utilized; most participants used only one color even when describing a range of symptoms.
precise marks		indicates precise symptom location
regions		indicates general location of symptom
text	captions	describe drawn marks
arrows		link text annotations to drawn marks
zoom	call outs with more detail	users drew scaled versions of body parts for higher resolution
views	side-view, cross-section	users drew body parts in different perspectives
reference marks	vertebrae, knee cap	users drew body parts as reference "anchors" for the relative location of their symptoms

Table 2: BodyDiagrams encodings for symptom attributes.

Attribute	Severity	Frequency	Location
Control			
Examples			

Pilot Study

To better understand how people conceptualize and communicate symptoms, we first conducted a pen-and-paper pilot study. Our pilot study comprised 8 participants (4 female, 4 male, most early 20's) recruited through an open email call at our university. We provided participants with a paper body diagram template and several colored pens. We prompted them to "describe a physical symptom [she/he] experienced recently". We interviewed each participant upon completion. Each session took about 45 minutes, and participants received a $10 Amazon Gift Card.

Figure 1 shows a selection of pilot study diagrams. We observed several commonalities (summarized in Table 1) as well as procedural patterns, which we discuss below.

Users draw accurately. Both location and shape of drawn marks is intentional and accurate. Users often physically referred to their own body (by touching the area in question) before drawing the corresponding mark on paper.

Users draw, link, describe, and repeat. When recording a symptom, users would first draw it (sometimes utilizing multiple lines or marks), then create a reference line from the mark to white space, and finally describe the symptom in text. Then, they would move on to draw then next symptom. This procedural pattern was uniform across participants.

Users draw the most severe symptom first. Though most users' symptoms had chronological structure, users drew the most severe symptom first and then "filled in" secondary symptoms, regardless of chronological order.

Users tend not to iterate, but iteration provides better results. Only one user drew a "draft" description before drawing a final one. He noted that while the first drawing contained the relevant information, the second one called out important details and was superior. Other users commented that categorizing symptoms without drafting them first was difficult.

Iterative Design Process

Based on our pilot study observations, we developed a prototype BodyDiagrams interface. We then followed an iterative design process including evaluations with Amazon's Mechanical Turk (MTurk). Over four major interface revisions, we recruited 10-12 MTurk workers (Turkers), gave them a synthesized pain description, and asked them to replicate it using BodyDiagrams. Turkers then completed a post-task survey and were paid $1.00. By fixing the input condition, we were able to observe the effect of new features on the BodyDiagrams descriptions and compare them across iterations.

Design Considerations

Over the course of iterative design, we distilled a set of key design insights for effective visual communication of symptoms. We summarize these below, highlighting supporting observations from our design process.

DC1: *Implement both freehand and regional drawing tools.* As drawing accurately with a mouse is difficult, our initial designs favored a purely shape or palette-based annotation approach. In our pilot study, however, users utilized regional marks in concert with free-form marks. The latter were used primarily when the precision of a symptom's location or shape was key to the description. This behavior was sustained in our online MTurk studies.

DC2: *Support the draw, link, describe, repeat cycle.* This cycle (described in our pilot study observations) embodies a natural procedural framework for how users develop visual symptom descriptions. Transitioning through the cycle's stages should be frictionless so as to allow the user to focus her attention on her description. In earlier versions of BodyDiagrams, which supported this process poorly, users reported higher levels of frustration. In later versions, Turkers utilized this feature seamlessly, without prior tutelage.

DC3: *Group consecutive marks into a single symptom.* It may take several marks to describe one symptom (e.g., a rash or a series of bug bites). We observed that users drew these compound symptoms consecutively before moving to annotate them. A natural way to extract compound symptoms and follow **DC2** is to automatically group consecutive marks.

DC4: *Structure symptom description input to capture inherent attributes.* Formal pain questionnaires, such as the McGill questionnaire [12], often ask patients to describe specific attributes of their pain symptoms. These include severity (typically scored on a horizontal, 1-10 scale [12]), descriptive characteristics (e.g., flickering, burning, radiating), location,

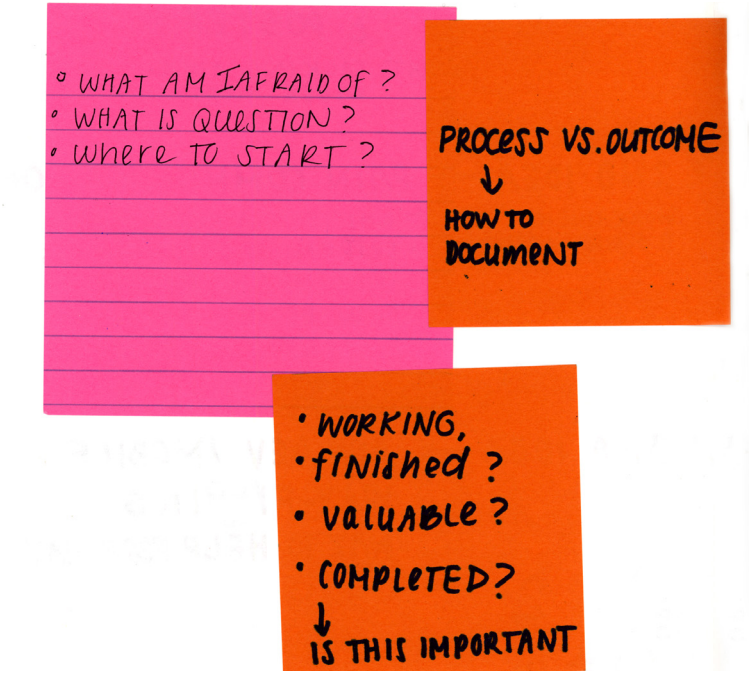
Thanks to the help from Susan, we discovered that Stanford had continued working on the study. One thing we were shocked to find in the follow up study was that the original study only tested eight people. Even more interesting was the fact that the new prototypes seemed to be a downgrade from their original versions. The new figures were overly rendered, almost creating chart junk on the human frame.

Pictured left is a snapshot from the follow-up study. It is interesting to note the inventory they created about trends in drawing patterns observed in the study.

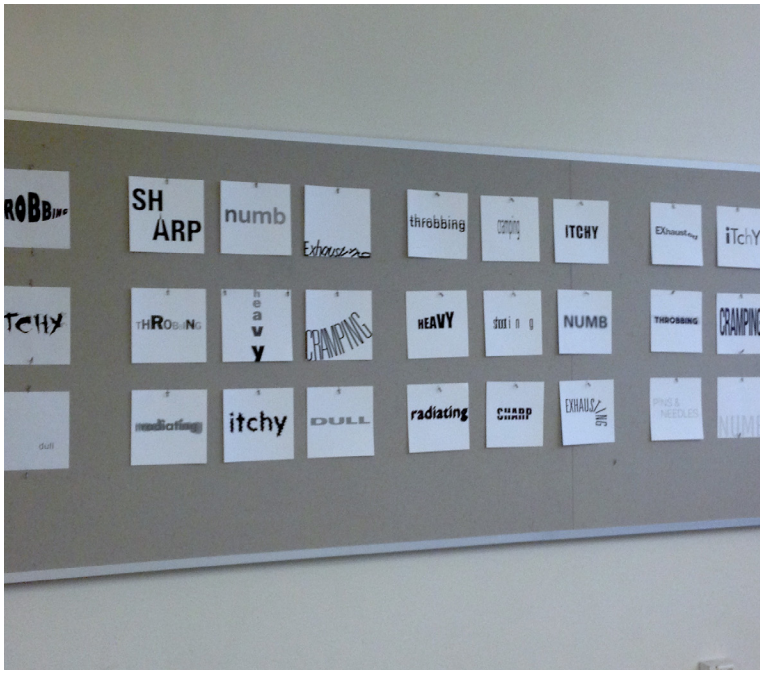
We wish to research this source further, in particular if it is a government funded grant, thus allowing us public access to the records to conduct further research

Refinement & Direction

Inspiration

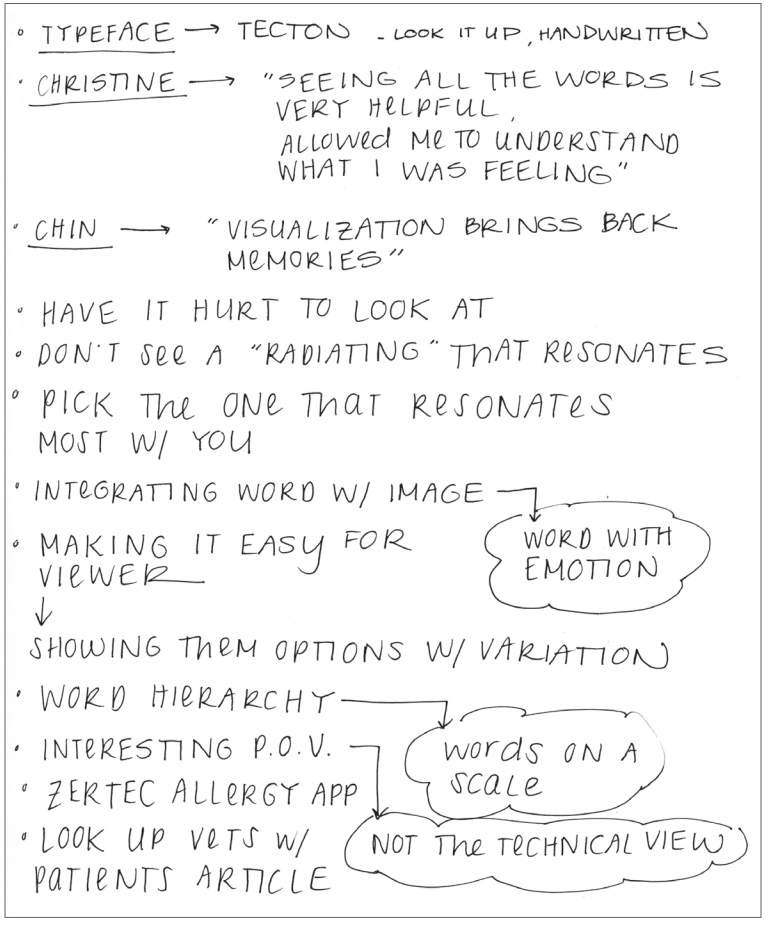


Revisiting our initial project brief, the objective of creating an effective procedure of communicating pain between the patient and the doctor fostered a variety of directions that our project could possibly go towards. At the time, however, what we wanted our project to be left us with the above questions about the final product.



From each group's focus area of research and our own interests in pain research, we became even more interested in how patients go about communicating their pain. What intrigued us the most was how people interacted with our type studies of the pain words and how visual representation can play a major part in how patients could potentially communicate their pain in an effective manner.

Main Idea



Because visual representation of pain in the form of 1-10 scale charts is already widely used in health diagnoses, we found the type studies to be another way in visually communicating one's pain with much effect. From this, we were able to refine the direction of our project and continue to focus our efforts on the finding how people visually communicate their pain.

With our project's new refined direction mostly inspired from the responses of the type studies (shown left), we wanted to focus our project on gathering research findings from conducting user testing.

Main ideas we aim to cover with our new research

Macro View of Pain (Qualitative/Descriptive)
Providing a pool of words to guide individual in communicating their pain

Micro View of Pain (Quantitative/Magnitude)
Gauging how each pain word is experienced with the individual

Interpretive View of Pain (Individualistic)
Providing space for individuals to represent their pain in their own way

Prototypes

Prototype 1 | Macro

Prototypes were initially designed under the idea of creating a macro/micro integrated test system.

The first portions show Keaton's work on the macro view; there are seven drafts total.

The macro view aims to give users a wide view of words they can pull from to describe their pain.

