Appendix A - Project Brief

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy". Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Eichenlaub
initials: J.A. given name: John
student number: -------
street & no.:
zipcode & city:
country:
phone:
email:

Your master programme (only select the options that apply to you):

IDE master(s): (★) IPD ( ) DfI ( ) SPD

2nd non-IDE master:

individual programme: - - (give date of approval)

honours programme: ( ) Honours Programme Master

specialisation / annotation: ( ) Medisign ( ) Tech. in Sustainable Design ( ) Entrepeneurship

SUPERVISORY TEAM **

Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Dr. Haian Xue dept. / section: HCD/Design Aesthetics

** mentor: Dr. Gijs Huisman dept. / section: HCD/HICD

2nd mentor:

organisation:

city: country:

comments (optional)

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

Sensory Appreciation to Enable Conscious Emotional Self-Regulation — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 15 - 02 - 2022 27 - 07 - 2022 end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

One of the most dominant trends of 2017 was the "fidget spinner", a 3-lobed plastic toy (see figure 1) that spun on ball bearings. Instantly popular amongst kids and students, the device was purported to help with concentration, among other benefits. It became explosively popular, spawning and popularizing an industry of related products and creations (again, see figure 1). Scientific research reaches conflicting conclusions as to the efficacy of these devices for emotional regulation, attention, and fine motor control. Some studies report attention increases in user with ADHD, while many report no or adverse effects on learning and memory. See Schecter (2017) for a review and Mennilo (2015), Cohen et al. (2018), and Soares and Storm (2020) for more specific efficacy studies. Quickly fidget spinners were banned in classrooms for the nuisance and health hazards they created, yet some related holdouts remain popular.

Obviously, the aim is not to make a repeat of this device for all its failings. But its existence and the enduring trend of "fidget objects" speaks to an underlying need and desire of a large target group: persistent tactile interaction that helps self-regulate behavior (or at least is perceived to help). This trend is further strengthened by the ongoing coronavirus pandemic and the related lifestyle changes unexpectedly forced upon us. People are inarguably more stressed and anxious than before, and frequently find themselves left alone to deal with those emotions. A tool that allows for independent emotional self-regulation is thus much more immediately relevant than in the near past. The main stakeholders in this project are thus the target "users," which is any person that desires assistance in emotional and behavioral self-regulation. This project fits within the research scope of the Delft Institute of Positive Design, specifically the 5-year VICI grant project on "Mood Regulation by Design" that runs through October 2022.

This project will extend from a relatively contemporary philosophy called "somaesthetics," which was developed in the mid-1990s by Richard Shusterman. Somaesthetics rejects mind/body dualism and instead considers one united whole in that experience and emotion are inseparable from our bodily experience. In his 2020 paper "Somaesthetics in Context", Shusterman "outlines the roots of somaesthetics in pragmatist philosophy and the philosophical idea of the holistic art of living." As stated in the same paper, somaesthetic application has the further goal to explore "not merely what the body is but also what it could be through disciplined cultivation." Somaesthetics has already been introduced into the design space, primarily in the HCI field by researchers such as Kristina Höök. She views the primary purpose of somaesthetic design as "making people more aware of their felt bodily experiences" Höök (2015). I consider this aim a necessary precondition to leveraging sensory appreciation to enable conscious emotional self-regulation. Additionally, this increased focus of one's lived experience would help people to be more emotionally present in good and bad experiences, a subgoal of this project.

The technology to support nuanced tactile interaction is highly advanced thanks to smartphones and vibration-feedback interfaces we use regularly. Subject matter research is also very detailed. Expected barriers to project success and adoption are more in behavioral and social norms in the same way that meditation or attending therapy experiences pervasive resistance. The project aims to reduce the time effort required to emotionally self-regulate over existing practices, as that is often a barrier for young people.

As a cultural movement, the younger generations are increasingly focusing on "experiences" over "possessions," and attempting to secure meaningful life experiences in the face of increasing instability. As such, meditation, yoga, and other activities that support being emotionally present are popular. It is time a product was introduced that could achieve similar effects in a robust way and meet this growing cultural need of holistic, present, experiential wellbeing.

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introduction (continued): space for images

Examples of "Fidget Toys" Current For Sale

image / figure 1: Composite image of the many available fidget devices, each of variable efficacy and purpose

Sources:

Cohen, E.J., Bravi, R. & Minciacchi, D. The effect of fidget spinners on fine motor control. Sci Rep 8, 3144 (2018). https://doi.org/10.1038/s41598-018-21529-0

Höök, K., Ståhl, A., Jonsson, M., Mercurio, J., Karlsson, A., & Johnson, E. C. B. (2015). Somaesthetic design. Interactions, 22(4), 26–33. https://doi.org/10.1145/2770888

Mennillo M. Stop touching things! The role of fidget toys. (23 March 2015). http://occupationaltherapychildren.com.au/stop-touching-things-the-role-offidget-toys/.

Schecter, Rachel A.a; Shah, Jayb; Fruitman, Katec; Milanaik, Ruth Lynnc Fidget spinners: Purported benefits, adverse effects and accepted alternatives, Current Opinion in Pediatrics: October 2017 - Volume 29 - Issue 5 - p 616-618 doi: 10.1097/MOP.0000000000000523

Shusterman, R. (2020). Somaesthetics in context. Kinesiology Review, 9, 245-253. doi:10.1123/kr.2020-0019

Soares, JS, Storm, BC. Putting a negative spin on it: Using a fidget spinner can impair memory for a video lecture. Appl Cognit Psychol. 2020; 34: 277– 284. https://doi.org/10.1002/acp.3610

image / figure 2: Sources

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

The following are structured themes and research questions that define the project scope:
Theme 1: Principles of Emotional Regulation
RQ1.1 - What (tactile) sensory interactions contribute to effective emotion and mood regulation, especially of "undesirable" emotional states?
RQ1.2 - Can tactile interaction contribute to deeper perceptual awareness of one's own body and bodily experience?

Theme 2: "Art of Living" and Somatic Consciousness
RQ2 – In what ways could deeper perceptual awareness (mindfulness) and connoisseurship of the lived mind-body experience benefit people's emotion and mood regulation?

This project seeks to combine traditional research methods with a relatively new field in somaesthetics. Somaesthetics frequently asks for the centering of the lived experience of the designer, contrary to much existing design methodology. This theoretical support for the project is very important to defining the process and scope of my work.

This project ideally produces a solution that enables people outside of the designer themselves to better emotionally self-regulate through an engagement with the full depth and breadth of their experience. Quickly stated: mood regulation by technology-supported somatic mindful practice. In this "experience" is not only emotion and mood, but the physical presence and sensation of one's body in the world. Theme 1 contains the primary research aims for the project. Were those questions to be sufficiently answered, the project could be considered a success. Any further knowledge generated over the second theme would serve to advance somaesthetic design principles as a functional and useful basis for product design.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I will deliver a functional prototype of a product/product-service combination that enables conscious emotional self-regulation through the appreciation of sensory experiences, specifically touching/tactile interaction. This design also should encourage living according to "somaesthetic" principles and promote heightened engagement with our everyday experience.

The end deliverable for this project is intentionally vague as it should be driven by the insights of detailed literature review and target group interviews and analysis (a.k.a. the design process). That being said, it's important to me that the project is NOT purely speculative, a museum "installation," or primarily AR/VR based. We are approaching this subject through the lens of somaesthetics and embodied cognition/interaction, and as such it should be grounded in the physical world and readily accessible. "The metaverse" is a hot-button topic and I wish to avoid all the controversy and strong opinion involved with that, thus the aversion to AR/VR implementations. Further, exploring touch is potentially harder in a digital space.

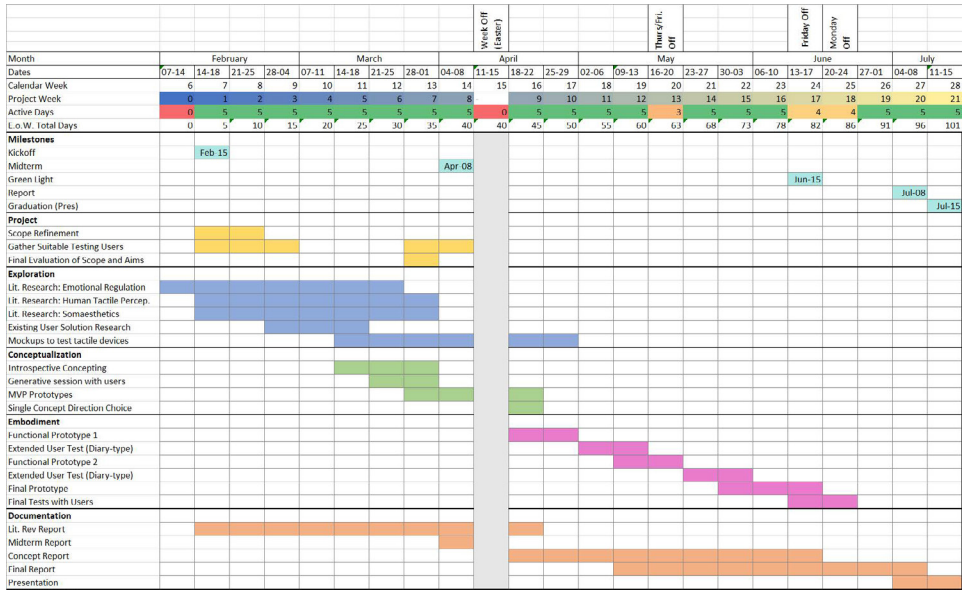
I am targeting a product that can be used by a single individual independently. However, if the process determines a social product is more suitable, we will pivot that direction. I am also targeting younger adults around age 18 to 40, especially those interested in "fulfilling experiences" or those that experience pervasive work and school related stress and anxiety. It is my preliminary belief that these groups will be most invested in this type of product and purpose.

It is also important that the "final prototype" is functional and achieves the set objectives. This may seem obvious, but often student projects fall short of a complete functional prototype for time or energy constraints, and this does not fit with the vision for this project. One final goal is that the project could, with a little additional work, result in a publishable case study of "soma design" in action.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 15 - 2 - 2022 27 - 7 - 2022 end date



A few notes are necessary to fully explain the planned schedule:

First, this schedule is subject to change as it suits the evolving project. I have scheduled in multiple opportunities for longitudinal user feedback as I expect a product in this space can only be validated through intensive user testing (if we choose to base the product on external user feedback). Another option is to make the project significantly more "designer centric," and at that point the testing moments would be shortened and I would test with myself frequently.

Literature review and research are likely persistent and ongoing throughout the course of the project. However, at the start they will be the majority of my work and progressively tail off.

The project is structured in 3 successive stages: exploration, conceptualization, and embodiment. This is loosely based on the double-diamond model, with recognition that design should be iterative and incorporate the freedom to reconsider past decisions. We also incorporate plenty of time for the necessary deliverables.

This project has the potential to be highly technical (or technology-enabled), so that exploration and decision making will come before at at the midterm meeting. Overarchingly, I am proposing side-by side exploration of overall concepts directions with specific tactile devices, their produced sensations, and emotional responses.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

Competencies:
This project is structured to round out my design competencies from my time at TU Delft. Most items have been learned by this time, and I wish to prove them in practice.

My elective coursework gave me opportunity to explore designer-centered and emotion-centered design methods which I found incredibly useful and appealing as an approach. I wish to prove those out in this project, especially as it relates to using abstract traits like emotion and "experience" to drive product requirements and development.

The ACD and AED projects helped me to structure my own time and plan necessary project steps, but each still had many benchmarks and checkpoints. This project will challenge me to actualize my own time management and planning skills. Those skills are to be "proven," but perhaps one that needs learned is intrinsic self-motivation without immediate deadlines or external motivation. Conducting work in the coronavirus era seems to be significantly more difficult for me, and I will be challenged to maintain my own motivation throughout the project.

The last skill to prove is as it relates to creative ideation and visualization of those ideas. Coming from an engineering background, ideation existed within predetermined constraints. Further, most ideas could be written and understood, or made in CAD. I have learned how to better communicate unfettered ideas through words, visual drawings, mockups, and more, and look to this project as an opportunity to show those skills in action.

Ambitions:
I simultaneous wish to have expert knowledge on topics that interest me, but never want to be pinned into a specific niche and to maintain my identity as an educated generalist. Thus, the first ambition I have is to dive deep into human tactual perception and understand how humans process touch as a sense and how we can be influenced by it. This includes literature on neuroscience but also on applied HCI work in modern smartphone tactile interfaces and the like.

The second ambition is to obtain a broad knowledge in many fields such as philosophy, anthropology, design, cognitive science, and programming. I believe all of these are necessary to create a well-rounded designer capable of leading innovation in a competitive business environment.

The third ambition is to develop products not specifically for commercial gain or to contribute to consumerist culture, but rather to create to improve human living. I recognize that there is no firm line between these product types, but it is a moral aim of mine all the same. Specifically, I would like to address the global south at some point, but not in this graduation project.

The fourth (and final) ambition is to return to one of my core skills of manufacturing and prototyping with this project. Due to our turbulent last few years, I have not had good opportunity to make use of the prototyping facilities at TU Delft, despite that being one of my deepest interests and favorite parts of the design process. I hope to showcase my abilities in this arena while also producing a very high-quality final prototype for the project.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

Thank you all! I'm excited for this opportunity.

I have appended a list of sources as the second image

Appendix B - Somaesthetics

Origins of Somaesthetics

Somaesthetics is largely the creation of an American pragmatist philosopher named Richard Shusterman, who proposed the discipline just before the turn of the 21st century. As philosophy, the direct links to design and HCI are tenuous, yet many in the field have found value integrating a somaesthetic-centered approach in both design process and product. A philosophy that centers the lived body's experience in the world, somaesthetics has immediate relevance for this graduation project that focuses so closely our sensorial perception and understanding of felt emotion.

Somaesthetics contains many interrelated foci, so to define it simply requires more than a few simple words. Somaesthetics is at once a physical, cognitive, and metaphysical position and asks for our awareness of this very fact. To enact a "somaesthetic perspective" is to pay attention to one's own body and how it filters our lived experiences each day. As Shusterman offers:

> *Somaesthetics can be provisionally defined as the critical, meliorative study of the experience and use of one's body (soma) as a locus of sensory-aesthetic appreciation (aesthesis) and creative self-fashioning. It is therefore also devoted to the knowledge, discourses, practices, and bodily disciplines that structure such somatic care or can improve it. If we put aside traditional philosophical prejudice against the body and instead simply recall philosophy's central aims of knowledge, self-knowledge, right action, and its quest for the good life, then the philosophical value of somaesthetics should become clear in several ways. (Shusterman, 1999, p. 302)*

Not so simple, right? Somaesthetics is functionally proposing a "connoisseurship/cultivation of the body," whereby one can enhance their own living in the

world. Primarily derived from ideas of "mind-body" unity (as opposed to dualism), somaesthetics gives agency to every individual to leverage their own corporeal awareness to live life to the fullest experiential extent. The body thus is considered not only as a valuable aesthetic object in and of itself, but also as the critical filter or medium through which we interact with all other aesthetic (and non-aesthetic) objects in the world.

Shusterman supports his disciplinary proposal through a reframing of prior accepted philosophical work from thinkers such as William James, John Dewey, and Michel Foucault. Without labelling their work as "somaesthetics," these philosophers nonetheless advocated for the acceptance of "body-mind" unity and divergent practices for reclaiming autonomy and extending "aesthetic practices."

In keeping with developments in the field and related pursuits, Shusterman has refined the definition of somaesthetics many times over, giving the following scoping in a recent paper concerning the context of use of somaesthetics:

> *Concerned with both "knowing that" and "knowing how," somaesthetics aims to improve the meaning, understanding, efficacy, and beauty of our movements and of the environments to which our actions contribute and from which they also derive their energies and significance. (Shusterman, 2020, p. 245)*

Within these two given (non-mutually exclusive) definitions, Shusterman considers somaesthetics to exist in three branches. These branches help to reveal the impact potential of somaesthetic thought in designing a fidgeting object to enable emotional self-regulation.

