SOMA LITERATE DESIGN

Recentering the Interstitiality of Experience

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I pick up my foot to take a step forward.
I tip my body weight forward.
For a split moment I am in free fall,
yearning toward the soft earth,
expecting it to catch me,
allowing my forward trajectory to
continue uninterrupted until
I come to rest in the step.

Abstract

The domain of Interaction Design (IxD) strives for rich interactions yet continues to work with both a shallow definition of gestalt experience and a meager palette of experiential variables from which to pull. The presence of the body in human experience is noted, but poorly understood or utilized when making design moves. Through a turning of attention to the visceral variables of experience, this thesis presents the first comprehensive definition and taxonomy of *Soma Literacy* to reveal an expanded palette of variables to the design fields. Interventions into worlds through such a tactile and personal lens challenge many entrenched beliefs and reframes the very nature of interaction and experience. This new framing and set of priorities applicable to designing for engagement of the felt-sense provides both a timely provocation, and a much-needed practical aid to designers and educators.

Influenced by interaction aesthetics, somaesthetics, pragmatic philosophy, and the theoretical and pedagogical principles of Émile Jaques-Dalcroze's Eurhythmics, I present the sentient body (soma) as the core of experiential perception. I introduce the *soma tier* of experience and discuss to what extents Design can offer interventions to reveal, nudge, magnify, or diminish experiential gestalts through the manipulatible variables of the *soma tier*, thus offering interaction design not just a renewed and expanded palette, but also a clarification of the fundamental palette of human interaction factors. The human experience is analog. It is the actual, visceral, flesh and bone, breathing, beating body that is the only translator of experience that we possess. It is only through this lens that we might come to know and thereby design meaningful interactions.

This thesis re-presents the feeling body as the single fundamental constant for IxD, a playground for all participation, engagement, and felt-experience. *Soma Literacy* is introduced as an encompassing and organizing field of study that frames this renewed attention and offers a path to analyze, interpret, reveal, and make meaning through the bodied content present in experience.

Authorship attribution

This thesis contains material from the following pre-published papers:

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Roles: Stephen Neely designed the studies, performed data analysis, generated categories, collected and organized the materials, and wrote the manuscripts. Supervisors Jonathan Chapman, Dan Lockton, and Cameron Tonkinwise assisted with proofreading and feedback on the overall manuscript, which includes aspects concerning content, structure, conceptual and theoretical framing. Jonathan Chapman, Dan Lockton, and Cameron Tonkinwise were all three invaluable as sources of guidance, provocation, and encouragement as I wrestled with these ideas over the past five years.

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Propositions accompanying this thesis

The knowable world...is the human body's world, and only those elements that have some kind of affinity to the human body can enter it. (Todes, 2001, p. 42)

Soma Literacy first principles

1. As living beings we are, by our very nature, dynamic (always in motion).
2. All experience must engage the kinaesthetic sense to be recognized.
3. The kinaesthetic sense can only recognize natural shifts of weight.
4. Any designed experience that loses or severs a natural shift of weight will register as inauthentic.

Grounding Premises

1. The body is the first instrument (Émile Jaques-Dalcroze & Rothwell, 1930).
2. The body feels. We come to know our world through the immediate tangible interactions with our environment (Lakoff & Johnson, 1999).
3. Feeling is only revealed through motion.
4. We yearn for harmony with our world.

Starting with these biases, one can ask questions about designerly attentions:

1. When is the body ignored?
2. When is the life experience assumed to be static?
3. How do we foster or reveal the kinaesthetic arc of experience?
4. How might we reveal the hidden momentums, making real that which was previously non-existent?

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1.0

INTRODUCTION

1.0 Introduction

The domain of Interaction Design (IxD) strives for rich interactions (Frens, 2006) yet continues to work with both a shallow definition of cohesive experience[1] and a meager palette of experiential variables from which to pull. IxD claims to recognize bodies as useful variables in designed interactions (as in haptics, AR/VR, and as a source for data, i.e. Fitbit or gestural interfaces), and it also makes mention of time as an obvious dial to turn in any planned engagement (as in the tempo of a Service Design, or more commonly in the removal of time for speedier feedback loops), but there is an aching emptiness in IxD when one looks for the conversation around bodies+time (as in the attention to an ideal experience of the sentient body). Addressing this gap, this thesis presents research that outlines a vocabulary and palette of experiential variables drawn from the performing arts. There are insights and practices that choreographers, conductors, and stage directors have fostered over ages that both clarify what is at play in any experience as well as specific variables that influence the experience in the participant that can aid in clarifying some of the goals of the Interaction Designer.

In the following document I will present:

a) new literatures curated to speak to IxD (Part II).

b) case studies of teaching the principles from that literature to various kinds of designers and prototyping the principles in an interactive artifact.

c) a summary glossary of new IxD Soma Literacy concepts.

By taking a particular slice of corporeal philosophy and combining it with performance aesthetics this research presents a language that is relevant to interaction design, a language that frames experience as aspiring to a musicality; an idealized, cohesive, whole, moving arc of participation. In short, this musicality is created through the variables of tempo (time), rhythm (as experienced in the body), and phrase (the body+time gestalt, or the body engaged).

1 Cohesive or gestalt experience: "a composition of qualities that 'creates a unified concept, configuration or pattern which is greater than the sum of its parts'" (Lim et al., 2007, p. 1).

1.1 Cohesive Temporal Interactions

Designers are charged with making parts cohere (Campbell, 2013). In the same way that traditional designs are assessed by their ability to create cohesiveness via the multiple parts of the artifact (i.e. how the forms of legs, cushions, materials, and colors combine to create a cohesive chair), I remind the reader that all time-based designs require an identical attention to cohesiveness. In temporal interactions, the variables of body and time must be involved, yet *cohesiveness* is proven in the attention to body+time (the phrase). If one desires to foster a cohesive temporal interaction, they can no more choose touchpoints and tempos independent of an overarching phrase anymore than they would choose random legs and cushions and call it a chair. Yet, in current IxD, language concerning the cohesiveness of the varied experiential variables is absent from the discussion. In this thesis, I present Corporeal Design, a new discourse that leverages Soma Literacy[2] to provide attention, analysis, and language for the cohesion of temporal variables.

Corporeal Design presents a conversation relevant for not only interaction designs but for all designs: Communication, Products, and Environments inclusive. Where the temporal cohesion of a designed engagement in IxD may seem obvious, there are parallel attentions one can benefit from when considering the 2-D, 3-D, the environmental, or systems level change. All designs require the participation of bodies to be enacted. Corporeal Design directs the attention to this basic statement and provides a discourse for future conversation and study.

This thesis investigates the use of body-in-motion awareness and pedagogical interventions which aid in revealing the roots of subjective experience. Pulling theoretical and pedagogical principles from Émile Jaques-Dalcroze's Eurhythmics study and placing an emphasis on the performative, participatory, bodied nature of all interactions, I offer a new framing and set of priorities to consider when designing

2 Shusterman uses the term soma when referring to the body-mind being. As a disciple of Dewey, and greatly influenced by Merleau-Ponty, he regards the corporeal and the cognitive as a unified whole. It is not possible to have one without the other. Throughout this docuent I use the term 'soma' to refer to the "sentient perceiving 'body-mind'" (Neely, 2018, p. 129; Spaid, 2008).

for engagement of the felt-sense. The research questions interrogate the concepts of aesthetics, meaning-making, actors as performers, engagement, and the felt-sense in design as understood through the lens of the moving+feeling body (Soma Literacy) and consider how these attentions can generate techniques, pedagogy, and offerings to design practice (Corporeal Design). The questions were tested through six studies utilizing a mixture of pedagogical, participatory, performative, and auto-ethnographic methodologies.

This thesis re-presents the single fundamental constant for IxD—the feeling body—as a playground for all participation, engagement, and felt-experience. Recognizing the participant not only as a 'user' but as an 'actor/performer' shifts the designerly focus to the individual feeling body. This research presents Soma Literacy as an encompassing and organizing field of study that frames this new attention, and the Corporeal Design agenda, the conscious application of these attentions in the design fields.

1.2 The Project

I started my career as a teacher of music in 1991, specializing in Dalcroze Eurhythmics pedagogy. This specific practice places the body at the center of experience—that is, it assumes that an interaction must be recognized as feeling in the body before the happening can contribute any significance. The pedagogy builds both (1) a keen attention to the feeling body in lived, unfolding experience, and the practice also (2) makes great use of the body-in-motion as an analytical tool to reveal, clarify, vet, and debate the actual happenings of a participatory experience. It is from this background and bias that I began the current investigations.

Utilizing this Dalcrozian frame, I will present and define a variety of concepts including *embodied vs. disembodied*, *experience vs. an experience*, *aesthetic vs. anaesthetic*, *eurhythmic vs. arrhythmic*, *kinaesthesia* and *enkinaesthesia*. I will present a case for these concepts being of great relevance to design practice and design pedagogy, and share the research that brought me to these understandings.

My primary project is to provide the first comprehensive description and taxonomy of Soma Literacy and to clarify the relevance of these ideas to IxD and general design pedagogy. Rather than merely stating that the body matters and the body feels, I am claiming that design of experience designs bodies and will offer specific insight and a conceptual framework for this field of inquiry pulled both from my doctoral research projects and my 25-year career as a specialist in the body-based performance practice of Dalcroze Eurhythmics.

In this thesis I will:

- place Soma Literacy as a relevant study in design practice.
- highlight common somatic gaps in Interaction Design attention.
- share six case studies/investigations that shed light on these gaps.
- present Corporeal Design as a framing to reintegrate the soma into design practice.

The research arc was framed through the following research questions:

1. What variables are present and designable in *an experience*?
2. In what ways is the body[3] implicated in actual experiencing?
3. What might be learned, afforded, or made possible if the body were utilized as an analytical tool?

3 Here I am referring to the literal body, flesh and bone in motion, as opposed to other modes of experience such as the visual, aural, or logical.

Soma Literate Design research time-line

YEAR 1

8.2014	began coursework

YEAR 2

4.2016	Proposed "Soma-Deep" as a new concept of experience
5.2016	Completed coursework
5.2016	Submitted "Corporeal Design" literature review
5.2016	ABD
6.2016	Presented **Bodies-in-action as a Medium of Design** at Design Research Society (DRS 2016)

YEAR 3

9.2016	**"How the body can..."** Vignettes draft 1 completed
9.2016	Soma Literacy **Workshop 1**: Time, Motion & Communication
10.2016	Proposed "Soma-Literacy" as a new field of study
11.2016	Presented **Bodies-in-action as a Medium of Design** to CMU Grad Designers
12.2016	CHI 2017 Soma-Based Design Theory Position Paper Submitted
3.2017	Soma Literacy **Workshop 2**: Environments Studio IV: Designing Environments for Social Systems
4.2017	Completed study #1 of **Fundamentals of Experience** with CMU Design Jr class
5.2017	Attended CHI 2017 Soma-Based Design Theory Workshop
7.2017	**"Soma-Deep as a marker in idealized experience"** AHFE 2017 paper published

Year 4

10.2017	Began **Haptic Enviro-Sensing Metronome** project
4.2018	Completed study #2 of **Fundamentals of Experience** with CMU Design Jr class

Year 5

6.2018	Soma Literacy **Workshop 3**: Transition Design Short Course
9.2018	Soma Literacy **Workshop 4**: Actions and Traces
10.2018	Soma Literacy **Workshop 5**: Design Tactics and Operations
10.2018	Soma Literacy **Workshop 6**: Bok Center for Teaching
12.2018	Submitted final draft of dissertation
4.2019	**"A pedagogy for noticing"**, Design and semantics of form and movement 2019, MIT, paper accepted
4.2019	Live defense of the research

This dissertation is broken into five main sections. In Chapter 2 I discuss the role of the body in the creation of our worlds and introduce Dewey's *an experience*. In section 2.3 I use this specific definition of experience to share three *lenses of attention* that delineate the depth of such an experience. In section 2.4, I introduce the concept of Soma Literacy, the recognizing and analyzing of the bodied variables of experience. Then, after a short survey of current body-in-design practices, I present the Corporeal Design agenda as an encompassing attention, bringing the Soma Literacy knowing to the front of any interaction or experience design. In Chapter 3 I present six case studies that aided in articulating and testing the specific frame for the claimed body's role in experience. Chapter 3 includes a description of the work of Émile Jaques-Dalcroze and draws connections to present design practice and pedagogy. In Chapter 4 I lay out a case for Soma Literacy as a new lens for experience understanding and evaluation, and summarize the initial forty-five concepts of Soma Literacy. In Chapter 5 I discuss the implications of this research to Transition Design, and in the final section, Chapter 6, I present conclusions and opportunities for future research.

Throughout the dissertation I establish (1) a model for the embodied classroom, noting the kinds of knowing that kinaesthetic and enkinaesthetic strategies make possible. I highlight the ways in which researching through this model revealed more experiential concepts than had been collected in prior traditional design rhetoric and education, offering new concepts potentially critical for the modern designer who is working evermore in explicitly temporal realms. (2) Through the Universal Principles of Temporal Design I have provided the first comprehensive description and taxonomy of Soma Literacy concepts and have tied the relevance of these to design practice. (3) I have presented the body-in-action (the living body) as both a medium for design and the proving ground for all of experience, and (4) I have created the Soma Literacy and Corporeal Design frameworks, which include "three lenses of attention" and "four bodies of embodiment" which then offer the design fields a new grounding with which to discuss and analyze experience with greater fidelity.

