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'Squeaky/Pain': Cultivating Disturbing Experiences and Perspective Transition for Somaesthetic Interactions

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'Squeaky/Pain': Cultivating Disturbing Experiences *and* Perspective Transition for Somaesthetic Interactions

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ABSTRACT

Through an exemplary design case study, we look at how mediating bodily disturbances and cultivating perspective transition from first-to second-person perspective amplifies somaesthetic awareness. The paper focuses on the less explored aspect of soma design, which is the mediation of disturbing experiences that disrupt the everyday flow i.e., pain. The design process illustrated a transition between first- and second-person perspectives to cultivate and externalize the experience with pain as a wearable bodily interaction. The externalized pain experience was translated into an interactive wearable, 'Squeaky/Pain', that augments the wearer's somaesthetic awareness via sound, tactile, and kinesthetic sensations. This paper makes two main contributions to soma design: introducing the implications of disturbing experiences for augmenting somaesthetic awareness and exemplifying how inner bodily disturbances can be materialized through the cultivation of first- and second-person perspectives.

Keywords

First-person perspective

Second-person perspective

Soma design

Felt experience

Interactive wearables

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I INTRODUCTION: AUGMENTING SOMAESTHETIC AWARENESS THROUGH BODILY ENGAGEMENTS

Somaesthetics is concerned with sensory appreciation and the cultivation of lived bodily aesthetic experiences. It is a disciplinary proposal that involves the ways of living better lives by the improvement of experience and the use of soma, i.e., the sensory body. As Shusterman says,

> Just as skilled builders need expert knowledge of their tools, so we need better somatic knowledge to improve our understanding and performance in the arts and human sciences and to advance our mastery in the highest art of all-that of perfecting our humanity and living better lives. (Shusterman, 2006, p. 2)

Drawing on the somaesthetics concept of Shusterman, Schiphorst (2009) presents design strategies as a framework of somaesthetics for interaction design. Somaesthetics is often examined by designers in the fields of Human-Computer-Interaction (HCI) and interaction design (Aslan et al., 2016; Hendriks et al., 2021). Höök (2018) established a theoretical framework called 'soma design' that considers designing interactions for the soma.

     With the surge of designing for bodily interactions, various researchers have implemented somaesthetics and soma design in their research, establishing a profound portfolio within these fields. One area of research is the

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somaesthetics of tactile sensations (see Höök et al., 2015; Maranan et al., 2020; Schiphorst, 2009; Schiphorst & Seo, 2010). Alfaras *et al.* (2020) study biodata as soma-data. Aslan *et al.* (2020, 2016), Höök *et al.* (2015), and Tsaknaki *et al.* (2021) apply physiological and biological data for somaesthetic interactions. A common aspect of these examples is that they mediate comfortable interactions. Differently, Tennent *et al.* (2020) apply uncomfortable physical experiences as part of their project. Although existing research on soma design and somaesthetic interaction mostly focuses on pleasurable experiences (Tennent et. al., 2020), Höök (2018), based on Shusterman's somaesthetics account, suggests that soma design does not necessarily focus on pleasurable interactions. According to Shusterman (2019), somaesthetics aims at improving the perception, namely the perception of bodily feelings, to appreciate our pleasant and disturbing feelings. Thus, by perceiving discomforting and negative feelings one can improve bodily knowledge and sharpen awareness (Shusterman, 2019).

      The design process presented in this article focuses on bodily disturbances, such as pain, that disrupt the body's everyday flow. The design process explores the modes of designing with chronic pain as a bodily disturbance and converts pain into a tangible and embodied interaction to promote somaesthetic awareness. It examines the unhabitual ways of interacting and moving with pain. An interactive wearable artifact called 'Squeaky/Pain' emerged from the design process, which is considered as a soma extension. This paper describes the design process of 'Squeaky/Pain', which combines first- and second-person perspectives to cultivate the felt experience of pain and convert it into a soma extension. This project contributes to soma design and somaesthetic interactions by introducing the implications of disturbing experiences for augmenting somaesthetic awareness and exemplifying how inner bodily disturbances can be materialized through the cultivation of first- and second-person perspectives.

