

Pilot Study: Sharing Electrodermal Biofeedback with Customizable Kinetic Type

Fall 2016 Independent Study Final Report

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Abstract

Expressive biofeedback is the use of physiological data—in this case, electrodermal activity from the Empatica E4 wristband sensor—to enhance social interactions. In this pilot study, we explored questions of trust, comfort, and expression, with regards to sharing biofeedback data through messages with kinetic type. Using data from the E4 wristband, six participants monitored their baseline and current electrodermal activity in a chat interface while chatting with the experimenter. As the participants typed, a preview box displayed an animation of their text with a fast or slow speed, as determined by whether the participant was above or below their baseline. While the participant could not control the animation speed, which was determined by their physiological data, they could control the animation style of the effect. Each participant chatted with the experimenter, whose sharing settings were off, and answered a series of positive emotional, negative emotional, and neutral questions. While all participants chose to keep their sharing settings on, all participants also indicated that they could not see a strong link between their perceived emotional state or raw data (as shown in a streaming chart) and the text animation speed. Despite this, several were intrigued by the possibility of expressing themselves through custom kinetic typography choices, and expressed interest in seeing biofeedback represented in other ways, like color, or more fine-grained speed changes.

Introduction

This chat builds directly on Raina Langevin’s work for the project, *Understanding Perceptions of Expressive Biofeedback and Implementing it into a Kinetic Instant Messenger*, which created several text animations corresponding to a variety of biofeedback. In the chat implementation for this pilot study, these animations were added into an effect library which each participant could choose from. In addition to choosing their effect, the participant could also choose whether or not to share with the other person in the chat.

The pilot set out to explore four central questions:

1. *Are people comfortable sharing messages with biofeedback data?*
2. *Do people want control over how their biofeedback data is presented to others?*
3. *How do people understand the biofeedback data, as shown through data visualizations vs. kinetic typography?*
4. *Do people trust that their biofeedback data is accurate?*

Pilot Study Methods

Participants

Six CMU graduate students in their early to late twenties, three male, three female.

Instruments

One Samsung phone connected to a Mac Desktop computer via USB lightning cord and Empatica E4 wristband.

Note: In this pilot, for expediency, and because their sharing effects were off, the experimenter on the other side of the chat was not connected to their own E4 device, although this is technologically possible for future pilot studies.

Procedure

From 12/14/16 to 12/15/16 six participants came into the CoEx Lab A. They were greeted by the experimenter and given a consent form to have their biofeedback data, text responses, and post-interview responses recorded anonymously. They were then given basic information about the E4 wristband sensor and shown a demonstration of the chat interface with dummy data—in particular the graph, the sharing option, and the effect options, and told that an experimenter on the other side of the chat would see the same interface.

The experimenter then connected the participant to an E4 device, ran the EmpApp Android app, and instructed the E4 to turn on the device and sit calmly as the baseline was calculated. During this time, the experimenter monitored the gsrData.txt file to make sure that data was coming into the text file. Once the requisite number of baseline values populated the text file, the experimenter opened up a new chat window for the participant with an anonymized username (e.g. A1, A2, etc.) and told the participant to wait for the experimenter to send them a chat message in order to begin. The experimenter then left the room, opened up their own chat window, and asked the participant if they were receiving the message. The experimenter's sharing settings were off for the entirety of the chat.

Upon confirmation, the experimenter used random.org to randomly picked at least three questions from a set of five positive emotional questions, five negative emotional questions, and five neutral questions (see script). After receiving all responses, the experimenter recorded audio of a post-chat discussion and debriefing.

Preliminary Results

1. Are people comfortable sharing messages with biofeedback data?

I hypothesized that people would only be comfortable sharing information about their physical state if the sharing was two-way. Since the experimenter did not share their biofeedback at all during the chat, despite the participant's being told that the experimenter had the option to share, I hypothesized that the participants would opt to turn their sharing effects off in order to even out the dynamic.

However, all participants kept sharing on for the entirety of the chat. Their motivation for keeping sharing on fell into several buckets: 1) indifference to sharing the effect, either due to focus on the conversational content or the graph, 2) wanting to share their emotions, and 3) wanting to be a good experimental participant—which to them meant keeping sharing on. Although all participants left sharing on, some expressed that they thought about turning them off, either because the effect was seen as distracting away from the conversation’s content, or because the conversation was seen as one-sided.

Interestingly, several participants did not even seem to notice the experimenter’s sharing settings were off, or else indicated that they thought this was part of the experimenter/participant dynamic.