Branches of Somaesthetics

The definition of the three branches of somaesthetics is again taken from Shusterman's 1999 work Somaesthetics: A Disciplinary Proposal. Here it is simplified to reveal the most relevant aspects for my own work, as this project does not seek to be a philosophical oeuvre.

i. Analytic Somaesthetics

Perhaps least relevant for this project, analytic somaesthetics pursues the definition of somaesthetics itself, and describes the theoretical nature of the philoso-

phy. It addresses epistemological and ontological issues concerning our bodies, such as how we can perceive it and what role it has in our understanding of "reality." This can also extend to sociopolitical influences on our understanding of self. Regardless, this graduation project is not involved in this dimension of somaesthetics.

ii. Pragmatic Somaesthetics

Instead of pure theory, pragmatic somaesthetics puts forward methods and practices of somatic improvement to compare and critique their relative value. This concerns such practices as yoga, dance psychosomatic therapies, dieting, etc. These methods and practices can be categorized into representational, experiential, and performative forms. Representational practices focus on the body's visible, external appearance while experiential practices center the "inner" experience. As Shusterman (Shusterman, 1999) highlights, "experiential methods aim to make us "feel better" in both senses of this ambiguous phrase...to make the quality of our experience more satisfyingly rich, but also to make our awareness of somatic experience more acute and perceptive." This domain, experiential pragmatic somaesthetics, is the key focal point in my design work.

iii. Practical Somaesthetics

As the name suggests, practical somaesthetics concerns the actual practice of somatic care through intentional body work directed at somatic self-improvement (in any of the 3 forms of practice, representational, experiential, or performative). This dimension of somaesthetics is inarguably necessary to complete immersion into the philosophy, and theory without action does not uphold the underlying principles. Practical somaesthetics can be seen as the practice of the methods debated and created in pragmatic somaesthetics.

To wrap up the discussion of somaesthetics as a philosophical underpinning of this project, I next share its potential impact and ways in which it has already been embraced by the design and HCI communities.

Impact and Potential of Somaesthetics

Not every person is able to be a philosopher, chiefly for lack of time, motivation, prior knowledge, or any further reason. The effort required to fully understand the theoretical basis of somaesthetics could be frankly counterproductive to the aims of its practice. As such, this design project seeks to embody experiential

pragmatic somaesthetics (methods for making us "feel better" in our inner experience) and make it accessible to a much wider audience. Somaesthetic practice is embodied in an object for fidgeting, enabling, and encouraging savoring and positive living through its use.

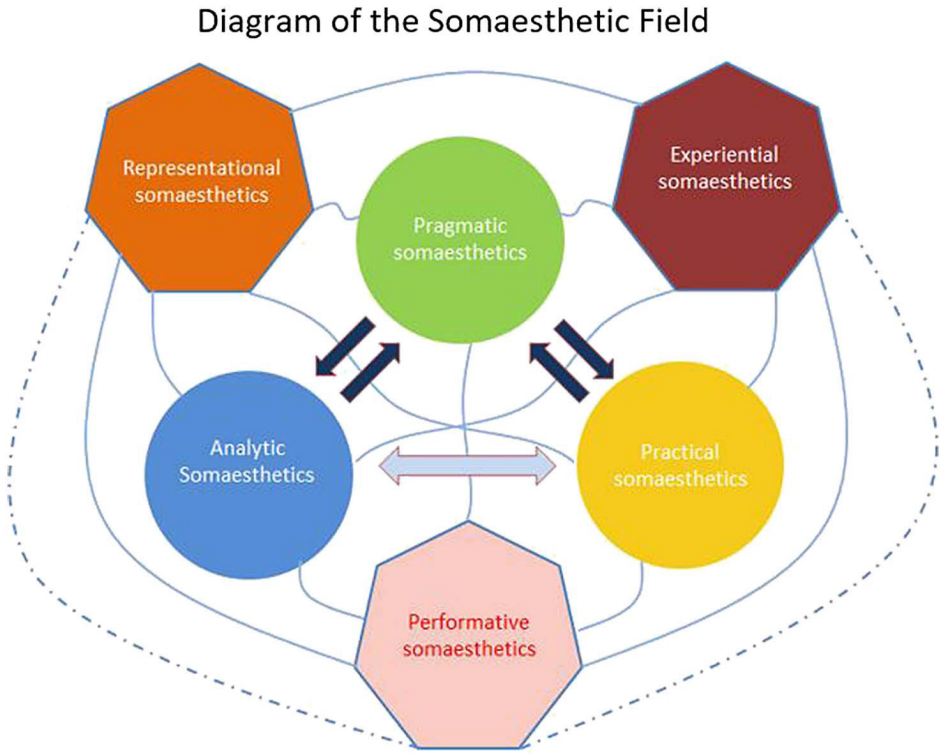


Figure 59. Diagrammatic Relationship of the Branches of Somaesthetics. Reprinted from "Fits of Fashion: The Somaesthetics of Style," by R. Shusterman. In Philosophical Perspectives on Fashion (pp. 91–106). M. Stefano and G. Matteucci (Eds.), 2017, London: Bloomsbury

It is fair to say many products and projects have this overarching goal, even if they do not define themselves using this framework. Even further, some design researchers have already embraced somaesthetics in their investigations. Chief among them is Kristina Höök, a researcher at KTH in Stockholm, who proposes a strong concept called "Somaesthetic Appreciation Design." This and other design-centered approaches to somaesthetic principles are detailed in the following sections.

Somaesthetic Appreciation Design

Authors Höök, Jonsson, Ståhl, and Mercurio have adapted somaesthetics to fit the interaction design context in their (Höök et al., 2016) CHI conference paper, Somaesthetic Appreciation Design. This application also falls under the umbrella of a "strong concept," a theoretical construct discussed earlier in this chapter. As a strong concept, Somaesthetic Appreciation is a loose framework of attributes and goals that a design exemplar can embody to promote somaesthetic living and wellbeing. A strong concept is generative, otherwise stated as useful in creating alternative instances to answer a design challenge. The research, conducted as a Research-through-Design process, outlines this framework as adapted below.

Somaesthetic Appreciation design upholds four main attributes that describe the interactive experience one could have with an example implementation.

i. Subtle Guidance – directing attention inwards
As the name suggests, any "feedback" systems or guidance in place in the interaction must be subtle and focus one's attention inward to their own somatic self. Subtlety here describes stimuli that are not distracting or perceived as "other" or external, and quietly meld with one's own body. Subtle guidance is necessary to engage both change and interest, concepts originally from William James and repurposed by Shusterman (James, 1905). Change¬ references a shift in attentional focus between different distinct parts of the body, where interest describes ongoing attention towards a specific focus part of the body. Thus, "subtle guidance should be understood as mechanisms that both provides a changing stimuli (sic) that helps the shifting of attention between areas or functions of the body as well as providing support for attention to linger and stay focused in one movement or area, keeping the mind from wandering." (Höök et al., 2016)

ii. Making Space – temporal, interactive, and spatial places for reflection

Understood both as a literal, physical space and an emotional "safe space," space is needed where one can block external stimuli and focus on the desired somaesthetic interaction. Within this physical space, one is also required to "make space" in their life by slowing down the pace and disrupting the everyday, habitual routines. While this quality of Somaesthetic Appreciation is not precisely defined, such loose bounds give the freedom to make a situationally appropriate interaction and setting.

iii. Intimate Correspondence – feedback and interactions that follow the rhythm of the body

Feedback loops are critical in somaesthetic appreciation, whether they are generated purely through self-examination or supported by external designs. Elements such as biofeedback can enhance awareness through mirroring or amplifying felt bodily experience. Höök et al. highlight the critical elements of immediacy, synchronization within a correspondence relationship in the delivered feedback. They also argue for an "implicit" correspondence interaction; one does not engage in an explicit, active dialogue with the system but rather interacts in a subtle, implicit, almost unconscious way. The provided feedback should also be carefully mapped and match with its source, avoiding any contrasting forms of expression that detract from the information to be communicated. This also relates to the fourth attribute of Somaesthetic Appreciation.

iv. Articulating Experience – providing means to articulate the experienced bodily sensations

For both in-the-moment and reflective activities, a Somaesthetic Appreciation design will allow for articulation and externalization of one's experience. This could be through visualization (drawing), verbalization, physical action, or other medium. Without diving too deeply into the subject, we can acknowledge that expression, language, and perception are inextricably linked. To remove any of those 3 elements would hinder evaluation and sharing of one's lived experience. Further, a design could encourage user to actively reflect on emotional and experiential qualities and externalize them for better recognition and awareness.

It is important to briefly mention the overlap between this and other strong concepts, namely Affective Loops. Where affective loops are emotion (affect) modification loops that are intentionally promoted by the system, Somaesthetic Appreciation activates only an implicit, intimate correspondence. Its purpose is not to actively persuade. However, the difference between these concepts and others such as Biofeedback Loops is slight, and they could all be considered within one overarching family. Thus, exemplar design objects can fulfill one or more of these "concepts" at the same time.

In accordance with the Somaesthetic Appreciation framework, the authors drew a few actionable conclusions for future designs. Chiefly, they note that attracting

attention, “guiding without demanding” is necessary and that sound and visualizations are often too distracting. In fact, heat was found to be evocative and useful in a way other tactile feedback (like vibration) was not (Höök et al., 2016). Following the outlined principles of Somaesthetic Appreciation design can help this project to align with an existing body of work and have a clearly defined impact on a user. There are, however, other design theories in this space to consider, such as Schiphorst’s Somaesthetic Design Framework.

Somaesthetic (Touch) Design Framework

An early foray into somaesthetic influences of touch in interaction design is courtesy of Thecla Schiphorst, a design researcher and interactive artist. Through the design of an interactive and tangible soft object art installation, Schiphorst presents a general framework of the ways in which somaesthetics can be applied to tactile interaction (Schiphorst, 2009). Schiphorst also links tactile experience in a somaesthetic framework to the concept of active touch from 20th century philosopher J.J. Gibson. Active touch specified a type of touch that is not passive, i.e. being done to an observer, but is rather active engagement from a participant (who is also an observer). As such, active touch is both objective and subjective, and concerns “the detection of the impression made on a perceiver while he is primarily engaged in detecting the world” (Gibson, 1962). Otherwise stated, active touch is bidirectional interaction that combines the active, information-seeking touching and the passive, affective being touched. This distinction, drawn in the early days of haptics (or even “feedback” as a concept), helps to construct Schiphorst’s framework.
The framework specifies four themes: experience, poetics, materiality, and semantics of interaction/caress.

1) Experience - Our experience of our own bodies can not be disassociated for our “meaning of self,” as experience is sensory, aesthetic, and emotional all at once. Embodied interaction is a necessary lens through which to create interactions.
2) Poetics – Acknowledges that meaning is subjective and multi-leveled; it is created through our experience and interaction with the environment. Somaesthetic design is to allow for open interpretation of an interaction, imagination, many meanings, and playfulness.
3) Materiality – physical form should be constructed to enhance sensory (touch) experience. Embodiment form will always be important to an interaction. Schiphorst specifically investigates soft and conductive textiles. Material exploration is

to be integrated throughout the prototyping process.
4) Semantics of Caress – how the meaning of touch can be applied and understood in tactile interaction. Seek to gather data and interpret it to engage the participant and provide feedback. Consider the qualities and details of (touch) interaction as meaningful and significant.

The framework provided by Schiphorst is even more abstract than that of Höök et al. However, this one specifically deals with touch and some of the higher-order needs when designing for somaesthetic tactile experiences. Given their slightly different positions, both frameworks can be accounted for in the design and development of a fidget object for emotional self-regulation.

Somadata

For a more actionable construct in this design project, Alfaras et al. propose requirements for transforming sensed biodata (heart rate, skin conductance, etc.) into “somadata,” or data that can be readily used in a somaesthetic-oriented context. The key argument of the paper is that translating biodata into a felt experience helped to generate novel interactions during design exercises (Alfaras et al., 2020). While this research might be creating a new term for something that is already accounted for and defined within interaction design, it is still useful for this project to keep these principles in mind.

The authors propose three key points: 1) somadata enables a felt and lived somatic experience of our own biodata. 2) the manifestation of somadata enables collaborative and shared experiences within a design team or user group (leading to collective meaning and new ideas. 3) somadata does not constrain exploration.

Somadata offers a unique experience whereby an observer can potentially have a first- or second-person perspective on another’s body (knowing another’s experience through mirroring it in your own body). In most other contexts, we can only adopt a detached third-person perspective when understanding another’s experience. Thus, “making biodata available as a design material goes beyond a single first-person somatic experience towards shared first-person experiences” (Alfaras et al., 2020). This “sociodigital material” can go far in enabling implicit interactions that leverage our somatic sensory abilities for information communication and experience modification.

Somaesthetics Conclusions

The body of research conducted in somaesthetics revealed layers and levels of nuance that can exist within interaction design. While the final prototype and design concept do not explicitly leverage all somaesthetic design principles, one can clearly see how the design was influenced by somaesthetic thought. As such, these research outcomes are included in this appendix and not simply removed entirely. The key takeaways for somaesthetic topics were as follows:

Somaesthetics:

- Somaesthetics is a philosophy that champions an active, personal awareness of our body and its experience in the world in order to access a finer granularity of sensory-aesthetic appreciation and a connoisseurship of lived experience.
- As applied to design, somaesthetics is a process and desired outcome of product embodiment.
- Somaesthetics has three branches: analytic, pragmatic, and practical. This project leverages the latter two and seeks to lower the “barrier to adoption” of these practices.

Somaesthetic Appreciation Design

- Formulated as a strong concept, SAD is a groups of design goals and attributes that can be followed to produce interactions that promote somaesthetic living and wellbeing
- The framework has 4 parts: Subtle Guidance (inwards), Making Space (physical and metaphorical), Intimate Correspondence (feedback), and Articulating Experience (of the body).
- Differs from Affective Loops in that implicit, intimate interaction is desired, no active reinforcement effects that are perceptible

Somaesthetic (Touch) Design Framework

- Somaesthetic touch interaction are to uphold 4 main themes: experience, poetics, materiality, and semantics of caress.
- A somaesthetic touch interaction should always allow for multi-levelled subjective meaning, interpretation, and communication. The details of its physical construction can also carry significance.

Somadata:

- Somadata is a framing of biosensor data that can enable the sharing of first-person perspectives on lived experience and allows for a common dialogue.

Appendix C - Fidgeting Experience Sampling 1

ESM Report Form - Fidgeting and Distraction

Hello all! This form is to be used to log events of fidgeting and distraction: what happened as well as what precipitated and followed that event.

Please use this form as soon after the event as possible so that the memories, feelings, and physical actions are fresh in your minds.

You are also welcome to record distraction events in a physical journal or other method, as long as the majority of these questions are answered. I have sent these questions in an email as well.

* Required

1. Who is filling out this form? *

Mark only one oval.

- ◯ Gijs
- ◯ Haian
- ◯ Jack
- ◯ Other?

2. Was this event a fidgeting action, becoming distracted from a task, or both? *

By "fidgeting action" we mean physically interacting with an object. It is not required that such interaction distracts from a task one is doing, but it could.

Mark only one oval.

- ◯ Fidgeting Action *Skip to question 3*
- ◯ Distraction Moment *Skip to question 10*
- ◯ Both

Fidgeting Experience

The questions specifically address the feelings and actions one experiences while fidgeting. This section applies most for a fidgeting action that did not distract from one's goal task.

3. What was the MAIN (focus) task you were doing? *

4. What prompted or brought about the fidgeting action? *

5. How was the fidgeting physically manifested? What did you do to fidget? *

6. How did you recenter and refocus on the task at hand (if required)? *

7. Consider how you experienced this fidgeting action "in the moment." Rate how appropriate the following statements feel: *

Mark only one oval per row.

	1 (Not at all)	2	3	4 (Neutral)	5
How well were you concentrating?					
Was it hard to concentrate					
Did you feel good about yourself?					
Were you in control of your situation?					

8. Please upload a picture or video that helps to describe your fidgeting (only if useful)

   Files submitted:

Emotions and Mood

Emotions: Positive and Negative Typology

9. Was your emotional state affected as a result of this fidgeting action? Share using emotions from the above "typology of emotion".

_____

Skip to question 24

Distraction Event

This section is for an instance where you recognize a distraction from your task at hand, but the distraction does not specifically involve in fidgeting actions.

10. What was the MAIN (focus) task you were doing? *

_____

11. What prompted or brought about your distraction? *

_____

_____

_____

_____

_____

12. Did you find your focus task to be too simple (boring), or too challenging, or neither? *

Mark only one oval.