THEORETICAL BACKGROUND: CULTIVATING FELT EXPERIENCE FOR/WITH/THROUGH THE MOVING BODIES

Through the living and moving bodies, humans interact with the world and meaning arises from this interaction (Massumi, 2002; Merleau-Ponty, 1962; Sheets-Johnstone, 2010). Meaning-making through bodies suggests that moving is a fundamental notion for perception. Merleau-Ponty (1962) discusses from the phenomenological perspective that rediscovering the self is possible via remaking contact with the bodies, as perception happens via moving bodies. Similarly, Sheets-Johnstone writes that "an enhanced sense of agency is related to enhanced kinesthetic awareness" (2010, p. 123). Various HCI researchers and interaction designers have worked with the concept of designing for, with, and through the moving bodies by drawing inspiration from Merleau-Ponty's and Sheets-John-

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stone's phenomenology (Höök, 2018; Svanæs, 2013; Wilde et al., 2011, 2017). Additionally, Shklovsky's concept of 'defamiliarization' inspires movement-based design methodologies (Newton, 1997), for instance, 'Moving and Making Strange' (Loke & Robertson, 2013). Similarly, Wilde *et al.* (2017) discuss 'estrangement' as a concept to be implemented in embodied design ideation methods.

Haines (2015) suggests that learning to move, think, and feel in different ways can promote our ability to learn by going beyond habitual patterns. The concept of defamiliarization suggests that by engaging with unhabitual movements one can alter the perception and understanding of oneself and the world. The project presented in this paper offers a movement-based interaction with pain that is mediated via a soma extension. By defamiliarizing the notion of pain and providing a place to engage with different bodily movements via an interactive soma extension, the project aims for augmenting somaesthetic awareness. Sheets-Johnstone (2010) argues that by being aware of movement one can develop a living sense of their 'I can' (e.g., I can dance, I can calculate); thus, the perception of the body shifts accordingly. Drawing on Sheets-Johnstone's argument, in engaging with unhabitual bodily movements via 'Squeaky/Pain' one can sharpen the bodily awareness. Hence, this can help the wearer to develop an 'I can' attitude regarding how they cope and move with the pain.

The movement-based engagement of 'Squeaky/Pain' offers a sound-motion interaction. 'Squeaky/Pain' generates two different sounds: one mimics the experience of pain, the other mimics the experience of pain relief. The volume of the sound responds to the wearer's body movement: slow movement decreases the volume of the disturbing sound but increases the volume of the pleasant sound. Shusterman (2019) introduces Burke's term of 'relative pleasure' — in other words 'delight' — which is the pleasure that emerges with the relief of discomforting experience. By mimicking the alleviation of pain, 'Squeaky/Pain' generates 'relative pleasure' as an instance of somaesthetics of bodily disturbances. The design process of the prototype consists of the engagement of unhabitual movements for the cultivation of felt experiences from first- and second-person perspectives, which are described in-depth in the next sections.

METHODOLOGY: TRANSITIONING BETWEEN FIRST- AND SECOND-PERSON PERSPECTIVES IN SOMA DESIGN

This research inquiry is situated in the context of soma design (Höök, 2018) and is driven by a 'research through design' approach (Savic & Huang, 2014; Zimmerman et al., 2007). In this inquiry, 'Squeaky/Pain' is a design artifact that emerges as a materialization of felt experiences from first- and second-person perspectives. The design process of 'Squeaky/Pain' arises from the first author's (who will be referred to as 'the designer' throughout the text) experience of pain and

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its analysis from the first-person perspective. First-person perspective has been applied in both interaction design and HCI by several researchers (Desjardins & Ball, 2018; Tsaknaki, 2021; Zhang & Wakkary, 2014). Devendorf *et al.* (2020) present a method based on a first-person perspective to gain an understanding of difficult experiences. In soma design, it is important to cultivate the subjective felt experiences for developing an understanding of the soma to design somaesthetic interactions. Höök *et al.* (2018) discuss that the cultivation of first-person experiences of the designers, who wish to design for bodily engagements, can provide a better understanding of the lived bodies. Carefully translated, first-person experiences have a great potential to meaningfully resonate with others (Núñez-Pacheco & Loke, 2020) and provide an extensive contribution to the design outcomes (Smeenk et al., 2016). The acquisition of first-person somatic experience sets a base for somatic understanding and makes it possible to test the designed products in the early phases of the design process. However, generalizations cannot be done merely with the first-person perspective approach due to the possibility of people's unexpected engagements with the products; therefore, broader testing may inspire new realizations (Neustaedter & Sengers, 2012).