Key quotes:

Indifferent to sharing the effect

- *“I didn't really think about [whether to share the effect or not]. I didn't mind sharing it, so I just chose to keep it shared.” (A6)*
- *[On not noticing sharing settings] “I was really fixated on the graph.” (A3)*

Comfortable sharing the effect

- *“I like when people know what my emotions are.” (A2)*

Uncomfortable sharing the effect

- One-sided sharing
 - *“I moused over the experimenter's responses a little bit and I didn't get anything, so I felt like it was a little one-sided.” (A4)*
- Effect style
 - *“I thought you know, I'm fine sharing it, although I can see that you know you may not want to share it all the time, because I don't know, that very first effect lasted long but all the other ones were just [quick] and then they would stop. So that's why I would like [to turn them off].” (A1)*
 - *“I forgot about [the sharing checkbox] so I shared the entire time. ...I probably would have taken it off because when my mouse hovered over the area it would shake. I just think it's annoying.” (A5)*

Didn't notice experimenter's sharing setting

- *“Well I wasn't really paying attention to [whether the experimenter was sharing their effect]” (A1)*
- *“I never saw [an effect] so I assumed that they weren't [sharing an effect], unless there was a very subtle one, which is very possible. But I wasn't really looking for them.” (A2)*

Other

- *"I thought that [not sharing] would ruin the experiment, I thought the point was for [the experimenter] to see my effect. Maybe I misinterpreted it. But no I didn't manipulate the sharing." (A4)*
- *"No I didn't think about it [as sharing my physiological state]. I think I thought I was sharing my answers and that was, I was ok with that part of it." (A6)*

2. Do people want control over how their biofeedback data is presented to others?

I hypothesized that if participants wanted control over styling, they would make use of the "change effect" button. I further hypothesized that if participants wanted control over styling, they would express that they changed the effect in order to express themselves better in the post-pilot discussion. Both of these hypotheses found support from the pilot participants, as half participants experimented with changing effects and identified with the visual style of one effect over another. Of the participants who didn't change their effect, they explained that their focus was more directed to either the conversational content or the raw biofeedback data.

The participants who changed their effects did not seem to notice or perceive the effect style in the context of the biofeedback aspect, or the speed of the effect. They enjoyed ownership over the effect style, but did not see it as strongly communicating biofeedback.

Key quotes:

Didn't change effect

- *"I was fine with the effect and I wanted to pay attention to the questions and not leave you hanging so I could mess around a bit." (A4)*
- *"To be honest I was more focused on the graph than the effect." (A3)*
- *"I didn't see the point in it I guess, to change [the effect]. It seemed kind of annoying. I was more interested in the actual biofeedback, like the actual data. (A5)*

Changed effect

- *"I found [the bounce effect] that represented me as how I see myself as a person. So I actually found that immediately and kept the same the whole time because it is actually reminiscent of how I often act in person which is kind of jumping up and down ... I feel like, if I didn't find one like that, I don't know if I would have had such a strong reaction to it...definitely having the choice was cool." (A2)*
- *You know I think the first time it was just to see what it does, then the second time because you asked some question, there was one question, [that made me want to switch to the] squishy [effect]. ...The very first effect was a bit distracting like it was too much. But then the squishy one was good and so I think I stuck with it maybe at some point I changed it a little bit" (A1)*
- *"I remember you showed me that I could [change the effect] and I wanted to see if there was a difference. At first it was going sideways, and then I wanted it to go up and down just to, I don't know what, I just wanted it to. I thought it visually, it looked better to me if it went up and down." (A6)*

Not expressive

- *“The dynamic nature was cool, but I guess I read it more as a data [visualization] exercise rather than something that was supporting my response. Like it didn't feel, maybe because of the nature of the experiment and the environment, it didn't feel like something that was complementing my response as much as just a metric to take separately. I guess it felt very biofeedback-y in a way that wasn't necessarily linked to my expression.” (A4)*
- *“So in the second half where it was just you know I had to think hard you know to find the answers, I just stopped thinking about the effect. And I think the effects they were very subtle. ...because it's not too customizable you can not really target [certain words too animate]” (A1)*

3. How do people understand the biofeedback data, as shown through data visualizations vs. kinetic typography?

I hypothesized that if the participant understood their biofeedback, they would confirm that they understood that “Above baseline” indicated that they were in a high-arousal state, and “Below baseline” indicated that they were in a low-arousal state in the post-pilot discussion. Further, I hypothesized that they would confirm that they paid attention to their state through the animation speed and/or the data range label.

In the post-experiment discussion, it became clear that there were several breakdowns in understanding when it came to the graph, and especially the kinetic typography. No participant saw a strong relationship between the speed of the text and their raw biofeedback, even when some explicitly looked for it—this was likely due to an expectation of more fine-grained speed variations, as opposed to the binary fast/above baseline and low/below baseline states. Since many participants had values consistently above their baseline, for example, this would mean they would see no difference in text speed throughout the chat.

Most participants did however show basic understanding of the idea that a higher pink/purple current value line above the blue baseline line indicated that they were more stimulated, and vice versa. Participants reported focusing on the graph over the baseline labels. Several indicated that they would find the graph easier to interpret if it were bigger. One participant indicated that the magnitude of fluctuations was unclear to him—i.e. beyond above and below baseline, what kind of jumps represented drastic vs. minor EDA changes?