Each draft organizes the words in a unique way, hoping to uncover a method that is most effective for users.

abc

Achy
Burning
Cramping
Dull
Exhausting
Heavy
Itchy
Numb
Pins & Needles
Radiating
Sharp
Stabbing
Shooting
Tender
Throbbing

abc variation

Achy
Burning
Cramping
Dull
Exhausting
Heavy
Itchy
Numb
Pins & Needles
Radiating
Sharp
Stabbing
Shooting
Tender
Throbbing

category

Dull
Numb

Achy
Heavy
Exhausting

Itchy
Tender
Burning

Cramping
Radiating
Shooting

Sharp
Pins & Needles

Stabbing
Throbbing

category variation

Identify your pain categories.	Circle the specific pains you are experiencing below.
Emotional	Dull Numb
Weak/ Worn Down	Achy Heavy Exhausting
Irritation	Itchy Tender Burning
Directional moving pain	Cramping Radiating Shooting
Intensity of pain	Sharp Pins & Needles
Rhythym	Stabbing Throbbing

Prototype 1 | Macro

Played with idea of creating a scale with words in category & hierarchy draft (left). Most hesitant about this draft because it ranked the words and put them on a scale. This could sway user interpretation too much.

category & hierarchy

Random

Dull	Heavy	Cramping
Numb	Shooting	Radiating
Throbbing	Achy	Exhausting
Pins & Needles	Burning	Tender
Itchy	Stabbing	Sharp

The random draft was inspired by our random assortment of type studies we pinned up on the wall.

Prototype 1 | Macro

The final option repeated words twice to create a large pool of words for users to see if a sea of words was a positive or not.

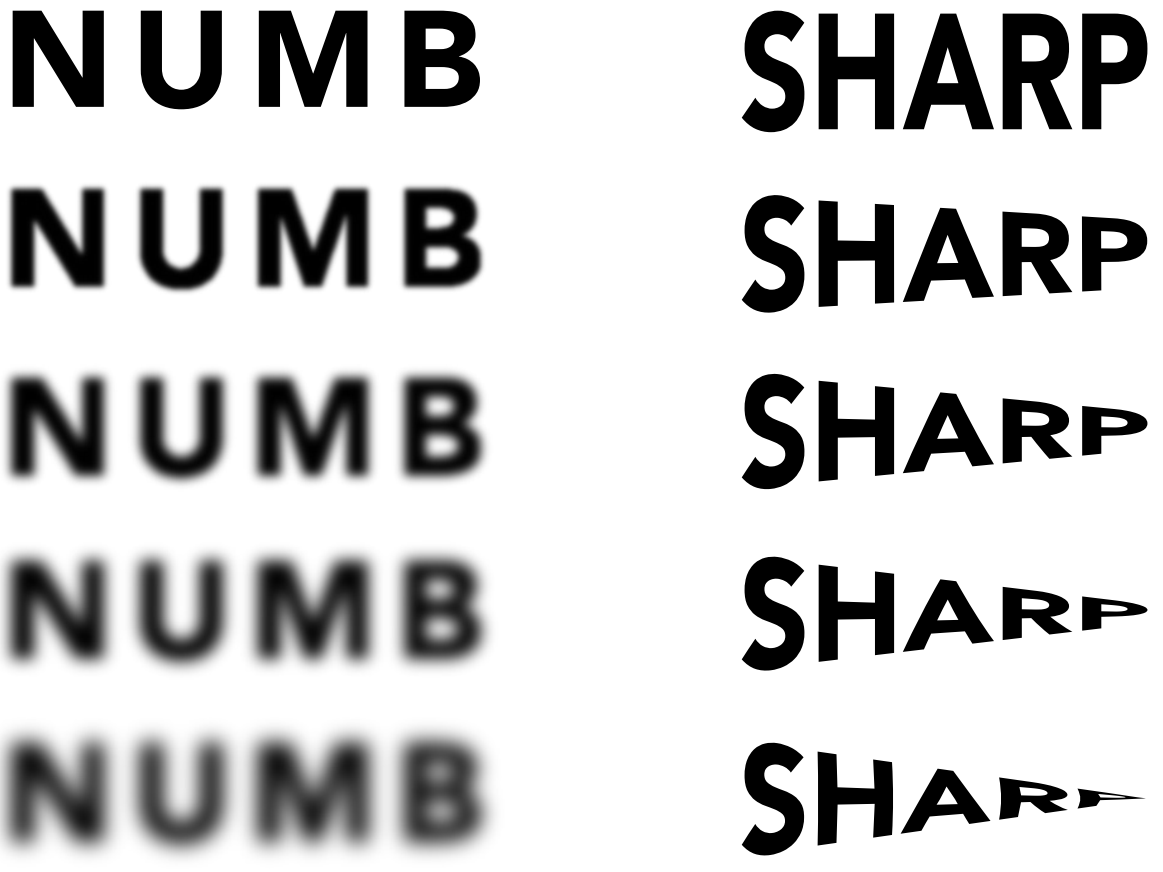
Random with repeats		
Dull	Heavy	Cramping
Pins & Needles	Burning	Tender
Numb	Shooting	Radiating
Itchy	Stabbing	Sharp
Throbbing	Achy	Exhausting
Dull	Heavy	Cramping
Numb	Shooting	Radiating
Itchy	Stabbing	Sharp
Throbbing	Achy	Exhausting
Pins & Needles	Burning	Tender

Prototype 1 | Micro

The second portion shows Daniel's work on the micro view.; there are four words total.

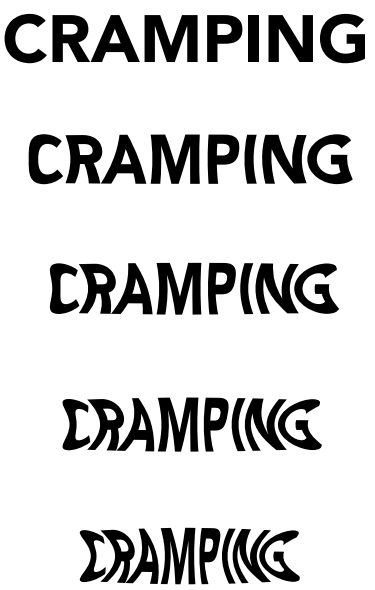
Once users have narrowed down the word list specific to their feelings, the micro view aims to let users rate the intensity of their specific pains.

Daniel created word scales for users to mark their level of intensity.


NUMB
SHARP
NUMB
SHARP
NUMB
SHARP
NUMB
SHARP
NUMB
SHARP

Prototype 1 | Micro

As Daniel worked, he created varieties of scales for the same word. This was done due to the idea that people have different meanings for the same word.



We showed these to the class for feedback to see which scale they related to most and found to be the most accurate.

Daniel also created interactive versions of these scales in AfterEffects. The user could then slide the video scrubber to the point at which they most identified.


THROBBING
THROBBING
THROBBING
THROBBING
THROBBING


THROBBING
THROBBING
THROBBING
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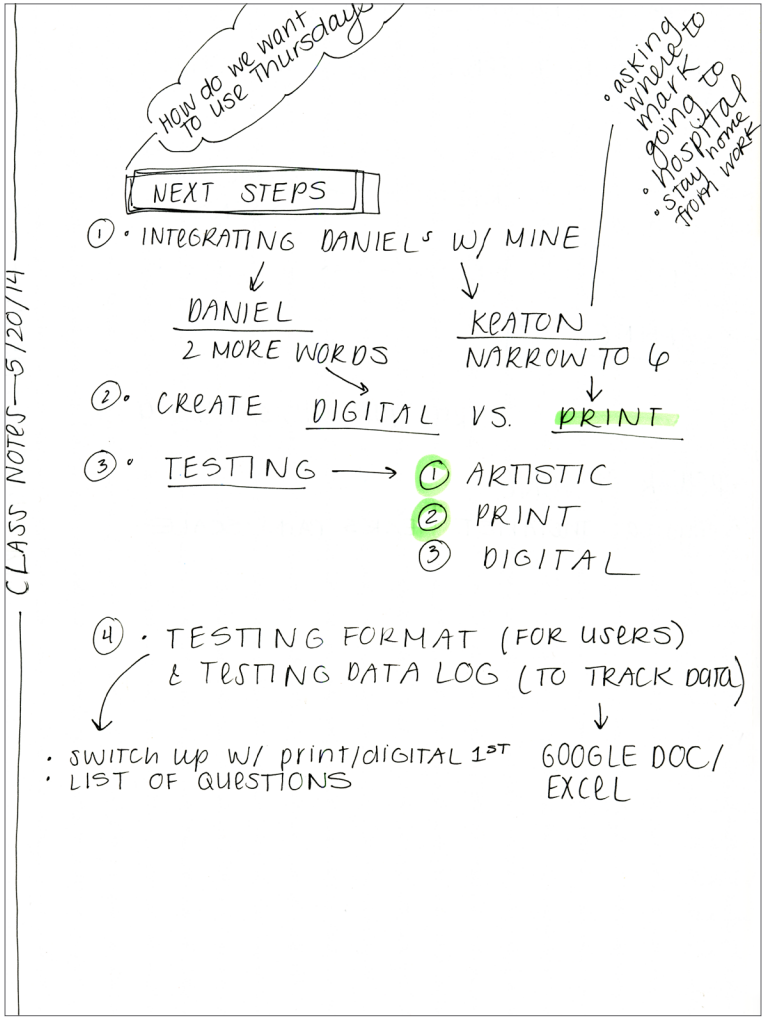
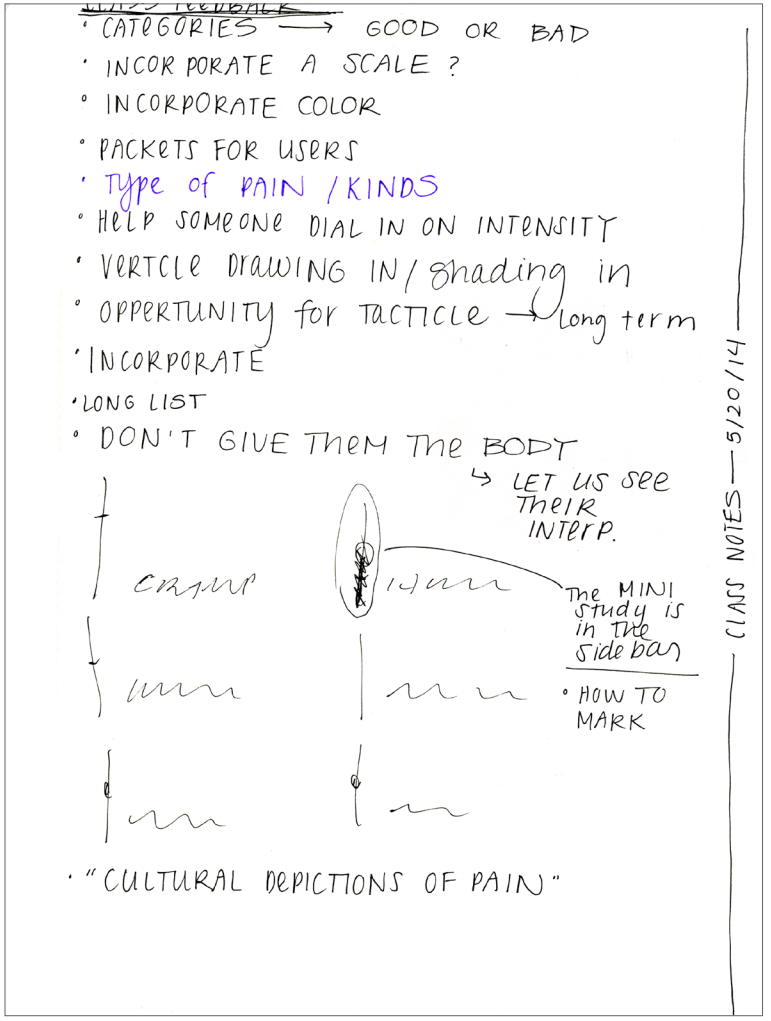
Prototype 1 | Feedback