1.3 Transdisciplinary in Design

The themes explored in this dissertation can be found in many disciplines and domains. Ideas such as flow, cadence, crusis, or agogics are central to all of the performing arts, but also to any sort of participatory happening whether it be in manufacturing, web interfaces, or ditch digging. The performing arts of music, drama, and dance are referenced throughout this dissertation as these fields all contain a rich history of attention to the design of experience. Attention to the thoughtful manipulation of experiential variables in these domains was tested and established hundreds of years before IxD was a noted field of practice. While there is still much to be discussed and discovered in each of these individual domains who strive to compose, write, or choreograph an experience for an audience, I chose to present the current discussion and discoveries in the field of design to allow for a more global conversation. **The artful experience is not only to be found on the precious stage, but also in the mundane acts of life.** Design-global is broad enough to include the fine art examples of curated audiences and well-lit stages as well as the hum-drum actions and actors of everyday life. So, it is with a very intentional strategy that I have placed the conversation squarely in the field of design. I am forever grateful to my advisors and design colleagues for their willingness, curiosity, and eagerness to engage with these ideas. I have personally benefited in extreme measures by taking notions surrounding experience that began in a music classroom and pressing these through the forge of design practice and pedagogy.

1.4 A Note for Dalcroze Eurhythmics and Other Music Professionals

The following dissertation could not have come together in the manner that it did without my prior thirty years as a student and instructor in the methods and attentions of Jaques-Dalcroze. The Eurhythmics professional should read the following pages not as a description of what happens in a Dalcroze classroom, but rather, as what might happen as *one* result of a Dalcrozian mindset combined with a curiosity for applications outside of the field of music. The longer I have taught from his methods and within the music community, *I have been ever more interested in what the method reveals*, rather than what old lessons it continues to teach. The traditional lessons and well-trodden insights are extremely valuable, and I am sure that I will continue to teach those lessons and insights to my students (music, design, and other) as long as I am in the classroom. But here, of special significance to this point in time and to this current project, I am interested in the tradition of Jaques-Dalcroze's "experiments." In 1903, Jaques-Dalcroze began with a bit of insight, a notion, a hunch. He did not have any established plans or traditions—there was not a pedagogy. He set off on a series of experiments that led him not only in and through music (Bachmann, Parlett, Dobbs, & Stewart, 1993), but also in and through drama, stage design, lighting design, dance, psychology, philosophy, childhood education, and work with the non-musician folk of his day. He was not only interested in music as the one most sacred modality. He collaborated with practitioners and theorists of a wide variety of fields and cultures, and continued to search for a through-line, a common thread that rendered all of the varied modalities and attentions artful. His great insight was that the body—the ever-moving, dynamic, pulsing, shifting, personal, feeling body—held knowledge that was yet to be explored. In the current set of "experiments" I have done my best to continue the attentions and biases of Jaques-Dalcroze into a new field of practice, a field where we can question the nowness and ubiquity of potential artful interactions and attempt more thoughtful designs yielding more meaningful connections on all of the varied stages.

Any time I use wording such as "the design fields" or "designed experience" or "interactions," the music professional is welcome to replace those titles with "the composers, conductors, choreographers, performers" and "compositions of all genres." The primary difference between the musicians and the designers of the world are only the venues in which we play. Whereas the traditions of musicians, dancers, and dramats enjoy performances on the precious stage at assigned hours with special costumes, lighting, and curated audiences, designers are working in every other venue throughout our day. Designers work with the masses in every generic space, without the advantage of choosing the audience within whom they aspire to *occasion* an experience.

As a practicing/performing/teaching musician I have benefited greatly from this venture into extra-musical territory. It has shed light on both sides of the curtain, providing both a greatly enhanced conversation and deeper understanding of the potential of music to transform the participant, as well as a whole new audience with whom to make music.

1.5 Transition Design

The Carnegie Mellon School of Design adopted a specific focus of attention to *transitions* in 2015. The redirection toward systems-level change and more sustainable futures was fortuitous in that it provided a global perspective for my pending research and contains many values in common with the Corporeal Design agenda that I will lay out in section 2.4.

> Transition Design acknowledges that we are living in 'transitional times,' takes as its central premise the need for societal transition (systems-level change) to more sustainable futures, and argues that design and designers have a key role to play in these transitions. This kind of design is connected to long horizons of time and compelling visions of sustainable futures and must be based upon new knowledge and skill sets. (Irwin & Kossoff, 2019, para. 1)

Transition Design espouses "four mutually reinforcing and co-evolving areas of knowledge, action, and self-reflection" (Irwin & Kossoff, 2019, para. 5). These areas are 1) *Vision*; 2) *Theories of Change*; 3) *Mindset & Posture*; 4) *New Ways of Designing*.

Mindset and Posture is the title Terry Irwin, Gideon Kossoff, and Cameron Tonkinwise have given to the personal disposition and biases the individual actor brings to the Transition Design program. Many Western default assumptions and biases can be found to be among the root causes of the unsustainable present we find ourselves in.

> *Treating nature as a storehouse of resources rather than the context for human life; considering the world as a machine full of disparate parts, rather than a living organism; considering short discrete time frames, rather than long horizons of time; assuming primary worth in the individual rather than the communal; seeing only the disconnected parts, rather than searching for gestalts; assuming the individual is capable of isolation, rather than noting the implicated-ness and dependence on overlapping systems; assumptions that anything living can be still, rather than noting the dynamism of life; continuing myopic appraisals of reality, rather than acknowledging the complexity and varied viewpoints.*

These orientations to the present/future, to problems/solutions, to time as moments/gestalts, to the earth/Gaia, etc. each position the actor for understanding and growth, or limit their viewpoint. In some cases, the default mindset and biases can be so limiting as to make it impossible to work in the other three Transition Design knowledge areas: *Vision, Theories of Change and New Ways of Designing*.

The varied default assumptions and biases noted above each possess somatic knowing that the Corporeal Design and Soma Literacy agendas comment on. Specifically, the Soma Literacy concepts of *in time* knowing—*empathy*—*living systems* as dynamic, symbiotic, networked—and the ethics of bodies-in-motion are of particular relevance to both the Corporeal Design agenda and the field of Transition Design.

Throughout the following pages I will introduce both Soma Literacy and the Corporeal Design Agenda. I will lay out the principles, values, ideals, and variables of a soma-aware attention to experience and then in section 5.0 I will return to Transition Design and discuss the application of this research to long horizons of time and arcs of change leading to more sustainable futures.

1.6 Corporeal Design Preamble

> [D]esigners should have knowledge of how to *shape* aesthetic interactions in a more visible, explicit, and designerly way. This is a kind of knowledge we are currently missing in [the interactive design fields]. (Lim, Stolterman, Jung, & Donaldson, 2007, p. 2)

How does the ever-evolving landscape of design attentions change the responsibilities of the designer? Modern design practices have brought us to a variety of exciting crossroads. Of particular significance to this study is the increasing focus of the design fields to **the temporal**. The deliverables of third- and fourth-order design are all expressed as happenings, experiences, and cycles (Buchanan, 1992). Rather than things merely seen or touched, Design for Service (Polaine, Løvlie, & Reason, 2013), Social Innovation (Moritz, 2009), and Transition Design (Irwin, 2015) all require solutions experienced as unfoldings and proceed with a tempo, a gait, a cadence, and a trajectory. This reality, requiring a valuing and attention to experience as unfolding time, opens a complex space and a need for a wholly different set of variables from the design rhetoric of the past.

A second noteworthy focus, found both in design practice and many examples in contemporary culture, is now more interest in, and technology for, **the feeling body**. The body is not only implicated in, but central to the concept of interactions, experiences, and engagement. Whether it be the ubiquity of motion-sensing technology, personal gait data collection, all of the hopeful energies around AR/VR, or the new "Soma-Based Theory" collective at CHI (not to mention the explosion of yoga studios on what seems like every street over corner the past ten years), there are mounting examples of new attentions to the role of the performative body.

This thesis explores the crossroads of these two concepts: **experience as unfolding time** and the **sentient body**. I hypothesize that the current field of IxD is working under an incomplete understanding of the role of felt experience (unfolding time + sentient body), inherent in every interaction and the proving ground for all reflective understanding. Furthermore, any conversation regarding **cohesive temporal interactions** is completely missing from the literature, leaving a wide berth for the present investigations.

I have chosen **Corporeal Design** as the title for a design attention that is concerned with the sentient body, recognizing it as the foundation for meaning-making in experience. Corporeal Design identifies with the approaches to knowledge that recognize an inseparable body-mind-world unity. There is no mind without the situated body, and no world without body-mind connected. The mind itself is formed, implicated, and situated, in a mind-body-world stew that cannot be separated (Ihde, 1990; Lakoff & Johnson, 1999; Shilling, 2008; Todes, 2001; Verbeek, 2005). In section 2.1 I will present this connected body as the foundational constant in all interactions and in section 2.4 I will demonstrate both how the diminishing or removal of specific visceral body awareness from practice amounts to the removal of meaning from these activities, as well as how an overt awareness of the actor[4] as a sensing being, can open possibilities for a more rich and meaningful interaction.

While there are a number of practices that use awareness of the body either as mere inspiration for designed interventions (i.e. bodystorming (Burns, Dishman, Verplank, & Lassiter, 1994), Wizard of Oz prototyping (Wilson & Rosenberg, 1988)) or as a model for other types of ideation (i.e. biomimicry in software design (Mann & Smith, 2008) or industrial design (Volstad & Boks, 2012)), this thesis is primarily concerned with the actual, *in the moment* body-in-motion (unfolding time + sentient body), how it is designed by artifacts, and how it, in turn, designs our worlds. Before the design fields will be able to efficiently discuss, analyze, and design with the aesthetic of the sentient body, a new set of understandings must be achieved. The manipulable variables of felt experience, previously uncodified and uncollected in design practice, are found through a parallel set of attentions solely concerned with the feeling body. The conversation and understandings concerning this collection of variables is the basis for a **Soma Literacy**, which through the present research studies became a central theme of this thesis.

4 Throughout this dissertation I am using the term **actor** in place of user, consumer, performer, or acting-performer. I have chosen actor for both senses of the word. A user is an actor in the way in which they act upon their world. The user is also an actor in the sense of a performer who is making choices, in the moment, with aesthetic goals in mind.

Looking to the various disciplines of the performing arts as inspiration for this thesis' research studies, I have coopted (1) specific dispositions for time, (2) a valuing of the performative body, and (3) attention to the variables at play in an experiencing act. As the studies mounted, I arrived at a number of grounding premises that I will present in the following sections. In summary these premises are stated as follows:

1. The body is the first instrument (Jaques-Dalcroze & Rothwell, 1930). [sections 2.4, 3.3]
2. The body feels. We come to know our world through the immediate tangible interactions with our environment (Lakoff & Johnson, 1999). [sections 2.1, 3.3, 4.1]
3. Feeling is only revealed through motion. [sections 2.3, 2.4]
4. We yearn for harmony with our world. [section 2.4, 3.3, 4.1]
5. Authentic engagement with the world is an act of empathy. [section 2.4]
6. Participation is the prerequisite for meaning (Todes, 2001). [section 2.3]

KEY TERMS

There are a number of terms used throughout this dissertation that are not a part of the traditional design rhetoric. The most significant of these terms are noted below:

Actor. I am using the term actor in place of user, consumer, performer, or acting-performer. I have chosen actor for both senses of the word. A user is an actor in the way in which they act upon their world. The user is also an actor in the sense of a performer who is making choices, in the moment, with aesthetic goals in mind.

Aesthetic/Anaesthetic. For the purposes of the present conversation, an interaction becomes aesthetic when it is felt in the body. Anaesthetic notes the 'designs' that either cannot or simply do not engage the feeling body.

Anacrusis–Crusis–Metacrusis. These are the terms noting the progression of the parts of any action. Whereas a crusis is the point of arrival (in design we think of a 'touchpoint'), the anacrusis is the gesture necessary to drive toward the crusis and the metacrusis is the decaying falling-away-from said point. The concepts are critical in that they note how one can not experience a crusis. That is, one can not revel in an instant moment. What we actually experience over time can only be the anacrusis/metacrusis. The crusic moment is a mere flash in an ever progressing experience.

Experience vs. An Experience. Throughout the dissertation I draw a difference between a mere happening (experience at large), and a happening of significance (*an* experience, Dewey, 1934), whereby I claim that the threshold for significance is embodiment.

Embodiment. This dissertation uses this term to note the threshold of experience whereby an interaction tips from a disembodied happening outside-of or around an actor into a visceral experience, noted by the soma-deep shifts that resound in the body in-concert with the happening.

Eurhythmic/Arrhythmic. Eurhythmic is simply 'with good flow' whereas arrhythmic notes an absence of good flow (Jaques-Dalcroze, 1921; 1920).