- ◯ Too Simple
- ◯ Too Challenging
- ◯ Neither

13. How did you recenter and refocus on the task at hand? *

_____

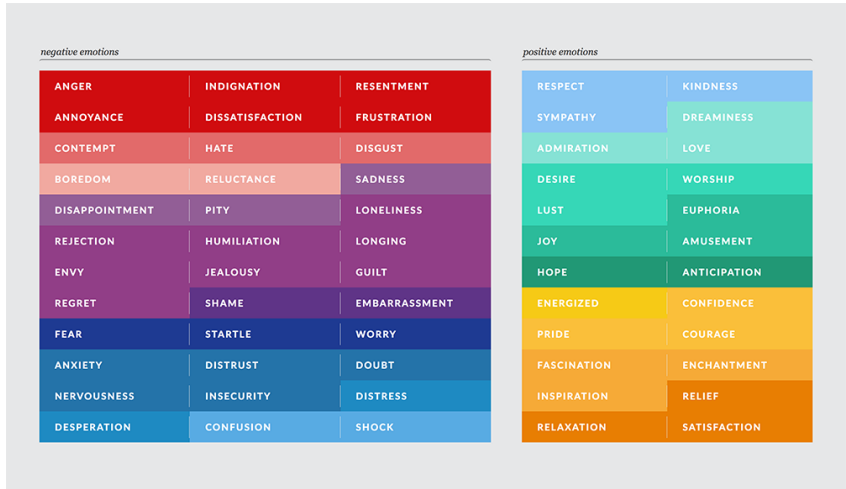
14. Consider how you experienced this distraction "in the moment." Rate how appropriate the following statements feel: *

Mark only one oval per row.

	1 (Not at all)	2	3	4 (Neutral)	5
How well were you concentrating?					
Was it hard to concentrate					
Did you feel good about yourself?					
Were you in control of your situation?					

Emotions and Mood

Emotions: Positive and Negative Typology



15. Was your emotional state affected as a result of this distraction? Share using emotions from the above "typology of emotion".

Skip to question 24

Combined Fidgeting and Distraction

This section applies when one's fidgeting actions become a significant distraction from the task one is trying to work on/accomplish. The subject is thus cognitively distracted from their task and physically engaged with some object or device.

16. What was the MAIN (focus) task you were doing? *

17. What prompted or brought about your fidgeting and distraction? *

18. How was the fidgeting physically manifested? What did you do to fidget? *

19. Did you find your focus task to be too simple (boring), or too challenging, or neither? *

Mark only one oval.

- ◯ Too Simple
- ◯ Too Challenging
- ◯ Neither

20. How did you recenter and refocus on the task at hand? *

_____

21. Consider how you experienced this distraction "in the moment." Rate how appropriate the following statements feel: *

Mark only one oval per row.

	1 (Not at all)	2	3	4 (Neutral)	5
How well were you concentrating?	◯	◯	◯	◯	◯
Was it hard to concentrate	◯	◯	◯	◯	◯
Did you feel good about yourself?	◯	◯	◯	◯	◯
Were you in control of your situation?	◯	◯	◯	◯	◯

22. Please upload a picture or video that helps to describe your fidgeting (only if useful)

Files submitted:

Emotions and Mood

Emotions: Positive and Negative Typology

23. Was your emotional state affected as a result of this fidgeting and distraction? Share using emotions from the above "typology of emotion".

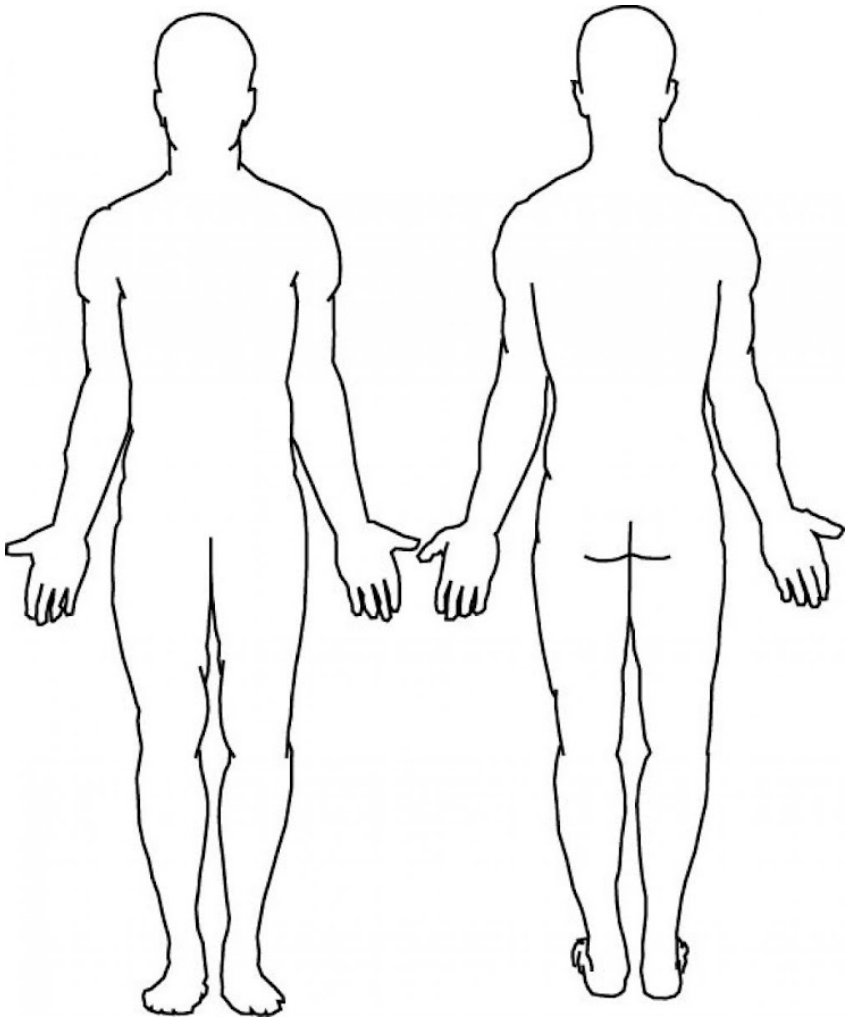
_____

Skip to question 24

Ending

24. (Optional) Body Scan Template - Show how you somatically experienced this event by expressively drawing physical sensations on the body shape.

Printable double-sided PDF containing 8 body maps is available here: https://drive.google.com/file/d/1d2GD_0V2pyyxVyafKk2o5zWUWA5U8RXb/view?usp=sharing



25. Any additional notes necessary? eg. Did this event take place at a different time to when the form was filled?

Thanks for filling out the form! Until the next time you experience significant distraction or fidgeting behaviors!

Appendix D - Fidgeting Experience Sampling 2

Fidgeting and Distraction Report Form

Hello all! This form is to be used to log events of fidgeting and distraction: what happened as well as what preceded, caused, and followed that event.

Please use this form as soon after the event as possible so that the memories, feelings, and physical actions are fresh in your minds. We are most interested in your internal state and how fidgeting influences affect and emotions

You are also welcome to record distraction events in a physical journal or other method, as long as the majority of these questions are answered.

* Required

Definition - Fidgeting
Fidgeting:

an interaction secondary to one's focus task. It is often playful, repeated, and exists partially on unconscious level. It consists of continuous, small physical movements that interact with physical objects or one's own body, with no clearly established purpose.

Examples: a student holds a pen and rotates the cap with their other hand while listening to a lecturer. A person strokes the fur of their pet cat on their lap while clicking through work documents. Drumming fingers on a table or bouncing one's leg repeatedly.

Definition - Distraction
Distraction:

a diversion of attention; a thing/event that draws someone away from concentrating on something else. Marked by a complete shift of attention from one focus to another that requires conscious recognition of the distracted state to refocus on the task at hand.

Examples: clicking into a web browser to search for academic literature (for work) and instead viewing and clicking on previously opened tabs of unrelated topics. Watching the trees sway in the wind by looking through the window over and past your computer screen (containing the work one is to do).

1. Who is filling out this form? *

   Mark only one oval.

   - ◯ Gijs
   - ◯ Haian
   - ◯ Jack
   - ◯ Other

2. Did this event take place immediately before filling the form or at an earlier time? *

3. Was this event a fidgeting action, becoming distracted from a task, or both together? *

By "fidgeting action" we mean physically interacting with an object. It is not required that such interaction distracts from a task one is doing, but it could.

Mark only one oval.

- ◯ Fidgeting Action *Skip to question 4*
- ◯ Distraction Moment *Skip to question 11*
- ◯ Both *Skip to question 18*

Fidgeting Experience

The questions specifically address the feelings and actions one experiences while fidgeting. This section applies most for a fidgeting action that did not distract from one's goal task.

4. What was the MAIN (focus) task you were doing? *

5. What prompted or brought about the fidgeting action? *

6. How was the fidgeting physically manifested? What did you do to fidget? *

7. Open response for further description of the context and action (optional)

8. Consider how you experienced this fidgeting action "in the moment." Rate how appropriate the following statements feel: *

Mark only one oval per row.

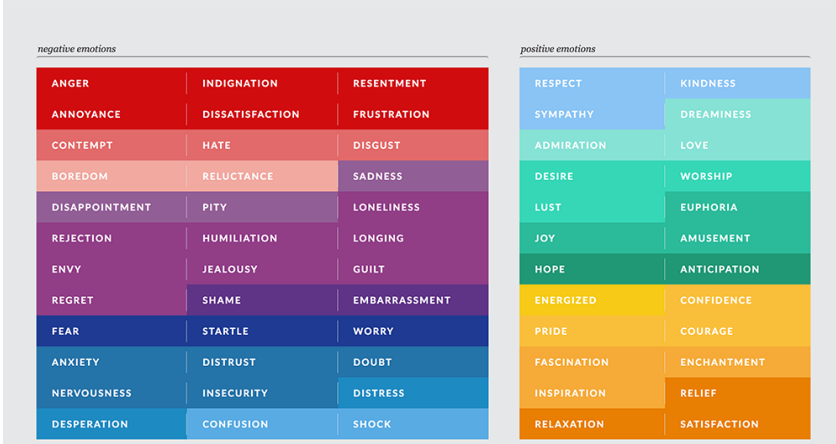
	1 (Not at all)	2	3	4 (Neutral)
How well were you concentrating?				
Was it hard to concentrate				
Did you feel good about yourself?				
Were you in control of your situation?				
Did you enjoy the fidgeting you did?				

9. (Optional) Please upload a picture or video that helps to describe your fidgeting (if useful)

Files submitted:

Emotions and Mood

Emotions: Positive and Negative Typology



10. Was your emotional state affected as a result of this fidgeting action? Share using emotions from the above "typology of emotion" or in your own words.

Skip to question 26

Distraction Event

This section is for an instance where you recognize a distraction from your task at hand, but the distraction does not specifically involve in fidgeting actions.

11. What was the MAIN (focus) task you were doing? *

12. What prompted or brought about your distraction? *

13. Did you find your focus task to be too simple (boring), or too challenging, or neither? *

Mark only one oval.

- Too Simple
- Too Challenging
- Neither

14. How did you recenter and refocus on the task at hand? *

15. Open response for further description of the context and event (optional)

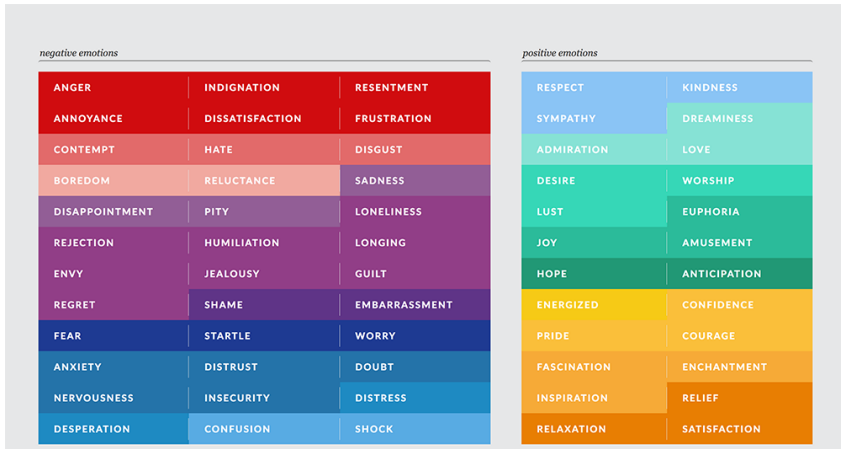
16. Consider how you experienced this distraction "in the moment." Rate how appropriate the following statements feel: *

Mark only one oval per row.

	1 (Not at all)	2	3	4 (Neutral)
How well were you concentrating?				
Was it hard to concentrate				
Did you feel good about yourself?				
Were you in control of your situation?				

Emotions and Mood

Emotions: Positive and Negative Typology



17. Was your emotional state affected as a result of this distraction? Share using emotions from the above "typology of emotion" or in your own words.

_____

Skip to question 26

Combined Fidgeting and Distraction

This section applies when one's fidgeting actions become a significant distraction from the task one is trying to work on/accomplish. The subject is thus cognitively distracted from their task and physically engaged with some object or device.

18. What was the MAIN (focus) task you were doing? *

_____

19. What prompted or brought about your fidgeting and distraction? *

_____

_____

_____

_____

_____

20. How was the fidgeting physically manifested? What did you do to fidget? *

_____

_____

_____

_____

_____

21. Did you find your focus task to be too simple (boring), or too challenging, or neither? *

Mark only one oval.

- ◯ Too Simple
- ◯ Too Challenging
- ◯ Neither

22. Open response for further description of the context and action (optional)

_____

_____

_____

_____

_____

23. Consider how you experienced this distraction "in the moment." Rate how appropriate the following statements feel: *

Mark only one oval per row.

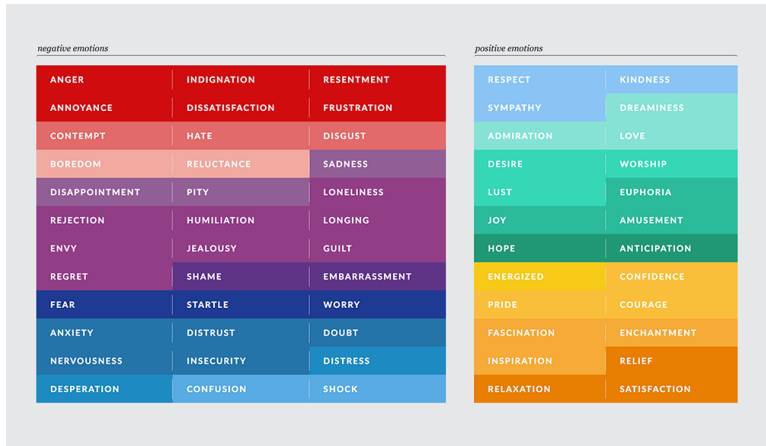
	1 (Not at all)	2	3	4 (Neutral)
How well were you concentrating?				
Was it hard to concentrate				
Did you feel good about yourself?				
Were you in control of your situation?				
Did you enjoy the fidgeting you did?				

24. (Optional) Please upload a picture or video that helps to describe your fidgeting (if useful)

Files submitted:

Emotions and Mood

Emotions: Positive and Negative Typology



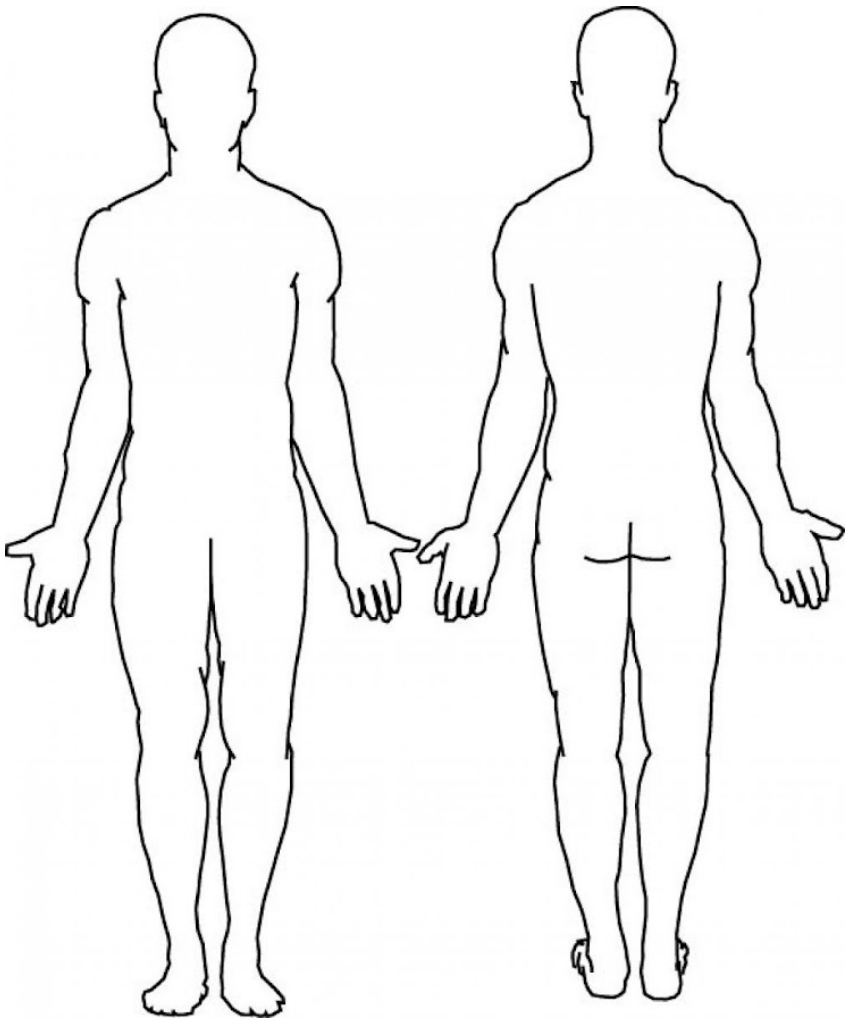
25. Was your emotional state affected as a result of this fidgeting and distraction? Share using emotions from the above "typology of emotion" or in your own words.