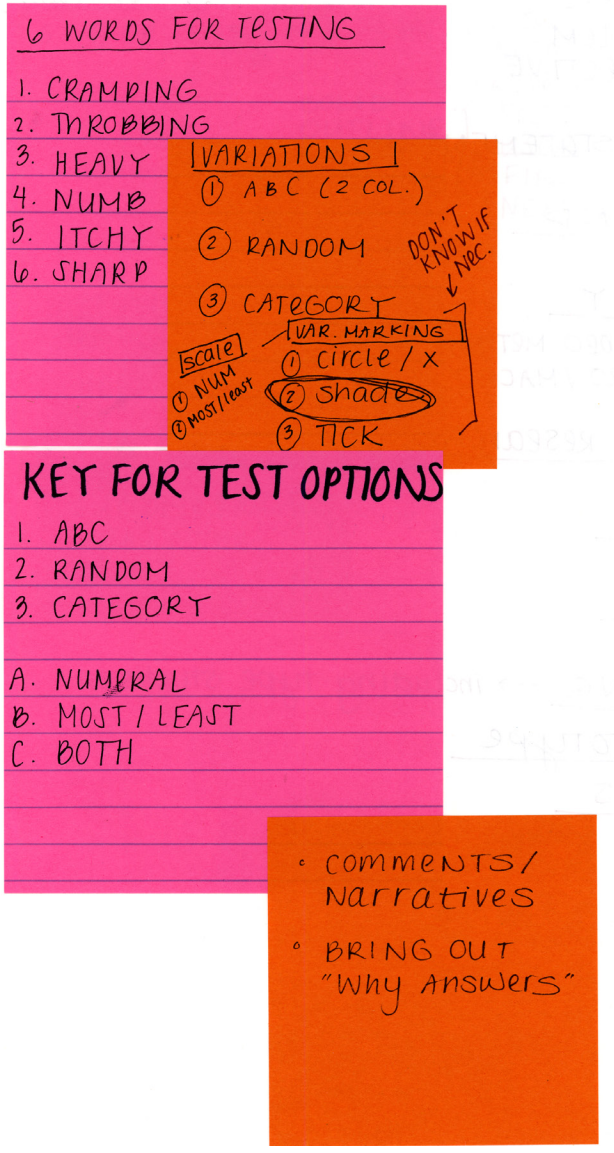


We got great feedback for prototype one, and refined our focus for the next round of studies. Due to the success of Daniel's interactive digital drafts, we shifted our focus from macro/micro design to print/digital.

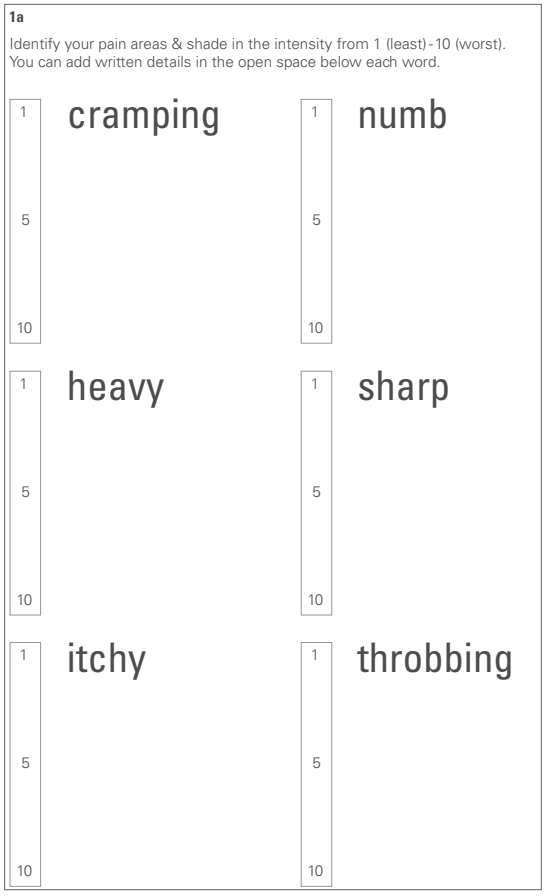


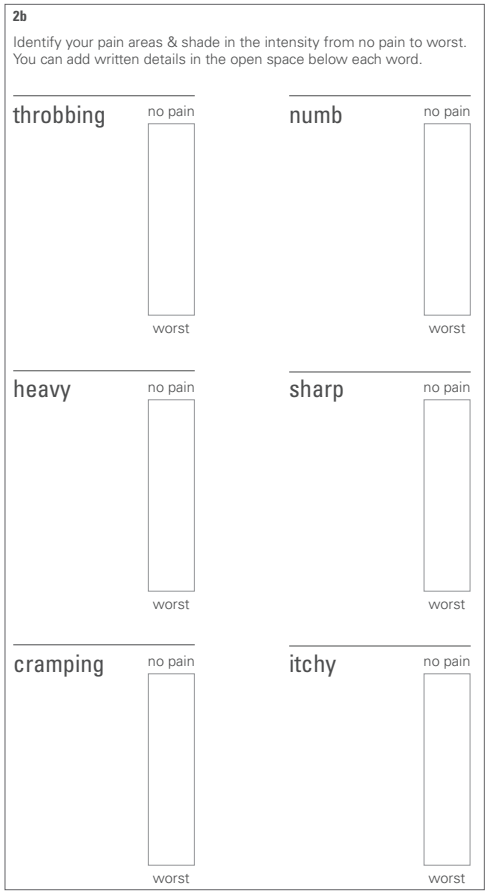
Above pages note this shift and our next steps on how to execute. We planned to create a test that incorporated an artistic, print and digital portion. Daniel would the design digital, and Keaton the print/artistic.

Sample from Keaton's sketchbook. Outlines the final six words we picked for testing. Also establishes key used for organizing her options in prototype two. The key pairs the two lists as follows; 1a, 2b, 3c. This streamlined the possible combinations of test styles into 3 variations.



Prototype 2 | Print





Through feedback we narrowed the word list down to 6 words. We also integrated the micro/macro version into a combined version for both digital and print. The user can pick the words they identify with, then rate the level of intensity. The first option above organizes the words alphabetically and has a numeral based scale.

The second option organizes the words randomly and incorporates a most-least scale.

Prototype 2 | Print

3c, 1

Identify your pain areas & shade in the intensity from no pain (1) to worst (10).
You can add written details in the open space below each word.

numb

1 no pain
5 distracting
10 worst

sharp

1 no pain
5 distracting
10 worst

heavy

1 no pain
5 distracting
10 worst

itchy

1 no pain
5 distracting
10 worst

cramping

1 no pain
5 distracting
10 worst

throbbing

1 no pain
5 distracting
10 worst

The third option organizes the words by category and uses a numeral and most-least scale. The categories are organized by similar suffixes.

3c, 1

Identify your pain areas & shade in the intensity from no pain (1) to worst (10).
You can add written details in the open space below each word.

numb

1 no pain
5 distracting
10 worst

heavy

1 no pain
5 distracting
10 worst

itchy

1 no pain
5 distracting
10 worst

cramping

1 no pain
5 distracting
10 worst

sharp

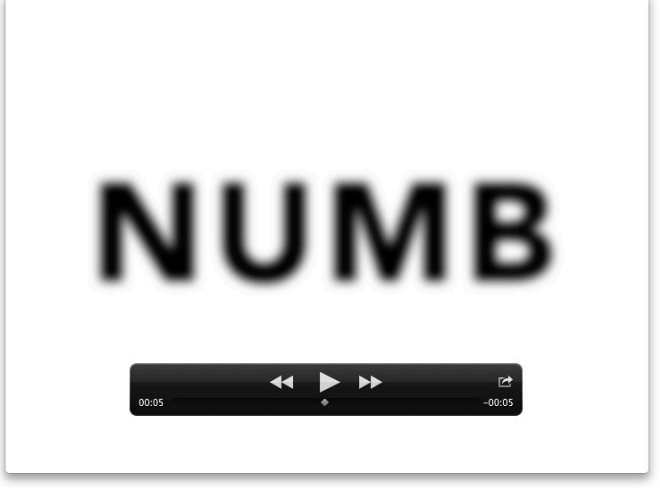
1 no pain
5 distracting
10 worst

throbbing

1 no pain
5 distracting
10 worst

The fourth option organizes the words by category and uses a numeral and most-least scale. The categories are organized from top to bottom in terms of intensity of pain.

Prototype 2 | Digital



First digital studies completed by Daniel created in After Effects.

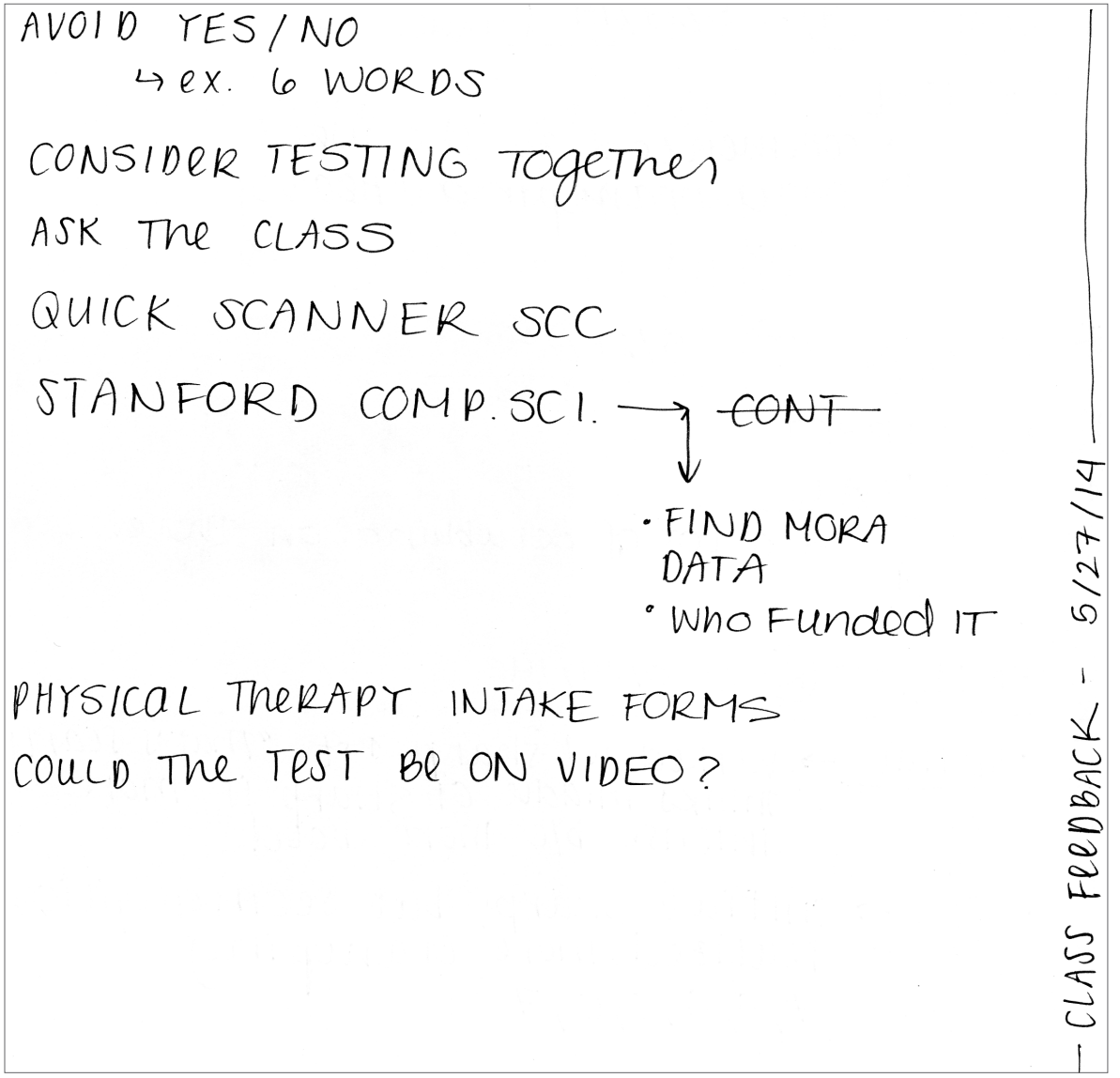
Prototype 2 | Digital

Screenshot of After Effects work station for word videos. Showing how tests created.

Prototype 2 | Feedback

Feedback for our second round of prototypes was also very successful. For the print version, we got feedback to narrow the options down to two versions. A circular, non-conventional scale was also suggested to create a contrast to the shaded bar option.