In Time. This collection of studies recognizes a profound difference in the analysis of experience between the experience *in time*, as it is happening, compared to an after-the-fact reflecting on the experience.

Interstitial. The interstitial is the lived, experienced time/space between touchpoints or cruses.

Kinaesthesia and Enkinaesthesia. Kinaesthesia is ones awareness of their own movement and enkinaesthesia is the awareness of collective motion in a partnership, group, mob, ensemble, etc.

Meaning (emotional narrative) vs. Meaning (soma literate). Whereas the term meaning is most commonly utilized to describe the emotional narrative that one tells when trying to decide in what ways an interaction comments on their past history (descriptions of happy/sad, exciting/upsetting, etc.), soma literate meaning is concerned with the pre-reflective raw aesthetic of the experience.

Meaning as emotional narrative values the reflective narrative and is driven by individual context and history. Soma literate meaning, also personal in that it literally touches the feeling-body, looks at the *in time* shapes of interactions, and notes the universality of fundamental experiential concepts: tension/release, dynamic ebb/flow in an organic model, awkward/beautiful, yearning-toward/away-from—all shifts of weight.

Nudge. The term nudge is used throughout the dissertation to comment on our collective desire to remain in harmony with our environments, whether this be the weather, the architecture, the artifact, the peer, or even in harmony within ourselves. Our desire to stay in harmony is so profound that we are, as a result, nudgable, inclined to go with the flow, lest we fall out of sync with our worlds.

Phrase. For the purposes of this dissertation, a phrase is a completed crusic gesture (anacrusis–crusis–metacrusis).

Soma. Soma refers to Shusterman's (2008) sentient perceiving body-mind, a unified whole that is the active participant in an unfolding reality.

Soma-deep. The inner haptics of organs sloshing around while on a playground swing or the chest pressures of dread are each examples of soma-deep feeling. Soma-deep is experienced as shifts of heavy/light within the body.

Soma Literacy. Soma Literacy is an awareness of the bodied content present in experience. The soma-literate individual is skilled to analyze, interpret, reveal, and make meaning through the soma tier of experience. (Neely, 2017)

Tiers of Experience. The tiers of experience noted in this dissertation include the visual, aural, logical, and somatic. Each of the tiers can be analyzed alone or in conjunction with the others. The classifications permit a more efficient conversation surrounding experience as each of the tiers have distinct variables that can be analyzed as distinct from the others.

Shift of Weight. A shift of weight is the most fundamental action. It is the litmus test of any embodied gesture manifest as felt motion soma-deep. The simple recognition of transference of weight from one point to another is required for any happening to achieve potential significance.

Vectorial Trajectories/Yearning-Forward. This dissertation draws a distinction between generic motion and gesture. All gestures possess a trajectory that yearns-toward some resolution.

A more detailed glossary of Soma Literacy concepts are presented in section 4.2.

Chapter two introduces the foundational perspectives of 'experience' that inform the full project. In conjunction with describing the relevant design and HCI literature implicated in my hypothesis, research and philosophical grounding from Schilling, Todes, Flusser, Dewey, and Shusterman are discussed in order to present the base concepts of embodied/disembodied, the sensuous, and aesthetic/anaesthetic, which are necessary for the following presentation of Corporeal Design and Soma Literacy.

2.0

THEORY AT THE INTERSECTION OF EXPERIENCE AND THE SOMA

2.1 The Landscape and Gaps of IxD Attention

In this introduction to chapter two, I present a short history and definition of IxD and critique the ways in which the field assesses and gives attention to experience. I will then present an initial description of the role of the body in experience which will highlight gaps around affect, experience, the body, and aesthetics. Setting the stage for a more granular investigation into these gaps, I have curated a specific narrative pulling ideas from a small set of thinkers working in these areas. Citing these authors, I introduce the field of Interaction Aesthetics, Interaction Criticism, Performance Studies, and Somaesthetics which then serve as a grounding for this project's critical attention to design's biases concerning experience as a designable event.

The Beginnings of Interaction Design

"We aspire to design a higher quality interaction" (Moggridge & Atkinson, 2007, p. xvi) is a statement printed in the preface to *Designing Interactions*, by Moggridge & Atkinson. Their book traces the history of IxD from the early days to the date of publishing in 2007. Bill Moggridge and Bill Verplank coined the term Interaction Design around 1984 (Moggridge & Atkinson, 2007), and from the beginning of the discipline, *quality of interaction* was front and center. The beginnings of IxD research looked at discrete actions like the feel of the mouse click and the swipe of the arm when working through a graphical user interface and recognized that there was a designable aesthetic range into which the various prototypes fell. As the field became more sophisticated, the aesthetics of the interaction (flow/friction, easy/hard, smooth/rough, intuitive/confusing, etc.) started to gain direct attention. The goals of IxD have been consistent from the beginning: to make computer tech more "graceful", "beautiful and intriguing with emotive as well as functional qualities" (Moggridge & Atkinson, 2007, p. xi).

Moggridge stated that IxD is "the design of the subjective and qualitative aspects of everything that is both digital and interactive, creating designs that are useful, desirable, and accessible" (Moggridge & Atkinson, 2007, p. 659). It is the "shaping [of] everyday life through digital artifacts" (Moggridge & Atkinson, 2007, p. xi). According to Moggridge, good IxD requires (1) good mental models or metaphors (i.e. Hypercard), (2) reassuring feedback, (3) navigability, and (4) consistency. IxD is not only concerned with the look of a device, but more-so how it behaves. IxD fosters the doing over the seeing. We aspire to design the *quality* of interactions by "making technology fit people" (Moggridge & Atkinson, 2007, p. 293).

And this becomes the starting point for this thesis. How is "quality of interaction" related to the idea of good "fit" to an individual? This question points out the tension between the two players in the room, the designer and the actor. Starting with Moggridge and his contemporaries, designers started to recognize that the technology has to do more than work glitch-free. The new definition of *quality* included a *fit* to the individual actor.

When looking at temporal design settings, just what exactly are we measuring when addressing proper *fit* and *quality*? If the *fit* we are searching for were only describing the correct size of a jacket, one would only need a tape measure to know the appropriate size of the garment fitted to the specific person and the *quality* demonstrated through fabric selection and craftsmanship. But what of time-based artifacts? What of services? What is *quality* and *fit* in Service Design? Interactions are happenings, encounters, unfolding moments. What is *fit* and *quality* in a time based, intangible interaction? How does one *fit* an unfolding experience to an actor? In the same way that we recognize good-fit/bad-fit of clothing by the body-felt frictions of too tight, too loose, oversized/undersized/just-right, there are parallel attentions to the body-felt results of friction-full/friction-less interactions.

Moggridge lists the following as priorities of IxD: (1) ease of use, (2) enjoyable, (3) delivers what people want, (4) offers satisfaction, (5) beauty, (6) behaviorally and aesthetically enjoyable (Moggridge & Atkinson, 2007). Consider also the following goals of IxD and User Experience (UX) as quoted from a few recent publications:

> Successful design encourages the eye to move around the page with a **'smooth flow'**. (Garrett, 2018, p. 145 emphasis added)
>
> A successful design . . . should form a system that operates as a **cohesive, consistent** whole. (Garrett, 2018, p. 150 emphasis added)
>
> [A successful design should foster] end-to-end experiences that **unfold gracefully** over time and space. (Risdon, Quattlebaum, & Rettig, 2018, p. xvii emphasis added)
>
> People like their jobs more when their tools are **natural** and easy to use; not frustrating and needlessly complex. (Garrett, 2018, p. 18 emphasis added)

What are the design definitions of **ease**, **satisfaction**, **beauty**, **cohesive**, **consistent**, **graceful**, or **natural** when we are considering the temporal? Where should one look for assurance or proof of success?

Designing interactions, experiences, and services is about understanding people and their needs (Moggridge & Atkinson, 2007). The IxD priorities of **ease**, **satisfaction**, **beauty**, **cohesive**, **consistent**, **graceful**, and **natural** are all versions of the base human need/desire/yearning for harmony as proven in the sentient body; harmony with others (by the feelings of connection/intimacy), harmony with our natural and built environments (by the feelings of connection and freedom), and harmony with ourselves (by the feelings of stability, creativity, and connection), all of which I will take time to discuss in the coming chapters.

Design with Bodies

There are many examples in design research, practice, and education that are obviously based in a tacit understanding of the engaged, sentient body (Loke & Robertson, 2011; Nicolle & Maguire, 2003), and there are also explicit uses and acknowledgment of the body in a number of design methods (Burns et al., 1994; Oulasvirta, Kurvinen, & Kankainen, 2003). Yet, the field has not found a way to value the most base, most ubiquitous reality of these interactions: the actual bodily-resounded lived experience.[5] Seen through this lens, the body is neither a static picture of a corpse, nor the measured body of the ergonomics handbook, rather, it is a living body ever in unfolding motion. The living body—the center for lived-experience—is a body of motion.

Different than the attentions of dancers, bodystormers (Oulasvirta et al., 2003), yogis, and athletic crowds, the motions I am primarily focused on are the *gestures of living*, rather than performative choreographies. The *gestures of living* are just the dynamic breathing, heart beating, walking, leanings, and subtle shifts of weight we are involved in every moment of our life. These shifts, the ever-present dynamic shifts of weight, the ebbs and flows, the micro rises and falls, are what both defines the living experience, and holds the model for transcendent experience.

5 I will present a thorough critique of design attention gaps concerning somatic experience in section 2.4.

Living is Dynamic

The definition of living is to be dynamic. The living being will not actually be static until they are cold in the grave. Until then, every moment of living is defined by the cyclical, unending, micro and macro shifts of weight we participate in every moment of our life. This is contrasted with common descriptions, both in and outside of design, where we find the body regularly described as though it can be still. Any attempt to actually still the body can only result in a building of tension as the body fights against its most base instinct, the instinct to stay alive. Every grip and tension and suppression of the natural gestures of the body is a suppression driving the individual farther from the experience of living and only closer to the experience of death. If designers were to eliminate the static model of bodies from the list of possibilities, we would start to recognize the many times that bodies have been designed into spaces they cannot actually inhabit.[6] If we were to reframe the act of experiencing as an act of unfolding motion, it would present the design fields with a more ethical frame, a healthier frame, and permit a more thoughtful alignment for the transcendent.

6 Consider the parallels between (1a) every time a child has been ordered to stand still, (1b) anyone required to be seated for hours in a rigid chair, (1c) unending hours in a car on a long trip, or (1d) being put in a cast for a broken limb, and (2) the realities of living in a prison

Transcendent Introduced

Transcendent is a term used to describe something that **lies beyond** the limits of ordinary experience. In the coming pages, and sections 2.2 and 2.3 specifically, I will present the Spectrum of Experience and compare the mundane, the transcendent, and the profound. In the present description, I will limit the conversation to an initial description of *experience* and then *transcendent experience* via the musical ideal of *ensemble*.

In musical performance, the term *ensemble* is used in two ways. It is most commonly used to describe the group of musicians who play together in an orchestra or sing together in a choir. This is the same usage when describing the cast of Hamlet as the ensemble. A second use of the term is to describe the ideal in playing together. To have ensemble or to achieve ensemble is a benchmark that denotes coordination, entrainment, synchronicity, togetherness. This synchronicity required for ensemble demands more than the accurate hitting of notes from two or more players at the same time. The achievement of ensemble in a duet or large orchestra requires the performers to not only strike the notes at the same time, but additionally, to approach and release the notes with entrained momentum. The playing or singing of musical notes is not a binary action of note-on/note-off. The actual playing of notes is filled with interstitial inertial movements—swings of gesture between all of the hitting of notes. The human playing of music requires the analog swing-*toward* and swing-*away-from*, and this then reveals a primary gap in experience understanding.

The interstitial swing-*toward* and swing-*away-from* of any given moment *in time* is experienced in the body as a shift of weight—a shift toward, a shift away—identical to the experience of shifting weight while walking down a path. If we were to walk in lock step, but I perform the steps in a halted, jerky motion, and you proceed with a notable lilt to your gait, we will not achieve the threshold of ensemble (even though we might strike the earth at the same moments). Alternatively, if we can entrain not only our strikes, but the forward-leaning, shifts of weight that fill

the unfolding interstitial space; if we can entrain our momentums, we will not only find entrainment, we will find a kind of community that lies beyond the mundane. This entraining of weight shifts affords an intimacy in that I now feel what you feel. This threshold of experience affords a transcendence in that I am now extended by feeling-*with* you.

Experience

Anyone attempting to *play a note* has a variety of options: pitch, duration, articulation, dynamics, timbre. These are the stuff of music composition and performance, yet noting all of that variety, there are not multiple options when coming to actually play the note. There is only one base reality for any human performance. One cannot just *hit* a note, we must *come-to* the hit and *fall-away-from* the hit. The rhetorical confusion is the same in music as it is in IxD and in the majority of Western culture. We speak of interactions as if they are only the touchpoints. We *hit* the note, we *pay* for the transaction, we *click* the button, we *marry* our spouse—all conceived not by the unfolding time of *coming-to* the moment and *falling-away-from* the touchpoint, but scantily defined by the mere touchpoint, which is not even 1% of the interaction.