Skip to question 26

Exit Section

26. (Optional) Body Scan Template - Show how you somatically experienced this event by expressively drawing physical sensations on the body shape.

Printable double-sided PDF containing 8 body maps is available here: https://drive.google.com/file/d/1d2GD_0V2pyyxVyafKk2o5zWUWA5U8RXb/view?usp=sharing



Thanks for filling out the form! Until the next time you experience significant distraction or fidgeting behaviors!

Appendix E - Codes and Extracts from RTA

Particpant #	Referenced Text	Code (Iteration 1)	Code (Iteration 2)
1	. I especially like hearing the "snap" and the feeling of the impact when the two pieces collide.	Auditory and tactile sensory feedback is pleasurable	Tactile and auditory feedback drive choice of a specific FO.
1	I always seem to grab this doohickey when I'm stuck on a software programming problem	Fidget Object (FO) is sought when facing intellectual barrier	Fidget Objects (FOs) help overcome cognitive problem
1	while figuring out how to express an idea in written form.	FO used when expressing idea in writing	Fidgeting helps to process ideas for writing.
2	I like i because it is squishy and malleable	Soft and malleable are desired FO traits	FOs should be malleable without being "too squishy"
2	I can mush it around while I am thinking	FO is used while thinking	FO is used to occupy hands while thinking
3	"I fiddle consistently with 4 things:	FOs remain consistent for the user	FOs are relatively constant for any individual person
3	so I will hold my dry erase marker and twirl it with my fingers	Writing utensil is appropriated as a FO	Writing utensils are used secondarily as FOs
4	The possibilities are literally endless	FO can be used in many different ways	FO supports multiple, flexible interaction modes
4	play with it forever."	FO can be interacted with indefinitely (no end point)	Fidgeting behavior is ongoing and extensive
5	so I fiddle with the cup non-stop."	FO is used to support other, secondary actions	FOs with functional (primary) purpose support secondary fidgeting interaction
5	I specially play with it once it´s empty and cold,	FO attributes of empty and cold encourage play	Select FO attributes encourage use as FO
5	as a way have my hands busy while I think."	FO used to occupy hands while thinking	FO is used to occupy hands while thinking
5	I guess it feels relaxing and natural, since I do it without noticing."	Unconscious nature of FO associated with relaxing and natural interaction	Mindless fidget behaviors provoke relaxation
6	Super embarrassing.	After-effect (bodily manifestation) of fidgeting brings embarrassment	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
6	The downside is that I look like a greek uncle who's been sitting at the same cafe for the last 5 years spouting non sensical political/football theories in between backgammon sessions.	FO choice modifies social perception of the user	FO choice influences social perception of the user
6	Finally – MakerBot was a fidgeting culture.	Certain (maker) communities and companies exhibit collective fidgeting behavior and interest	Specific communities can exhibit collective fidgeting behavior and interest
7	When I'm at work, I always fidget with my pen, spinning it with my fingers	Fidgeting behaviors are common and constant	Fidgeting behavior is ongoing and extensive
7	To do that, you need to find the perfect balance and grip on the pen."	Fidgeting can require practice and learned skill	Fidgeting can require practice and learned skill
7	a great way to give myself something to concentrate on while waiting for tables and spending time to perfect it	Fidgeting can occupy the mind in otherwise un-engaging scenario	Fidgeting can work as a boredom alleviator and time filler
7	I find it helpful to concentrate my thoughts	Fidgeting aids in concentration	Fidgeting behavior supports mental concentration
7	fidgeting in a way that looks cool. :)	Users desire to look cool since outward appearance of fidgeting matters	Outward appearance of fidgeting matters to users
8	the ability to do this trick with a pen was a rite of passage.	Fidgeting action can be a prerequisite to group membership or signify meaningful social data.	Certain fidgeting actions/behaviors can be a prerequisite to social group membership.
8	once I did I never stopped	Fidgeting behaviors are long-term and enduring	Fidgeting behavior is ongoing and extensive
8	"I didn't really think I had a desk object until I saw that someone else had submitted a pen video.	FOs are not necessarily purposefully so designed	Writing utensils are used secondarily as FO
9	"They have such great texture, with variation from rough to smooth. I love to run my fingers over it, and rub the walnuts against one another. The texture gives just enough friction."	Textural variation makes FO appealing and "internally diverse"	Tactile and auditory feedback drive choice of a specific FO.
9	They are the perfect size and weight to roll around in my hand	Rolling action in hand is used for FO	FO are desired to be manipulated by hand only
9	That they are organic is a really important feature. I used to fidget with plastic toys made on a makerbot – the bolt, for example. Their rough edges would leave my fingers sore and raw after a day of fidgeting (I'm an intense person like that, haha….) but the walnuts don't."	FO material can determine use case and frequency	FO material properties can determine long-term usability
9	the inside is also nice and smooth for tactile variation."	Textural variation makes FO appealing and "internally diverse"	Textural variation/contrast makes FO appealing and "internally diverse"
10	When I get really deep into something,	Fidgeting behavior emerges with deep thought or focus	Fidgeting behavior appears during deep thought and focus.
10	I never noticed I do it until someone pointed it out to me."	Fidgeting behavior was not consciously recognized	Fidgeting behavior is "mindless" and often unrecognized
11	"I stole this wooden chew toy from my 10-month-old baby to play with at work. I gave it to him in a pricey baby boutique to settle him down so I could finish my shopping but all the time thinking, "This is really for me. This thing is so pretty and feels so nice." He kept it for almost a week and then today I thought, "Maybe I'll just try it out one day."	FO was designed for children's use	FOs are appropriated from designed use scenario
11	The balls are on a thick elastic cord so they can be separated briefly and then knock back together. It's also solid; because it's made for babies to chew on, it has to be sturdy. It feels substantial but isn't too heavy.	FO gives impression of substantial and solid through material and sound	FO affective impression determined through material (tactile) and sound (auditory) characteristics
12	Everyone was jealous of it and it would sometimes make it's way to other people's desks "accidentally,"	FOs can be coveted by others	FOs can be desired by others in social setting
12	. I play with it constantly, on the phone and during meetings	FO use is consistent and indefinitely ongoing	Fidgeting behavior is ongoing and extensive
12	The sound is soothing, and the feeling of the rings going across my fingers."	Emotion regulation of "soothing" is achieved through material sound and tactile sensation	FO affective impression determined through material (tactile) and sound (auditory) characteristics
13	but because I play with them, usually as a paper surrogate while working with digital copies of things. I'll have a tablet in one hand and a pad of post-its in the other, strumming the free edge to hear and feel the edges of the paper	User desires a "real" surrogate to feel while doing digital work.	User desires a "real" surrogate to feel while doing digital work.
13	"I also have at least 9000 pens with the clip broken off because I play with those too—usually when talking to people, or in a seminar.	FO use secondary to listening or talking primary focus task	Fidgeting supports attention in listening/conversation.
14	"Nothing copes with daily work stress like a shape-shifting widget,	FO useful as [illegible]ping mechanism	FO useful as coping mechanism for regular stresses
14	I'm amazed at how many people like baby toys in here."	FO are often toys for small children	FO are appropriated from designed use scenario
15	I can't remember a time where I wasn't absentmindedly fiddling or getting my fingers trapped in it, especially while working at my desk	Fidgeting is ongoing, indefinite behavior	Fidgeting behavior is ongoing and extensive
15	I pretty much play with it any old time though - watching tv, while arguing, or when anxious."	FO use context is more diverse than explicitly emotion regulation	FO use spans whole context of daily life
16	It fits so easily in the hand and all my fingers can play with it in many different positions	FO handheld size enables many modes of interaction	FO handheld form enables diversity of interaction modes and movements
16	The spring always feels so satisfying to squash and release when stuck finding that creative breakthrough	Fidgeting is satisfying in moments of cognitive struggle	FO provides satisfying experiences in moments of cognitive difficulty
17	They help keep my hands busy and I feel like they help me focus	FO used to occupy hands while thinking for focus	FO is used to occupy hands while thinking
18	I have showcased 3 of my favorite fidget thingamabobs.	User has consistent favorite FOs	People exhibit clear and ingrained fidget object (interaction) preferences
18	to absentmindedly pinch at the air when I am taking a moment to gather my thoughts.	FO used for unconscious physical movement while thinking	Fidgeting behavior is "mindless" and often unrecognized
18	"I find this fidget to be particularly handy in moments of stress. It fits in the palm of my hand perfectly so I can press down the latch rapidly, as if I were furiously trying to ring in an answer for a Jeopardy question.	Rapid and forceful FO movement is useful for dealing with experience of stress	Force and frequency of fidget movement correlate with high-arousal, negative valenced afective states.
18	It is almost never used for its intended purpose	FO are appropriated from intended purpose	FO are frequently used in a manner secondary to intended purpose
18	. I often find myself wrapping it around my hand or seeing how tightly I can coil it	FO offers a physical challenge or decided "optimal state"	FO offers a tangible physical challenge
18	I also like feeling the texture of the different sized beads in my hand as I fiddle with it."	FO shape and texture variation is pleasant	Tactile and auditory feedback drive choice of a specific FO.
19	While I'm problem solving, pondering my next decision	FO used while thinking deeply	Fidgeting behavior appears during deep thought and focus.
19	, I tend to fiddle with the Wacom pen	FO is component of focus task and work	Fidgeting behavior appears during deep thought and focus.
19	That usually involves a fun little pen trick spin I learned in middle school	Fidgeting is pen spinning behavior from youth	Fidgeting can require practice and learned skill
19	One day an art director noticed me flipping the pen around. "You're pretty good at that. Is that what you do at bars to pick up ladies?"	Fidgeting behavior can influence social perception	Fidgeting behavior influences social perception of the user
20	"I know it is kind of generic but my fidget widget my pin.	User has perception of "acceptance" and uniqueness of FO	FO choice influences social perception of the user
20	It clicks, spins, and has texture."	FO displays variety of interactions and feedback	Tactile and auditory feedback drive choice of a specific FO.
22	I used to like holding a pen and play with it, but now I just keep holding my handsfree cable while I work."	FO preference can change over time	Individual FO preferences can change over time
23	When wearing my necklace, I fiddle with beads when I am thinking something	FO used when thinking	Fidget objects support deep cognitive effort
23	I fiddle with necklace because it can changed into different shapes, like a snake."	FO supports multiple forms (use cases)	FOs have "internal diversity" of resultant forms/shapes
24	I just mess around with cards all day no matter what I'm doing."	Fidgeting is ongoing and consistent behavior	Fidgeting behavior is ongoing and extensive
24	They are MADE for fidgeting, and are super awesome :"	Some FOs have the explicit purpose of fidgeting interactions	Certain FO properties/affordances encourage fidgeting
25	"I work in tech support, so while I'm on the phone with a customer	FO used while engaged in conversation	Fidgeting supports attention in listening/conversation.
25	the Koosh ball gets pulled, thrown, and bounced (by grabbing one of the rubber strands and quickly bounding it up and down), since it's quiet and non-disruptive to my calls."	FO traits must not be disruptive to primary task	FO should not have interaction properties disruptive to primary task
25	When I'm working on a project at my desk, the pen gets spun, shaken between two fingers, and rapidly clicked."	FO supports multiple interactions	FO supports multiple, flexible interaction modes
26	I like to play with while I wait for code to run	Fidgeting as a boredom alleviator and time filler	Fidgeting can work as a boredom alleviator and time filler
27A	one of the reasons I don't shave is that it's a handy thing to play with	Convenience is valued in a FO	FO convenience and availability is critical for selection and use.
27A	one of the reasons I don't shave is that it's a handy thing to play with while I think, read, or whatever.	Fidgeting behavior emerges from thought or focus	Fidgeting behavior appears during deep thought and focus.
27A	Some years ago I gathered a large number on the Outer Banks in North Carolina, which is a good thing because they tend to get lost eventually, so I have a large pool of backups on hand."	FO preference is strong and ongoing	FO preference is enduring and stable
27B	and take it out regularly to rub with my fingers, tumble it around, just have it in my hands.	Fidgeting behavior is regular and ongoing	Fidgeting behavior is ongoing and extensive
27B	to rub with my fingers, tumble it around, just have it in my hands.	FO supports multiple modes of interaction	FO supports multiple, flexible interaction modes
27B	I find it comforting and helps me pay attention to other things more easily."	FO aids in attention and focus	Fidgeting behavior appears during deep thought and focus.
29	At work I spend a lot of time on the phone or reading reports. While I'm working I fidget with knitting wire to create "chain" for necklaces.	Fidgeting creates useful byproduct	Fidgeting behaviors that "generate" or "create" are seen as valuable
29	. I strongly believe that this action increases my concentration in my work.	Fidgeting aids in attention and focus	Fidgeting behavior supports mental concentration
29	Good thing my employer doesn't mind.	Users have concern of public perception of fidgeting	The social impression of fidgeting is important to users
30	I cannot stop rolling BlueTac either on the table or between my fingers	Fidgeting seen as behavior that is consuming and uncontrollable	Fidgeting is a compulsive and latent trait.
30	making it into a thin tube then flattening it and then into a sphere	Fidgeting behavior follows set pattern of use	Individual users have fidgeting behavior that follows prescribed patter
31	Absentmindedly playing with this toy seems to jump-start the creative process. I usually play with it until my fingers need to jump to the keyboard."	FO "play" and interaction supports creativity	FO use supports creative thinking
31	. I usually play with it until my fingers need to jump to the keyboard."	Fidgeting stops when hands are necessary for primary task	Fidgeting is interrupted by primary activities that require use of hands.
32	I usually fidget with it while in deep thought or in meetings	Fidgeting associated with deep thinking	Fidgeting behavior supports mental concentration
32	The lack of noise makes it much less distracting to others than fidgeting with (spinning and clicking) my pen	Fidgeting behavior is modulated due to effect on others	FOs are selected based on social perception
33	only use them to help me get through conference calls.	FO as a support for difficult (emotionally/attentionally) work tasks	Fidgeting supports attention in listening/conversation.