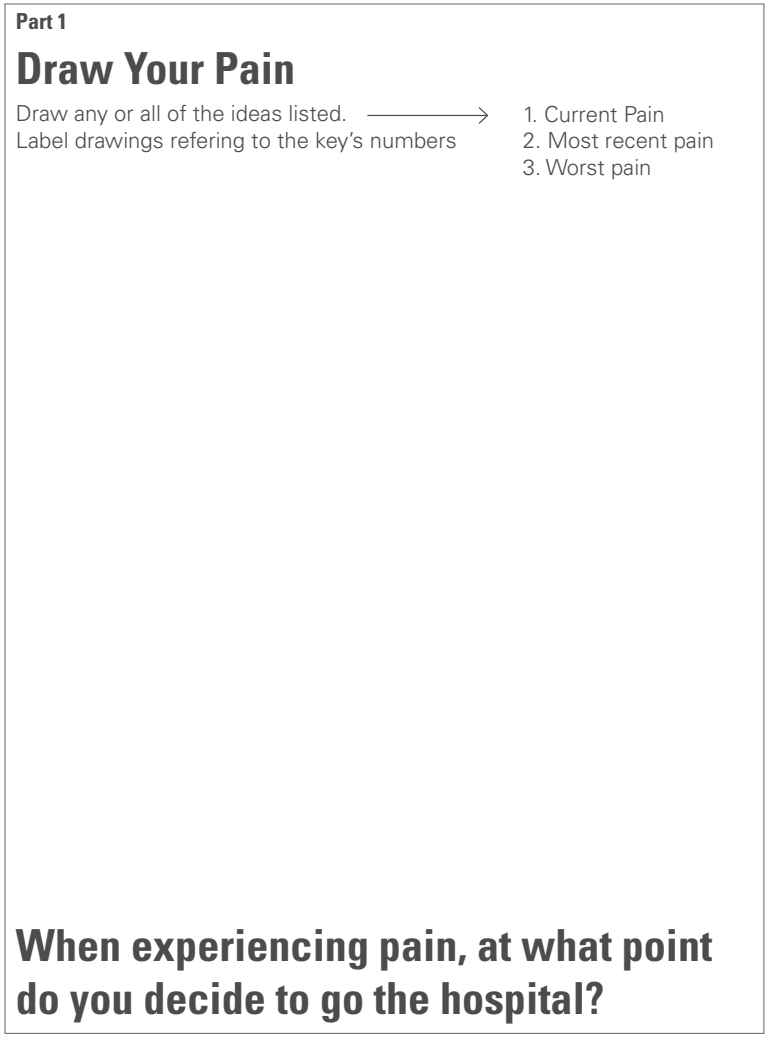
As for the digital version, feedback was very positive and urged Daniel to continue making all six words, while refining throbbing and heavy.



A snippet from Keaton's sketchbook of class feed back for the final revision of our test. Some next step ideas are also included.

Final Prototype | Artistic Portion

The first part of our final prototype is the artistic portion. We wanted to start the test by giving the user free reign to communicate their pain. We follow the section up with a question of when one feels they need to go to the hospital.



Final Prototype | Print Version

Part 2a

Identify your pain areas & shade in the intensity from no pain (1) to worst (10). You can add written details in the open space below each word.

numb

1 no pain
5 distracting
10 worst

sharp

1 no pain
5 distracting
10 worst

heavy

1 no pain
5 distracting
10 worst

itchy

1 no pain
5 distracting
10 worst

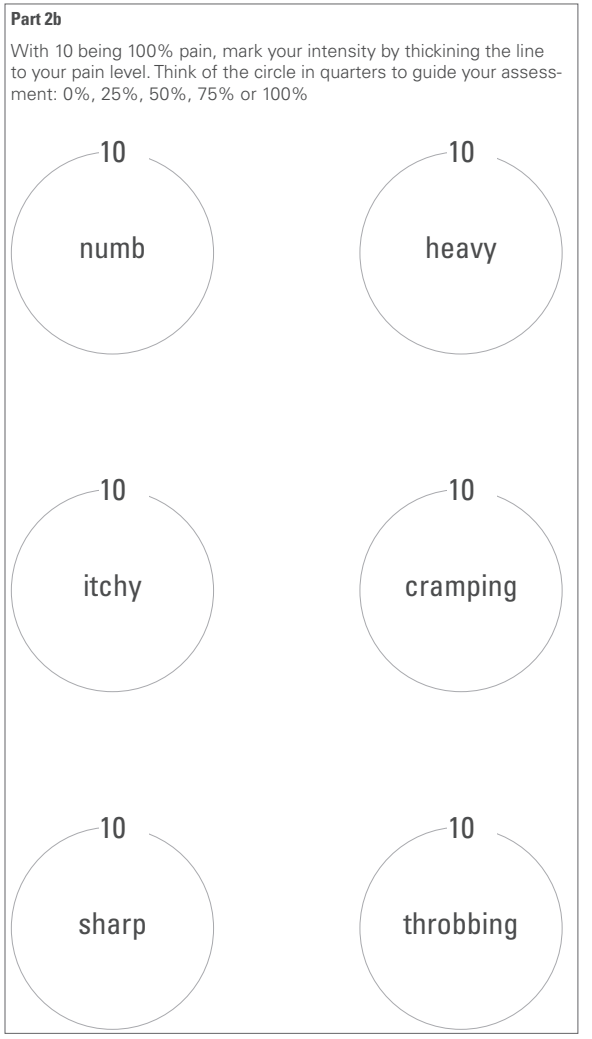
cramping

1 no pain
5 distracting
10 worst

throbbing

1 no pain
5 distracting
10 worst

Print Scale 1 | Shading scale with numbers & words

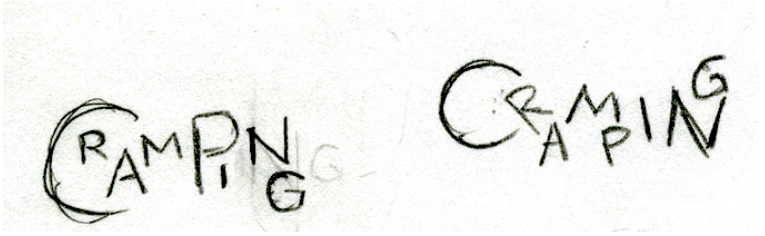


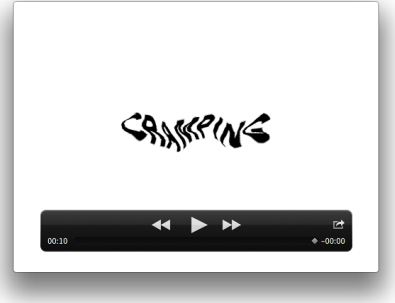
Print Scale 2 | Thickening the outline of the circle to one's percentage out of 100% pain levels.

Final Prototype | Digital Version

For the final digital portion, we showed users a series of six word videos. We allowed them to drag the scrub bar to the point in the 10 second span that they most identified with.

Pictured above and on the next several pages are the storyboards for each pain word.

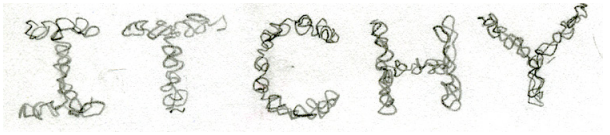


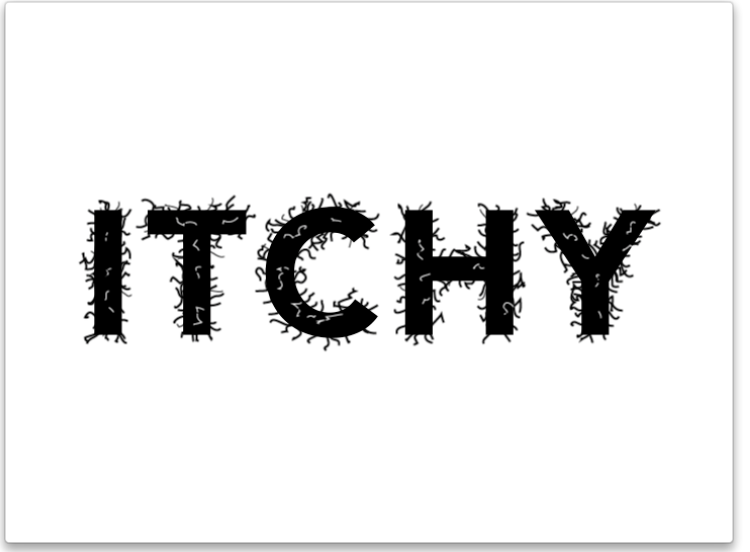


Final Prototype | Digital Version

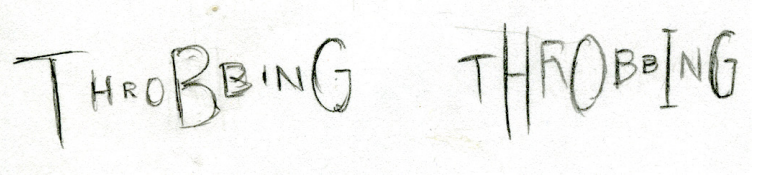
Final Prototype | Digital Version

Many people commented on how much they liked this one for its effects. Ironically, it was among one of the most common words that users said they did not identify with.






THROBBING


THROBBING
THROBBING

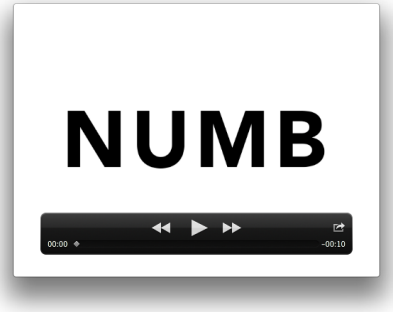

THROBBING

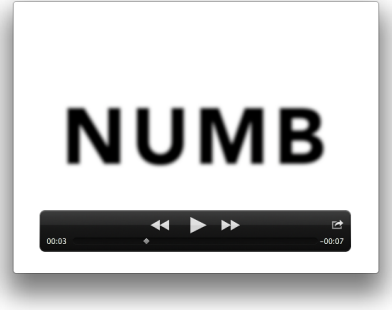

THROBBING

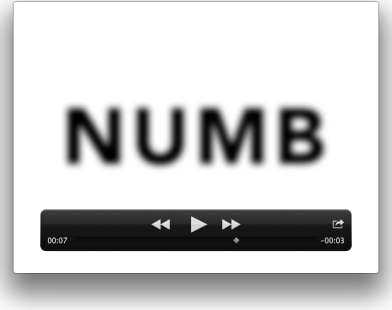

THROBBING


THROBBING

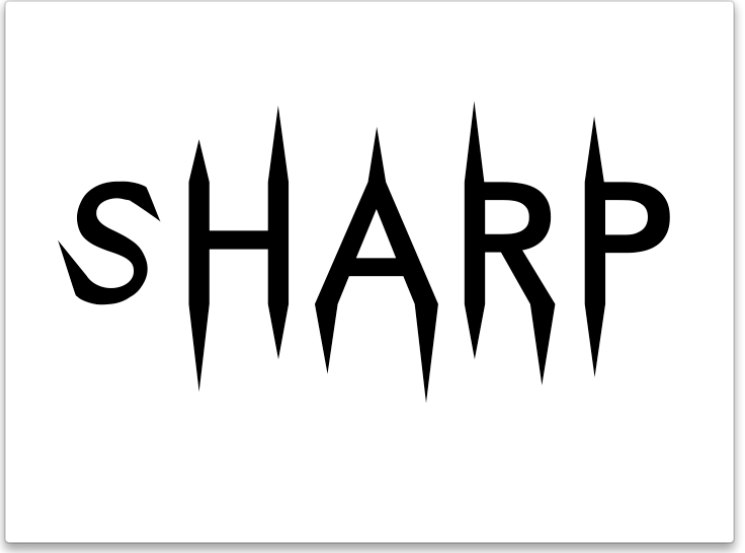
Final Prototype | Digital Version

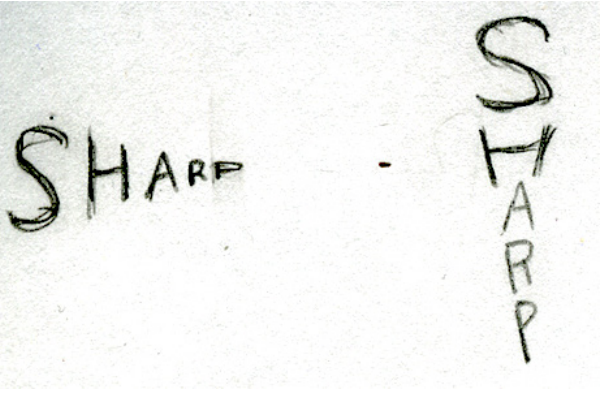






Final Prototype | Digital Version





Methodology & User Testing

User Testing

With three final prototypes, we divided our user testing into four sections, including questions we will be asking during each portion:

Introduction

Initiates test subject to think about pain

Measurement Scales

For these two sections, the user will reference one of the pain experiences they drew in the Artistic section of the test

Follow-Up

Administered at the end of the testing session

1. Artistic Interpretation of Pain

Having the test subject draw: 1) Current Pain, 2) Most Recent Pain, and/or 3) Worst Pain
How did they draw their pain?