All digital modalities, unchecked, only serve to amplify this fallacy. While the circuit board and lines of code make things happen, they also process these happenings in an explicitly non-human form. The 1s and 0s of digital code have nothing in common with the ways in which the human is required to know through. The digital world has no "affinity to the human body" (Todes, 2001). When interacting with and designing in a digital scape, it becomes necessary to 'fill in' the analog attention in all of the places where the human experience is desired (as in the Genie effect (Chow & Harrell, 2009) in the MacOS application dock or in the active hand controller feedback of an airplane controller stick (Repperger, 1984). There is no digital experience for the 'participating' actor. The only experience that the human actor can engage in is the experience of the human world, the analog, the dynamically bodied.

We are analog. All experiencing is analog. It can only exist in situations where the strike (the crusis, the ictus, the climax, the touchpoint) is approached via an analog swing-*toward* and resolved via the analog swing-*away-from*. Rather than presenting the body as capable of static being or of binary on/off positioning, it must be pointed out that neither of these are even remotely true or possible. The body is living. The body is analog. The body experiences over unfolding time and cannot jump from instant to instant (touchpoint to touchpoint) separate from the interstitial swing-*toward* and swing-*away-from*. Additionally, this swing-*toward* and swing-*away-from* is inertial. It is not a mechanical type of movement but rather, it is vectorial and proceeds with momentum, with inertia.

Literal Transcendence

The definition offered above describes the transcendent in terms of *extending* or *lying beyond* the mundane. Being in true community *with the other* is just that, it is an extension of my mundane. It is beyond my average or normal living. Building an awareness of the non-me shifts of weight and then fostering the skill to synchronize, not *-to* the instants of striking hits that seem to bombard me but *synchronizing-with* the ebbing and flowing of the weight shifts of the non-me, allows me to be *me-with*. This is a transcendent-me. It is an extended-me and opens a path to the profound.

The transcendent experience of music is not realized unless the participant (composer/performer/listener) transcends their mundane being by experiencing the shifts of weight in the composition/performance *-with*. *With* something or someone else. This *with* can be *with* the performer (whereas the performer is engaged in musical shifts of weight that I feel in my own body—I feel what they feel—We feel *with*.), or *with* the composer (whereas the composer conceived of musical shifts of weight that I feel in my own body as I review their notes on the page or in the live performance—I feel what they feel—We feel *with*.), or even *with* the listener seated near me (whereas my neighbor listener is engaged in (feeling) musical shifts of weight that I also feel in my own body—I feel what they feel—We feel *with*.).

The psychiatrist and Oxford literary scholar Iain McGilchrist shared a beautiful passage describing the literal *-with* in his deep dive into the social and historical implications of specific neuromechanics, *The Master and His Emissary*.

> In Anglo-Saxon, as in Old Saxon, Old High German and Old Norse, from which it derives, the roots of the verb 'to long', in the sense of 'to yearn for', relate to the word meaning 'to seem, or be, or grow long'; hence 'to reach out' or 'extend towards'. The word *langian* in Anglo-Saxon, like its equivalents in each of the other languages, is impersonal in grammatical form, with an accusative of the person who is longing: thus not 'I long for', but, literally, 'it longs me [of]', whatever it might be. This form suggests something about longing that differentiates it from wanting or desiring a thing. Wanting is clear, purposive, urgent, driven by the will, always with its goal clearly in view. Longing, by contrast, is something that 'happens' between us and another thing. It is not directed by will, and is not an aim, with the ultimate goal of acquisition; but instead is a desire for union–or rather it is experienced as a desire for *re*-union . . . Spiritual longing and melancholy share these more diffuse and reverberative features, of something that 'happens' or 'comes about' between ourselves and an Other, whatever it may be . . . Wanting is clear in its target, and in its separation from the thing that is wanted. [On the other hand,] Longing suggests instead a distance, but a never interrupted connection or union over that distance with whatever it is that is longed for, however remote the object of longing may be. It is somehow experienced as an elastic tension that is set up between the one that is longing and the object of that longing–the pull, tautness as in a bow string (in German, *die Bogensehne*) holding together the two ends of the bow that are never really separate. (McGilchrist, 2009, p. 308)

This description of "*longing*" is precisely what I am attempting to highlight as I present both *ensemble* and *transcendence*. *Ensemble* with the other singers of the choir or actors in the play or felt as a connection between best mates creates a transcendence, a long-*ing* of mundane-me into a larger-than-me, extra-dynamic-me.

Outside of this conversation, the term transcendent is often used to imply something mystical or otherworldly, even pointing toward the divine. While I find nothing mystical or spiritual in the demonstrations above, I think it is describing the same visceral experience for which the church and the zealot are searching. Whether it comes about through music,

or religion, with significant partners, or rowing on an eight-man shell, true harmony is manifest as intimacy, which can only be intimacy-*with*. And this long-*ing*-of-myself, this visceral intimacy, this entraining of momentums, the *feeling-with*, can be so transcendent ("extending or lying beyond the limits of ordinary experience"), that we often have no other words to describe it than religious.

This description does not lessen the truth of religious experience in any way. In fact, it serves to point out to the faithful how it is possible that people the ages over have been convinced of "false gods." If all that anyone is searching for is the visceral long-*ing*-of myself, that rush can be designed in an infinity of situations. The leaders of the faithful have done very well to include the visceral in their worship services as this affords an intimacy that we experience as otherworldly. The visceral -*with* becomes a 'proof' that something larger than myself is occurring, which is how we end up with zealots of all faiths, including the church of the NFL, and the church of the concert hall, and the church of surfing. It falls to the earnest faith leaders to follow-up the visceral with the meanings of the teachings, using the visceral as an opening to the profound. This same phenomenon accounts for mob mentality and riots where often what is embodied is only visceral, having no 'teachings' to gain, only the swept-up-ness of the mob *ensemble*.

The Czech-born philosopher Vilém Flusser (1920–1991) writing about the phenomenology of communication and art, describes an equivalent experience, in this case the act of listening to music. In listening to music, he reflects: "I am performing a perfectly profane, perfectly technical, and perfectly public (unconcealed) gesture. And if I am really attentive, I can have the ecstatic experience" (Flusser & Roth, 2014, p. 117).

When Flusser describes the perfectly "profane" (Flusser & Roth, 2014, p. 117) experience of listening to music and allowing it to merge with his body in an ebbing/flowing visceral sort of way, his profanity is found in the lack of dogma. His example values the visceral for visceral sake. It serves no larger purpose than to break him out of his mundane range of weight shifts and transcend him to something larger than himself. It is a self-serving, hedonistic, masturbatory reveling.

Soma Literacy, which will be laid out in full in section 4.1, is partly the ability to recognize and separate the visceral swept-up-ness of the congregation (or the mob) from the truths for which they are searching (or the rhetoric they espouse). It is also the literacy required of the designer interested in designing swept-up-ness. Rhetorical agendas of truth and spirituality aside, I am merely pointing out that it is possible to encourage and nudge the visceral, separate from the ideological.

Transcendence through *long-ing* is the first significant grounding for this thesis. If third- and fourth-order design have now come to value experience, then the actual experiencing of experience, which is idealized in the intimacy of *feeling-with* must be studied, rehearsed, skilled, and embodied.

Interaction Design Criticism and Aesthetics

The past 50 years have been quite a ride for the technology industries and specifically for usability R & D. Pre-1984, there was very little attention paid to usability. The machines were so difficult and expensive to put together, that it was more cost-effective to make the human user adjust to meet the needs of the machine than to try to rework the actual hardware and software to meet the human. 1979 marked one benchmark in the beginnings of usability testing with John Bennett's paper, "The Commercial Impact of Usability in Interactive Systems" (Bennett, 1979), the first scientific publication with usability in its title (Sauro, 2013). The new attentions to the user opened up technology little by little to the average consumer and brought it into the home. As this migration continued into the 1990s, the internet arrived, and the nature of work completed on the machines started to include leisure activities. The various technologies suitable for homes and individuals became more personal and attempted to offer "complex and fulfilling experiences" (Lesage, 2015, p. 22). The personal computer was only able to achieve this goal by paying more attention to the personal (intimate) experience of the users. It was Lauralee Alben who asked the question in 1996, "How does effective interaction design provide people with a successful and satisfying experience" (Alben, 1996, p. 2)? This marked a shift in attention from highly choreographed or prescriptive usability attentions to what have become designerly attentions focused on the personal experience of the individual actor (Lesage, 2015). Yet nearly twenty-five years later, the question still remains: what can interaction design do to foster a successful and satisfying experience?

Enter the Pragmatists

If the attention is to move from the "prescriptive nature of usability" (Lesage, 2015, p. 22) to the interactions of individual actors in order to achieve *successful* and *satisfying*, it is then critical that the designer consider the personal experience of the actor. What is successful *to you*? What is satisfying *to you*? What is *fulfilling*?

Asking 'what is satisfying' and 'how do we mark success' in interactions points us squarely in the direction of aesthetics. Here it will be helpful to introduce three different parties who have made contributions to the aesthetics of interaction design: (1) Jeffrey & Shaowen Bardzell and Jonas Löwgren were early champions of Interaction Aesthetics and presented critical readings of interaction designs to the academy and the practice, (2) Jocelyn Spence wrote the book on Performative Experience Design (Spence & others, 2016), and (3) Richard Shusterman, the philosopher and body practitioner introduced us to the field of Somaesthetics (Shusterman, 2008). Brought together, these three form a trajectory that this thesis builds upon.

Beginning in 2008, Shaowen Bardzell and Jeffrey Bardzell began writing and publishing about what they coined Interaction Criticism (Bardzell, 2009; Bardzell & Bardzell, 2008). This is presented as a parallel kind of criticism as is practiced in more mature creative disciplines such as literature, architecture, music, drama, etc (Löwgren, 2009). The Bardzells pointed out that it is possible to read a designed interaction for more information than what can be proven empirically. There are expert readings or deep readings in literature, architecture, music, etc. that can shed a critical eye on the events presented by noting word choices, pacing, history, juxtaposition, chronology, context, etc. Likewise, in IxD, there are both data points that can be empirically proven and there is also rich knowing that can prove useful to the individual designer and design field that originates from the critic, an expert reader of interaction. "In other words, interaction criticism talks about interactions that are in some sense idealized" (Löwgren, 2009, p. 14). Jeffrey Bardzell lists "experience, symbolic density and cohesion, beauty, enlightenment,

social justice, dialogism, identity and the self, form and meaning, taste and judgment, ideological encodings, interpretation/hermeneutics, and signifying structures" (Bardzell, 2009, p. 2357) among the concepts that an attention toward aesthetics and critical theory make possible.

The critic, or deep reader of an interaction requires an ideal model (or range of models) to compare to the current performance if they are to render their critique (Bardzell & Bardzell, 2008). What is the (or even *an*) ideal model when pointing at the ephemeral and temporal? What are interaction values? What are the variables of a temporal happening? What attention is required to be the critic of this modality? The Bardzells are rightly credited with opening the book on Interaction Criticism and have provided an impressive body of writing and lecturing on the subject, yet, questions concerning *interaction values*, *experiential ideal*, or *temporal variables* specific to ephemeral interactions still remain. The central role of the experiencing body has yet to be fully articulated or understood in the design fields (Schiphorst, 2009). Literary criticism uses the term "resonant passage" to describe the moments in a text where the critic recognizes that word choice, pacing, and/or context hold particular power to bring about a significant shift in the reader. Where should we look for the equivalent of a "resonant passage" in IxD, xD, SD, etc?

These questions of aesthetics open a wholly new kind attention to the designer or pedagogue. Rather than efficiency or static beauty being the one supreme indicator, such questions surrounding emotion, investment, embodiment, intimacy, affect, and desire will effect designerly attentions, and demand new questions and new framing. Rather than looking at discrete moments and static artifacts, aesthetics requires a wholistic understanding, seeing gestalts and intertwined agendas, systems, and desires.

Experience is Not a Noun

> Attention changes *what kind of* a thing comes into being for us: in that way is changes the world. . . . Attention, however, intrinsically is a *way in which*, not a thing: it is intrinsically a relationship, not a brute fact. (McGilchrist, 2009, p. 29 emphasis in the original)

To further this point, Jeffrey Bardzell presented the idea of *hermeneutic reception* (Bardzell, 2009) in IxD. *Reception Theory* (Holub, 2013) claims that when discussing interactions, the artifact of study cannot be any traditional 2-D or 3-D static artifact. It is instead, very strictly, the enactment of the artifact, individually interpreted (Landow, 1997). He borrows this idea from critical theory which, in the latter part of the last century critiqued the separation of user from artifact. When looking at a text and its reader, a mug and the coffee drinker, the music score and the performer, the Laban notation and the dancer (Laban & Lawrence, 1979), or the apartment and its resident, critical theory recognizes that the *text* is only realized in communion with the actor. I will go so far as to claim that the *actual* score/artifact only exists as it is enacted. This enactment can take place in a variety of manners. Take the printed notation of a musical score for example:

- The music score is enacted (performed) by the performer when rehearsing in the privacy of their home.
- The music score is enacted as the composer or performer *perform* the selection in *audiation*[7] (E. Gordon, 1975; E. E. Gordon, 1999).
- The music score is enacted as the composer conceives and vets the original compositional choices.
- The music score is enacted when presented in a concert hall of +/- 2000 listeners. In this case there are at least two enactments happening concurrently:
  - The live performer is enacting the score by their live realization.
  - The engaged listener is also very likely enacting the performance as they sit in the theater seating. To the extent that they are engaged with the unfolding performance, they too become part of the event and can experience the transformation/transcendence.