34	"I'm sure you'll get a lot of stress ball-type toys as submissions	FOs have latent perception and "common forms"	FOs have latent perception and "common forms"
34	, it's the perfect size for my hand,	FOs often fit nicely within a single hand (occupying space)	FOs are desired to fit in one hand.
34	it represents a great pun from one of our vendors in town.	FOs can have other associated meanings	FOs can have other associated personal meanings
35	The rose-gold one is actually my wedding band, because my SO and I are gamer geeks. :D	FOs can have other associated meanings	FOs can have other associated personal meanings
35	When I need to fidget, I find myself either manually turning the spinner bands of that ring, or just flicking my other thumb over them to spin them	Fidget interaction involves spinning circles	FO motion involves spinning rotation
35	Both rings make a satisfying hissing sound when the bands spin, and a quiet clacking when I move my hands	Auditory feedback of FOs can be satisfying to user	Auditory feedback of FOs can be satisfying to user
35	I've gotten used to and only noticed as I was typing this post.	FO Interaction sensory feedback can become unconsciously absorbed	Fidgeting iteractions and feedback can become unconscious with time.
35	When I'm bored or anxious I'll take it out of my bun clip and either braid it, run my fingers through it to get tangles out, or re-tie it into a knot or bun and pin it back up in the clip."	Self-fidgeting as a result of boredom or anxiety	Fidgeting can work as a boredom alleviator and time filler
37	Ever since I was a child, I would play with rubber-bands as a sort of safety blanket	Fidgeting provides feelings of comfort and safety	Fidgeting provides feelings of comfort and safety
37	and use them as a stress-reliever	FO used to relieve stress through manipulation	FOs have tangible impact on affective state
37	"Now, as an adult, I still have at least one rubber-band on me at any time.	Fidgeting behavior is ongoing and pervasive	Fidgeting behavior is ongoing and extensive
37	I can also tell if I lose one of the rubber-bands I had been rolling in my hands because of the way it feels. I can tell the difference between four rubber-bands in my hand rather than the five I started out with."	Sensitivity to fidget experience is trained over time and built experience	Fidgeting behavior heightens perceptual sensitivity.
38	And it is accompanied by some coins that serve as pacifiers for my hands.	FO associated with childhood "pacifiers"	FOs provide calming capability for hand movement.
39	And I always find myself absentmindedly fidgeting with it.	Fidgeting is an unconscious interaction	Fidgeting behavior is "mindless" and often unrecognized
40	I normally fiddle with other pens primarily by twirling them	Pen spinning as fidget interaction	Writing utensils are used secondarily as FOs
40	There's also a greater concern for dropping it and having it clatter on the desk.	Users concerned about causing disturbance with FO	FOs are selected based on social perception
40	There's a soft locking mechanism for keeping the nib in place that is pleasant to engage and disengage by entering and exiting the last cm of rotation.	Tactile FO feedback is considered pleasant	Tactile and auditory feedback drive choice of a specific FO.
40	Pressing the stylus against a surface provides a similar combination of give and certainty.	FO can provide nuanced encapsulation of stable certainty (in otherwise uncertain moments?)	FOs can provide nuanced, physical encapsulation of stable certainty (in otherwise uncertain moments?)
40	Overall, the pen just feels solid. Nothing rattles, and both the body and mechanisms seem very durable."	User values solid durability in FO	User values solid durability in FO
41	This is more meditative for me and I don't share it."	Fidgeting is a private, individual experience	Users have intimate and personal attachment to FOs
42	I find that visitors to my office, who have come seeking research help, like to play with this sculpture. It helps them focus on their question	FO aids in focused thinking	Fidgeting behavior supports mental concentration
42	As they sort the pieces they seem to be sorting the parts of their problem, then they reassemble the sculpture as they organize their thoughts about their problem and its answers."	FO as physical manifestation of problem solving process	Fidgeting is a phsyical manifestation of a problem solving process.
43	The wood blocks are a natural finish Maple I think–very smooth and pleasing to the touch. There is nothing like a smooth piece of wood (or rock!).	Smooth textures are pleasing in a FO	Tactile and auditory feedback drive choice of a specific FO.
43	Despite being plastic they feel buttery, so the sensory benefit is in the connectors as well. The connectors are also just a cool thing to look at themselves and are a great small fidget item."	Smaller elements of larger system can be FO	FO are appropriated from designed use scenario.
43	"The reason that I really like this toy is that it is open-ended and I get to actually create new things. It is a bigger creativity escape that a polished rock for example	Fidgeting is not limited but interpretive and flexible	FO supports multiple, flexible interaction modes
43	The things I build are also new each time and the builds are adjustable so I can make something and then fidget with the design a bit. I even invented a stand for phone."	FO allows for the creation and "making" of something	FOs that allow for "creation" and "output" are seen as valuable
43	"I do a lot of multidimensional work (IT, programming, modeling) and the use of 3D building is great for a creative escape–on topic but not on task.	Fidgeting can have topical relation to primary task	Fidgeting behaviors that assist in primary task are seen as valuable
44	I always have small toys and gadgets on my desk and this one proved particularly addictive.	Suitable FOs are alluring and addictive	Specific FO traits support compulsive nature of fidgeting behavior
44	material has a beautiful texture and the differently sized suction cups produce cute sounds when they pop apart.	FO appeal is in the texture and sounds produced	Tactile and auditory feedback drive choice of a specific FO.
45	"I play with this headless shark when I'm thinking or on the phone.	Fidgeting supports thinking and focus	Fidgeting supports attention in listening/conversation.
45	I took it to work one day to see if I could buy a replacement part – kiddos were really upset about the chewing… – and here is has stayed!"	FO discovery is accidental or unintentional	FO discovery is often accidental or unintentional
46	Sometimes I'll roll up a whole sheet of paper with a happy swoosh!	Accomplished fidgeting action can bring satisfaction/happiness	Fidgeting is in pursuit of sensory pleasure
46	I also doodle, which is a fidget too, because I don't have any goal in making the doodle.	Fidgeting is perceived as being without goals	Fidgeting does not have specific generative aims
46	I enjoy the tactile sense of the pen on the paper and the rhythmic motion.	FO tactile feedback is enjoyable	Tactile and auditory feedback drive choice of a specific FO.
46	I enjoy the tactile sense of the pen on the paper and the rhythmic motion.	Repeat FO motion is desired	Fidgeting actions are repetitious and regular.
47	If there's a paper clip nearby, I'll reshape it repeatedly and sometimes use it to pick the lock of my desk drawer (even though I have the key). I like rolling up the leftover bits of paper that get stuck in the spiral of a spiral notebook when I rip a page out. And I have one of those pens that floats vertically in its magnetic cradle…I like to hold it above the cradle and drop it to see if it will stay upright.	Fidgeting behaviors are repetitious within an object	Fidgeting actions are repetitious and regular.
47	I find myself extending and retracting the USB connection when I'm on the phone or my hands are otherwise unoccupied	FO occupies otherwise empty or purposeless hands	Fidgeting supports attention in listening/conversation.
49	"My fidget widget is a clix, received at Christmas 1998 from my brother,	FO are long lasting and ongoing	Fidgeting behavior is ongoing and extensive
49	. I do the same movements over and over again; make it into a chain of boxes or steps. I most often break it apart.	Repeat motions to manipulate FO	Fidgeting actions are repetitious and regular.
49	It has received more than a few puzzled looks at meetings and the like	FO are questioned by others in a public setting	Fidgeting behavior is socially stigmatized or intentionally suppressed
49	, and more than a few times people have taken it off my desk and started playing with it, which felt a little personal, as my hands are on it all day, and after which I immediately took it to wash it off.	Users have intimate and personal attachment to FOs	Users have intimate and personal attachment to FOs

49	I love this thing."	Users have intimate and personal attachment to FOs	Users have intimate and personal attachment to FOs
51	The screaming ghoul is a stress reliever, and I enjoy watching the skeleton dance.	FOs can relieve stress and promote enjoyment	FOs have tangible impact on affective state
51	I have several other toys I occasionally play with: a somersaulting frog, a running chicken, a couple of toy cars, and a slinky."	Users have a collection of FOs for rotational use	FO selection is consistent within a range of interactions
54	"This is a toy my grandfather gave to me 20 years ago.	Users have intimate and personal attachment to FOs	Users have intimate and personal attachment to FOs
55	It keeps me mindlessly entertained for hours."	Fidgeting is mindless or unfocused behavior, yet provides entertainment	Fidgeting behavior is "mindless" and often unrecognized
56	Orange peels dry surprisingly hard and make a satisfying snap.	Tactile sensation and auditory feedback are important to user	Tactile and auditory feedback drive choice of a specific FO.
56	"I usually mess with something in a "destructive/productive" manner, a widget wouldn't work for me probably."	Users have preconceived definition of what qualifies as a FO	Users have narrow popular definition of FO
57	Since it doesn't make any noise, I don't get those annoying looks from clicking my pen any more.	FO can become a social nuisance	FOs with certain traits can become a social nuisance
58	Eos chapstick (I repeatedly take the lid off and put it back on).	Fidgeting behavior is repetitious and regular	Fidgeting actions are repetitious and regular.
59	"My favourite thing at the moment is that I twirl rulers around pens.	FO preference changes	FO preference changes with time
59	I also swing my necklace round and make patterns amongst my fingers when it lands, sometimes it flicks off and gets lost, and sometimes the ruler flies off an other people. I sometimes put my calculator on its corner and make it spin too	FO contains rotational movement elements	FO motion involves spinning rotation
59	. I do it all without thinking."	Fidgeting as unconscious motor behavior	Fidgeting behavior is "mindless" and often unrecognized
59	"In times when twirling things around is distracting for others (like in meetings) I doodle on pads.	Fidget behavior modified to avoid distracting others	Fidgeting behavior modulated to fit social context
59	I take a pen and paper with me and I doodle, it helps keep me in the meeting. I find that I listen better and retain the information when I am fiddling. I learn by listening and I listen better when I have my hands doing something that is completely unrelated to what I am hearing."	Physical fidgeting aids in attention and information retainment	Fidgeting supports attention in listening/conversation.
60	I think it mainly keeps my hands occupied, which focuses my mind on the thing I should be working on and prevents me from becoming distracted with something else.	Occupied, fidgeting hands allows mind focus	Fidgeting behavior supports mental concentration
60	I think it mainly keeps my hands occupied, which focuses my mind on the thing I should be working on and prevents me from becoming distracted with something else.	Hands in fidgeting interaction are prevented from any other distracting behaviors	Fidgeting behavior supports mental concentration
61	"Unless I actually use a paper clip for its intended use, no paper clip will pass through my hands in its original form.	Fidgeting behavior is compulsive	Fidgeting is a compulsive and latent trait.
61	While talking on the phone, or in meetings,	FO is used when paying attention to others	Fidgeting supports attention in listening/conversation.
62	In my backpack, I keep a labadorite stone sphere I've had sine 1999 and some Crazy Aaron's thinking putty. In my shoulder bag, I keep a glass marble I picked up in Stockholm a few years back	FOs are often hard and round	FOs can have other associated personal meanings
62	"Sadly, the kids know about my stashes and have my genetic disposition for fidgeting	User views fidgeting behavior as a genetic inevitability	Fidgeting is a compulsive and latent trait.
63	Until someone tells me to stop	Fidgeting behavior is impeded by needs of others	Fidgeting behavior is impeded and influenced by others in social context.
64	"Number one go-to is Silly Putty, the king of all fidgeting supplies. If something as endlessly malleable	Infinite forms is valuable in FO	FO supports multiple, flexible interaction modes
64	I will fall back on Eos lip balm, because it's the closest hard object to a putty-like object I can come by. (Does that make any sense?) Plus, it fits perfectly inside my hand."	Shape and fitting in hand is important for FO	FOs are desired to fit in one hand
65	I think it has something to do with the sticky texture and crinkly sound.	FO choice is driven by tactile and auditory sensations	Tactile and auditory feedback drive choice of a specific FO.
66	Knowing my tendency to fidget at my desk, I keep this around to improve my rock climbing	FO has secondary beneficial effect	Fidgeting behaviors that "generate" or "create" are seen as valuable
67	Whenever I had to read texts in college, there was something about having my hand(s) engaged that made it easier to focus on the reading.	Fidgeting with hands helps to engage mind	Fidgeting supports attention in reading.
67	scratching certainly does not help with the dandruff, but for some reason I unwittingly scratch my head.	Fidgeting behavior can go against logic of self-preservation	Fidgeting is a compulsive and latent trait.
67	This does not seem to be a result of stress, but a concentration tic. Similarly, I have colleagues who bite their nails just as a habit, not out of anxiety	Fidgeting driven by habit and concentration, not stress and anxiety (user thinks)	Fidgeting behavior supports mental concentration
67	Sometimes our bodies can suffer as fidget widgets themselves!"	FO do not have to be external objects, can be corporeal	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
68	I usually make it spin repeatedly on the desk, passing from one hand to the other	FO spins rotationally	FO motion involves spinning rotation
69	It was really magical to play catch with and watch the colors invert	FO visual change was emotionally impactful	Detectable visual change heightens FO engagement
69	The 3.5 inch size was also perfect for my hands.	FO well fits in hands	FOs are desired to fit in one hand
69	I tend to play with it when I am puzzling through the best way to write a formula/code or looking for trends in data."	FO used in support of deep thinking processes	Fidgeting behavior appears during deep thought and focus.
69	The creation aspect of making pieces, fitting the pieces together, and yielding a compact little ball was very satisfying.	FO that supports creation and building found to be satisfying	Fidgeting behaviors that "generate" or "create" are seen as valuable
69	The process is repetitive enough to make it mindless and not distracting to note taking.	Fidget interaction is desired to be mindless	Fidgeting behavior is "mindless" and often unrecognized
69	I have had several teachers and managers give me the stink eye for it and an equal number of people who are utterly fascinated to watch me make something in under 60 minutes	Fidgeting has varying social impacts (based on relationship b/w parties?)	Fidgeting behavior is socially stigmatized or intentionally suppressed
69	I think the important thing is that my fingers were worrying at something while my brain processed.	User perceives divide between brain and body? Good quote	Users feel a need to occupy hands alongside cognitive tasks
70	Often, it's music player or other work that I use to escape whatever I am working on at the moment."	Fidgeting as an escape from primary task	Fidgeting is used as an escape from a primary task
71	The one who I perpetually come back to is my Pillsbury Doughboy vinyl doll. Squeezing him or chewing on him is my favorite way to alleviate stress and anxiety whether I am at work, school, or in need of motivation to finish up household tasks.	Fidgeting behavior is a stress/anxiety alleviation tool	FOs have tangible impact on affective state
71	Stress balls, pens, and paperclips have been other fidget widgets over the years. However, nothing compares to Doughboy!"	Users express clear preference and favoritism for fidget objects	People exhibit clear and ingrained fidget object (interaction) preferences
72	As a full time student who battles anxiety and perfectionism on a daily basis, it is safe to say that I need to occupy myself with something satisfying and easy to do while I am working.	Occupation with easy (satisfying) fidget can counter anxiety and perfectionism? Good quote	FOs have tangible impact on affective state