'Squeaky/Pain' dynamically applies first- and second-person perspectives, which requires rigorous observation and reflection upon those observations during the research process. This corresponds to Schön's 'reflective practice' (1995), suggesting that to utterly understand what a person knows in action, one should observe their experiences and reflect upon them. Swann (2002) discusses that Schön's notion of reflective practice leads to action research where planning, acting, observing, and reflecting happen sequentially. In a soma design context, the designer responds reflexively *in* and *on* the actions of the research. The importance of reflexivity refers to the continuous exploration of the research assumptions, its influence to shape the research actions, interpretations, and the generation of knowledge in action research (Given, 2008).

The design research process of 'Squeaky/Pain' unfolds in three phases where the designer moves between first- and second-person perspectives to cultivate the felt experience of pain and to materialize it as a tangible interactive wearable — a soma extension. The first phase includes the first-person somatic inquiry of the designer to understand the pain and to produce design ideas and visuals for the soma extension. The second phase comprises a study that explores the effects of the soma extension on other people's lived experiences. The study includes participatory design actions of users in relation to the first design prototype after it is completed. This phase of study follows the definition of participants in Ehn's (2008) meta-design in which both users and designers can be considered co-designers even though they participate in design actions that take place in different time and space. In the third phase, the soma extension is rede-

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signed based on participants' feedback that is then tested on the designer's body to conclude the study.

In the creation of the soma extension that aims to act as an extension of the body, various textiles were selected for use, based on their technical and expressive qualities. Thick felt fabric was utilized as the base material to prevent sagging due to the weight of electronic components fixed to the soma extension. The surface was made of neoprene fabric, which does not fray. Other material choices were selected following the designer's expression of her own pain in a three-dimensional form. For example, in both prototypes, the designer utilized thin black and red stitched lines at the edges of the artifact to reflect the subtle experience of pain. Transparent stockings were used in both prototypes to reflect the ugliness of the pain experience. Needle felted layers on the arm were created in the first prototype to reflect the longing for comfort that exists in the relief of pain. In what follows we present the three-folded design process of 'Squeaky/Pain'.

PHASE 1: EXPLORING DESIGNER'S LIVED BODILY EXPERIENCE

Phase 1 aims to inform the design idea and produce visuals for the soma extension. Pain was the bodily disturbance selected for exploration in this design case because the designer was experiencing upper back pain, which made it impossible for her to focus on any other bodily experiences. The design process started with a movement experiment. The designer, who is also a yoga instructor, prepared a yoga sequence that helped to relieve the pain. The sequence consisted of various slow movements of arms and shoulders in synchronization with breathing, which was daily performed by the designer for three weeks. During the movement practice, the designer kept a journal to document the felt experience (Figure 1). Upon the completion of the movement experiment, a somatic experience map was drawn informed by the journal to communicate the essential aspects of the felt experience (Figure 2). During the movement practice, the sound created by the joints on the painful side of the body became an apparent aspect of the somatic experience of pain. Additionally, as the body was moving, in each pose there was a strong feeling of expansion and stretching that provided relaxation. While performing the poses, moving in synchronization with breathing was important for promoting awareness of each little movement in the body and helping to keep the focus on the bodily experiences throughout the practice. The location of pain was another essential aspect of the experience. The intensity of the feeling of pain changed each day but it was always present at its location.

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You are like a heavy weight on my left shoulder.....pain is changing its form and turns into a knot where it exists, creates a tension. Although, I might say it is easier to deal with this version than before.

How do you cope with the pain? How can I?