7 Audiation is the silent rehearsal, rehearsing it via thinking/feeling/listening with no instrument in hand or audible sound generated.

While the printed musical score is static, never changing, and identical in each of the examples above, the varied interactions can only be dynamic and will have an unending variety of *hermeneutic receptions* paired with each different *performer* (who can also be a listener) and each varying *performance* (Eco, 1984). The interpretative personal engagements are the interactions. The static service design blueprint or the wireframe are not the engagement. Engagement requires dynamic interactions *in time*. Sequences, juxtapositions, meaning, and significance (Bardzell, 2009) are only found in the live interacting of the interactions, identical to live theater; the live theater of the mundane.

In practical terms the Bardzells conceived of some impressive strategies to place the affective front and center. They offered a framework (Interaction Criticism) whereby goals and attentions around emotion, affect, embodiment, desire, etc. become valid ideals, goals, and conversations for the interaction designer (Bardzell, 2009). Seeing the world through these lenses, it becomes clear that working with interactions requires a new workspace that is both ephemeral and temporal.

Jonas Löwgren, Professor of Interaction and Information design, Linköping University, describes this new workspace as "the difference between aesthetics of appearance[8] and aesthetics of interaction" (Löwgren, 2009, p. 2).

> [A]esthetic qualities are most often equated with the static appearance of a device or a screen layout; there is a striking lack of conceptualizations for addressing the beauty (or lack thereof) with which the interaction between user and product unfolds over time. (Löwgren, 2009, p. 2)

Cameron Tonkinwise also writes about the unfolding temporal ideal in aesthetics of interaction and makes a pedagogical call when he writes about *beauty-in-use*.

8 It is my opinion that there is no actual difference between these two indicators except for the modality of choice. In reality, there is only one aesthetic. One can find aesthetic in the visual or auditory, logical or dialectic, but the aesthetic is common in all modalities. One must experience the modality to reveal the aesthetic; and experience, when it reaches the threshold of *an experience*, requires and is then proven in the sentient body. Regardless, Löwgren's point is taken. Interactions cannot be analyzed (or designed) as though they were static objects.

> [D]esigners tend to still get their aesthetic education from the contemplation of museumed objects, silhouetted out from their background everyday life, and recast in the ethereal neutrality of the photographic studio. When all sense of *aesthesis* as the experience of things is lost beneath the hegemony of vision, then designers are ill-equipped to design what was called . . . beauty-in-use.
> (Tonkinwise, 2003, p. 4)

Joining in the pedagogical reprimand for "a lack of approaches recognizing the fundamentally temporal nature of interaction aesthetics" (Löwgren, 2009, p. 1), Löwgren presents four concepts of interaction criticism that aspire to characterize the aesthetic qualities of interaction (Löwgren, 2009). His four *characteristics* are as follows: (1) **Pliability** refers to the responsiveness of the technology to the body. If entrainment is easily achieved, if the technology is easily adaptable to the actor, or if the actor finds that they can easily sync to/with the presented interaction, the design is considered more beautiful via pliability. (2) Löwgren uses the term **Rhythm** to denote the ebbs and flows, the tempos, the rubatos, and the predictable (or not) temporal patterning that adds to (or detract from) the beauty of a design. (3) **Dramaturgical structure** assumes a narrative (explicit or implicit) and directs the critic's attention to the logic, the novelty, the recognition (as comfort or dissonance) of the story to bring about an aesthetic in the actor. Dramaturgical structure aids in the beauty of a design via the narrative composition. (4) Löwgren sets **Fluency** as the title for the ways in which a technology is seamlessly fused into larger systems and practices, calling attention to itself in the most fluid, frictionless manners. Fluency creates beauty by eliminating frictions (Löwgren, 2009; Núñez-Pacheco, 2018).

Ephemeral and *temporal* are the second set of attentions for this thesis. The stuff of Interaction Design cannot be contained in a bottle. It is not an *artifact* in the same way that a paper weight or an oil painting can be. Interactions are performative, personal, and felt. They take place over a period of time and can feel connected and continuous, forward-moving with a natural gait, or contain interruptions and frictions.

Löwgren is on the same page as the Bardzells as concerns Interaction Aesthetics, but he extends the conversation by categorizing and naming

specific affective content. All four of his concepts comment on the ephemeral and temporal unfolding experience yet the discourse still fails to make any mention of how one actually experiences said aesthetics. Where is the individual proof of an aesthetic? What is the experience of *pliability* or of *fluency*? What is happening when one is subject to one *rhythm* or *dramaturgical structure* over another? Why do many of these designs fail while a few persist for centuries? The writing of Jocelyn Spence brings us closer to these answers in her deep dive into *Performative Experience Design*.

Experience is Not Data

Spence quotes Marc Davis, inventor and technologist (MIT Media Lab, Interval Research, UC Berkeley, Yahoo!, Invention Arts, Microsoft), who made a strikingly simple statement concerning the design of interactions: "Experiences are not data." (Spence & others, 2016, p. 39) Spence takes this statement and then builds upon the idea to remind us of the fundamental goal of Interaction Design. IxD strives to create new experiences that cause actors to engage with their environment in a different manner.[9] (Spence & others, 2016). IxD is not first a data platform—it is a fostering, manipulating, nudging platform. What it fosters is experience (doings, encounters, engagements, participations), and when it goes well, the experiences can transcend the mundane, *long-ing* the actor by way of viscerally felt engagement.[10]

9 Spence's original quote is: "[to] 'occasion' new experiences that cause 'organisms' to view their 'environments'...in a different light" (Spence & others, 2016, p. 39).

10 see Section 2.2 & 2.3, Dewey's *an experience*.

A Bodily Turn

As a practice that began with interface design and descriptions that were regularly presented as static descriptions of artifacts, contemporary IxD is more and more concerned with living engagement; the in-the-moment, unfolding interactions understood as participations. Seeing the actor as a participant rather than a mere user gives agency back to the individual involved in the interaction. Rather than an omnipotent designer decreeing all that will be, IxD strives to understand the user journey as an individual, personal experience (UX) rather than a list of steps so as to "'occasion' new experiences that cause 'organisms' to view their 'environments' . . . in a different light"[11] (Spence & others, 2016, p. 39). This turn to the actor's subjective understanding of their personally felt engagement leaves the designer in a space less explored. Temporal designs cannot generate static artifacts, but rather, must recognize the dynamism of experience.

How is one to 'occasion' the personal experience of a stranger? What are the temporal variables in the designer's palette that contribute to the felt interaction between the actor and their environment? With the attention to the *felt* becoming ever more keen, an opening for a richer conversation concerning the sentient experience is now timely.

DesignLab Director and performance studies theorist Jon McKenzie (University of Wisconsin, Madison) writes of the overlapping agendas of theater and Experience Design. He states that once turning his attention to the values of the theater,

> [He] went from seeing design in primarily—even exclusively—visual terms to feeling design in performative terms . . . an open, synesthetic, and processual approach to design, one that includes all the senses and, as important, the temporal *and* the spatial dimension. (McKenzie, as quoted in Spence & others, 2016, p. 39)

11 'Different light' is the nudging and manipulating and transcending that arises through the engaged-in performance. As a designer, I do not want you, the actor, to feel the same upon completing the interaction, I want you to transcend your mundane and feel [insert values here].* We nudge through ideals [blueprints] which rely on principles [heuristics (rules of thumb) and physical laws].

* Interaction Design values such as community, intimacy, inclusion, flow, ease, urgency, etc. are covered in Section 4.1.

Jocelyn Spence follows up on McKenzie's agenda by highlighting how *performativity* of all intensities (from the mundane to the profound) "refers to a contextualised, durational, heightened, and meaningful interaction among people." At the beginning of my PhD aspirations, I started with an initial hypothesis that design could learn some new attentions, tricks, and vocabularies from the world of the performing arts. As my research matured I formed a clear understanding; **Interaction Design is a performing art**. IxD should be recognized for the directed performances/improvisations that it is. Rather than simply waiting for serendipity to occur, designed interactions can encourage, nudge, foster, manipulate the actor into new realities, whether designed for the precious stage or the mundane interaction.

The Bardzells remind us that interactions are aesthetic (personal and dynamic) and the affective is study-able via Interaction Criticism. Löwgren builds on their foundation by offering initial framing for temporal interaction critique. Spence recognizes the specific type of power and intimacy that performance framing offers, bringing the critic closer and closer to the generating attitudes of meaning and significance. These performative attitudes are personal and dynamic, temporal and ephemeral, often powerful and intimate, resound in the feeling body. They all require movement, gait, and cadence, yet this is not made explicit by the aforementioned authors. In order to complete this trio, we look to HCI, Richard Shusterman, and Somaesthetics.

The contemporary pragmatist philosopher, Richard Shusterman recognizes the body as the experiential core of perception and action (Bukdahl, 2015). He introduced the interdisciplinary field of *somaesthetics* with his book Body Consciousness in 2008. In this book, he lays out a clear argument for a new perspective on the body, the body-mind connection, the lineage of body-centered philosophy from the West and the Eastern traditions, and implications for ethics, politics, and a "Body Conscious" daily living.

Shusterman recognizes not only the health and well-being results of a more mindful soma-centered experience, but also sees "somaesthetic training . . .[as] enriching our cognition and our global art of living. Improved perception of our somatic feelings not only gives us greater knowledge of ourselves but also enables greater somatic skill, facility, and range of movement that can afford our sensory organs greater scope in giving us knowledge of the world" (Shusterman, 2008, p. 126). It is this combination of self-awareness and world-awareness that is at the heart of ideal design interventions.

The Bardzells and others (Ferreira & Höök, 2011; Höök, Friedman, & Stolterman, 2018; Loke & Robertson, 2011; Núñez-Pacheco, 2018) in the HCI community became excited about Shusterman's project to recognize the literal, fleshy, dynamic body as the center of experience (Bardzell, 2009) and have adopted Somaesthetics as a theoretical foundation for understanding the aesthetics of interaction. Somaesthetics places a deep attention on the "haptic, dynamic, and invisible qualities of movements" (Lee, Lim, & Shusterman, 2014, p. 1), and provides a foundation for interaction aesthetics (Petersen, Iversen, & Krogh, 2004).

Shusterman, in collaboration with his design colleagues, has presented a pragmatist perspective that values the feeling body as the center of meaningful interactions. They present somatic empathy through heightened body awareness as a key to unlocking understanding of any deeply felt interaction (Lee et al., 2014). Somatic empathy is a major point of focus in the Soma Literacy agenda that will be presented in section 2.4, Corporeal Design.

Summary

Steven Fokkinga's doctoral thesis *Design +/-* isolated and presented the concept of "subjective transformation" which demonstrates the emotional journeys that individuals search out (via entertainment, relationships, etc.) that, "produce specific bodily and mental effects which together transform their perception of, and attitude toward, the situation" (Fokkinga, 2015, p. 39). His thesis states that every different combination of "bodily and mental effects . . . holistically generate a unique transformation of subjective perception and attitude" (Fokkinga, 2015, p. 41). Otherwise stated, the body feels—literally—and this literal visceral reality helps to create one's perception of their world.

The Corporeal Design and Soma Literacy agendas of this thesis are both deep dives into the *bodily effects* that Fokkinga mentions but never clarifies. Bodily effects exist on a spectrum of experience.

The literature review thus far reveals a trajectory but also gaps in the conversation. The trajectory starts with the affectual and drives us through aesthetics to the resonant body, the proving ground for experience. However, many questions arose as I presented their ideas. To review, I have reprinted the questions (gaps) from the past pages below:

- What is fit and quality in a time based, intangible interaction?
- What are the design definitions of **ease**, **satisfaction**, **beauty**, **cohesive**, **consistent**, **graceful**, or **natural** when we are considering the temporal?
- What is the (or even an) ideal model when pointing at the ephemeral and temporal? What are interaction values?
- What attention is required to be the critic of this modality?
- Where should we look for the equivalent of a "resonant passage" in IxD, XD, SD, etc?
- How is one to 'occasion' the personal experience of a stranger?

- What are the temporal variables in the designer's palette that contribute to the felt interaction between the actor and their environment?
- What can interaction design do to foster a successful and satisfying experience?

Stacking up the questions in a list thrusts the idea of experience into the foreground. I note how loosely this term is regularly tossed about. While everyone certainly has a basic idea of what *experience* is referring to, it remains a bit elusive. In the following sections I would like to take some time to introduce John Dewey, the philosopher who put the phenomenon of *experience* center stage.

2.2 The Spectrum of Experience

Experience on a Spectrum
Dewey's Somatic Aesthetics

Of particular focus to this research is the wide spectrum of experiences that we all encounter and specifically, the degrees to which we are aware of and can even control, nudge, or design for said experiences, the basis for Corporeal Design.