Key quotes:

Saw relationship between speed of kinetic text and biofeedback

- *[On whether chat partner could sense physiological state through effect speed] “Yeah, because I guess that there was a progression. It started a little faster and then got calmer, maybe.” (A4)*

Didn't see/understand relationship between speed of kinetic text and biofeedback

- *“I thought that the way that it was moving it wasn't moving that fast, so I didn't think it was above the baseline, but afterwards when you explained it I now know that it was*

above the baseline. But I don't know what that means about my physiological feedback.” (A6)

- *“I just see shaky text, as like an animation, but it's hard to connect the fact that it's supposed to be related to biofeedback, and it's probably because I don't think I provided much feedback anyway.” (A5)*
- *“I was so strongly identifying with the effect that I was like, it had already become a part of me, so I was just like, I figured [the speed] was just going to do its thing.” (A1)*

Didn't understand graph

- *“I don't know the true magnitude of what filling up the whole screen with purple or pinks means as opposed to like half-way, I don't really know the magnitude of increase.” (A1)*
- *“I didn't expect it to go below baseline at any point, below what we had established as my relaxed state, so I mostly just watched the purple line rise and fall. It seemed to indicate that I was stressed. Maybe I am not interpreting this correctly but it felt like lots of purple [above baseline] meant that it was stressed, and maybe the environment being in a user test informs that a little bit.” (A4)*

Graph too small

- *“[I would like a] bigger graph so that you can see those minor dips, because it was right at the top, you could barely see it, so if it were bigger then it's like oh, something's actually happening.” (A5)*
- *“I felt like this [graph] was also very small for me personally, it was too small to pay attention to. ...I wasn't sure like where's the baseline right now. Yeah. You know and the other part is that because it's here like I'm focusing here trying to write [and] thinking, it's really in the periphery.” (A1)*

4. Do people trust that their biofeedback data is accurate?

I hypothesized that if the participant trusted that their biofeedback accurately represented their state throughout the chat, they would indicate this in the post-pilot discussion.

Most participants indicated that they trusted that the device was accurate. Two observed patterns in how the values increased/decreased related to social stress (e.g. the experimenter entering the room) and physical activity (e.g. typing). Others indicated that they trusted the data, but didn't undergo drastic enough emotional changes to observe a clear change they could identify with. They struggled to figure out what exactly the wristbands were responding to, and their level of sensitivity to emotional thoughts.

Key quotes:

Noticed patterns

- *“I found that like, I felt like it would be more representative of thoughts, but it seemed to be more representative of physical actions. Like I noticed that when I was typing it would go up by a lot, but if I was just thinking [it wouldn't].” (A3)*
- *“I definitely like would try to think about random stressful or exciting things while I was waiting for stuff to see if that would affect what happened, and there were definitely changes. So like something was going on there, I have no way of knowing if it was*

accurate, but it at least seemed to change. And I also noticed a couple times, like when you came in the door it spiked immediately, because I'm like 'oh!' so a lot of the spikes seemed to occur at logical times.” (A1)

Didn't notice patterns

- *“I tried to watch to see if there's a difference in my responses between the positive and the negative. Um, but it seemed pretty consistent. Maybe I missed it, maybe there was a correlation that I'm not picking up on.” (A4)*

Discussion

There are several actionable takeaways coming out from this study. First, the experimenter/participant dynamic drastically changes the way people think about sharing biofeedback. In order to learn more about attitudes around sharing, I recommend conducting future studies between a participant and a confederate, or two participants. I think the chat would further benefit from being conducted outside of a lab setting, perhaps on mobile phones, in order to learn about sharing attitudes as they would apply in naturalistic social environments.

Another takeaway is that triggering an emotional reaction in an experimental setting is difficult. Despite asking a range of emotionally intense questions, participants communicated that they did not feel strong emotional changes throughout the chat, and would have needed to delve deeper into a topic to experience drastic emotional changes. Future studies would benefit from conducting a quantitative analysis of the biofeedback signals against question types in order to see if there are real correlations between the emotional questions and above baseline response.

Several design recommendations come out of this study. The speed effect was both too subtle, infrequent, and narrowly applied to be convey meaningful biofeedback information to the participants. Varying the speed to map more directly with continuous values may be more effective than classifying states like “above baseline” and “below baseline.” Several participants suggested incorporating color: applying color gradients corresponding to values could be an effective way of communicating state, while allowing user control over other expressive dimensions, like the style of the animation.

Although participants for the most part enjoyed being able to customize their effect, they also expressed that some effect communicated strong emotions on their own. It could be interesting to create subsets of effects corresponding to different value ranges, and allowing users to select only an effect within that range.

Finally, to ensure accuracy of data measurement, I would recommend a more scientifically rigorous approach to calculating the baseline in future studies, as opposed to finding the average of the first 120 values.

Appendix

Code and README.txt

See project description and instructions for running in README.txt

<https://github.com/Saltzshaker/bio-kinetic-typography-chat>

Script

[Starting the Experiment]

Hi, thanks for participating in this Kinetic Typography Biofeedback pilot study. To ensure that there aren't any interruptions while you're doing the experiment, please turn off your cell phones. Please don't set it to vibrate, but turn it off completely.