Follow-Up Questions:
When experiencing pain, when do you decide to go to the hospital?
On a scale of 1-10 (10 being worst pain), at what point do you decide to go to the hospital?

2. Print Measurement Scales

Two versions: Vertical Number Scale vs. Circular Scale
Both print versions are given at the same time to ensure one scale does not affect the results of the other

Follow-Up Questions:
Which scale (vertical or circular) do you prefer? Why?
How did they fill out each scale? (Did they follow the given directions? Did they fill it out otherwise?)

3. Digital Animation Measurement Scales

Six 10-second animated word videos that visually represent the experience of different pain words
Test subjects will move the marker on each video to have each word represent their pain experience

Follow-Up Questions:
Where did you pinpoint the marker for each word (1-10 seconds)?
Which word(s) did you most identify with? Why?
Which word(s) did you least identify with? Why?

4. Post-Survey Questions

Did these six words help you communicate your pain? Why or why not?
Is there one word missing from the list that would help you communicate your pain?
Did this study make you more mindful of how you communicate your pain? If so, in what ways?

Test Subjects

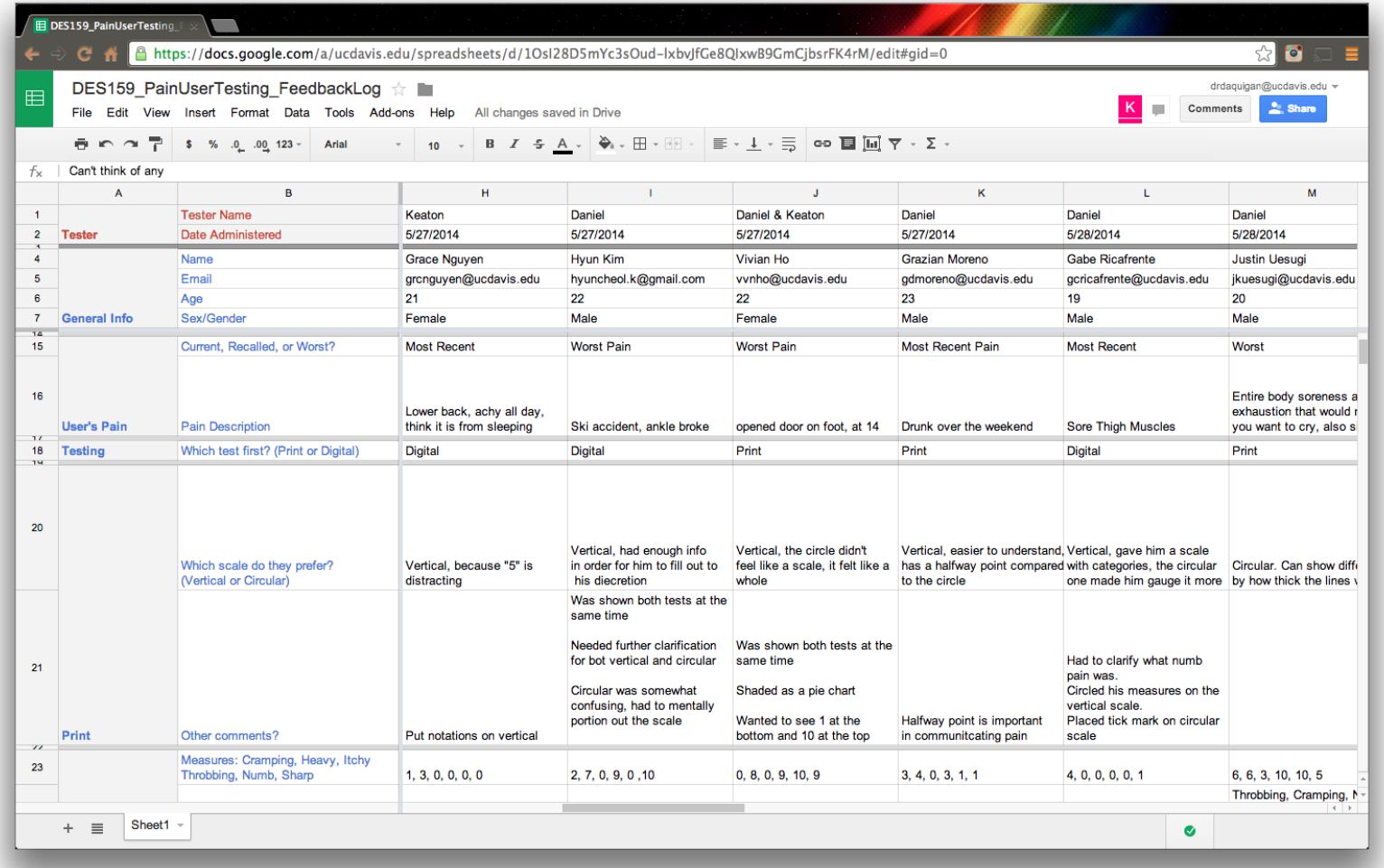
Avoiding Testing Bias

Although we provided general directions for all three portions of our tests, it was important for us as those administering the tests to remain impartial towards how our test subjects measured their pain throughout the test — this aims to ensure that every test result is accurate, unbiased, and unique to each individual.

Test Subject Range

The range of subjects for our user testing consisted mostly of college students due to the time constraints of this project. However, these tests were created so that they can also be administered to hospital patients with chronic pain and/or undergoing current pain, which would yield more applicable results.

Data Logging



DES159_PainUserTesting_FeedbackLog

https://docs.google.com/a/ucdavis.edu/spreadsheets/d/1Osl28D5mYc3sOud-lxbvJfGe8QlxwB9GmCjbsrFK4rM/edit#gid=0

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive

drdaquigan@ucdavis.edu

Comments Share

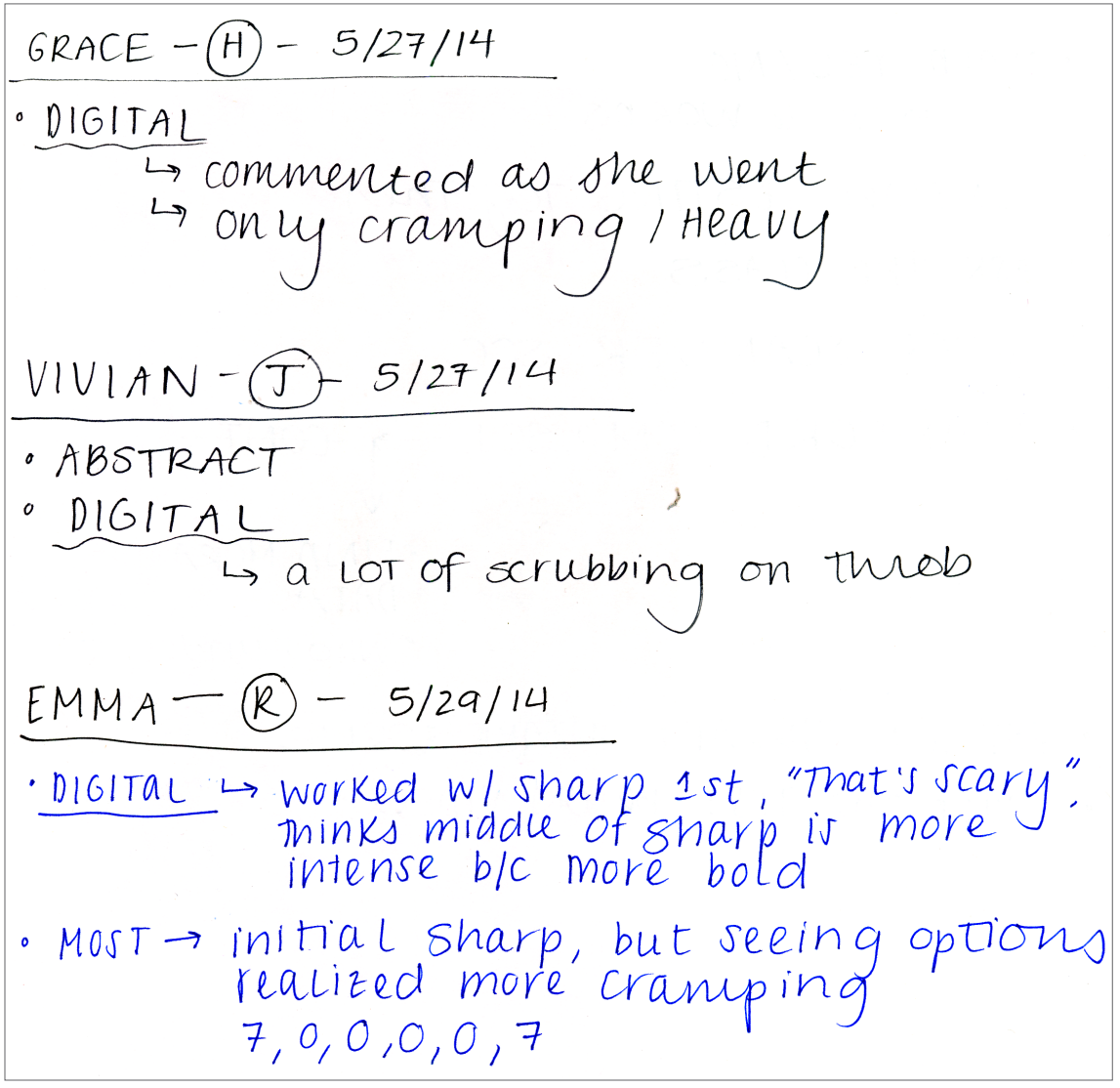
Can't think of any

	A	B	H	I	J	K	L	M
1		Tester Name	Keaton	Daniel	Daniel & Keaton	Daniel	Daniel	Daniel
2	Tester	Date Administered	5/27/2014	5/27/2014	5/27/2014	5/27/2014	5/28/2014	5/28/2014
4		Name	Grace Nguyen	Hyun Kim	Vivian Ho	Grazian Moreno	Gabe Ricafrente	Justin Uesugi
5		Email	grcnguyen@ucdavis.edu	hyuncheol.k@gmail.com	vvnho@ucdavis.edu	gdmoreno@ucdavis.edu	gcricafrente@ucdavis.edu	jkuesugi@ucdavis.edu
6		Age	21	22	22	23	19	20
7	General Info	Sex/Gender	Female	Male	Female	Male	Male	Male
15		Current, Recalled, or Worst?	Most Recent	Worst Pain	Worst Pain	Most Recent Pain	Most Recent	Worst
16	User's Pain	Pain Description	Lower back, achy all day, think it is from sleeping	Ski accident, ankle broke	opened door on foot, at 14	Drunk over the weekend	Sore Thigh Muscles	Entire body soreness a exhaustion that would r you want to cry, also s
18	Testing	Which test first? (Print or Digital)	Digital	Digital	Print	Print	Digital	Print
20		Which scale do they prefer? (Vertical or Circular)	Vertical, because "5" is distracting	Vertical, had enough info in order for him to fill out to his diecretion	Vertical, the circle didn't feel like a scale, it felt like a whole	Vertical, easier to understand, has a halfway point compared to the circle	Vertical, gave him a scale with categories, the circular one made him gauge it more	Circular. Can show diff by how thick the lines
21	Print	Other comments?	Put notations on vertical	Was shown both tests at the same time Needed further clarification for bot vertical and circular Circular was somewhat confusing, had to mentally portion out the scale	Was shown both tests at the same time Shaded as a pie chart Wanted to see 1 at the bottom and 10 at the top	Halfway point is important in communitcating pain	Had to clarify what numb pain was. Circled his measures on the vertical scale. Placed tick mark on circular scale	
23		Measures: Cramping, Heavy, Itchy Throbbing, Numb, Sharp	1, 3, 0, 0, 0, 0	2, 7, 0, 9, 0 ,10	0, 8, 0, 9, 10, 9	3, 4, 0, 3, 1, 1	4, 0, 0, 0, 0, 1	6, 6, 3, 10, 10, 5
								Throbbing, Cramping, N