Figure 1: Extracts from the journal. Photograph: Arife Dila Demir.

sound of the pain
where is the pain?
streching-lengthening
flow of the breath
expanding areas
abstract form of body in movement
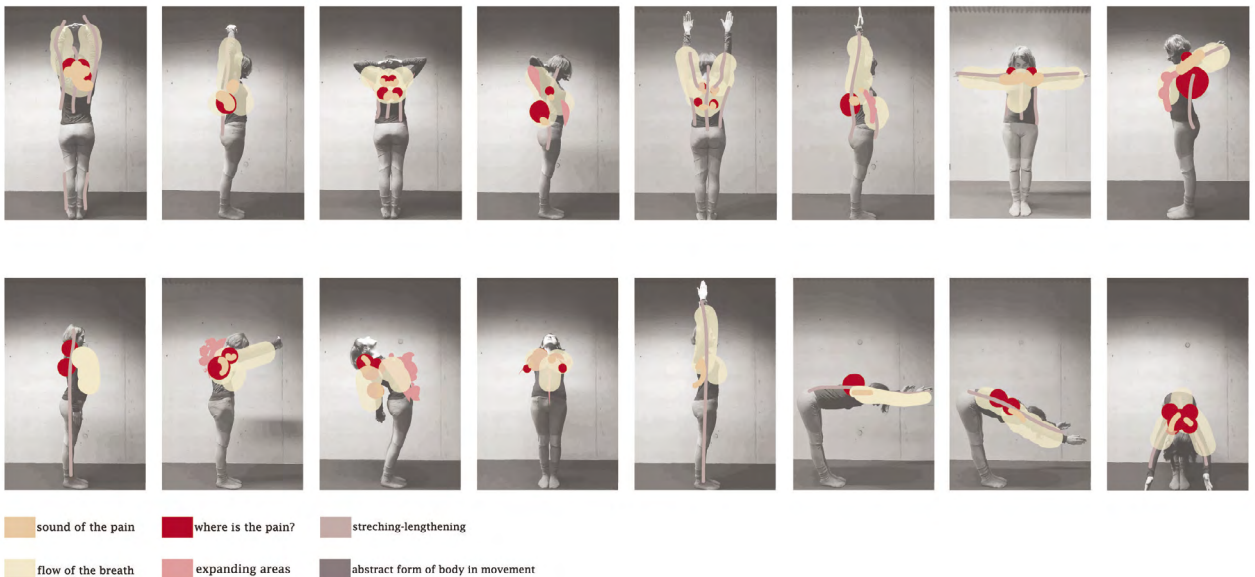
Figure 2: Somatic experience map. Illustrations: Arife Dila Demir.

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> Practice is much easier now, the sounds that were coming within my body decreased and this makes me feel more positive. Sounds were extremely disturbing; I was feeling myself as an old wooden house that squeaks all the time. (Extraction from experiment journal, 22 November 2019)

The somatic experience map and the real-scale body map (Figure 3) on which the designer reflected her felt experience of pain informed the shape and the interactive qualities of the soma extension. In other words, the shape, form, and material choice of the artifact are the visualization of the designer's pain experience. For instance, the expansions and stretching qualities mirrored as a textured extended skin with the choice of material. As reflected in Figure 3, the pain radiated from the right scapula to the left shoulder; hence, the location of the pain informed the shape of the wearable. The first translated aspect of the felt experience was the unpleasant sound of squeaky wood, which emerged as an essential aspect during the movement experiment. This disturbing sound was employed for the movement interaction. Accordingly, 'Squeaky/Pain' emerged as a soma extension, which is the materialization of the designer's pain and mediates a sound-motion interaction (Figure 4). When worn, it generated a squeaky wood sound that could not be switched off, but its volume could be turned down when the wearer was moving slow. The annoying sound of 'Squeaky/Pain' motivated the wearer's slow bodily movement, and when such movement could lower the volume of the sound, the wearer felt that they could overcome their bodily disturbances. Various psychological approaches for pain treatment suggest the acceptance of pain as a first step for dealing with it in contrast to the ineffective attempts of avoiding it (McCracken et al., 2013; Trompetter et al., 2015). Inspired by the designer's experience and the above psychological approach, pain became 'material' for designing the soma extension. 'Squeaky/Pain' created a tangible interaction of pain by mimicking pain's qualities. It focuses on creating a different way of perceiving pain rather than suppressing it.