72	When I am really stressed with a project, I start filing my nails, making sure that each edge is rounded to a perfect shape, with not one hangnail out of place. In other instances, if they have already been filed then I will paint each nail. On purpose, I make sure that paint gets on the skin surrounding my nail. After the paint dries, I will pick at the leftover paint on my skin and clean up each fingernail.	Higher stress yields very involved fidgeting process	Higher arousal states drive more intensive fidgeting
72	After the paint dries, I will pick at the leftover paint on my skin and clean up each fingernail. This helps me take a minute or two away from my stressful task. Cleaning up a nail is easy and fast to complete–plus I then have 9 more opportunities for a mental break!"	Fidgeting seen as a break from primary stressful task	Fidgeting is used as an escape from a primary task
73	Whenever I'm thinking through a problem particularly if it is complex I straighten the paperclip out. I find it helpful when I'm thinking to make my hands work on a task while my mind works as well.	FO supports thinking and problem solving	Fidget objects support deep cognitive effort
73	I find it satisfying because it is physically changing something and I enjoy the feeling of the paperclip pushing back against my attempts to straighten it	Fidgeting interaction reveals power/control in physical change and tangibility of that change?	Fidgeting interaction serves as representation of power and control
74	Whenever I'm lost in thought or want a quick distraction from work I play with it. Generally I just rotate it around my wrist, or adjust it slightly. The only reason I can think of for why I probably do this is because I enjoy the feeling of the leather and the metal moving against my skin."	Users are not fully cognizant of reasons why they fidget	Fidgeting behavior in pursuit of sensory pleasure
74	The only reason I can think of for why I probably do this is because I enjoy the feeling of the leather and the metal moving against my skin."	Fidgeting can provide sensory pleasure	Fidgeting behavior in pursuit of sensory pleasure
75	Whenever I do homework or study for a big test coming up I hold a pencil while doing so. I may tap the pencil on my notebook or keep flipping it in my hand.	FO supports multiple movements/modes of interaction	FO supports multiple, flexible interaction modes
75	The pencil is hard and it is almost always a pencil rather a pen. If I do not a have a pencil with me at the time I may take something else like a paperclip or a piece of paper and twiddle it in my fingers	Users have clear hierarchy of FO preference	People exhibit clear and ingrained fidget object (interaction) preferences
75	Having a fidget widget helps me concentrate on what I am doing more than having nothing in my hands.	FO supports concentration on task	Fidgeting behavior supports mental concentration
76	I usually have my headphones with me all the time so I play with these frequently.	FO is a subcomponent of commonly used object	FOs with functional (primary) purpose support secondary fidgeting interaction
76	Interestingly enough I don't do this when I am stressed or working hard, usually just when i'm working on something easy or reading something. It generally just offers something satisfying for my hands to do when i'm not doing anything too stressful."	Fidgeting behavior is present in low-investment activities (contrasting)	Fidgeting supports attention in reading.
77	The Slinky is good for when I'm thinking in front of my computer, and the Pokeball is better for when I'm meeting with people	FOs suit different use cases depending on their attributes	FOs suit different use cases depending on their attributes
77	I play with them when I feel bored or anxious."	FO regulate negative affect	FOs have tangible impact on affective state
79	I somehow got into the obsessive habit of pulling out the actual "ink pen" component and chewing on the plastic shell. I hold them in my hand while I'm chewing, mindlessly twirling them around in between chomps. As you can see by the picture, I chew them to literal pieces."	Fidgeting habits are destructive and modify original object	Fidgeting interactions are destructive and modify original object
79	"If've worked remotely for years now, so I'm sure the privacy of a home office has helped fuel the fire.	Office/social setting can temper fidgeting behavior	Fidgeting behavior is socially stigmatized or intentionally suppressed
79	I'm a writer and creative-type, so I find the mindless chewing a must while I'm working or doing just about anything on the computer. (But never really have the urge to chew on them when I'm away from my computer desk.)	Mindless fidgeting supports computer work	FO use supports creative thinking
79	I have come to associate it with creativity and writing, and I'll mindlessly reach out to grab one whenever I begin typing an email or content project."	Fidgeting behavior is associated with creativity and productivity over time	Fidgeting behaviors can develop learned associations
80	I am constantly fidgeting with those little metal breifcase-looking clips as well as this little metal clip with yellow plastic coating on it. It feels really good and seems to relieve my stress to clip them to my fingertips.	FO used as stress relief device	FOs have tangible impact on affective state
80	Plastic things like pens and markers don't give me the same feeling, it's got to be metal and I prefer the clips because I can squeeze them open repeatedly."	User displays strict material preference (metal) for FOs	People exhibit clear and ingrained fidget object (interaction) preferences
82	Working in a corporate environment I have to fidget discreetly and so i find myself reaching for the post it pad and bending it back and forth non stop all day	FO must suit social office setting/ corporate environment	FOs are selected based on social perception
82	i find myself reaching for the post it pad and bending it back and forth non stop all day.	Fidgeting is ongoing and pervasive	Fidgeting behavior is ongoing and extensive
82	I have a interest in body language and am aware how this may come across as stress, while this may be subconsciously. Consciously I do not feel stressed. I just need something to keep my hand occupied with as I process my thoughts	FO is used for thought processing and occupation, not stress despite behavioral markers. Good quote!!	Fidget objects support deep cognitive effort
82	There is alway a part of me physically tapping rubbing or scratching	Fidgeting behaviors exhibit specific motor characteristics	Fidgeting actions are repetitious and regular.
83	It goes round and round and keeps the ideas coming while it cools down my PowerPoint damaged fingers during hot summer days.	FO used as cooling device for hands	FO use supports creative thinking
84	"i use a plain pencial and let him rotate between my fingers, or i grab a 5 cent coin from a New York trip an flip it :)"	FO used with repeated rotational or flipping motion	FO motion involves spinning rotation
85	I noticed I use it in a variety of moods :sometimes it helps me focus, I do it subconsciously, other times its a conscious action that reduces my social anxiety."	Fidgeting behavior can have different desired effects depending on use context	Fidgeting behavior can have different desired effects depending on use context
86	I am constantly pulling apart paper clips throughout the day	Fidgeting behavior is ongoing and extensive	Fidgeting behavior is ongoing and extensive
87	Not only can I twirl it between my fingers like one would a pen or pencil, I can "fold" it back and forth while twirling, almost like rigid silly putty. Rather than running along one axis like a pencil, the binder clip can have multiple, moving axes."	FO that supports many modes of interaction is positive	FO supports multiple, flexible interaction modes
87	Opening the lips of the binder clip incorporates aspects of a stress ball, but, like the multiple axes compared to a pencil, the binder clip gives me more options in how I choose to squeeze it, depending on I how hold it in my hand and between which fingers I squeeze." It really is interesting how a boring binder clip can incorporate several aspects of other common "fidget-able" items.	FO interaction options is positive traitGood quote	FO supports multiple, flexible interaction modes
88	I like to roll it out and coil it and then make the "pop" noise by smooshing it.	FO has repeat action and feedback cycle	Fidgeting actions are repetitious and regular.
89	"I used different fidget widgets. My current choice is this one	Users specify "current choice" or favorite	Users rotate between different focal Fos
89	I roll the nuts with a click sound mostly. Sometimes I roll the ball between the magnets. I turn it over, bend it, etc." This thing is awesome.	FO supports many movements	FO supports multiple, flexible interaction modes
90	As I was reading this article I was fidgeting without realising on my hair pin.	Fidgeting behavior is unconscious action	Fidgeting behavior is "mindless" and often unrecognized
91	I constantly fidget and play with my keys and the attached lanyard. I love the softness of the lanyard as I wrap and weave my hand through it almost like "cat's cradle". I also like to spin the whole thing around by the key hole or fabric as well as to just push around the keys feeling the smooth surface, ridges, indents and raises just to hear the sound of the keys hitting against each other.	Fidgeting behavior driven by variety of desirable tactile and auditory feedback types	Tactile and auditory feedback drive choice of a specific FO.
94	"I learned how to solve a 2x2, 3x3, and finally 4x4 rubiks cube to keep from getting too distracted at work when I'm waiting on my computer to finish loading or processing something.	FO used to fill "dead time" in working moments	Fidgeting can work as a boredom alleviator and time filler

94	I don't even always solve them. A lot of times I just like to flick the faces of the cube around. This one is a Chinese-made cube actually meant for speed-solving, but I just like the smooth rotation of the pieces."	FO provides pleasant tactile sensations	Tactile and auditory feedback drive choice of a specific FO.
96	Bendy, scratchy, edgy textures, twisty screws, silent."	FO has desirable rough and hard textures and forms and silent operation	Tactile and auditory feedback drive choice of a specific FO.
97	It's one I also like to watch while I fidget, something about the gears and motion help me code. I bought it in a junk/antique store in rural NY because we had one when I was a kid. Started fidgeting instantly."	FO feedback helps cognitive processing	Fidget objects support deep cognitive effort
98	This is a piece of painted concrete, I found it outside my workplace (in Sydney, Australia) on the Street and decided it was likely to be flicked up by passing vehicles potentially injuring someone It has been with me on my desk and fiddled with through 8 years and three jobs.	FO are meaningful artifacts to users	FOs can have other associated personal meanings
98	I fiddle with it all the time, rolling it around in my hands when I talk to people at my desk."	FO used to support attention in conversation	Fidgeting supports attention in listening/conversation.
99	"I like to squidge the chain around the magnet, pull a bit away and put it back on, worm my fingers into gaps. I wrap some of the chain around my fingers like a ring and stick the end back to the magnet. If I have both hands free I'll sometimes thread the chain through the hole and slide the magnet up and down, or wrap the chain around the edge of the magnet in a little spiral. The chain is the perfect length for holding in my hand and twirling the magnet around, and then I might stick a finger out for it to wrap around before sending it back the other way."	FO allows creativity and flexibility in interaction	FO supports multiple, flexible interaction modes
100	I've carried these in my right front pocket for 20 years.	FO are long term meaningful objects	FOs can have other associated personal meanings
100	I roll them around, either in my pocket or hand. Sometimes I take them out and let them settle between my fingers like so... sometimes I put one in each hand and feel their weight.	FO used in multiple ways	FO supports multiple, flexible interaction modes
100	I generally find that I take them out when I'm listening intently."	FO used to support focus in listening/conversation	Fidgeting supports attention in listening/conversation.
101	I just keap closing it, then releasing the grip with the little lever. When I had enough I just play with the screw to adjust the grip until I'm satisfied with the feel of the wrench now, or just keep playing with the screw.	FO allows for customizability for optimal "feel	FOs are often created and customized by the user
101	It's probably the best fidgeting experience I had since the little trackballs in old blackberry phones. Also the click sounds are so satisfying."	Best fidgeting experiences are memorable and impactful	The best fidgeting experiences are memorable and impactful
102	Two golf balls. I wanted something to roll in my hands, and Chinese baoding balls are too huge, heavy, and expensive. I searched for substitute and finally used golf balls instead, smaller (~40cm in diameter), fits better in my hand.	FO selected based on targeted tactile interaction	Tactile and auditory feedback drive choice of a specific FO.
102	I use them whenever when I am reading articles or watching movies / videos on my laptop."	FO used as attentional aid for cognitive work	Fidgeting supports attention in reading.
103	Currently use a guitar pick I found and a worry stone. Often will push and then flip the guitar pick on my cheek. Worry stone isn't as good as the pick to fiddle with. Something about the pick being thin is nice.	FO is custom mishmash of 2+ objects	FOs are often created and customized by the user
104	An old AMD processor, very smooth texture on one side and the pins have a very tactile texture.	FO has multiple textural forms in one package	Appealing FOs contain diversity of tactile sensations in singular object.
105	This is a sampler of different Cherry MX keys. Each has a different click, resistance, and catch-feeling when pressed. Too noisy for meetings but it's nice to work out rhythms and patterns.	FO use is limited by social context/setting	FOs are selected based on social perception
106	"If I'm not twirling these pinky sized vials in my hand (mostly the front one, filled with teeny black beads)	FO supports rotational or twirling movement	FO motion involves spinning rotation
106	Most are filled with coloured rice grains but I have a few filled with water that I freeze for stressful days and one filled with glitter.	Similar shape FOs yield different tactile and auditory sensations	Tactile and auditory feedback drive choice of a specific FO.
107	I can't have excess noise at all to work most efficiently, so having something to help me distract myself from the distraction and to help me remember what the heck I was doing really helps work go by smoother	FO serves as a regular, known, targeted distraction	Optimal FO choice reduces focus interruptions and distraction.
108	I mostly squeeze it together between my thumb and index finger, creating a little hat over my index finger which eventually pops off with a distinct sound.	Fidgeting has distinctive action sequence with desired feedback outcomes	Fidgeting actions are repetitious and regular.
108	So during a stressful day in front of my computer it´s rather reassuring to have this little plastic-rubber thingy that somehow makes me feel a bit more relaxed. Weird behavior but there it is, hehe!"	FO supports reassurance and relaxation in face of stress	FO useful as coping mechanism for regular stresses
108	Weird behavior but there it is, hehe!"	Fidget behavior seen as weird or abnormal	Fidgeting behavior is socially stigmatized or intentionally suppressed
109	I use Fidget Stick. It has three main activity: spin, roll and worry stone part:"	FO supports multiple modes of interaction	FO supports multiple, flexible interaction modes
110	"This is a tiny Oball that I stole from my daughter.	FO appropriated from children's toys	FO are appropriated from designed use scenario
111	These are my cat D (they're like soft hacky sacks). They're good stress balls and fidgets. I take them almost everywhere.	FOs travel with users for frequent use	Users have intimate and personal attachment to FOs
113	"I can stretch it constrict it fling it. Even roll it around in my hand.	FO supports multiple interactions	FO supports multiple, flexible interaction modes
113	This has become very helpful in hell week at University and wile recording audio content. Very grounding helps slow down my mind so I can focus on speaking more slowly then normally feels natural.	FO is useful in pacing users speech	Fidgeting supports attention in listening/conversation.
115	I burn through widgets really quickly. This is my current one	User switches between fidgets frequently	User changes FOs frequently
115	"I play with it by rapidly solving it, usually in under a minute. I like it because it's brainless but also mathematical, because it's based in binary."	Fidget interaction is simultaneously brainless yet complex. Low effort barrier?	FO cognitive demand must be balanced with primary task
116	"I've always had "busy fingers" and I used to pick at my hair when I was working/thinking/anxious which was no good. I struggled finding an alternative – stress balls never did it for me.	FOs are not universally useful	FO selection is a complex and personal process
116	These magnetic hematite "sticky stones" are perfect because they are more stimulating than just squeezing repeatedly, and I think I like that they are malleable but not soft and squishy. They are also said to help energy and mood which I remind myself especially when feeling anxious!"	FO that is malleable yet not squishy and soft is liked.	FOs should be malleable without being "too squishy"
117	I find other stimuli besides touch also impact my focus. A HUGE one is sound. I work at a restaurant and when I have to do any sort of admin work I will often go and sit at the bar instead of the office. The ambient sound is not mentally engaging (like a conversation or music with lyrics) but comforts me enough to focus on what I'm doing. Another is smell. Sort of "sharp" smells also help me focus better	User utilizes sound and smell stimuli to direct focus	Auditory and olfactory stimuli direct attention and focus of user
118	"I just got a Fidget Cube and it's been very good at keeping me from messing with a pen - my former fiddling tool. Previously, I've literally - but accidentally - thrown a pen a good few feet away because I wasn't paying attention to it and lost control.	Certain FO are not suitable for use due to secondary effects	Fidgeting behavior modulated to fit social context
119	"Paper clips are my big go-to. I stick my thumbnail in them & flip them around. They have to be the textured, not smooth, kind, so I can also use them like a worry stone and feel the texture."	Specific FO textural properties are important to users	Appealing FOs contain diversity of tactile sensations in singular object.