Just so you know, your participation in this pilot study is completely voluntary. Although I don't anticipate any problems, if at any point you become uncomfortable and do not wish to continue the experiment just let me know.

Before we begin, please read and sign the consent form that was on your seat. When you're done, let me know and we'll get started.

In this experiment you'll be chatting with an experimenter for about 15 minutes, during which time they'll ask you a few questions. During this conversation, you will both be wearing the Empatica E4 wristband sensors. The E4 is a skin-conductance sensing wristband that we are using to record galvanic skin response. The higher your electrodermal activity is, the more stimulated you are. There is no risk involved with wearing this wristband. All of your data and answers will be anonymized.

For the first two minutes of the experiment, you will sit silently as our baseline states are calculated. Once your baseline state is done calculating, your own electrodermal activity will be displayed on the laptop in front of you, as well as your average baseline value. You can assume that the experimenter is seeing the same display as you are, but for my own electrodermal activity. Do you have any questions at this time?

If no

Great, now I will show you the chat interface and demonstrate how it works in a test chat. Once we begin the chat, you can make use of several features. By default, your message will be shared with an effect.

Experimenter will send sample message on

If you are above your baseline value, the effect will be played at a fast speed, and if you are below the baseline, it will be slow. The effect will reflect the state you were in when you typed the message.

Experimenter will demonstrate how the effect speed changes as above/below baseline state changes with dummy values, then delete data in gsrData.txt file.

You can unclick this “Sharing” checkbox at any time if you don’t want to share your message with an effect.

Experimenter will unclick “sharing” and send message without effect

If you would like to use a different effect, you can click “Choose Effect,” however this will not change the speed of the effect, which is determined by the data from the wristband sensor.

Experimenter will choose a different effect

Do you have any questions about the chat interface?

If no

Great, then now I will connect each of us to the wristband sensors. This will take a few minutes.

Experimenter will connect themselves and the participant to Empatica E4 wristband. Once both are connected...

Now I will open up the chat windows.

The experimenter will open chat windows at <https://biofeedback-kt.herokuapp.com/> on the experimenter’s laptop and the participant’s laptop.

Enter a username and click submit, then wait for my next instructions.

The participant will create a username and enter the chat window.

Now that we’re connected, there will be a short period where your baseline state will be collected. During this time, just sit calmly and breathe. Once your chat has the “Baseline Calculated” message, I will leave the room and the experimenter will send you a chat and ask you a few questions. Remember that “Above Baseline” means that you are in a more stimulated state, and “Below Baseline” means you are in a less stimulated state. Do you have any questions at this time?

The experimenter will wait for the chat to display "Baseline Calculated" label. Then experimenter will chat to the participant:

<IN CHAT>

Hi, are you ready to start? I will ask you 15 questions. Let me know if you have any questions before we start.

On yes

Get random number from random.org and submit random question with that number for subsequent questions

What do you do that makes you feel the happiest?

Wait for response

Thank you! For what in your life do you feel most grateful?

Wait for response

What makes your heart flutter? Why?

Wait for response

Tell me about a time where you were in great awe of something.

Wait for response

When was the last time you felt deeply moved? What moved you?

Wait for response

What is something that you've done recently that you regret?

Wait for response

Tell me about a time when you've hurt someone's feelings.

Wait for response

What is your biggest fear?

Wait for response

When did you last cry in front of another person? By yourself?

Wait for response

Describe a time where you experienced a stressful situation.

Wait for response

What's something you have to do every day?

Wait for response

What's your favorite TV show?

Wait for response

If you were given a day off on short notice, what would you do?

Wait for response

What is your favorite thing to do on a Saturday?

Wait for response

What is something interesting you learned recently?

Wait for response

Consent Form

Study Title: Expressive Kinetic Typography in Biofeedback Chat

Principal Investigator: Emily Saltz, 323 896 0860, esaltz@andrew.cmu.edu

HCI Institute, Carnegie Mellon University (5000 Forbes Ave, Pittsburgh, PA 15213)

Purpose of this Study

The purpose of the study is to understand how people can use biofeedback signals to express themselves in a chat setting.

Procedures

You will be asked to carry out an activity in the lab or engage in conversation with other participants with our system that provides feedback about your interaction patterns. You will be then asked to answer interview questions. The recordings will be analyzed to understand interaction patterns, and will be accessible only by the research team. Your data and answers will be anonymized. The experiment will take about 30 minutes.

Participant Requirements

Participants need to be 18 or older.

Risks

The risks and discomfort associated with participation in this study are no greater than those ordinarily encountered in daily life.

Benefits

There may be no personal benefit from your participation in the study but the knowledge received may be of value to humanity.