PHASE 2: CULTIVATING SOMATIC EXPERIENCES

Phase 2 was a study that utilized 'Squeaky/Pain' to cultivate the felt experience of people. The study aimed to gain information about people's somatic experiences that might help further develop the artifact. To recruit participants for the study, an open call e-mail was sent to three universities in Tallinn, Estonia. The participants responded to the open call by first filling out an online questionnaire to provide information regarding their pain history. Their responses were reviewed to determine how they could fit within the scope of the study. Three participants were chosen to take part in it, all having chronic pain in the upper back area of the body. The three participants will be referred to as P1, P2, and P3.
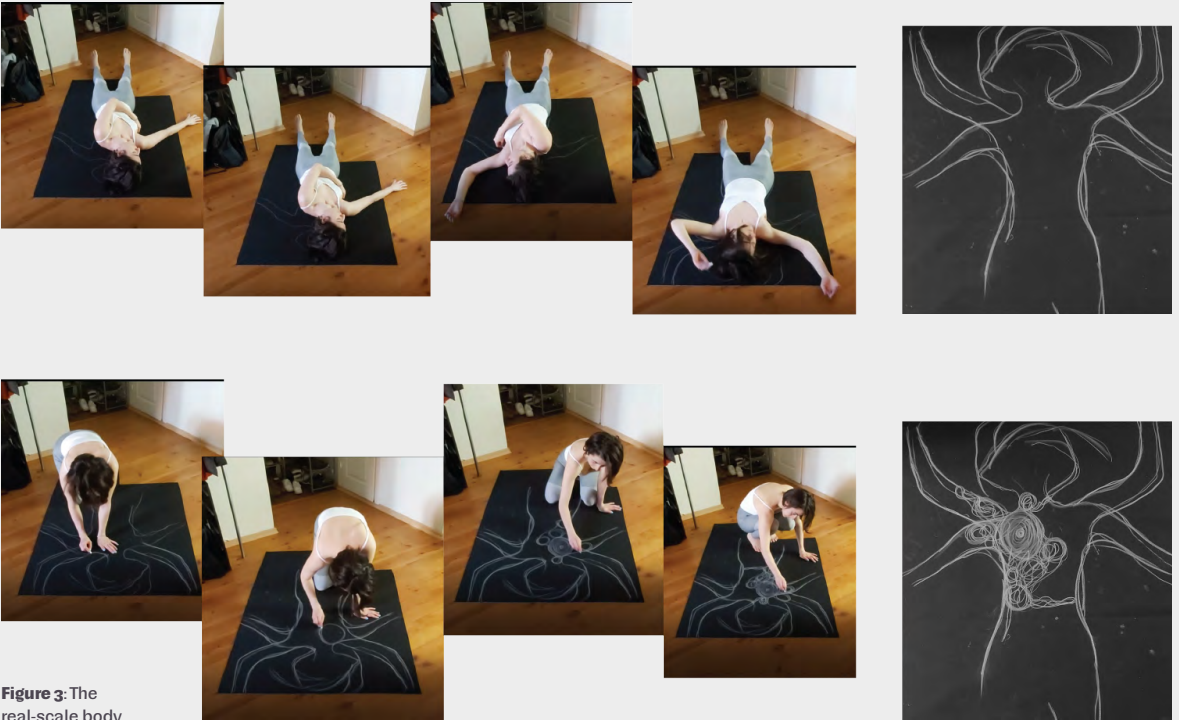
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Figure 3: The real-scale body map as a visual expression of the designer's bodily pain later translated into the prototype. Photographs: Arife Dila Demir.

Figure 4: First iteration of the 'Squeaky/Pain' prototype. Photograph: Mehmet Can Boysan.

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The study was conducted as one-on-one sessions, each lasting one hour and a half. The sessions consisted of four stages: (1) in-depth interviews and drawing body maps; (2) guided movement and breathing exercises; (3) non-guided movement with the soma extension; and (4) in-depth interview and drawing body maps. The first stage aimed to understanding the participants' body perception of pain and their pain experience. The second stage aimed to bringing their focus to their bodies before wearing the soma extension. The third stage allowed the participants to use the soma extension without any guidance. The fourth stage aimed to revealing their experience with 'Squeaky/Pain' and its influence on their body perception. Both interview sessions were voice recorded and the third stage was video recorded.