Before presenting Corporeal Design's specific conversation and new toolbox of manipulable soma variables for Interaction Design, it will be helpful to attempt a more detailed description of experience. To this end, I am referencing experience as in the Deweyan concepts of *experiencing* vs. *an experience*, which I will define presently. I have also adopted the stance that experience happens on a multi-dimensional spectrum, rather than treating experience as a binary action that either happens or not. In order to shed focused light on something as ubiquitous as experience, I have curated some writings on the subject and will present these throughout sections 2.2, 2.3, and 2.4.

In sections 2.2 and 2.3 I will:

(1) introduce the Deweyan concepts of *experiencing* vs. *an experience*.
(2) demonstrate that there are different lenses that one can use to analyze an experience.
(3) discuss the spectrum of experience that each of these lenses contribute to.
(4) discuss the ways in which the spectrum provides critical insights when presenting Dewey's concepts of aesthetic and anaesthetic.
(5) conclude by describing the specific relevance of *Lens 2* experience as the foundation for Soma Literacy, which I will present in Chapter 4.

In section 2.4 I will continue the review citing the body as the fundamental constant in experience and present supporting conversations concerning the body's essential placement in cohesive interactions.

Experience on a Spectrum

Experience is a single term regularly used to attempt a description of the depth and breadth of our multitudinous participations in our world. It covers everything from the utterly forgettable *bumpings-into* of daily life to the deeply held values and searingly-felt emotions that we find at the extremes of exceptional encounters (Spence & others, 2016). The *Handbook of Human-Computer Interaction* (Houde & Hill, 1997) defines experience as "the concrete sensory experience of using an artifact—what the user looks at, feels and hears while using it" (1997, p. 369). I extend this notion of "using an artifact" to include all variety of *participation-with*. Using an artifact is an example of participating with a thing. We can also recognize ways that we experience in participation *with-others*, *with-our environments*, and *with-ourselves*.[12]

The handbook goes on to clarify the definition by pointing out that any resulting experience is also influenced by the functions that "an artifact serves in a user's life—the way in which it is useful to them" (1997, p. 369). These personal implications are heavily influenced by "contextual factors, such as social circumstances, time pressures, environmental conditions, etc." (Moggridge & Atkinson, 2007, p. 687). Experience is not just the using of the artifact or the doing or happening of an event. This term experience also assumes a synthesis of the doing in the context of a plethora of temporal, contextual, social, environmental factors (Moggridge & Atkinson, 2007; Spence & others, 2016). Experience is not just one thing. There are the literal interactions of bumping, holding, reaching, shifting, etc., and there are the meanings that we pull from the interactions. Additionally, there are moments of experience that begin as commonplace, of no apparent consequence, and there are the times when such moments transform into something intrinsically rewarding or profound.

12 I will expand on this point in section 2.4, The four bodies of embodiment.

Annemarie Lesage's[13] 2015 dissertation investigated a specific range of experiences, the autotelic experience. She explored the ways in which the autotelic experience (intrinsically rewarding—tied to the flow state) can be harnessed to strive toward a more ideal UX. Her research presented the "mixture of cognitive and aesthetic content" as the recipe to trigger emotion, a primary goal of UX (Lesage, 2015, p. 36). She speaks of the appraisal of *sense-making* and *aesthetic experiences* necessary "to bridge between the outside world and an emotional response" (2015, p. 36). She writes about both of these goals, *sense-making* and *aesthetic experiences*, as two variables or attentions that are both requirements for an experience that transcends the mundane. For the remainder of this chapter, I would like to dig a bit deeper into these variables of *cognitive and aesthetic content* leading to *sense-making* and *aesthetic experiences*.

Dewey's Somatic Aesthetics

The American pragmatist philosopher John Dewey presented a series of guest lectures at Harvard in 1932 which were later compiled into a volume titled *Art as Experience* (Dewey, 1934). Throughout the lectures he lays out a detailed account of his theories of aesthetics. Briefly stated, Dewey led the charge to redirect our understanding of aesthetics as something that must be personally, physically understood as resounding on the inside of the feeling body rather than something that is merely *pretty*, residing on the outside of the actor, separate and removed. In Dewey's estimation, a piece of art cannot become *true art* until it is participated in, transforming the actor by speaking/working/performing in communion with him.

Dewey's somatic aesthetics have proved a great inspiration to a generation of design academics and practitioners (Lesage, 2015; McCarthy & Wright, 2007; Núñez-Pacheco, 2018; Spence & others, 2016; Zimmerman & Forlizzi, 2014). As the fields of design have evolved, now possessing a mandate to create experience, Dewey's ideas have required the reevaluation of

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many biases and unanalyzed routines. His ideas point out how, if one does not take the time to consider the wholistic, it is quite easy to believe that the thing I am designing is the thing in my hand. This thing is visual and tactile. I formed it out of clay resulting in a highly concrete and tangible experience for the designer. However, when this thing is offered to the using actor, the experience of using it becomes a *thing* of itself. The use, the participation, the engagement (proven in the feelings/motions of the actor body) becomes an artifact of its own. This usage, unfolding over time, temporal, bodily resounded, and therefore intimate, carries a potential that the stand-alone artifact, the thing of clay, cannot compete with. *This* potential is actually not even in the same category as the thing of clay. This is a potential only realized *in time*.[14]

Throughout Dewey's writings he makes a differentiation between experience and *an experience*. Here Dewey points the reader to the obvious experiencing we are involved in all of the time.

> [Experiencing] includes what men do and suffer, what they strive for, love, believe and endure, and also how men act and are acted upon, the ways in which they do and suffer, desire and enjoy, see, believe, imagine, in short the process of experiencing. (Dewey, 1958, p. 8)

Outside-noticing exists in the regular doings of my day. It is both the noticing of the events and things around me, such as traffic and weather, as well as the routine happenings that I engage in, such as walking, talking, eating, bumping, striving, believing, imagining—all of the common parts of a day. I characterize these doings as *outside-noticing* because they do not meet the higher threshold for engagement where mundane acts that require no particular attention (they do not create any attention in me, therefore, outside & shallow) can transform in a moment into something significant, something felt in the body. This is the threshold for Dewey's *an experience*.

14 see section 4.2 for a detailed description of *in time*.

The painting on the wall is not the art. The art arises as the actor engages with the painting on the wall. The painting affords a felt interaction (expressed as motion in the body, soma-deep) which then affords a transcendence of the actor. If the engagement does not take place, if the actor never finds the intimacy, the bringing-in of the outside artifact is missed and the *aesthetic* is empty (*anaesthetic)*. Dewey describes this shifting from outside-noticing to inside-feeling as the difference between experiencing and *an experience*.

In *Art as Experience*, he takes the description of experiencing, and builds a framework to differentiate the ubiquitous *experiencing* from the serendipitous occurrence of *an experience*. This is a higher bar on a spectrum of participations. Dewey states that the engagement of *an experience* contains a whole gesture that has its own beginning and end. The threshold of *an experience* clarifies the tipping into significance. These significant moments are well described as *gestures*. They are not distinct flashes in a day—they unfold over time. "For life is no uniform, uninterrupted march or Flow, it is a thing of histories, each with its own plot, its own inception and movement toward its close" (Dewey, 1934, p. 37). The events of our lives that amount to unique or memorable are not part of the hum-drum, uninterrupted march of our daily doings, the significant happenings are stories or gestures of their own. They all have beginnings that yearn-*toward* resolutions. Without the *yearning-toward* the experience will never *tip* into *an experience*.

Dewey expands the explanation by stating that *an experience* is an embodied happening. The experiences that tip over the threshold into *an experience* are recognized as happening by the visceral, soma-deep shifts that resound in the body.

Claudia Núñez-Pacheco writing in her 2018 dissertation, *Designing for Aesthetic Experiences from the Body and Felt-Sense*, speaks of the experiences that, "seem more important and memorable than others. For instance, when a **felt-shift** or insight happens a sense of individualised meaningfulness is consummated and merged with the ongoing process of flowing, allowing the process of carrying forward to take place" (Núñez-Pacheco, 2018, p. 36 emphasis added).

The "felt-shift" is an example of the achieving of *an experience*. Without this soma-deep realization, the experience remains in the realm of mundane, shallow, often dulled or routinised (Spence & others, 2016), uninterrupted march of our daily doings, bereft of any gesture *yearning-toward* a resolution.

Lastly, Dewey's *an experience* is interconnected with the environment and wholistic (Núñez-Pacheco, 2018). It is not just the actor feeling but is a sharing *in ensemble* of self *with* the environment. Here I expand the common usage of *environment* to include not only the environment of landscapes and weather, but also the other beings around us, the artifacts we engage with, and the ways we are able to participate in multiple overlapping experiential gestures within ourselves. As will be presented in section 2.4, *the four bodies of embodiment*, a wholistic attention, recognizing the interconnectedness and implications of feeling in *an experience* will reveal the actor as not isolated, sterile, and static, but feeling in communion *-with*. Embodied is always the actor *embodied-with*: self-*with*-self, self-*with*-other, self-*with*-thing, self-*with*-environment. To have Dewey's *an experience* is to make the experienced part of myself. It is a world-increasing, *long-ing* activity. It does not just change the knowing-you (logically), it changes the sentient-you (somatically).

The kinds of experience that this thesis is concerned with must reach the bar of the Deweian *an experience*, which become those interactions, happenings, and events where the average mundane interaction tips into significance. This tipping is first understood at the bodied, physically-felt level of attention. This may happen in conjunction with thinking and words, and/or pictures and sounds, but if the soma is not engaged, the experience falls into the hum-drum category of simply experiencing as opposed to the heightened, world-expanding reality of *an experience*. The interactions of intimacy, engagement, empathy, transformation, transcendence, etc. all are understood as authentic by the bodily participation that accompanies (and in some cases overshadows) any other modality of participation. The overall goal of IxD to "'occasion' new experiences that cause 'organisms' to view their 'environments' . . . in a different light" (Spence & others, 2016, p. 39), is about transcending

the mundane. Experiences are not data or artifacts. Significant experiences that meet the threshold of *an experience* are doings that must be occasioned (Spence & others, 2016), which of course, can occur through serendipity or may be attempted through design.

Dewey defined experience as "the result, the sign, and the reward of that interaction of organism and environment which, when it is carried to the full, is a transformation of interaction into participation and communication" (Dewey, 1934, p. 23). Two foci of this thesis are on (1) the organism-*with*-environment and (2) this transformation of the mundane into participation which affords communication.

In the following section, I will break down the Spectrum of Experience into a multi-layered set of attentions, lenses that one can focus on different aspects of any happening. The goal is to more clearly understand how the common usage of the word experience misses a wide range of details; details that will prove useful to the Interaction or Experience Designer, or truly anyone interested in authentic transformations of the mundane into the significant or even profound.

2.3 Experiential Lens

Lens 1 Attention—unnoticed to deeply felt
Lens 2 Attention—static to vectorial
Lens 3 Attention—quotidian to profound
Dewey's Anaesthetic vs. Aesthetic Meaning Making

Throughout section 2.1 and 2.2 I noted how the term *experience* is often tossed about as though it has an agreed upon definition, used by researchers, practitioners, and actors alike. In actuality, the term is regularly used as a loosely encompassing title, obscuring definable aspects of a deep and important concept. In Chapter 3 I will present the *Fundamentals of Experience* course and six workshops that served as significant research avenues for this thesis. Each of these seven initiatives required a conversation about *experience* as they involved bodies-in-motion as tools for analyzing the aesthetics of interactions. The observations and discussions that came from these studies revealed that there was not a single focus associated with the term *experience*. Rather, I found that the participants, like many of the authors cited in the literature review, described their corporeal involvements on three different spectrums, and while interrelated, these attentions are quite distinct from one another.

The choice to describe these attentions as lenses highlights the way that the analyst must be reminded to look for the depth in an experience. The participants in the research studies were never cognizant of the multidimensionality of the experiences they were participating in. Instead, they regularly focused on a single aspect of the collective aesthetic, as though looking through a single lens, pointed in a specific direction. This directed focus often left the participant unable to define the other overlapping spectrums contributing to the gestalt experience. It was through the combination of these studies, the literature review, and my own teaching practice that I started to understand the varied attentions we regularly attribute to *experience*. Rather than treating a participatory

happening as a flat entity, I have bracketed these three attentions as *lenses of experience* so as to analyze this notion of *experience* with greater fidelity.

The three lenses of experiential attention highlight the multidimensionality of any experience where:

> *Lens 1 attention* is on a spectrum of *unnoticed* to *deeply felt*. This attention draws us to the doing or participating-in an experience.
>
> *Lens 2 attention* is on a spectrum of *static* to *vectorial* and draws our attention to a base requirement of all experiences: motion.
>
> *Lens 3 attention* is on a spectrum of *quotidian* to *profound*. Here I discuss the embodied relevance or impact of an experience to the specific actor.