Confidentiality

By participating in the study, you understand and agree that Carnegie Mellon may be required to disclose your consent form, data and other personally identifiable information as required by law, regulation, subpoena or court order. Otherwise, your confidentiality will be maintained in the following manner:

Your data and consent form will be kept separate. Your consent form will be stored in a locked location on Carnegie Mellon property and will not be disclosed to third parties. By participating, you understand and agree that the data and information gathered during this study may be used by Carnegie Mellon and published and/or disclosed by Carnegie Mellon to others outside of Carnegie Mellon. However, your name, address, contact information and other direct personal identifiers in your consent form will not be mentioned in any such publication or dissemination of the research data and/or results by Carnegie Mellon.

The researchers will take the following steps to protect participants' identities during this study: (1) Each participant will be assigned a number; (2) The researchers will record any data collected during the study by number, not by name; (3) Any original recordings or data files will be stored in a secured location accessed only by authorized researchers.

Optional Permission

I understand that the researchers may want to use a short portion of any recording for illustrative reasons in presentations of this work for scientific or educational purposes. I give my permission to do so provided that my name and face will not appear.

Please initial here: _____YES _____NO

Please initial here for permission to record audio: _____YES _____NO

Rights

Your participation is voluntary. You are free to stop your participation at any point. Refusal to participate or withdrawal of your consent or discontinued participation in the study will not result in any penalty or loss of benefits or rights to which you might otherwise be entitled. The Principal Investigator may at his/her discretion remove you from the study for any of a number of reasons. In such an event, you will not suffer any penalty or loss of benefits or rights which you might otherwise be entitled.

Right to Ask Questions & Contact Information

If you have any questions about this study, you should feel free to ask them now. If you have questions later, desire additional information, or wish to withdraw your participation please contact the Principal Investigator by mail, phone or e-mail in accordance with the contact information listed on the first page of this consent.

Voluntary Consent

By signing below, you agree that the above information has been explained to you and all your current questions have been answered. You are encouraged ask questions about any aspect of this research study during the course of the study and in the future. By signing this form, you agree to participate in this research study.

PARTICIPANT SIGNATURE

DATE

I certify that I have explained the nature and purpose of this research study to the above individual and I have discussed the potential benefits and possible risks of participation in the study. Any questions the individual has about this study have been answered and any future questions will be answered as they arise.

SIGNATURE OF PERSON OBTAINING CONSENT

DATE

Post-experiment interviews

A1

Demographics: Male, late twenties

26:30 Why did you choose to change the effect during the chat?

I think because it was cute. You know I think the first time it was just to see what it does, then the second time because you asked some question, there was one question, the one that is squishy.

Why did you choose to share your effect?

The very first effect was a bit distracting like it was too much. But then the squishy one was good and so I think I stuck with it maybe at some point I changed it a little bit, just to see you know what it does.

Did you realize that you could choose not to share the effect and were there any moments where you thought of turning off sharing?

Yes. And no, no, I thought you know, you're sharing it, although I can see that you know you may not want to share it all the time, because I don't know, that very first effect lasted long but all the other ones were just you "boop boop" and then they would stop. So that's why I would like [to turn them off].

And could you tell that your conversational partner was not sharing their effect?

Oh! Well I wasn't really paying attention to the that part. I just thought that it's cute. ...So I wasn't really thinking about my conversational partner. I think the effects are cute it's just that sometimes they can get distracting. But they're cute. Especially the squishy. I think it could mean a lot of things.

Did you understand above/below baseline? How did you interpret these?

I wasn't paying attention to them, but my emotion—do I feel like they're excited about something, does it mean that they're sad, but probably neutral, but I wasn't really paying attention. You asked good questions, so I had to sit down and think "oh!"

Did you pay attention to the speed of the text and how that changed?

Of course, because the speed meaning is it going "bee bee bee bee" like the first one, that's just too much.

Do you think the baseline label which is also reflected in the speed of the effect accurately represented your state?

So I'm not sure, I just noticed that there were moments where it dipped. A few times I looked over and it dipped for a split second.

Do you feel like you could express yourself through the effects?

Squishy one.

Do you feel like you could express your physiological state to the other person?

Squishy one, I could see that if, maybe you're angry you're like 'leave me alone!'

Is there any way you would have liked to change the text effects?

I might have wanted just a word to have the effect in the whole sentence, as opposed to like, when it's the whole sentence, that's again why, because the squishy one was like, not just squish, but there was also a little bit of bouncing to it, squish, so it was nice because it was not symmetric, like the whole line wasn't just going "shoop shoop" because of the difference in height, some letters were squishing faster, some slower, so there was that diversity I liked it. But in general, I would like it if I could just [highlight this phrase] and this one could just jump, as opposed to like the whole line. Because then how can the other person read it if the whole thing is like "wer wer."

Did you enjoy chatting with the text effects?

The first half I was paying attention to them, the second half little by little I was more focused on giving the answer. And I think again in the end because it's not too customizable you can not really target —like emojis— emojis you can just put that one right there right after that word, but if like emojis, you had to just send them on their own without the text, like you send the text and then you send the emoji, that would have been not as interesting—but the fact that you can embed it in a sense.