Sheet1

Google Spreadsheet used for logging data during our user testing

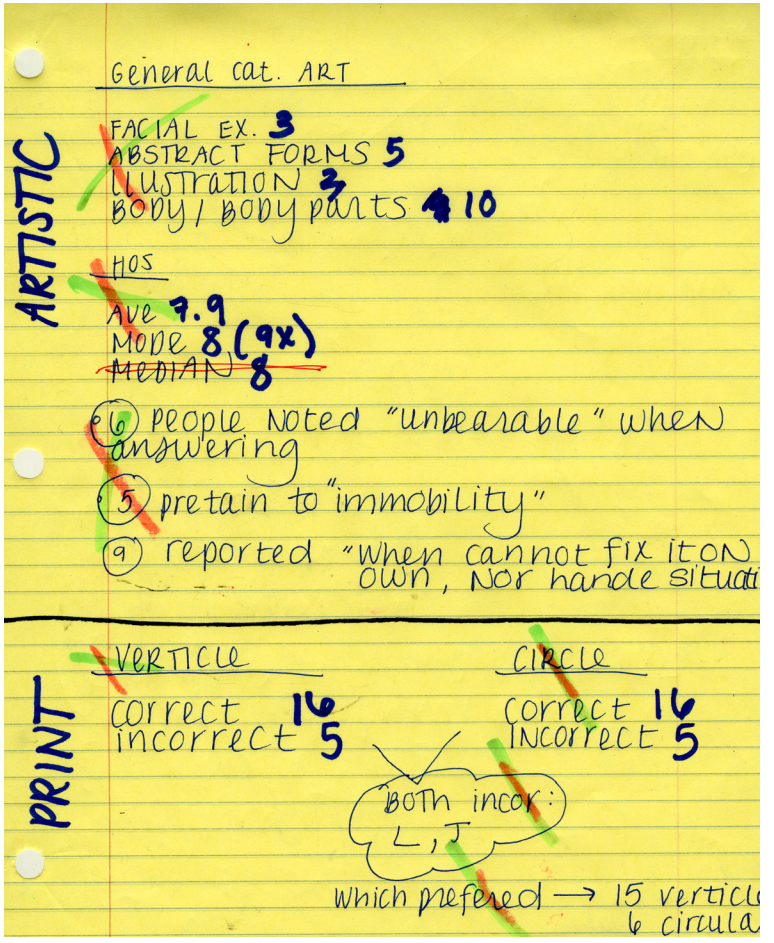
Handwritten data that Keaton logged, mostly observing the narrative accounts of our test subjects while talking about their pain experience(s) or talking about how they went about doing each test.

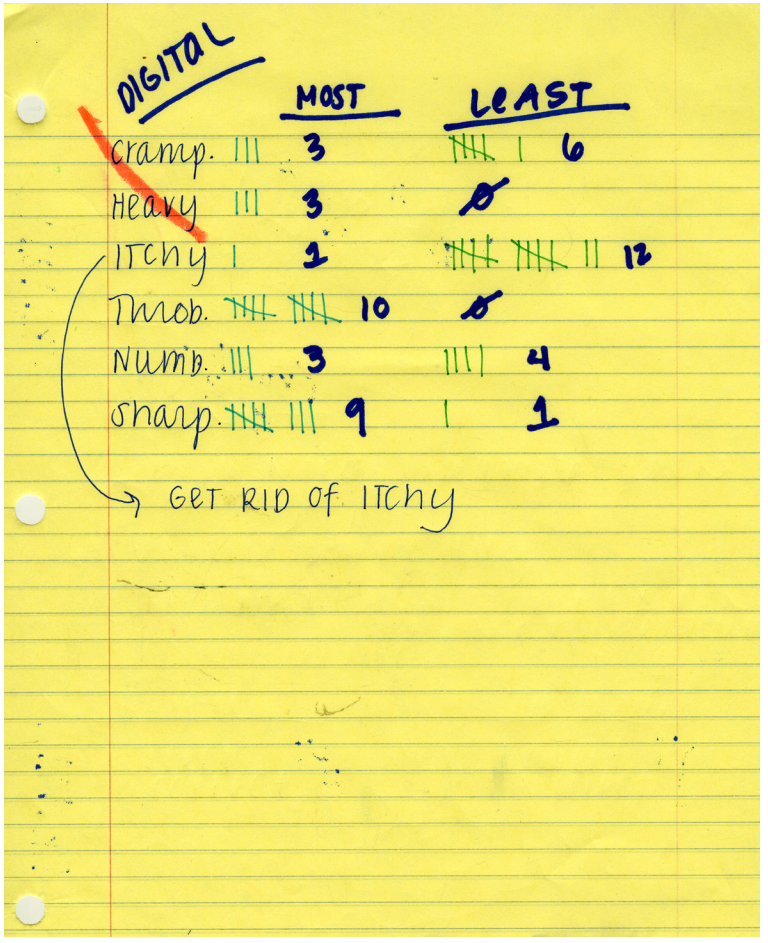


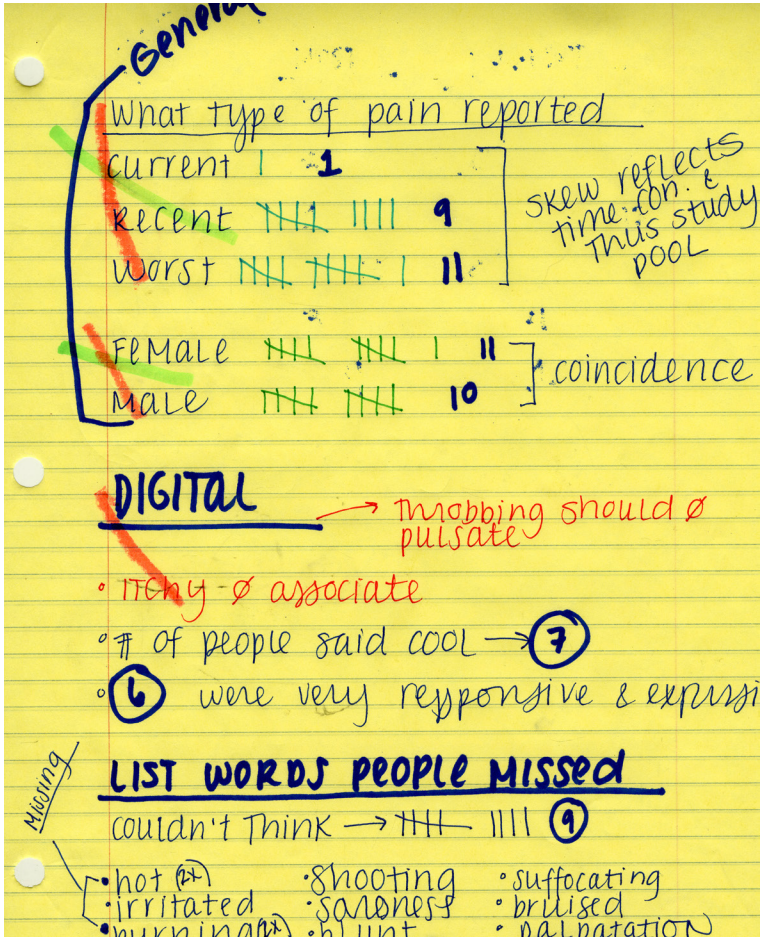
Analysis

Compiling Data

To analyze and synthesize our data, we sorted all the results into sub categories, counted response types and selected interesting examples and user quotes. The following photos show the notes we took to organize and record our findings.




DIGITAL
MOST
LEAST
cramp. III 3
Heavy III 3
Itchy I 1
Throb. 10
Numb. III 3
Sharp. 9
I 1
GET RID OF ITCHY


What type of pain reported
current I 1
Recent 9
Worst 11
SKEW reflects time con. & This study POOL
FEMALE 11
Male 10
coincidence
DIGITAL
Throbbing should ø pulsate
• ITCHY - ø associate
• # of people said COOL → 7
• 6 were very responsive & expressi
LIST WORDS PEOPLE MISSED
couldn't think → 9
• hot (2)
• irritated
• burning (2)
• shooting
• soreness
• blunt
• suffocating
• bruised
• pulsation

General Stats

General Summary

Inventory of test subject pool

Total Test Subjects

21 tests

Male to Female Ratio

11 F

10 M

Type of Pain Addressing

1 Current

9 Recent

11 Worst

Analysis | Artistic Portion

We organized the artistic section into four main categories listed below.

3 **Facial Expressions**

3 **Illustration**

5 **Abstract Forms**

10 **Body/ Body Parts**

Drawings of bodies and body parts were the most prevalent among respondents.

When asked "At which point do you go to the hospital?"

6 respondents used word "unbearable" when answering

5 answers pertain to "Immobility"

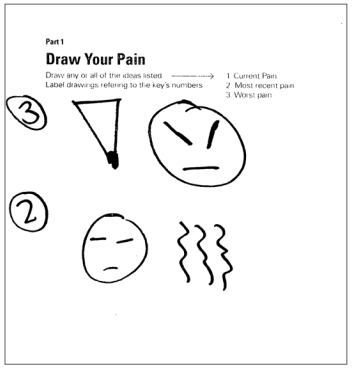
9 reported that they go when "they cannot fit it on their own, nor handle the situation".

Responses and findings from being asked to choose a number between 1-10 based on the question above.

7.9 was the average

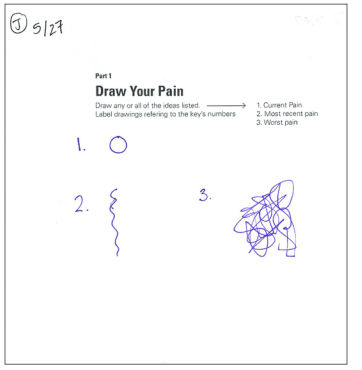
8 was the mode.

Analysis | Artistic Portion Examples

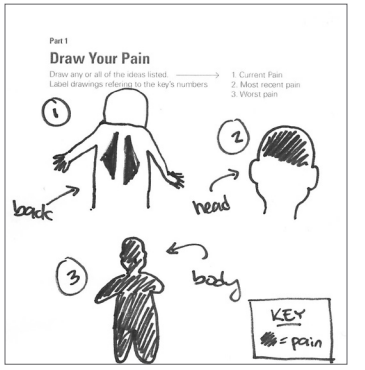


Example of faces. Most were similar in simplicity as seen in example.

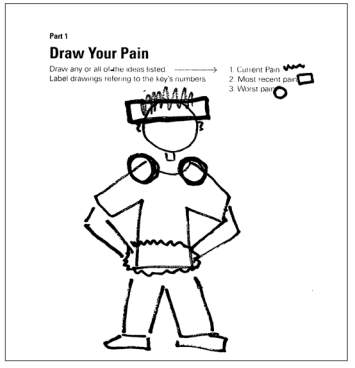
Example of illustration. This example is very cartoon like.