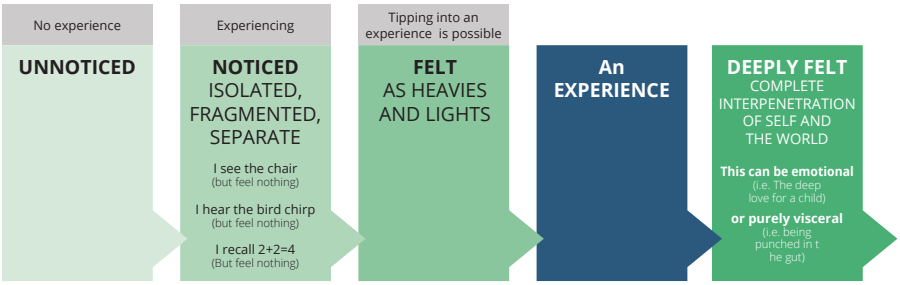
Lens 1 Attention—unnoticed to deeply felt

Lens 1 attention is on a spectrum of *unnoticed* to *deeply felt*. This lens draws our attention to the *doing* or *participating-in* an experience.

The first lens of the spectrum moves from unnoticed or not-felt to deeply-felt. By *felt*, I am including both the emotional and the visceral sensations of feeling. Consider George Lakoff and Mark Johnsen's *primary and derivative* experiences (Lakoff & Johnson, 1980, 1999). American linguists and philosophers Lakoff and Johnson, have written extensively about the embodied experience and the ways that our tangible interactions with the world guide our understandings of the world. In their groundbreaking book, *Metaphors We Live By*, they use the term *primary* to describe those experiences with which we can actively, tangibly engage. That which we can touch through our active senses is primary. Those abstract experiences where one cannot actively engage-in can only be understood as *derivative* of the primary experiences. Lakoff and Johnson highlight how one moves from no participation with the world [unnoticed], to primary interactions (like the baby reaching out), which then permit derivative interactions with the world (where the literal *reaching out* in infancy makes the figurative *reaching out* to old friends via email a physically understood metaphor to the adult) [deeply felt].

To be clear, by *felt* I am describing the physical and emotional sensations made manifest on and in a fleshy body. These engagements are received as pressures of lightness and heaviness on and/or in the body. Cuts, pokes, jabs, vibrations, tickles, and scrapes are all cutaneous and sub-cutaneous (haptic) feelings. Indigestion, nausea, and dizziness, as well as the *feelings* of dread, elation, ecstasy, and fear are all received as *soma-deep* (Neely, 2018) feelings, inward physical sensations, also experienced as pressures of lightness and heaviness. These *inner-haptics*

are *felt* on the inside of the body, as in the feelings of organs sloshing while riding a playground swing. The *feelings* described through *Lens 1 attention* span a spectrum from no feeling to deeply felt, requiring a sensation of dynamic lightness/heaviness in the experiencing body. The feeling body must be engaged before it can contribute to *an experience*.



On this axis, one may note that merely participating or noticing leaves quite a bit of space to cover before an interaction can be felt or deeply felt. To speak of the design of experience is to discuss a multidimensional kind of happening and it should not be assumed that everyone attempting to describe *experience* is thinking through the same lens or fidelity.

Lens 2 Attention—static to vectorial

Trajectory
Vectorial Intention

Trajectory

Lens 2 attention presents a spectrum of *static* to *vectorial* and draws our attention to a base requirement of all experiences: motion.

The way that one participates in their world is through a series of gestures: the gesture of smelling, the gesture of touching, etc. In *Lens 2 attention*, gesture requires more than mere motion. In order to count as the gesture of experience, it must be vectorial and possess intention. It must *aspire-to* a conclusion and the actor must become aware of this intentionality.

Gestures *yearn-forward*.[15] They all have a beginning point; they start from somewhere and then move toward an ideal completion. As I attempt to smell the peel of my orange, I begin the gesture by drawing the peel toward my nose, then I inhale, and I aspire for a cadence or a resolution, sensing the chemical compounds in the peel that register as *orange*. The deciding to smell *yearns-toward* the denouement. The gesture is the whole play: a beginning, a *yearning-toward*, and an aspired-to resolution. The orange will either present the expected result or it will somehow miss the mark. If the aroma is pungent, sweet, and tangy, we are granted a grand and rewarding finale to the gesture. It is a moment of closure. It is rewarding and is more likely to carry a rich aesthetic. If the smell is lackluster, bland, and with little fragrance, or if our *yearning-toward* becomes interrupted in some manner (possibly by accidentally dropping the orange), the experience, while disappointing, is still an experience as noted through the *Lens 2 attention*.

15 Gestures also fall-*away-from*. The detailed account of this phenomena is laid out in section 4.2 Soma Literacy concepts.

Lens 2 attention is not concerned with rich vs. shallow aesthetic, friction vs. flow, or pleasure vs. pain. *Lens 2 attention* merely reveals the gesture. Motion is the requirement for knowing that something happened and intentional motion is the threshold for the gesture to carry meaning. As long as there is a *yearning-forward* (in aspiring to smell, or in the way the dropping of the peel nudges my *yearning* to pick it up), the *Lens 2 attention* is created. If I accidentally bump my shopping bag off of the table and do not notice it, then, even though there was motion, there is no experience and no meaning in the happening as a result. If I am in my kitchen reading the newspaper and catch a scent of orange because my son started peeling one behind my back, the *Lens 2 attention* is revealed. In the realizing that I smell orange, *I feel a shift* from no scent (no experience) to gaining of scent (motion of mounting scent, experience beginning) to full pungency (cadence). The realized gesture of the scent (not to be confused with the relevance of the scent to the individual actor) is what permits the moment *Lens 2* meaning.

The French philosopher and sociologist Henri Lefebvre (1901–1991), who is known for his critiques of everyday life, shared a description of listening to music which describes this same *Lens 2* intention and result as mentioned above:

> [I]t affords our sole demonstration of a stability that is not stagnation but is **rhythmic and developing**. Because experience is the fulfillment of an organism in its struggles and achievements [*yearnings-forward*, trajectory] in a world of things, it is art in germ. Even in its rudimentary forms, it contains the promise of that delightful perception which is esthetic experience. (Lefebvre, 2004, p. 18 emphasis added)

Note the wording "rhythmic and developing". Dewey makes the same point in a different reading. "[Any] practical activity will, provided that it is integrated and moves by its own urge to fulfillment, have esthetic quality." (Dewey, 1934, p. 46). "Rhythmic and developing" and "moves by its own urge" are both pointing at the same *Lens 2 attention*. For an experience to achieve the level of the aesthetic, Dewey and Lefebvre both attempt to describe the vectorial by stating that experience of

this threshold must possess intention. It must begin with the intent to finish. The *start* is the beginning of an incomplete whole that yearns to complete its ideal gesture.

When describing *an experience*, Dewey requires a beginning, an unfolding, and a cadence or resolution. Without the trajectory-filled motion, the happenings often go unnoticed. He defines happenings that present as vague, broken, separate instances, or happenings that are based on rigid automatisms as *anaesthetic* (Dewey, 1934; Núñez-Pacheco, 2018). Such examples absent any gestalt, will often not even register as a happening let alone carry meaning, relevance, or impact to the actor. Directional motion, not just motion—but motion with an anticipated goal—is what permits meaning.

Another thinker who wrote extensively about these ideas is Samuel Todes (1927–1994), the American philosopher, Harvard scholar, and Associate Professor of Philosophy at Northwestern University. His dissertation was counted as one of the "most significant contribution[s] to the field of existential phenomenology since the work of Merleau-Ponty" (Hoffman, P. "Introduction II," in Todes, 2001, p. xxviii) and was of great influence to the thinking in the current project. In *Body and World*, Todes takes some time to highlight those happenings that are without gesture:

> Such indeed are the visual and tactile experiences that occur without movement, as, for example, by staring fixedly or by resting our hand inertly on an object. These experiences alone, however, are not sufficient to give us a sense of Space, but only of isolated points in Space. (Todes, 2001, p. 48)

The sense of space can only be understood by passing through, that is, *engaging-with* (self/self, self/other, self/thing, self/environment). And *engaging-with* requires motion, an inertial, vectorial, intentional gesture. The experiences that occur without movement carry no message of gesture or wholeness. Rather, such an experience reveals only a set of "isolated points", without a forward momentum, bereft of potential for *transcendence, heightened vitality,* or what Flusser refers to as *ecstatic experience* (Flusser & Roth, 2014).

Dewey states, "derogation of [the sensuous gesture], whether practical or theoretical, is at once effect and cause of a narrowed and dulled life-experience" (Dewey, 1934, p. 46). In this statement he reveals the first two of the three lenses of experience. There is a gesture that aspires-to resolution [*Lens 2 attention*] and there is a life-experience that can be narrowed/dulled or open/vibrant [*Lens 1 attention*].

Vectorial intention

In this thesis I am presenting the term *vectorial intention* to describe the literal directional yearning of any gesture which makes possible the meaning (impact or relevance) of the happening to the specific actor.

Simply put, a happening can only become *meaningful* when it achieves the level of intentionality or trajectory as seen through the *Lens 2 attention*. If there is a *yearning-toward* some yet-to-be-achieved cadence, then the meaning of the happening is wrapped up in the directionality of the gesture. Obviously, the scent of an orange means nothing if it is not participated in. Furthermore, it does not carry the same cultural and emotional weight for every different actor who engages in the smelling gesture. However, the gesture of smelling the orange does *permit* meaning in everyone in that by attempting the gesture of smelling the orange, everyone aspires to receive a conclusion (inhaling a sweet tangy aroma).

This is relevant to every designer concerned with experience because sadly, the attention to trajectory is easily overlooked, and as such, many designed happenings cannot carry *meaning*. If you hand me a tool that I have never seen before or ask me to open a door with no handle, or speak gibberish to me, these all will come with no meaning because there is no trajectory to the event. It cannot *yearn-toward* a resolution and so cannot be embodied.

There are many instances where the cognitive science field of 4E cognition (embodied, embedded, enactive, and extended) overlaps with these ideas. In *the Oxford Handbook of 4E Cognition*, Newen et al. present extensive research concerning mirror neuron activity. Of particular interest to the present conversation is their wording, "mirror goal encoding" (Newen,

Bruin, Gallagher, Gallese, & Sinigaglia, 2018). The mirror neurons do not merely mirror. They do not blindly mimic the random *motions* of those (self, thing, other, environment) around them. They mirror the *goals* of those around them.

Newen et al. present evidence that the richer an actor's motor expertise, the greater their sensitivity to other's actions, and greater the non-verbal communication (Newen et al., 2018). Mirror neuron activity is more strongly correlated with motor rather than visual expertise. *Embodied Simulation*, the result of mirror neurons picking up the feeling of another body's motion goals, requires motion in order to engage. *Mirror goal encoding* requires trajectory. Vectorial intention is a prerequisite of Embodied Simulation.

This phenomenon is further explained by the *Motor Cognition Hypothesis* (Gallese, Rochat, Cossu, & Sinigaglia, 2009) which is used to support the emergence of social cognition. The hypothesis states that,

> [C]ognitive abilities like the mapping of space and its perception, the perception of objects occupying our visual landscape, the hierarchical representation of action with respect to a distal goal, the detection of motor goals and action anticipation **are possible because of the peculiar functional architecture of the motor system, organized in terms of goal-directed motor acts**. The proper development of such functional architecture likely scaffolds more cognitively sophisticated social cognitive abilities. (Gallese, 2018, p. 33 emphasis added)

If the goal is graspable then meaning generation is permitted. The goal, however, does not reside in the artifact. It is not and cannot be a prescriptive answer (Núñez-Pacheco, 2018). The goal is individually understood. It is interpretive and will manifest as varied trajectories in differing actors. The actor, attempting to read the artifact, searches for a way to connect with the thing, the other, the environment, or even with the self. This connecting is not a frame of mind, or an understanding, rather it is a dynamic unfolding communication, an action that permits the embodied feeling of shared motion. Being participatory, it permits the aesthetic. If the participation is absent because the trajectory is missing or false, the interaction is recognized as anaesthetic.

Dewey uses the words "loose succession" (Dewey, 1934) to describe qualities of anaesthetic experiences (Leddy, 2016). Loose succession, like fuzziness (Gaver, Beaver, & Benford, 2003), is an example of motion without intention. It is the *intention* of a gesture that can become fuzzy as in instances where I am not sure how to use, or where to look, or what words to listen for. Loose succession occurs when all of the parts of a happening are present and possibly even in order, yet there is no connection or arc to the experience. This presents as a lack of authentic motion, a lack of *cohesion*.[16] In order to feel the gesture, I have to realize the gestural gestalt, a connected, single arc of intention rather than a simple series of stagnant points or smaller micro gestures.

The designer cannot prescribe the final meaning of an interaction because every actor brings a different set of life experiences to derive meaning from. The designer's role is merely to *occasion*, critique, and give attention to the graspable trajectory of the design, thus opening a space for meaning generation in the individual actor. The designer has variables to manipulate which effect *Lens 1* and *Lens 2 attention*. These will be covered in Chapter 4, Soma Literacy.

Núñez-Pacheco referred to a biofeedback interaction in 2014 that attempts to capture the *Lens 2 attention* and describes an example of inauthentic motion.