So in the second half where it was just you know I had to think hard you know to find the answers, I just stopped thinking about the effect. And I think the effects they were very subtle.

[Debrief]

What is the purpose of this [chart]? Because to me this part seems like something that you know the researcher wants to know what state you're in and which one of these effects you use. I just

was trying to be a good interviewee, so I just did whatever I felt like doing, as most interviewees would, but now that I think about it it's interesting that we, I could see this, and I wonder what the hope was that people would pay attention to it.

[While explaining relationship between speed of effect & state becomes clear that participant did not understand this]

But then I would need to see [this graph] still? Why do I need to see this? Like if you had told me that the effect of the animation depends on *your* emotional state, without this, then I would have only paid attention to this animation, or I might have been like, oh damnit, let's just not share, but I felt like this [graph] was also very small for me personally pay for me it was too small to pay attention to.

I wasn't sure like where's the baseline right now. Yeah. You know and the other part is that because it's here like I'm focusing here trying to write [and] thinking, it's really in the periphery like maybe if you do want people to pay attention to it, if it had been somewhere here [by the chat] it would have been easier for me...

So it's not just kinetic, it's getting your emotions too!

But the speed is defined by your emotions and you can see your...was this also part of it that you did not want to call this emotion, like you wanted to get technical explanation of what this is to see how people react to it?

A2

Demographics: Male, late twenties

Why did you change your effect?

I found [an effect] that represented me as how I see myself as a person. So I actually found that immediately and kept the same the whole time because it is actually reminiscent of how I often act in person which is kind of jumping up and down...like "that's so awesome, let's do this, that sounds great"

Why did you share your effect?

I like when people know what my emotions are. I think the society functions much better when people are open and honest. So since I tend to be hyper and hopefully happy and emotive I thought it would be useful to track it with the effect.

Did you notice the sharing settings of the experimenter?

I never saw [an effect] so I assumed that they weren't, unless there was a very subtle one, which is very possible. But it wasn't really looking for them.

Since I felt I was an interviewee I sort of expected more that I was the person who was going to emote in this case. In hindsight, yeah it would have been interesting if they had chosen to share the effect too, or if they did then wow I was really involved in the study [laughs]

Did you understand the meaning of the above and below baseline states? How did you interpret these?

I interpret it as, like, they seemed to change a lot when something was happening that was abnormal the baseline...I just assumed it meant that I was sweating more or less than usual which I can't really tell because I'm so sweaty in the first place. But I also thought part of it had to do with if I was caught off guard or if I was surprised or if I reacted to something in a way that I wasn't expecting to that it was going to cause presumably a spike.

Did you pay attention to the graph in terms of interpreting your effect throughout the chat? In terms of speed?

Not so much, I think because I was so strongly identifying with the effect that I was like, it had already become a part of me, so I was just like, I figured it was just going to do its thing.

Did you feel like your physiological state was represented to the other person in the chat through the effect?

I would like to hope so, that was my intent in choosing it. I know like in life I do sort of do the bouncy thing, I've had people tell me that it comes up, so my hope is yes, but I don't feel that I truly know.

...

[After asking again at end]

Maybe sort of, but maybe not necessarily because to begin with it connotes hyperness like no matter what. So I don't know that it with I don't know how easily I would be able to convey that or that that would convey what I was like more X emotion, but I think it would have at least shown it I guess at some baseline level like am I nervous or thoughtful or something.

Is there any way you would have liked to change the text effects?

Color would have been nice, but I don't have any rational reason for saying that.

Is there any other way you would have wanted to express your biofeedback data that was being gathered here?

If anything, because I tend to come off as quite a nervous person, I guess it would have been cool to like in advance, be like 'hey, I am nervous and often jittery,' like I guess hopefully you know the effect describes that, but since I don't exactly know how to interpret that, the person may have thought like 'oh he's really [?]

What do you mean when you say you don't know how to interpret the numbers?

I don't know the true magnitude of what filling up the whole screen with purple or pinks means as opposed to like half-way, I don't really know the magnitude of increase.

Do you trust this data as accurately representing your state?

Probably, I definitely like would try to think about random stressful or exciting things while I was waiting for stuff to see if that would affect what happened, and there were definitely changes. So like something was going on there, I have no way of knowing if it was accurate, but it at least seemed to change. And I also noticed a couple times, like when you came in the door it spiked immediately, because I'm like 'oh!' so a lot of the spikes seemed to occur at logical times.

Any questions for me?

Were you the experimenter?

Yes [Laughs]

...

[Explained study]

I definitely thought that because I identified really strongly with one [effect] from the outset that made me feel like it was more becoming a part of me. I feel like, if I didn't find one like that, I don't know if I would have had such a strong reaction to it...definitely having the choice was cool.

A3

Demographics: Male, early twenties

Did you enjoy the chat experience?

Yeah it was fine, I guess, I don't know like, I don't know how to describe it like it's just, just a chat, I guess.

Why didn't you change the effect throughout the chat?