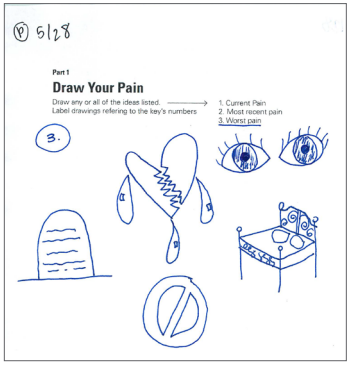
Example of abstraction. Shows a process/scale from current and calm to worst.



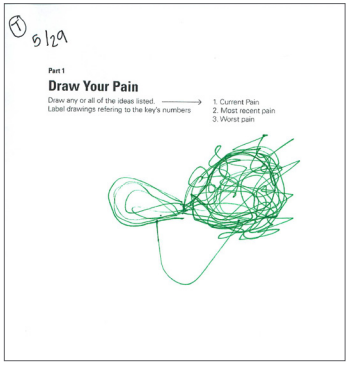
Interesting examples of body drawing. Created a method and key on how to label pain areas.



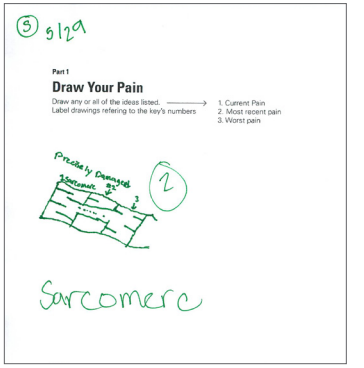
Another example of body drawings with self-created key. Interesting because used existing key to aid final drawing.



Example of emotional pain. Drawn when accidentally not instructed that the test was about physical pain, respondent chose to draw emotional pain.



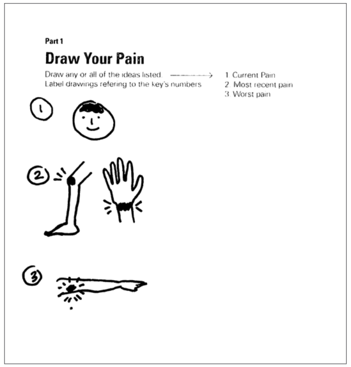
Example of abstraction. Respondent was suffering from current throat pain. Reported that this was a drawing of their throat/swollen tonsils with the tongue sticking out in the middle.

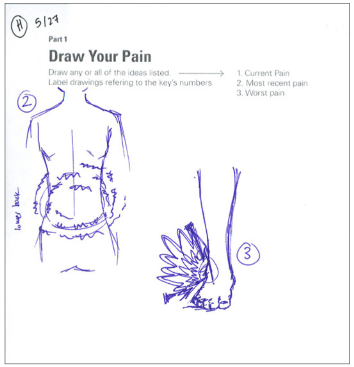


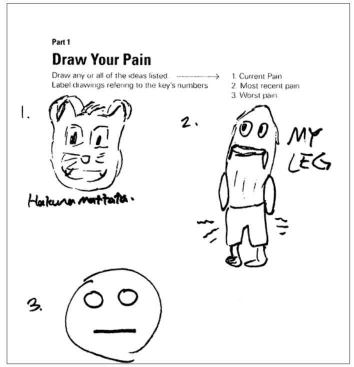
Interesting example of body drawing. Precision and scientific knowledge reveals background and study habits of respondent: pre-med student.

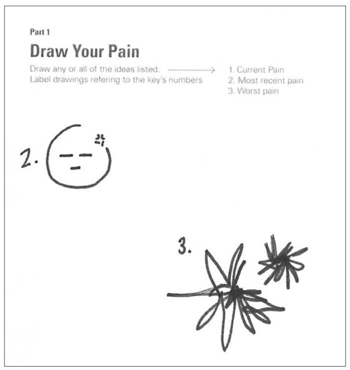
Analysis | Artistic Portion Examples

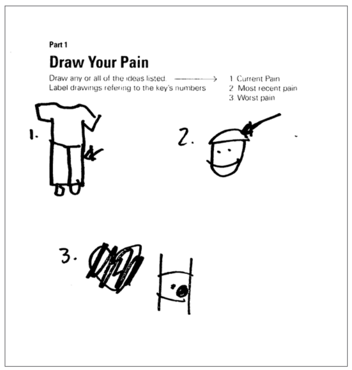
More examples of user testing artistic portions:

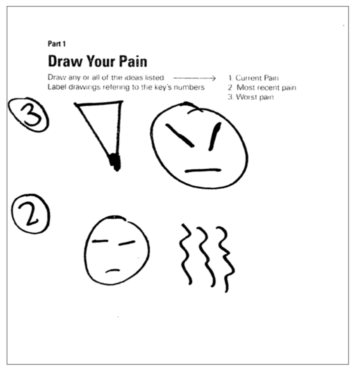










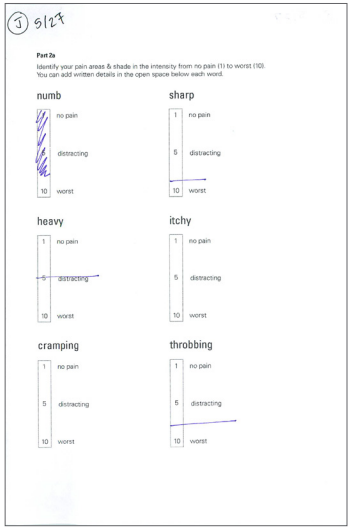


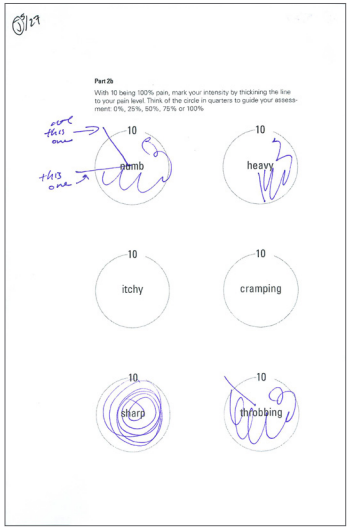
Analysis | Print Version

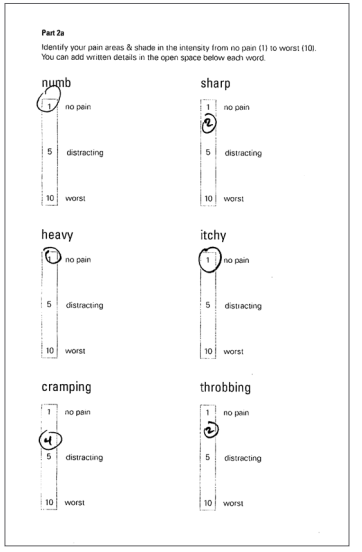
How many respondents filled out their scales correctly?

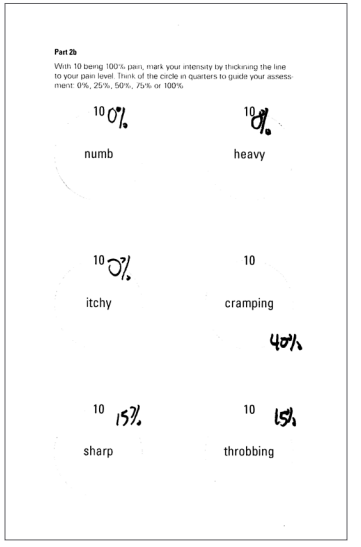
Vertical	16 **correct**	5 **incorrect**
Circular	16 **correct**	5 **incorrect**

2 respondents filled out both tests incorrectly.







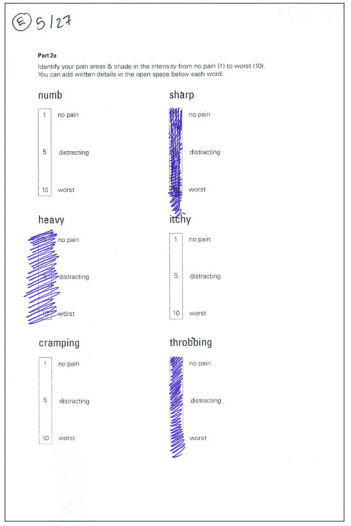


Which test preferred?

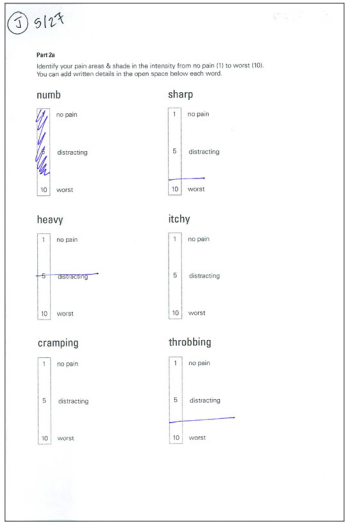
15 vertical

6 circular

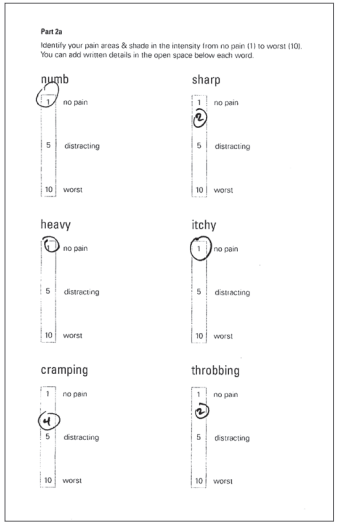
Analysis | Print Version Examples



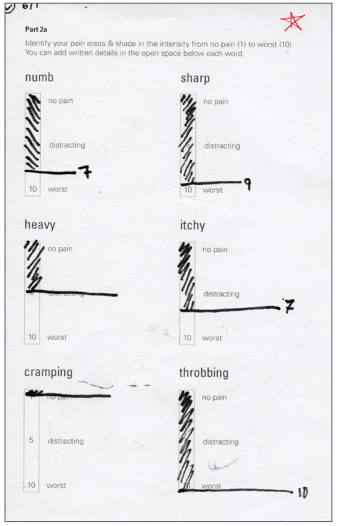
Respondent asked if they could shade outside of the lines to emphasize intensity.



Initially filled out correctly, then adjusted to simpler line marking method without shading.

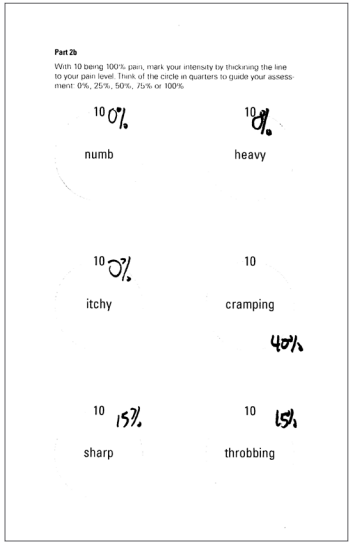


Although not following directions, user added numbers specific to self, taking the directions a step further

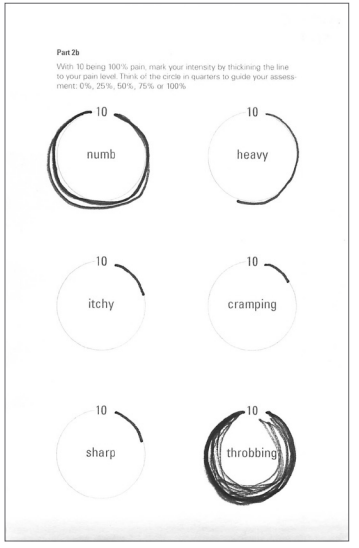


This example filled out the test correctly and added a marker and number to each scale to clarify.

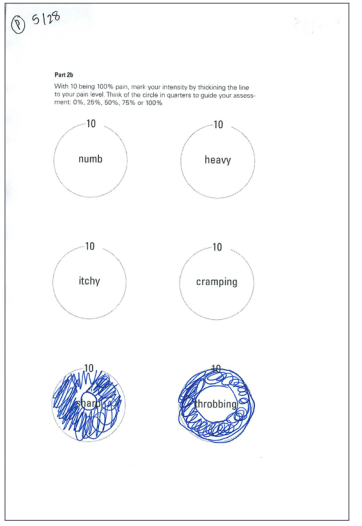
Analysis | Print Version Examples



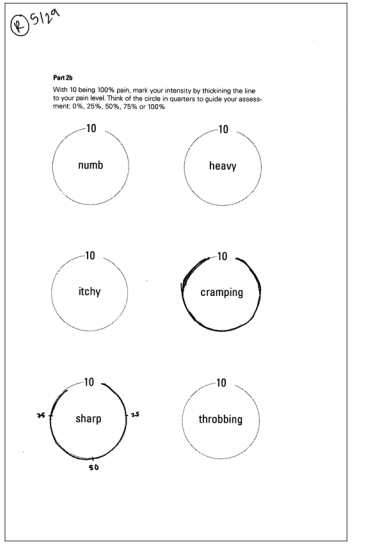
Another example of ignoring directions but inventing successful method to record feelings.