The study revealed two main roles of the soma extension. First, it resonated with the participants' pain experience. Second, it augmented somaesthetic awareness. Table 1 shows how these two roles emerged from the reflections of the participants.

Table 1: **Reflections of the participants regarding the influence of the soma extension on their lived bodily experience**

	P1	P2	P3
Resonating with people's pain	*Louder sound [is] what I feel, what I feel inside. [It is] like my migraine and cervical pain.* *It was more like a mutual relationship. I felt more in control when the sound was less loud [than] when it was louder, I was paying more attention to it, and it was in control.*	*Where it [the soma extension] touches locally on my body, there was a feeling of pulling, I identify it with the pain experience.*	*Sounds [were] like squeaky trees and it was like [the feeling of] stuck, like your joints are cracking. It was like [my] body is talking to me. (...) I [was] curious about the sound. It symbolizes stiffness like pain.* *I did not feel like that it was controlling my body, it was a mutual interaction.*
Somaesthetic awareness	*Some parts I felt relaxed and tr[ied] to concentrate on [my] breathing. Sometimes the feeling was natural and comfortable. [The] tension on [my] shoulder was going down but sometimes it was going up. (...) I wanted the sound [to] stay in a less loud[er] [level] but I did not understand that it was connected to my movements.*	*I felt that it was tight, it was kind of restricting the movements. (....) The sound was incredibly unpleasant and like it was depressive; so, I wanted to walk towards the window to see outside, to be opened.* *I focused on the extension and the sound to understand the working principles.*	*It works more on the positive side regarding reminding pain, the dense and stiffness of it. It creates [an] urge for movement. When I have pain very intensely, I feel very stiff. And this experience took away the attention from the pain and carried it to the movement.*

These statements correspond to direct quotes taken from the second interview, where participants answer questions regarding their experience with the soma extension.
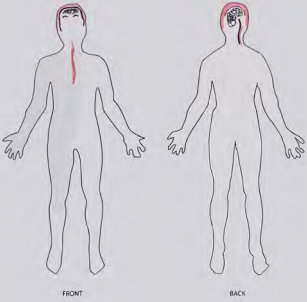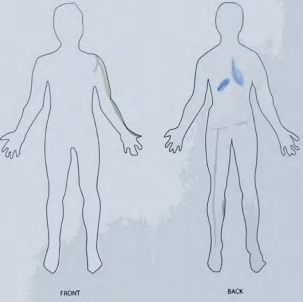
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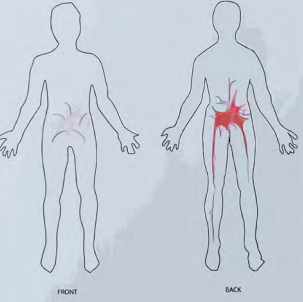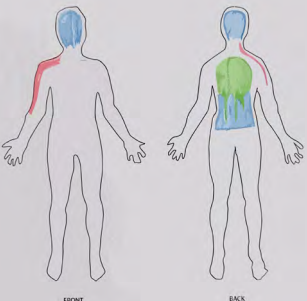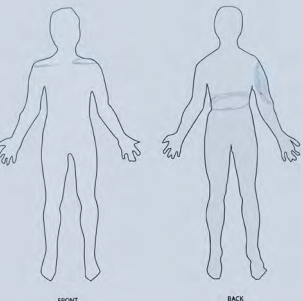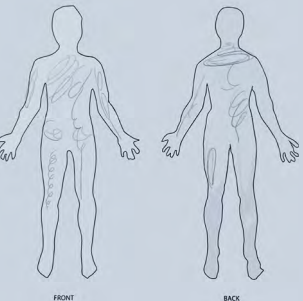FOR SOMAESTHETIC INTERACTIONS