To be honest I was more focused on the graph than the effect.

What did you focus on in the graph?

Just seeing if I could make it bigger and smaller. For a little bit there I was trying to game it to see if I could get it to be as small as possible [inaudible]

Do you feel like it represented your current state?

Yeah, for like a little bit. I found that like, I felt like it would be more representative of thoughts, but it seemed to be more representative of physical actions. Like I noticed that when I was typing it would go up by a lot, but if I was just thinking [it wouldn't].

Can you describe a particular time where you "gamed" it and what was going on?

I think that was one of the ones where you were asking a really deep question, so I could see, you would expect the graph to be really big or something like that, so I was thinking like, that actually got it to be small. So I was just thinking there. And it was very close to the baseline. So I found I could get it too the baseline, but when I was actually thinking and typing it would actually go up to where I expected it would be. So in that sense it was hard to lie to, if that makes any sense? So I could always, when I was like actually physically typing out the responses, I could get all the responses to go up, so it wasn't like I just made it up or anything.

Did you pay attention to the above or below baseline labels there?

No.

Did you pay attention to how the text speed was changing?

No, just the graph.

And did you notice anything about how the experimenter chose to share or not share effects?

What?

[Explains]

Oh, yeah, no.

Do you feel like the experimenter got a better sense of your physiological state through the effect?

Again, I was really fixated on the graph. Sorry.

Did you ever think about changing the text effect?

So one of the things I did do wasn't necessarily looking at the text effect, or changing the text effect, but I did like hover over a couple of the different answers that I had, and it seemed like they all animated the same. Like, I couldn't sense a deviation. So like, I couldn't tell the difference between my responses. They felt like they were the same speed.

...I guess that's the thing, I did look at the user responses, and it didn't look like they were any faster, so then I was just looking a lot at the graph.

If there any other way you would have wanted to change the effect?

I think that if this effect is showing some intensity level, I would have wanted it to be more indicative of that, so that it also doesn't affect readability or anything too, so having like color or something that's part of the conversation

Did you trust what you were seeing in the graph?

Yeah, I think so. Like I was saying before, when I was actually typing out responses it was very high up.

A4

Demographics: Female, mid-twenties

Did you enjoy that experience?

Yes, I did.

So did you change the effect style?

Actually I didn't. I thought about it but I was fine with the effect and I wanted to pay attention to the questions and not leave you hanging so I could mess around a bit.

Did you change the sharing settings at any point during the chat?

I didn't.

Did you think about it at any point?

No, because I thought that that would ruin the experiment, I thought the point was for you to see my effect. Maybe I misinterpreted it. But no I didn't manipulate the sharing.

Was it clear to you that you could uncheck the sharing box at any point?

Yeah it was clear, but I thought, I don't know I guess I thought that this experience was about sharing and didn't want to withhold.

Did you pay any attention to the graph of your data and what did you pay attention to?

I watched the baseline move up and down. I saw that it was mostly purple and I tried to think about whether these questions were stressing me out or trying to like match my emotions to what the data was telling me and I didn't feel like there were significant changes necessarily in how I was feeling even though it sometimes would rise and fall but I understand it's probably very sensitive and picks up maybe involuntary responses probably that I don't have a lot of control over.

Were there any particular points where you tried to watch for a certain response?

Yes, so I feel like the questions had two different tones, they were either about like nice things, what are the things I want to do on a Saturday or like what makes you feel happy and then the stressful ones, and I tried to watch to see if there's a difference in my responses between the positive and the negative. Um, but it seemed pretty consistent. Maybe I missed it, maybe there was a correlation that I'm not picking up on.

I didn't expect it to go below baseline at any point. Below what we had established as my relaxed state, so I mostly just watched the purple line rise and fall.

And it seemed to indicate that I was stressed. Maybe I am not interpreting this correctly but it felt like lots of purple [above baseline] meant that it was stressed, and maybe the environment being in a user test informs that a little bit, but.

Did you feel particularly stressed or calm at any point of the experience? So you said that the questions had those tones but do you feel like your emotional response matched the tone of that question?

I don't think so.

Did you pay attention to the speed of the effect over the course of the chat?

Mhm, it seemed pretty consistent. It started out a little bit faster and then I think it leveled out a little bit more.

Did you feel like you could express yourself during this chat?

Yes.

Did the effects help you express yourself?

No, I wouldn't say they helped me express myself.

Why not?

Well I only chose, I only kept the default stress. I didn't play with it, maybe I should have done that more. I did mouse over a bit and watch them again. The dynamic nature was cool, but I guess I read it more as a data [visualization] exercise rather than something that was supporting my response. Like it didn't feel, maybe because of the nature of the experiment and the environment, it didn't feel like something that was complementing my response as much as just a metric to take separately. I guess it felt very biofeedbacky in a way that wasn't necessarily linked to my expression.

Did you notice anything about the experimenter's sharing settings or think at all about that throughout the chat?