Filled out correctly & thickened line to further communicate the intensity.



Filled out incorrectly. Interpreted as the thicker the ring, the higher the intensity.



Filled out correctly. Note how respondent labeled sharp as a guide to mark circles.

Analysis | Digital Version

Which word did you most/ least identify with?

Most Identified (# of test subjects)

10 Throbbing
9 Sharp
3 Cramping
3 Heavy
3 Numb
1 Itchy

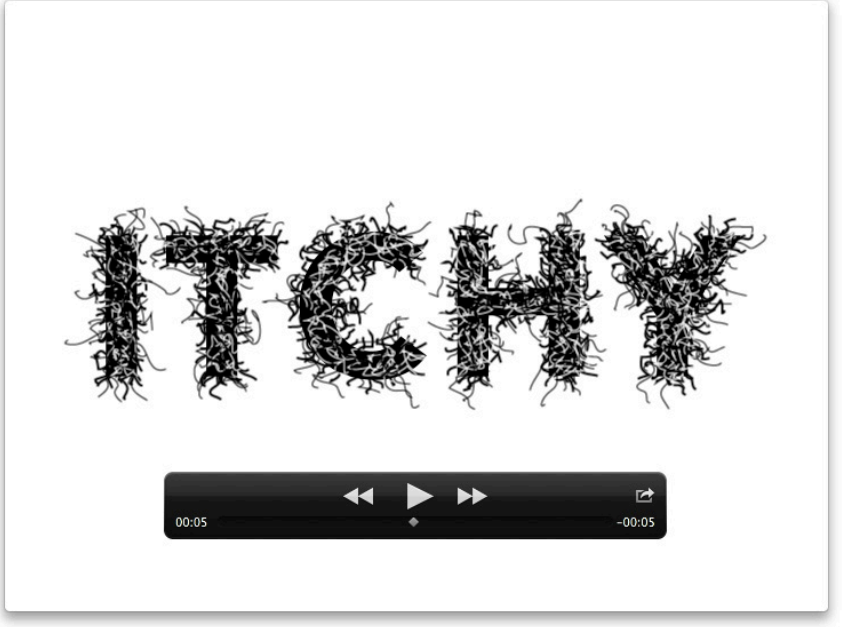
Least Identified (# of test subjects)

12 Itchy
6 Cramping
4 Numb
1 Sharp
0 Heavy
0 Throbbing

Itchy

Although many of our test subjects selected the word “itchy” as the word they least identified their pain with, many of them have commented on how effective it is and how much they liked its animation in the digital portion.

While we enjoyed everyone’s feedback, we have decided to remove “itchy” from the pool of words for future testing due to lack of relevance to the general consensus of how people describe their pain.



Analysis | Follow - Up

Is there one word missing from the list that would have helped you communicate your pain experience?

9 test subjects could not think of a word at the time

However, other test subjects were able to provide words:

Hot	Shooting	Burning
Irritated	Blunt	Bruised
Achy	Raw	Palpitating
Suffocating	Soreness	Swollen

Analysis | Follow - Up

Did these six words help you communicate your pain? Why or why not?

"Yes, they gave me a point to reference off of. I'm not sure if I would have picked the words without seeing them. But of the 6 these words, they helped me describe it well."

– V. H.

"Yes, but not really because the pain I was referencing only identified with cramping."

– G.R.

"No, because the tests didn't take into consideration emotional pain, which I think is 50% of everyone's pain experience."

– J. U.

"Yes, because sometimes it is hard to think of words to describe pain.

I wouldn't have thought of 'itchy,' 'throbbing' and 'sharp,' but they were there and described pain."

– C. K.

Did this study make you more mindful of how you communicate your pain? If so, in what ways?

"Yes, I liked the visual aspect when I couldn't explain it in words. It was more broad-reaching and accessible; easier in general."

– K. C.

"Yes, making me draw it made me pinpoint where my pain was, and the words help me describe it; it's not a process."

– T. K.

"Yes, it was easier to describe by drawing because I didn't need to use words. I liked the combo of drawing, then having a scale. Without a scale, I would not have described it in detail."

– G. N.

"Yes, it gave me a sense of what words to use when."

– G. R.

"Yes, having a preset of words make me think of my pain in that quality rather than as a scale."

– N. B.

"Yes, I realized that I don't use definite words for pain. It usually gives an example 'you know how it feels when xyz happens'."

– E. H.

"Yes, it's not something I would generally think about. It made me realize that there are a lot of different ways pain can feel and that pain can be visualized."

– C. K.

"Yes, those drawings helped me think about his pain more."

– A. K.

Next Steps

Improvement

After receiving much feedback about our prototypes from our user testing, we found multiple points for future improvement:

The Test Itself

Print: Remove directions — this will give more freedom to the test subject on filling out the pain scales and will give us more insight on how people describe their pain uninhibited

Digital: Administer test on a tablet or another type of touch screen interface — this will provide more hands-on interaction for test subjects

Digital: provide multiple versions of how each word is visually animated — we found that some test subjects did relate their pain experiences with one of our word options, however, the subject did not related to the way the word was animated. More options will result in more accurate pain measures

Overall: provide more words that describe pain — this gives the test subject a wider pool of adjectives to accurately describe their pain even more

Overall: remove/replace words unrelated to pain (e.g., "itchy")

How We Test

Overall: provide the least amount of guidance throughout the test — although we will allow them to ask us questions throughout the test, we want our test subjects to respond to the pain scales naturally through their own interpretations of the test and of pain in general

Overall: have the tests refer strictly to physical pain only — although we understand that emotional pain does factor into one's overall sense of pain, this kind of user testing needs to be limited to physical pain to be able to find conclusive and comparable responses

Overall: administering the test together, administering the test to multiple people at a time — although we want to study individual responses to pain, another variable that we wish to study with our testing is how people respond to pain in a group setting where two people may be administering the test or multiple people are given the test together

Who We Test

As mentioned previously, our range of test subjects consisted mostly of college students due to time constraints. For future testing, we aim to administer our tests to hospital patients with chronic or current pain, and to individuals who are undergoing current pain. This will yield more applicable results

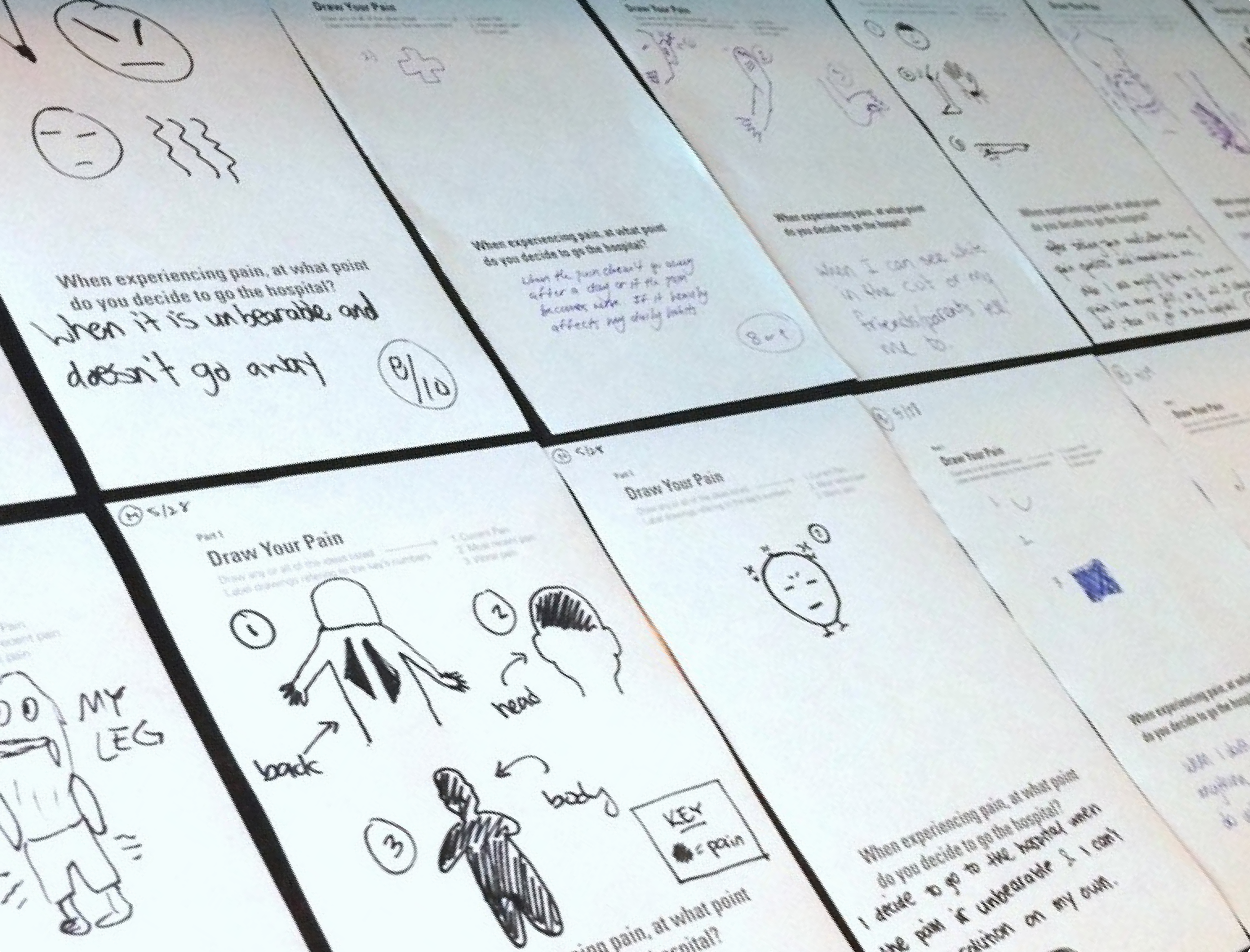
Why This Matters

In identifying the main issue that there is no universal written or visual language for pain, we directed our project towards finding out how individuals express and measure their pain. Although the end-product of our project was not intended to be a physical procedure that patients and doctors would use to communicate pain, the findings from our research and user testing contributes to addressing the issues of the current methods of communicating pain in the hospital.

With the final prototypes we created for our user testing, we aimed to provide the least amount of guidance to the test subject. Although our testing needed a base set of direction for our test subjects to follow, we found that each test we administered produced a different set of results everytime. While current methods aim to create a standardized procedure of communicating pain, our findings show that people's physical pain experiences are unique and using standardized scales to communicate it to doctors could lead to misrepresent the individual's physical pain and thus resulting in inaccurate or even faulty health diagnoses.

There were certain patterns and categories that we found among the way our test subjects measured and described their pain, but otherwise their responses were unique within these categories. From our findings, we want our project to remind physicians and health practices again that there is no universal written or visual language for pain: procedures for communicating pain between patient and doctor should aim to be experiential for the benefit of the individual.

For our next steps, we hope to administer these test on a wider scale. For example, by administering these tests in hospitals across the nation, the numerous amount of responses would allow us to have an inventory that would further improve the content of the test and how we administer the test, but most importantly providing us more insight on how people communicate pain.



When experiencing pain, at what point do you decide to go the hospital?
When it is unbearable and doesn't go away
8/10
When experiencing pain, at what point do you decide to go the hospital?
When experiencing pain, at what point do you decide to go the hospital?
MY LEG
Part 1
Draw Your Pain
1. Current Pain
2. Most recent pain
3. Worst pain
back
head
body
KEY
= pain
Draw Your Pain
When experiencing pain, at what point do you decide to go the hospital?