120	I have a small can always on may desk and I make something new almost every day during lunch break. I found them here: http://www.uxninja.org/en/blocks/	FO supports infinite creativity	FO use supports creative thinking
121	I roll it back and forth while I am on phone calls all day.	FO supports conversational attention	Fidgeting supports attention in listening/conversation.
122	this is me, obscured behind my monitors, working clandestinely on the back piece of my upcoming cardigan.	Fidgeting behaviors are to be hidden for view of others	Fidgeting behavior modulated to fit social context
122	Knitting is the perfect fidgeting for me, because not only my fingers do the same action for about 90,000 times	Users like repetitious actions	Fidgeting actions are repetitious and regular.
122	Knitting is the perfect fidgeting for me, because not only my fingers do the same action for about 90,000 times, while I can turn my focus inwardly and ponder for hours on end, but also it produces something tangible that I can use	Fidgeting allows inward focus and thought concentration	Fidgeting behavior supports mental concentration
122	it produces something tangible that I can use	Beneficial and tangible side effects of fidgeting are appreciated	Fidgeting behaviors that "generate" or "create" are seen as valuable
122	The repetition of the process helps as an external clock for my mind and I somehow find solutions easier while watching the stitches accumulate on the working needle." It may just be self-deception and conditioning but I'm not fixing this idiosyncrasy as long as it works.	Users doubt the efficacy and "placebo" effect of fidgeting for productivity	Users doubt the efficacy of fidgeting for productivity
124	I find that oddly satisfying, I don't know why."	Users unable to pinpoint exact reason why fidgeting is satisfying or useful	Users are not aware of why fidgeting is satisfying or useful
125	I like it better than a stress ball because if you push the keys in to a certain point, they'll click against middle section, which adds a rhythm to the fidgeting and a sense of success.	FO supports "success" and achievement	Fidgeting actions are repetitious and regular.
125	You can also vary the fidgeting by pressing each key one by one versus all together, or by holding all the keys down until your grip is exhausted	FO supports variation in use	FO supports multiple, flexible interaction modes
125	I tend to fidget with it when I'm taking a break from typing to think about a problem, and even find myself getting up and walking over to a colleague's desk to ask a question while still fidgeting with it.	FO used as thinking aid	FO is used to occupy hands while thinking
127	I twirl my pencil in my hair all through my work day.	Fidgeting behavior is ongoing and extensive	Fidgeting behavior is ongoing and extensive
128	Fiddle Focus for Busy Fingers which has a squishy insert along with 4 fabric textures. It mounts anywhere using a Velcro strip. These products are also being used by the elderly population to include those with Alzheimer's and Dementia.	Homebrew makers creating devices to support fidgeting behaviors	FOs are often created and customized by the user
129	My fidget widgt is my rubic cube. I play with it a lot, specially when i worked in service desk. Sometimes i didn't pay attention to pepole's issues becaus i was playing with it :s"	FO can consume attention	FOs can consume too much attention and cause distraction
130	I don't just turn them or worry with them, though, I take them apart and then twist them back into a new shape.	FO affords reforming and shaping	FOs have "internal diversity" of resultant forms/shapes
130	It helps me focus and think when someone talks to me, and they need my full attention.	FO supports conversational attention	Fidgeting supports attention in listening/conversation.
132	"I have lasted a long time without a fidget of any kind by picking at my nails and the skin around them. Not the healthiest choice at times, because I've made myself bleed many times.	Dissociation between fidgeting corporeally and with object	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
132	It is my bored/nervous tick, and I don't even realize I'm doing it a lot of the times, until I pull too much on the skin and start bleeding.	Fidgeting behavior is compensation for boredom or nervousness	Fidgeting can work as a boredom alleviator and time filler
132	"I plan on buying a fidget cube to help with my incessant fidgeting, to see if it stops me from picking at my nails."	Some fidgeting behaviors are undesirable for secondary effects	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
133	We issued Blackberry Curve phones to the staff. When people brought them in for repair many of them had circular marks on the back. Apparently they were perfect for spinning on a table during meetings	FOs are often primary objects with secondary use case	FOs with functional (primary) purpose support secondary fidgeting interaction
134	I roll it, fold it like an accordion, roll it again	Fidgeting follows prescribed pattern	Fidgeting actions are repetitious and regular.
134	I never thought of that as fidgeting until I read this article!"	Fidgeting behaviors are not recognized	Fidgeting behavior is "mindless" and often unrecognized
136	"pencil - tap it on a hard surface (table top, chair arm)" pen w/ top - click the top on and off in quick succession. Blue pen - click in quick succession	Multiple writing utensils can be fidgeted with in different manners	Writing utensils are used secondarily as FO
137	I used to get in trouble at school for 'flirting' because I was constantly pulling and twisting my long hair. I recently cut nine inches of hair off after my fiancé was diagnosed with cancer and I reach for where it used to be all the time	Fidgeting behaviors are learned and unconscious	Fidgeting behavior is "mindless" and often unrecognized
138	I constantly play with it. You can endlessly make new forms with it."	FO supports infinite variability	FO supports multiple, flexible interaction modes
140	I also made this spinner and a tangle of key rings	FOs can be custom creations or adapted by the user	FOs are often created and customized by the user
142	I bought one of these for my son when he was in 5th grade about 15 years ago.	FO appropriated from children's toy	FO are appropriated from designed use scenario
143	notoriously fiddle with pen caps and paper clips during meetings.	Fidgeting is behavior for which one can be notorious, negative connotation	Fidgeting behavior influences social perception of the user
143	I like the tangle because of the texture and the ability to wrap it around my hand. I've broken two of them from doing it, but I wrap it around my fingers and get added pressure.	FO applies perceivable pressure to hands	FO supports multiple, flexible interaction modes
143	Both help me think and both help calm anxiety	FOs support thinking and anxiety relief	FOs have tangible impact on affective state
144	I do this when I'm stressed, bored, or thinking. The speed of the spin is directly proportional to how stressed I am: increased stress = increased speed. And vice versa.	FO rotational speed has embodied meaning	Force and frequency of fidget movement correlate with high-arousal, negative valenced afective states.
145	I have a Lifeproof case and there's a part of it that snaps off and on so the phone (which is waterproof when it's snapped shut) can open up and charge. I've broken off three of these because I snap it open, then snap it closed constantly.	Chosen FO does not always properly support the fidgeting behavior	Chosen FO does not always properly afford the fidgeting behavior
145	I think I like how satisfying it is to hear it click in and out of place and it's a small movement so many people don't notice it	Social perception of fidgeting behavior is important	FOs with certain traits can become a social nuisance
145	I think I use my phone because it is something I always have with me.	Convenience is a factor in FO choice	FO convenience and availability is critical for selection and use.
145	I use these things when I am in a class that isn't conducive to note taking, when I'm having a conversation that I am worried about, or when I am bored. Hope	FO supports boredom, nervousness, focus	FOs have tangible impact on affective state
147	I like machinery and mechanical elements to begin with, and the relationship of motion between the parts is absorbing."	FO draws in attention (beneficial)	Fidgeting supports attention.
148	during game session it can get stressful and having something to fidget with can help get through the boring/stressful/non participation parts of the game.	FOs support emotional regulation during "non-active" moments	Fidgeting can work as a boredom alleviator and time filler
149	this simple fidget toy has legit changed my life. At work, with friends, watching sports (my biggest trigger…) this $8 "toy" reduced anxiety and calms my fingers/hands	FO reduced anxiety to very visible degree	FOs have tangible impact on affective state
149	it's also discrete and fairly silent so it's good in professional settings." "	FO stealth is valued in professional context	Tactile and auditory feedback drive choice of a specific FO.

149	If I forget it at home i usually use pens to click and tap or (to my great shame) twist my body (arm, chest) hair.	Fidgeting behavior involving the body generates shame	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
149	"I have a fidget cube. It sucks. Not discrete, too loud and my fingers like the motion of the other toy better."	FO considered through lens of "what fingers like"	Tactile and auditory feedback drive choice of a specific FO.
150	When I'm playing with this, I'm a lot calmer and can focus so much more!"	FO supports calm mood and attentional focus	FOs support calm mood and attentional focus
151	"I like to fiddle with this therapy putty i made, when im doing homework	FO is user created	FOs are often created and customized by the user
151	Its really relaxing because its got lavendar and eucalyptus essential oil in it ??"	FO relaxing effect of uncertain origin	Users are uncertain exactly why FO is useful
152	they are nice to squeeze and roll in my hands.	FO used in rolling motion in hand	FO motion involves rotation
153	when ever i'm in class and i'm having a hard time trying to focus i just start to doodle in my sketch book. i just like to draw whatever comes to mind	Creative fidgeting supports focus	Creative fidgeting supports focus
154	I got it forever ago in eighth grade and have used it so much it's unrecognizable now. It was given to me by someone who knows how passionate I am about neuroscience, and it has been my best friend ever since.	FO create long lasting attachment	FOs emerge from item with associated external value
154	but simply having it around me on the desk or in my pocket is comforting. I have a lot of anxiety that would be unmanageable with out this little guy	FO has learned comfort association over time	FOs can develop learned assosciations over time
154	I have a lot of anxiety that would be unmanageable with out this little guy. I never go anywhere without it."	FO (and association) is used as anxiety management tool	FOs have tangible impact on affective state
155	"Although I fidget with a number of things (silly putty, plastic slinky, anything I can find that keeps me engaged, deck of cards), the Koosh ball is my favourite	Users display clear FO preferences	People exhibit clear and ingrained fidget object (interaction) preferences
155	When I was in high school and college, I would knit to stay focused in between taking too many notes (because if I wasn't taking notes, I couldn't stay focused)."	Even primary activities (note taking) can be a fidgeting form	Fidgeting behaviors that assist in primary task are seen as valuable
156	"I am currently on a journey to find something to fidget with.	Certain FO are "better" or "worse" with complex evaluation criteria	FO selection is a complex and personal process
156	For years, I've had bad habits of picking at my lips, cheeks, and fingers, biting my fingernails, picking at scabs/mosquito bites/acne, pushing back my hair (or fluffing pony tails if I attempt to put it up to stop myself).	Fidgeting habits are "bad" if they impact appearance or corporeal self	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
156	I started using Bobby pins to pin back my hair recently (to prevent me from messing with it). However, this gave me something else to fiddle with. I ended up bending a few of my Bobby pins out of shape and had to figure out how to get them back to a shape that holds hair.	FO emerges from attempted solution to prior FO	FO emerges from attempted replacement solution for prior FO.
156	I tried a paper clip. I actually really liked it. It's so malleable, but doesn't pick up dirt like putty. It's smooth like a worry stone. You can slip it on your finger for pressure, or press on the middle part for a springy motion.	Liked FO supports many different modes of interaction	FO supports multiple, flexible interaction modes
156	A worry stone can feel nice to rub a finger against or twirl in your hands, but it isn't as springy or malleable as a paper clip.	User values springiness and malleability over firm, static stone	FOs should be malleable without being "too squishy"
156	Plus, you don't have to worry about a place to store them (because a lot of women's clothing doesn't have pockets that fit a worry stone or paper clip). It just goes right on your wrist."	Ease of access and storage is important for FO	FO convenience and availability is critical for selection and use.
157	I fidget with these bolts and nuts, I like to spin them loose and back tight again	FO supports spinning and rotational movement	FO motion involves spinning rotation
157	fidget with them when I have nothing Todo and want to get home already."	FO used as boredom distraction	Fidgeting can work as a boredom alleviator and time filler
158	My parents bought it for me at a knickknack shop when I was in third or fourth grade	FO has meaning outside of use	FOs emerge from item with associated external value
158	I carried it around with me constantly through high school, keeping it in a pocket or purse or even my sock, until I left it in a family friend's car in tenth grade or so. Luckily, my sister found it a few years later, and it came with me to college and beyond—although by then my fidgety fingers had calmed down enough that it mostly just lives at my desk	FO has history and journey	FOs emerge from item with associated external value
158	"I also took up knitting a few years ago, which is an amazing way to expend fidgety energy.	Generative fidgeting behavior is seen as more valuable	Fidgeting behaviors that "generate" or "create" are seen as valuable
159	I think of the end of each finger as a cross with four sides and a middle, and I touch each of the four sides and the middle before going onto the next finger	FO has strict pattern of use	Users exhibit ritualistic fidgeting behaviors
159	I feel it helps me pay attention and uses the part of my brain involved with motor sensory not fully engaged."	Hand fidgeting engages motor senses to aid focus	Fidgeting supports attention.
160	"Vape. I used to play with smoke by making O's and other different tricks. Now when I quit, I find it very difficult to concentrate on work without vaping, even when physical addiction passed	Fidgeting has learned associations	Fidgeting behaviors can develop learned associations
163	"It's just little tiny magnets, but it keeps me totally entertained."	Users minimize the FO's importance due to size, cost, etc.	Users minimize importance of fidgeting behaviors
165	This stopped me from picking at my hair all day whenever I do coding and stuff.	FO used as crutch to avoid other negative fidgeting behavior	FOs are used as a crutch to avoid other negative, destructive fidgeting behaviors.
166	Unfortunately, I needed to put that energy somewhere else when I would be bored or thinking hard, so once I developed acne, I started picking at it instead. I am embarrassed to say I am 26 and am addicted to picking skin that even slightly isn't smooth	Fidgeting behavior results from boredom or cognitive effort	Fidgeting can work as a boredom alleviator and time filler
166	I am embarrassed to say I am 26 and am addicted to picking skin that even slightly isn't smooth. I have been working on it as though it's an addiction	Fidgeting with "negative" effects is seen as shameful	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
166	Reading through some of the submissions on your page, I am now wondering if all these years, I was just looking for something healthy to fidget with (and that I don't have an addiction or mental problem for wanting to use my hands when I'm anxious, bored, or deep in thought	Fidgeting behavior is stigmatized or intentionally supressed	Fidgeting behavior is socially stigmatized or intentionally suppressed
166	I've tried adopting fidgets supposedly aimed at this issue (smooth stones and fidget cubes) but they are not as convenient and readily available as my hands and my skin… :("	FO convenience is very important for adoption	FO convenience and availability is critical for selection and use.
166	"I've always noticed it helps me think when I use my hands, but didn't know how to kick the bad habit. I can't wait to read more from your findings and hope that the science helps me find a solution for my skin picking problem!"	Skin-related fidgeting seen as a problem	Fidgeters perceive their corporeal fidgeting behaviors (and their manifested result) as shameful and unhealthy.
167	I like pulling it off the side of my laptop and having it snap back on.	Repetitious action with feedback is liked by user	Fidgeting actions are repetitious and regular.
167	I do this a lot as I am reading something on my laptop to help me focus."	FO used as focus aid	Fidgeting supports attention in reading.
168	Recently I lost my AirPods and I found myself fidgeting with much more distracting things. I found myself messing with my candle and or resorting to looking at my phone when distracted. Both of these things were much more distracting and made me lose focus."	Optimal FO can reduce the "lost focus" in use compared to alternatives	Optimal FO choice reduces focus interruptions and distraction.
169	"I spin my rings, as well as playing with any other jewelry or even zippers I'm wearing, whenever I need to listen attentively or read something I don't have to hold open."	FO used as attention aid	Fidgeting supports attention in listening/conversation.

171	I sometimes find myself fiddling with the bracelet mindlessly.	Fidgeting as unconscious act
171	I personally find fidgeting useful at times when I am anxious or on edge about something	FO supports calming from anxiety
171	It keeps me distracted from being bored however it helps me have a better focus at the task I am trying to accomplish.	FO used as attention aid

Fidgeting behavior is "mindless" and often unrecognized
FOs have tangible impact on affective state
Fidgeting behavior supports mental concentration