No I didn't. I moused over the experimenter's responses a little bit and I didn't get anything so I felt like it was a little one-sided.

Did that affect whether you whether you wanted to share your effect or not?

I think it contributed to...no, I guess, I never, I didn't really consider changing the effect I guess I thought about it for a split second in the beginning, and then I thought, no I'm just going to focus on the questions and watch my [biofeedback].

Is there anything you would have wanted to change about the text effects?

No, I think it was pretty effective.

Do you feel like an experimenter got a better sense of your physiological state through the effects you sent with your messages?

Yeah, because I just that there was a progression. It started a little faster and then got calmer, maybe.

A5

Demographics: Female, late twenties

What are your just general impressions of the chat experience? Did you enjoy it?

Um, the feedback, I kept looking at the feedback to see if it was going to change, but it didn't change much, so yeah, I guess I was expecting it to dip or do something like fun, or more interesting.

Did you change your effect at all during chat? Why?

No. I would say because I didn't see the point in it I guess, to change it. It seemed kind of annoying. I was more interested in the actual biofeedback, like the actual data.

Where did you look to find out about that data on the screen?

Just the bottom left corner, the chart.

Did you pay attention to the above/below baseline labels at all? Was that helpful?

No I didn't.

Did you share the effect for the entire chat?

Oh yeah I forgot about that so I shared the entire time. [Laughs]

If you had remembered, do you think you would have changed that?

I probably would have taken it off because when my mouse hovered over the area it would shake. I just think it's annoying. I really do, even though I forgot about it. I forgot I could take it off I mean.

Do you feel like what you were seeing in the graph matched what you were feeling throughout the chat?

Not really, but it's probably because none of the questions went into enough depth, or none of my responses, so I imagine maybe there would have been more variability had I maybe explained certain things more, or kept talking about it/

Where there any particular questions where you felt your state changing as you answered them?

I don't feel like...probably the violence one, there was one about violence, in one of my

response. So like if that topic would have gone deeper than maybe it would have changed, but the other ones were pretty simple, not like, I'm not moved. I wasn't moved by any of them particularly, just because it's stuff that I am like, thinking about the stuff I answered, there's just stuff that just like, a part of everyday life anyway I guess, if that makes sense, so like—my favorite TV show is Seinfeld but I wouldn't like expect that to change my emotion, you know unless I'm actually watching the show.

Do you feel like the effects helped you express yourself?

No.

Why not?

I tried to ignore them as much as possible. I don't like looking at it.

Do you feel like you were expressing your physiological state through the effect?

No. It just looks like annoying text. I wouldn't want to see that, I would rather share like my actual biofeedback. The actual graph I feel like is more interesting, to me, because you get straight to the point if they see that, vs. the text. Just because I think there's so many instances in which text is animated anyway that it just doesn't have value, it doesn't have meaning. I just see shaky text, as like an animation, but it's hard to connect the fact that it's supposed to be related to biofeedback, and it's probably because I don't think I provided much feedback anyway.

A bigger graph so that you can't see those minor dips, because it was right at the top, you could barely see it, so if it were bigger then it's like oh, something's actually happening.

A6

Demographics: Female, late twenties

General takeaways/thoughts from the chat?

I thought the questions were interesting and I tried my best to answer them honestly.

Did you change the effect throughout the chat? Why?

I remember you showed me that I could do it and I wanted to see if there was a difference. At first it was going sideways, and then I wanted it to go up and down just to, I don't know what, I just wanted it to. I thought it visually, it looked better to me if it went up and down.

Did you choose to share your effect throughout the whole chat?

I did. I didn't really think about it. I didn't mind sharing it, so I just chose to keep it shared.

Did you feel like you were sharing your physiological state, that that was being shared with the other person?

No I didn't think about it like that. I think I thought I was sharing my answers and that was, I was ok with that part of it.

Did you understand the meaning of above baseline and below baseline part? How did you interpret this throughout the chat?

Yeah. I remembered what you had said a little bit, but I thought that the way that it was moving it wasn't moving that fast, so I didn't think it was above the baseline, but afterwards when you explained it I now know that it was above the baseline. But I don't know what that means about my physiological feedback.

Were you paying attention to how your values changed throughout the chat?

They stayed pretty consistent on the graph, and I was looking at them and it was mostly pink for all of it, so I guess that did mean it was above.

Were there any particular questions where you paid particular attention to the graph or tried to change your state looking at that?

Yeah but that was not because of the question, but because my mouse was hopping from one part of the right side of the chat and then that answer started moving and I realized that oh wait I forgot to pay attention to it. And so then I scrolled through all of them and I started noticing how it

was going?

I think it took me a little while to figure out what was going on, and then as I kept answering the questions I got more accustomed to what was going on.

Is there any other way you would have wanted to change the text effects?

No, I liked all the options that were given to me and I felt like I had enough choices to make.

And do you feel like you could express yourself through those effects?

Maybe I would have liked color, or maybe a different kind of interaction that wasn't just motion from one side to the other or in different directions, but I'm not sure.