By influencing the participant's body perception with its tactile and audible qualities, 'Squeaky/Pain' mimicked the pain experience and promoted somaesthetic awareness at different levels for each participant. As explained in Phase 1, the materialization of the artifact is the visualization of the designer's pain; thus, possible tactile qualities of it were out of focus. However, what is worn on the body inevitably stimulates tactile sensations. For example, for P2 tactile sensation was restrictive as the soma extension was tight for his body, which influenced his movements. On the contrary, for P1 and P3 tactile sensations were rather evoked as pleasant; especially P3 felt like it was a warm layer of her body. By somaesthetic awareness, the project aimed at promoting inward focus and mutual interaction between the body and the soma extension that mimics the pain. As shown in Table 1, P3 focused on her bodily movements during the interaction while P1's attention was shifting interchangeably from the sound to her bodily experiences. On the other hand, P2 mostly focused on the working principles of the extension rather than on his bodily experience. This refers to the synchronization of sound feedback requiring fine adjustments in order to guide them so that they focus on their bodily experiences. Additionally, all participants agreed that they did not feel losing control of their bodies to the soma extension. Instead, it promoted the feeling of moving in synchronization with the soma extension. This feeling was an essential feeling that 'Squeaky/Pain' aimed to mediate, as chronic pain patients tend to feel the pain overtaking the control of their bodies.

In addition to the interviews, participants filled body maps during the first and the second interview (Table 2) to capture the intangible aspect of their bodily experiences. The first body map reflects their bodily experience when the pain was active and the second one reflects their bodily experience of wearing the soma extension that mimics the pain. As illustrated in the second body map, P1 and P2 mainly focused on the points where the artifact was touching their bodies, meaning that their tactile experience was highly impactful. Whereas P3's drawing covered almost all parts of the body. She mentioned while drawing that the experience with the soma extension was a full-bodied experience "first I moved with my upper body but then my legs wanted attention."

To sum up, the study indicated that 'Squeaky/Pain', which was designed based on the pain experience of the designer, can resonate with others' pain experience and augment somaesthetic awareness at different levels. In this phase, the soma extension was utilized as a tool to cultivate the participants' felt experience that might subsequently help to improve the prototype. Two significant concepts emerged from this study: incorporating pleasant sound feedback and scaling down the prototype to keep the tactile sensation on the painful area. Despite squeaky wood was the only sound generated by 'Squeaky/Pain', two participants stated that for a little while the sound was like a sea sound, which they associated

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with relaxation. Considering this, for the second iteration of 'Squeaky/Pain', a relaxing sound feedback was incorporated. While all participants focused on the prototype's tactile sensations, they might cause distraction in some participants. Therefore, it was decided that for the second iteration the size of the soma extension would decrease so as to keep the focus on the painful area.

Table 2: **Body map drawings of the participants during Interview 1 and Interview 2**

BODY DRAWINGS	P1	P2	P3
Body Map 1 Participants' drawing of their bodily pain experience before wearing the soma extension.			
Body Map 2 Participants' drawing of their bodily experience after wearing the soma extension.			

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PHASE 3: RETURNING TO THE DESIGNER'S FIRST-PERSON EXPLORATION

The third phase is the second design iteration of 'Squeaky/Pain' (Figure 4). The second iteration was informed by the study and the resulting prototype was tested on the designer. Three alterations were applied to improve the prototype: (1) fine-tuning the synchronization of the sound feedback; (2) incorporating a relaxing sound feedback; and (3) making the soma extension smaller in size.

Firstly, an atmospheric sound was incorporated to the disturbing squeaky wood sound to mimic the pain relief, and then the sound-motion interaction was synchronized. In this version, sound-movement interaction lasted nine minutes in total. Similar to the first artifact, a disturbing squeaky wood sound was generated in the first seven minutes where the body needs to move slowly in order to keep the volume down. In the last two minutes, the relaxing atmospheric sound started and this time the volume was down. To hear the relaxing sound, the body needs to move slowly again. Secondly, the visual form of 'Squeaky/Pain' was redesigned to keep the focus on the exact painful spot, specifically on the right scapula. The material and texture of it were constructed as a tangible reflection of the designer's pain experience. The same four-step structure as used in the study was followed to conduct the test on the designer. Additionally, self-interviews were voice recorded, and moving with the soma extension video recorded.