Appendix F - Arduino Prototype Software

```
//This code translates the applied force on a FSR into a scaled vi
bration intensity. Controls for a minimum applied force.

#include <Adafruit_MPU6050.h>
#include <Adafruit_Sensor.h>
#include <Wire.h>
#include <Arduino.h>
#include <PCF8563.h>
#include <Adafruit_DRV2605.h>
//Initialize Devices
Adafruit_DRV2605 drv;
//Adafruit_MPU6050 mpu;
//Input Pins to microcontroller
const int fsrPin = A0;
const int vibOutputPin = 8;
const int samples = 30;
int counter = 0;
int effectCounter = 0;
int effectTrigger = 0;
int sum = 0;
int average = 0;
int resistorArray[samples];         //array in dimensions fo desir
ed data type/retention
int fsrValue = 0;         // value read from the force sensitive r
esistor
int hapticValue = 0;       // scaled value for output to motor sys
tem

void setup() {
  // General Setup code for activating libraries and key functions
  Serial.begin(115200);
  Wire.begin();
  drv.begin();
  drv.selectLibrary(1);
  drv.setMode(DRV2605_MODE_REALTIME);
  // Select ERM (Eccentric Rotating Mass) or LRA (Linear Resonant
Actuator) vibration motor. The default is ERM, which is more commo
n
  //drv.useERM();
  drv.useLRA();
  //pinMode(frsPin, INPUT);
```

```
  //digitalWrite(frsPin, LOW); // disable internal pullup
}

void loop() {
  // subtract the last reading:
  sum = sum - resistorArray[counter];

  // read the analog in value and place in array:
  fsrValue = analogRead(fsrPin);
  resistorArray[counter] = fsrValue;
  //Serial.print("The resistor value average is: ");
  //Serial.println(average);

  // add the new reading in it's place the last reading:
  sum = sum + resistorArray[counter];

  //Look for significant forces and for an event to not be in proc
ess!
  if (fsrValue >= 200 && effectTrigger == 0) {
    effectTrigger = 1;
    Serial.println("Effect Triggered!!!!!!!!!");
  }
  //If significant enough force is detected, we now start keeping
track of the samples that follow it
  if (effectTrigger == 1) {
    effectCounter++;
  }
  //Calculate rolling average of resistor values
  average = sum / samples;
  hapticValue = map(fsrValue, 25, 850, 0, 127);

  if (average >=600 && effectCounter >= samples) {
    drv.setMode(DRV2605_MODE_INTTRIG);
    // Implement Very Harsh Feedback!
    Serial.print("Entering severe feedback loop");
    drv.setWaveform(0, 88);  // Transition Ramp Up Long Sharp 1 –
0 to 100%
    drv.setWaveform(1, 56);  // Pulsing Medium 2 – 60%
    drv.setWaveform(2, 55);  // Pulsing Sharp 1 – 100%
    drv.setWaveform(3, 12);  // Triple Click - 100%
    drv.setWaveform(4, 12);  // Triple Click - 100%
```



```
    drv.setWaveform(5, 12);  // Triple Click - 100%
    drv.setWaveform(6, 0);  // end of waveforms
    drv.go();
    delay(5000);
    drv.setMode(DRV2605_MODE_REALTIME);
    effectCounter = 0;
    effectTrigger = 0;
  }

  else if (average >= 400 && average < 600 && effectCounter >= sam
ples) {
    Serial.print("Entering second from top feedback loop");
    drv.setMode(DRV2605_MODE_INTTRIG);
    drv.setWaveform(0, 106);  // Transition Ramp Up Long Smooth 1
– 0 to 50%
    drv.setWaveform(1, 55);  // Pulsing Medium 2 – 60%
    drv.setWaveform(2, 55);  // Pulsing Medium 2 – 60%
    drv.setWaveform(3, 9);  // Soft Bump - 30%
    drv.setWaveform(4, 0);  // end of waveforms
    drv.go();
    delay(4000);
    drv.setMode(DRV2605_MODE_REALTIME);
    effectCounter = 0;
    effectTrigger = 0;
  }

  else if (fsrValue >= 3 && average < 600) {
    drv.setRealtimeValue(hapticValue); //setRealtimeValue operates
 on a scale of 0 - 255 - however, because the function works with
2's complements what I found was that 127 corresponds to max inten
sity, rather than 255.
    //analogWrite(vibOutputPin, hapticValue);
    if (effectCounter >= samples) {
      effectCounter = 0;
      effectTrigger = 0;
    }
  }

  else {
    /*drv.setMode(DRV2605_MODE_INTTRIG);
    drv.setWaveform(1, 56);  // Pulsing Medium 2 – 60%
```

```
  drv.go();
  delay(1000);
  drv.setMode(DRV2605_MODE_REALTIME); */
  if (effectCounter >= samples) {
    effectCounter = 0;
    effectTrigger = 0;
  }
}

counter++;
/*Serial.print("Counter: ");
Serial.println(counter);
Serial.print("Effect Trigger");
Serial.println(effectTrigger);
Serial.print("Effect Counter");
Serial.println(effectCounter);*/
if (counter >= samples) {
  counter = 0;
}
Serial.println(fsrValue);
delay(50);
}
```



```
/*
  Reads repeatedly from a MPU6050 accelerometer and gyroscope, cal
culating a running average and
  printing it to the computer. Keeps 50 readings in an array and c
ontinually
  averages them. Use this to trigger appropriate effects.


  created 22 Apr 2007
  by David A. Mellis  <dam@mellis.org>
  modified 9 Apr 2012
  by Tom Igoe
  modified 10 Jun 2022
  by Jack Eichenlaub

  This example code is in the public domain.

  https://www.arduino.cc/en/Tutorial/BuiltInExamples/Smoothing
*/

// Define the number of samples to keep track of. The higher the n
umber, the
// more the readings will be smoothed, but the slower the output w
ill respond to
// the input. Using a constant rather than a normal variable lets
us use this
// value to determine the size of the readings array.

#include <Adafruit_MPU6050.h>
#include <Adafruit_Sensor.h>
#include <Wire.h>
#include <Arduino.h>
#include <Adafruit_DRV2605.h>

//Initialize Devices
Adafruit_DRV2605 drv;
Adafruit_MPU6050 mpu;

//Define key variables
float aX, aY, aZ, gX, gY, gZ;
const int xDim = 3;
```

```
const int yDim = 15;
const int numReadingsY = yDim;
const int rotationThresholdHigh = 15; //Sets rotation thresholds t
hat will trigger different effects
const int rotationThresholdMed = 5;
const int rotationThresholdLow = 2;
float rotationMatrix[xDim][yDim]; //matrix in dimensions fo desire
d data type/retention
float gSumArray[yDim];         //array in dimensions fo desired da
ta type/retention
float aSumArray[yDim];         //array in dimensions fo desired da
ta type/retention
int readIndexX = 0;               // the index of the current read
ing in X dimension
int readIndexY = 0;               // the index of the current read
ing in X dimension
int effectTimer = 0;
int effectTrigger = 0;
int cyclesCounter = 0;
float totalGSum = 0;                  // the running total for dat
a from rotational sensor
float averageGSum = 0;                // the average rotational ve
locity (absolute)
float totalASum = 0;                  // the running total for dat
a from rotational sensor
float averageASum = 0;                // the average rotational ve
locity (absolute)
int hapticValue = 0;                  // scaled value for output t
o motor system


//Define inputs and outputs
//int inputPin = A0;

void setup() {
  // initialize serial communication with computer:
  Serial.begin(115200);
  Wire.begin();
  drv.begin();
  //Initialize 6050 MPU
  if (!mpu.begin()) {
```



```
    Serial.println("Failed to find MPU6050 chip");
    while (1) {
      delay(10);
    }
  }
  Serial.println("MPU6050 Found!");
  mpu.setAccelerometerRange(MPU6050_RANGE_8_G); //Other choices 2,
4,8,16 in g
  mpu.setGyroRange(MPU6050_RANGE_1000_DEG); //Other choices 250,50
0,1000,2000 in deg/sec
  mpu.setFilterBandwidth(MPU6050_BAND_44_HZ); //Other choices 5,10
,21,44,94,184,260 in Hz
  //Setup MPU6050 motion detection
  mpu.setHighPassFilter(MPU6050_HIGHPASS_0_63_HZ); //Other choices
 1_25, etc...
  mpu.setMotionDetectionThreshold(10); //Unclear what this number
represents
  mpu.setMotionDetectionDuration(100);
  mpu.setInterruptPinLatch(true); // Keep it latched.  Will turn o
ff when reinitialized.
  mpu.setInterruptPinPolarity(true);
  mpu.setMotionInterrupt(true);

  //Setup of the DRV haptic driver
  drv.setMode(DRV2605_MODE_REALTIME); //  Triggers vibration in re
al time based on some variable inputs. Can also use drv.setMode(DR
V2605_MODE_INTTRIG) for default, internal trigger when sending GO
command.
  drv.selectLibrary(1);
  // Select ERM (Eccentric Rotating Mass) or LRA (Linear Resonant
Actuator) vibration motor. The default is ERM, which is more commo
n
  drv.useERM();
  //drv.useLRA();

  // initialize all the readings to 0:
  for (int j=0; j < yDim; j++) {
    gSumArray[yDim] = 0;
    aSumArray[yDim] = 0;
    for (int i =0; i < xDim; i++) {
      rotationMatrix[i][j] = 0;
```

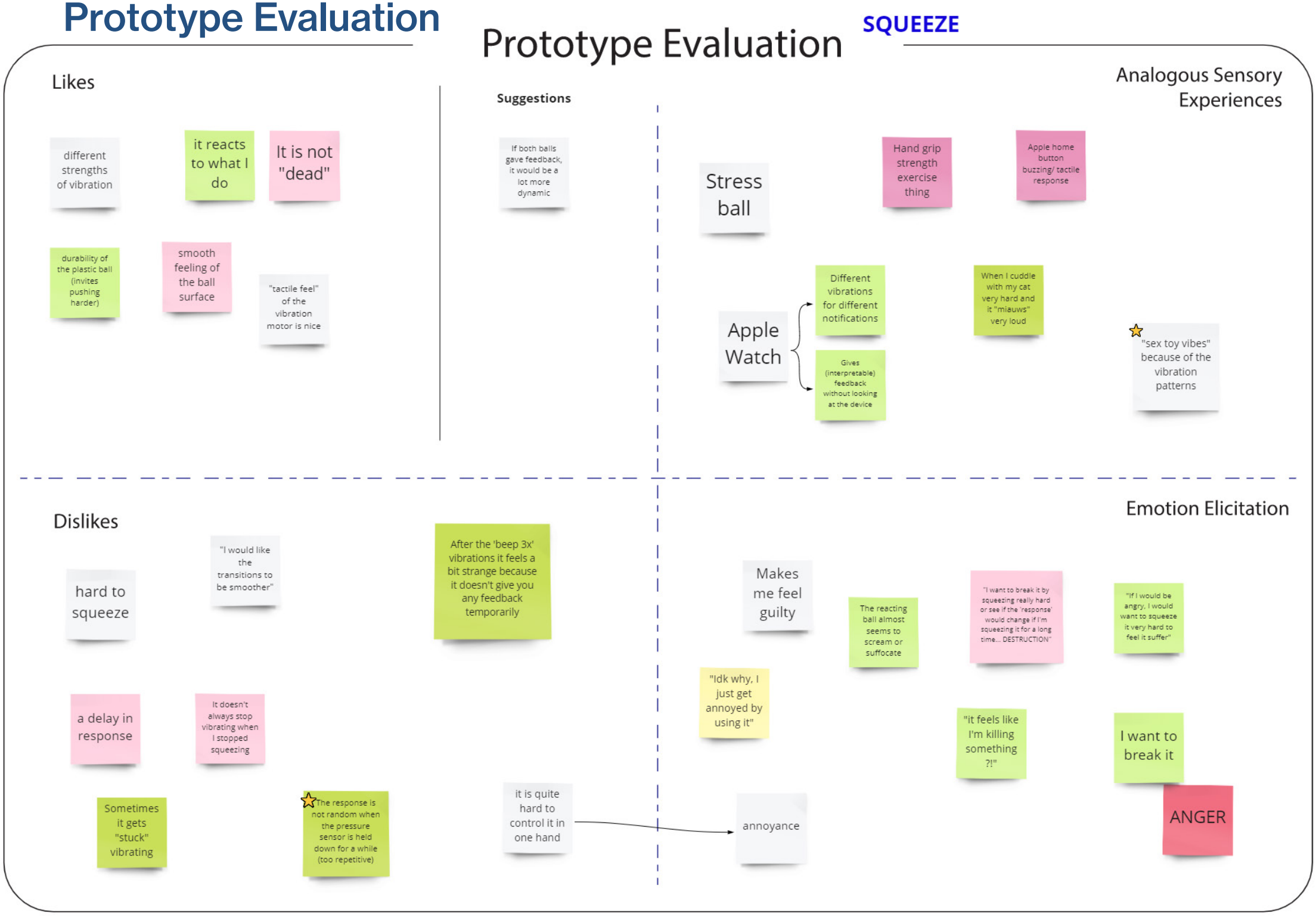
```
    }
  }
  //Serial.print(rotationMatrix);
}

//total += a[ row ][ column ];

void loop() {
  /* Get new sensor events with the readings */
  sensors_event_t a, g, temp;
  mpu.getEvent(&a, &g, &temp);
  // read the acceleration data
  aX = a.acceleration.x;
  aY = a.acceleration.y;
  aZ = a.acceleration.z;
  gX = g.gyro.x;
  gY = g.gyro.y;
  gZ = g.gyro.z;

  // subtract the last reading:
  totalGSum = totalGSum - gSumArray[readIndexY];

  //Copy in data from gyroscope (read)
  rotationMatrix[0][readIndexY] = gX;
  rotationMatrix[1][readIndexY] = gY;
  rotationMatrix[2][readIndexY] = gZ;

  //Sum up absolute values of directional acceleration and rotatio
nal velocity
  aSumArray[readIndexY] = fabs(aX) + fabs(aY) + fabs(aZ);
  gSumArray[readIndexY] = fabs(gX) + fabs(gY) + fabs(gZ);
  //Serial.print("gSumArray Value: ");
  //Serial.println(gSumArray[readIndexY]);
  if (averageGSum >= 1.5 && effectTrigger == 0) {
    effectTrigger = 1;
    Serial.println("Effect Triggered!!!!!!!!!");
    Serial.println(" ");
  }

  // add the reading to the total (and activate trigger)
  totalGSum = totalGSum + gSumArray[readIndexY];
```



```
  // advance to the next position in the array:
  readIndexY++;

  // if we're at the end of the array...
  if (readIndexY >= numReadingsY) {
    //return to the start of the array
    readIndexY = 0;
  }
  if (effectTrigger == 1) {
    effectTimer++;
  }
  cyclesCounter++;
  // calculate the average:
  averageGSum = totalGSum / numReadingsY;
  //Calculate the output value directly scaling from the inputted
rotational movement
  hapticValue = map(averageGSum, .5, 15, 10, 110);

  //This loop activates on of 3 effect levels based on the last 50
 samples of rotation data after a triggering event
  while (effectTrigger == 1) {
    if (averageGSum >= rotationThresholdHigh && gSumArray[readInde
xY] >= rotationThresholdHigh && cyclesCounter >= 25) {        //aS
um >= accelerationThresholdHigh ||
      drv.setMode(DRV2605_MODE_INTTRIG);
      Serial.println("Activating High Threshold Effect!");
      //Serial.println(aSum);
      //Serial.println(gSum);
      // Execute vibration pattern
      drv.setWaveform(0, 88);  // Transition Ramp Up Long Sharp 1
- 0 to 100%
      drv.setWaveform(1, 28);  // Short Double Click Strong 2 - 80
%
      drv.setWaveform(2, 14);  // Strong Buzz - 100%
      drv.setWaveform(3, 44);  // Long Double Sharp Tick 1 - 100%
      drv.setWaveform(4, 58);  // end of waveforms
      drv.setWaveform(5, 0);  // end of waveforms
      drv.go();
      delay(4000);
      drv.setMode(DRV2605_MODE_REALTIME);
      // reset the sample read count
```

```
      effectTrigger = 0;
      effectTimer = 0;
      cyclesCounter = 0;
      for (int i = 0; i <= yDim; i++) {
        gSumArray[yDim] = 0;
      }
      averageGSum = 0;
      //totalGSum = 25;
    }
    else if (cyclesCounter >= yDim) {
      Serial.println("Activating Scaled Vibration Feedback");
      drv.setRealtimeValue(hapticValue); //setRealtimeValue operat
es on a scale of 0 - 255 - however, because the function works wit
h 2's complements what I found was that 127 corresponds to max int
ensity, rather than 255.
      //Serial.println(aSum);
      //Serial.println(gSum);
      // Execute vibration pattern
      delay(20);
      // reset the sample read count
      effectTrigger = 0;
      effectTimer = 0;
    }
    else {
      Serial.println("Avoiding Activation: Cooldown Period");
      drv.setRealtimeValue(0);
      effectTrigger = 0;
      effectTimer = 0;
    }
  }



  // send it to the computer as ASCII digits
  Serial.print("g Average");
  Serial.println(averageGSum);
  delay(20);        // delay in between reads for stability
}
```

Appendix G - Workshop Prototype Evaluation



Prototype Evaluation

ROTATION

Likes

There is a "challenge" to it, to "wind it up" as much as possible

the vibration sound element is kind of soothing and feels alive

"I like how the vibration stays on after a while"

Makes me want to shake it wildly (with an "agree" from other participant"

Reacts on movement, not just shaking

I like the pattern of vibration when rotating it a lot

Analogous Sensory Experiences

vibration becomes "itchy" after a while (x2)

"dynamo squeeze lamp" or "knijpkat"

I am waiting for it to vomit

the accelerator of a motorcycle or scooter

feels like the purring of a cat when petting it

Like petting a cat and feeling vibration while stroking back

Dislikes

it takes two hands to fidget properly

Wish that the sensor and feedback were integrated into the same ball

Wish it was more sensitive to gentle touch

Only one hand vibrates, misbalanced

took a while to figure out, would be nice to have set axis for rotation sensing

Emotion Elicitation

The sound is like that of a dying frog → "disturbing"

Also gives audio feedback (because of motor used and ball material) → "makes me uncomfortable"

the vibration sound element is kind of soothing and feels alive

"I want to play with it gg"

Requires more attention than "passive" fidget objects

Playfulness makes me want to move as little as possible to get feedback

"funny feeling" and makes me happy

Want to either caress it or shake violently, two extremes only

Appendix H - Workshop Breaching Exercise

Breaching IN-PERSON

Product Traits and Characteristics

pen clicking (loud repetitive sound)

knocking/ drumming on table with fingers

Produces "anxious feeling" and "infectious energy"

sound notifications

shaking / vibrating legs continuously

people writing or scratching

buzzing noises

not making eye contact

Chewing gum

Important to interact visibly with others in space, not device

organic noises

Related Social "Norm"

Disturbing others (concentration) in a calm or quiet environment

potentially demonstrates lack of interest

makes people nervous if they see someone doing it

Not moving forcefully in a connected seating arrangement (bench, lecture hall row)

Cultural aspect: Korea - "lose your luck when you shake your leg"

Japan - "shaking your leg is something a poor person does"

damaging tables or others property

Correlates with sound of bugs

bugs not good inside & professional contexts)

Be mentally (and physically) present during a conversation

distracting, elements of private and "gross"

Breaching

ONLINE

Product Traits and Characteristics

- Answering/ responding to phone call
- notification sounds or on screen notifications
- accidental muting or unmuting (zoom)
- interaction requires vision (away from screen)
- repeated muting and unmuting constantly
- "ummm" over and over
- repetitious "tics" that break flow of communication
- opening/ closing computer windows with different brightnesses
- visible change to environment around meeting participant
- furry friend (pet)
- distracting thing (also desirable)

Related Social "Norm"

- making sounds when you're supposed to be quiet
- Not looking at the screen or "seeming distracted"
- Being annoying
- Wasting time (get to the point!)
- One should pay attention (or at least pretend to!)
- Object/ interaction inspires jealousy