> Sounds like my body was talking to me. When the sound was louder [in the first part], it was annoying. In the second part [two minutes of calming sound] I wanted to hear the sound more, it was even good when it was less loud. I was more in the realm like I am moving and there is this nice sound that accompanies my body. And as I'm moving it is responding to me. So, it was like how I respond and how it responds to me. (Self-report, Interview 2)

The designer stated that "I was assuming that my knowledge of the soma extension would influence my experience with it, so, I would focus on moving correctly rather than exploring various movements by focusing on my bodily experiences." Yet, despite that, she stated that the movements occurred naturally, and she solely focused on her bodily experiences. As illustrated in the above quote, the loud unpleasant sound was grabbing her attention until she was able to focus on her body movements and find slowness in them which helped to decrease the volume of the disturbing sound and increase that of the pleasant one. Additionally, she reported that the pleasant sound feedback with the disturbing one, augmented the complementary experience of pain from agony to relief. Thus, it was possible to experience all levels of pain in an unusual way which provided new understandings of the body.

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Figure 5: The designer wearing the prototype after the second iteration. Photograph: Mehmet Can Boysan.

DISCUSSION AND CONCLUSION

In this article, we have presented a project that is set up in the context of soma design and transition between first- and second-person perspectives. As stated in the literature review on soma design, not only does somaesthetics focus on the mediation of pleasurable experiences, but it also considers discomforting bodily experiences (Höök, 2018; Shusterman, 2019). However, pleasurable experiences have dominated the field of soma design to date, and little attention has been given to disturbing experiences. Hence, 'Squeaky/Pain' proposes that somaesthetic awareness is possible to achieve with the mediation of disturbing experiences. Benford *et al.* (2012) discussed that those uncomfortable interactions may naturally promote inward focusing. The design process of 'Squeaky/Pain' combines first- and second-person perspectives to cultivate and externalize bodily disturbances. The study illustrates how detailed cultivation of the first-person felt experience can inform the design process of bodily interaction. Neustaedter and Sengers (2012) discuss that, when the designer has the 'genuine need', which refer to when the designers need the artifact that they design also for themselves, their subjective experiences can extensively inform the study. This article stipulates that the soma extension designed based on the first-person experience of the designer can echo with other people's pain experiences. This suggests that an understanding of bodily experiences can be shared and that rigorously translated subjective experiences can be influential on other people. Complementing the knowledge gained via the first-person experience with the second-person perspective can elevate the impact of the design outcomes.

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The design process of 'Squeaky/Pain' revealed ways in which the felt experiences of bodily disturbances can be cultivated from first- and second-person perspectives. We discuss particularly two aspects of movement and body maps that enable the cultivation and materialization of bodily disturbances. The use of bodily movements provides access to bodily experiences. Wilde *et al.* (2011) discuss that one can easily escape from one's body as it is so natural to be in the body and that one can reconnect with the body by focusing on movement. It is significant for oneself to gain a different perspective to be aware of and appreciate bodily experiences. With this study, we argue that to be able to experience the bodily disturbances from a different perspective, one needs to move differently, and various somatic movement practices, such as yoga, enable one to achieve a different perspective on the body. There is a need for the physical translation of the felt experiences when aiming to design tangibly embodied interactions. As a first step for the translation, we present the body map as a visualization tool. Body maps enable the visualization of the felt experiences when written or spoken language is not sufficient to reveal the intangible aspects of felt experiences (Gastaldo et al., 2018). It is not new to use body maps; however, often the same abstracted body images are used. In the presented study, body maps are drawn in three different forms: (a) on the whole-body photo of the person (Figure 2); (b) directly drawing one's own body in real scale (Figure 3); (c) as standardized body maps (Table 2). We would argue the application of first and second forms provides much more expression rather than being limited inside the edges of common body maps. Felt experiences are special to the subjects; it is significant to provide a personalized tool that the subjects can relate to their bodily existence. Thus, personalized body maps as in first and second forms would be beneficial to better capture and express the intangible aspects of felt experiences.

The question raised by this study is how disturbing experiences can mediate somaesthetic awareness and how first- and second-person perspectives can be used for cultivating and materializing the felt experience of bodily disturbances. 'Squeaky/Pain' is an example of how somaesthetic awareness can be augmented by disturbing bodily interactions. By doing so, we aim to start a conversation for the future exploration of mediating disturbing bodily experiences in soma design and somaesthetic interactions. Accordingly, by depicting the design process of 'Squeaky/Pain' we illustrate how bodily disturbances can be cultivated, materialized, and converted into a bodily interaction by the application of first- and second-person perspectives. ◧

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