> Once the interaction [of the haptic biofeedback hardware] starts, two things may occur: (1) The stimulus on the body could be perceived as too removing or distracting, therefore meaning making might not be achieved. In the original cycle of present-at-body awareness (Núñez- Pacheco & Loke, 2014b), this part of the process would be represented by biofeedback 'not making sense' to the wearer, for instance a display showing fast-appearing visualisations of heart rate contradicting the calm state of the wearer. In such a case, the feedback could be interpreted as fake or unreliable, causing the wearer to stop paying attention. (Núñez-Pacheco, 2018, p. 274)

Csikszentmihalyi recognizes this same point in describing the anaesthetic encounter while walking through an art gallery. "It is likely that the

16 see section 2.4 for a detailed account of cohesion.

inability to have an aesthetic response is often the result of a lack of goals in the aesthetic encounter" (Csikszentmihalyi & Robinson, 1990, p. 83). Without the vectorial intention, there is no way to join in the interaction. *Lens 2 attention* is a clarifying notion revealing that if the "goal" of attending an art opening is to have an aesthetic response, the response is not first found in the dialogical meaning of the paintings, rather the *Lens 2 meaning* is first revealed in the participatory, goal-directed, *yearnings-toward* bodied level of experience. If we are to reach the threshold of *an experience*, the literal shift from unnoticed to noticed must be realized [*Lens 1*] and the discrete form of the shift must be vectorial if it is to register as aesthetic.

Recognizing a *Lens 2 attention* begins to account for the different interpretations of common events by varied actors. How is it that two different people can witness or even participate in the same happening yet walk away with a different understanding? I hold that at least part of the answer lies in the embodied gesture [*Lens 2 attention*]. The gesture of smelling an orange must be embodied before it amounts to a happening at all. "The gesture of smelling" is a *Lens 2 attention* in that the *gesture* is the *vectorial attention* aspiring for a resolution. This is the feeling of the unfolding scent, a bringing-in of the orange into my own body. The embodying occurs in the actor's actual, unique body [*Lens 2 attention*] which is a prerequisite to personal impact or relevance [*Lens 3 attention*]. While one actor finds a deep connection with the event, a second actor might very well see the action yet find no trajectory to simulate, or participate in. At this point, the second actor has no authentic participation, and therefore no feeling in the interaction. The vectorial intention of *Lens 2* requires the actor to body the gesture. It requires trajectory for a completed arc.

If I see the artifact and have no intuition as to how to engage with it, this is a deficiency on the *Lens 2 attention*. If I am aware of the gesture, as in hearing someone speak a foreign language, but can make no relevance to my own life, that becomes a deficiency of *Lens 3 attention* which will be discussed in the following section.

Significant interactions are regularly deemed to result from the reflective action of comparing the happening to my past experiences and "making meaning" from it. Here I point out that the prerequisite of meaning-making occurs in the *feeling* of the soma-deep shift. This does not require an internal or external dialogue. It precedes the dialogue.

> In reference to Dewey's distinction between *an experience* and *experiencing* (1934), the UX theory appears to understand what is involved in *experiencing*, but not what is involved in *an experience*, i.e. a memorable, remarkable experience. We figure *an experience* must have to do with **being aware**[17] of the experience as it unfolds, but little else is known about it. (Lesage, 2015, p. 36 emphasis added)

In what ways are we asking designers to be aware? There is a rich history of ethnographic research asking actors what they are thinking about in an attempt to reach *meaning*, but in advance of that line of questioning, one must recognize that there is a *Lens 2 attention* version of "being aware." While the common analysis often jumps directly to the worded reflection of the interaction to assess meaning or significance, it will be helpful to point out that some meaning is unlocked merely by participating in the vectorial gesture. One is not required to reflect or describe relevance at the moment of happening for an interaction to register as significant. In fact, the experiences of being *speechless*, or *at a loss for words*, or *unfathomable* are examples where the bodied participation is profound long before the dialogical reflection has commenced.

The interactions of intimacy, engagement, empathy, transformation, transcendence, etc. are all rendered authentic by the bodily participation that accompanies (and in some cases overshadows) any other modality of participation. This understanding is the focus of *Lens 2 attention*.

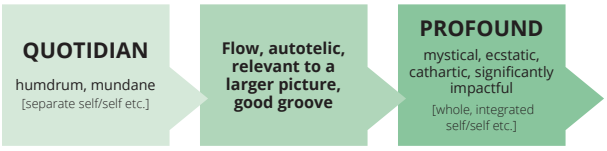
17 Being aware "while it unfolds" would be a benefit and more ideal, but it is not necessary. One only needs to recognize it at some point after the fact. We have experiences in our earlier lives, that are not significant for us until some points much later. i.e. "I had no idea at the time how important that conversation [or concert, or interaction] was. I had no idea how it would change me."

Lens 3 Attention—quotidian to profound via embodiment (*-with*)

Ecstatic Experience
Empathetic Projection

Ecstatic Experience

Lens 3 attention is on a spectrum of *quotidian to profound*. Here I discuss the *relevance* or *impact* of an experience to the specific actor via McGilchist's example of *long-ing*.



The *mystical, ecstatic, profound experience* lies at the far reaches of this spectrum and is revealed in the shift between the experience of *isolated points* and *wholeness*. The ecstatic is made possible as the actor experiences a previously static, lackluster, isolated point as transcending the mundane and transforming into the *start* of a yet to be completed whole. Our traveling through this transition is *pathein—commerce with the world*—where we not only see the potential but *yearn-toward* this gesture. As our experience is integrated with the forward moving gesture, our embodiment opens the potential for profundity.

The sociologist Chris Shilling, writing in *Changing Bodies: Habit–Crisis–Creativity*, describes it as such:

> The emotional experience associated with creativity is at its height during sudden experiences of revelation or epiphany when someone is gripped by the realisation that their relationship with the environment could be radically different. This feeling is often associated with religious insight or conversion, and is clearly not understood adequately solely as a cognitive event. As James (1982 [1902]: 113) argues, revelation and epiphany emerge from specific situations and problems, and can strike the individual with a

> physically and emotionally palpable force [*Lens 2*]. They can feel like a 'bolt of lightning,' increasing an individual's heart rate and blood pressure, and making them unable to contain themselves . . . The 'peak experiences' associated with feeling 'at one' with a demanding physical activity [*Lens 3*] have been experienced as 'life changing events' [*meaning*] in which a harmony is achieved between the participant, the activity and the environment (e.g. Baker and Moreno, 2001: 15–17). (Shilling, 2008, p. 20)

These profound experiences, the peak experiences of *transformation*, *epiphany*, and *transcendence* are rare and fleeting, assumed to be serendipitous and out of reach to design. While design cannot force or guarantee a deeply felt interaction (Núñez-Pacheco, 2018), it is obvious that there are variables of experience that political leaders, musicians, cinematographers, playwrights, magicians, choreographers, and snake-oil salesmen have manipulated to their own ends since antiquity. The project of this thesis is to develop a language around these experiences and the variables that build them up so as to make them more tangible, as both analytical and practical tools for design theory, design practice, and design pedagogy.

At the far end of this spectrum is the transcendent, ecstatic, or profound experience. This is the embodied reality of realized gesture [*Lens 2*] + integrated body-world [*Lens 3*]. The integrated body-world is revealed when I am not battling to assert myself in the environment, rather I am *integrated-in* and as a result am permitted to feel more than I might in a separated or removed interaction.

Empathetic Projection

McGilchrist's idea of *long-ing* was introduced in section 2.1.

> Longing suggests [a] union . . . with whatever it is that is longed for . . . It is somehow experienced as an elastic tension that is set up between the one that is longing and the object of that longing – the pull, tautness as in a bow string (in German, *die Bogensehne*) holding together the two ends of the bow that are never really separate. (McGilchrist, 2009, p. 308)

Lakoff and Johnson use the term *empathetic projection* to describe a parallel notion, "the focused, imaginative experience of the other" (Lakoff & Johnson, 1999, p. 566). *Imaginative* in this sense is not to the exclusion of *the real* or *tangibly felt*. True empathy is more than mere awareness of the other, it is the participatory sharing of the other's experience. It is a form of 'transcendence' in that one can surpass the given assumed physical boundaries of the self and participate in union with the other. It is not an experiencing on, or at, but in. Empathy is felt; it is our "[felt] sense of being present *in* the world" (Lakoff & Johnson, 1999, p. 565).

Dewey writes about this unison of world and body, describing the interaction as a "complete experience", and manifesting a "wholeness" (Dewey, 1934, p. 61).

> Experience in the degree in which it is experience is heightened vitality. Instead of signifying being shut up within one's own private feelings and sensations, it signifies active and alert *commerce with the world*; at its height it signifies complete interpenetration of self and the world of objects and events. Instead of signifying surrender to caprice and disorder, it affords our sole demonstration of a stability that is not stagnation but is rhythmic and developing. Because experience is the fulfillment of an organism in its struggles and achievements in a world of things, it is art in germ. Even in its rudimentary forms, it contains the promise of that delightful perception which is esthetic experience. (Dewey, 1934, p. 19)

McGilchrist's *long-ing*, Lakoff's *present in the world*, and Dewey's *commerce with the world* each point at the same reality. There is no "heightened vitality" without a communion of body and world. The two are not simply noticed, but "completed" in the coming together. Beyond that, Dewey sites what he calls "complete experience" as "fulfillment", "pending delight", and "art in germ" (Dewey, 1934, p. 61)—in short, "transcendence."

Consider the playground swing. This most simple interaction nearly guarantees an integration of self with thing which explains why such a simple and historic toy persists on playgrounds the world over. When you ride the playground swing, you experience a *long-ing* of self; a gaining and shedding of weight that is greater and lesser than your actual

static weight. This is the transcended experience, the literal feeling of more (and less) than your static self (felt in the body as *Lens 2* motion). Recall again Flusser, describing the act of listening to music: "I am performing a perfectly profane, perfectly technical, and perfectly public (unconcealed) gesture. And if I am really attentive, I can have the ecstatic experience" (Flusser & Roth, 2014, p. 117). The kind of experience that the swing affords merges on the profound as it transforms the actor, not by trading one experience for another, but by *long-ing* the actor to more-than (*Lens 3 attention*). This amplification of the individual is a literal transcendence, it is a *long-ing* or extending me beyond static me.

Flusser is seeing his experience through *Lens 3 attention*, noticing the amplified bodied feel of *more than and less than*. The body can tangibly experience the lightness and heaviness of the moving playground swing, or of the musical line, or of any of the potential experiences around us. Flusser references the literal vibrations of the music that join his body with the surrounding world and describes this experience as *pathein*, or the "knowing subjection," when explaining his listening to music (Flusser & Roth, 2014, p. 116). This *pathein* is a *participating-in* rather than mere *observation-of* the world. It is not just sound on the outside of him, but the mixing of the sound waves with his skin (cutaneous) and organs (soma-deep). He is involved in an experience that is greater than the static picture of him.

> Focus of attention and empathetic projection[18] are familiar cognitive capacities that, with training, can enhance our sense of being present in the world. (Lakoff & Johnson, 1999, p. 565)

This reality of amplification, of transcendence through integration of self-*with* is a major component of profound experience throughout the ages. Consider the spiritual experience. Spiritual traditions have developed strategies for emphasizing the bodily participation in ritual as key to personal transformation and our 'being present in the [spiritual] world.' These "experiences of excitement or transcendence . . . range from the pleasurable to the exceptional, and from the unexpected to

18 This "focus of attention" and awareness of the "empathetic projection" are what, in Chapter 4, I will present as the introduction to Soma Literacy.

the consciously sought after" (Shilling, 2008, p. 59). They are profound interactions and are given names like flow, transcendence, catharsis, transformation, mystical, spiritual, and life changing. This upper end of idealized experiences, while ephemeral, are the stuff of a life deeply lived.

I think it important to state again that the transcendent experience being described is not first and foremost a religious or mystical goal. Rather, it is highly pragmatic. It is simply the way in which entrainment results in an amplified experience. It is the amplification of the aesthetic that we call transcendent. It transcends the normal routines of the day by being integrated-*with*. This experience is to be found in our being-*with* others, things, environments, and in the varied overlapping gestures within ourselves.

Shilling writes, "It is by *living in*, *living with*, *attending to* and *caring for* one's own body and the bodies of others, that people become embodied beings with a *wide range* of capacities and potentialities" (Shilling, 2008, p. 163). This focus of attention is often overlooked. If we are to consider experience as a designable category, then we must consider the primary constant in the equation, our bodies. Through self-exploration (the infant reaching out, as well as the adult gaining new skills), attention, and unified communion with our world (self/self, self/other, self/thing, self/environment), we possess the potential for a reality that is rich, deeply felt, and tangible, and as a result concrete. Feelings are not the imagined playground of fairies and sprites, nor are they to be reserved for the mystic or spiritual; they are the ubiquitous literal vibrations, pressures, resistances, and releases of our own body-world in the spatiotemporal living space.

Dewey's Aesthetic vs. Anaesthetic

Aesthetic
Anaesthetic

The *aesthetic* is a term often associated with the arts, with moments of high curatorship and specialized knowing. Of great interest to this thesis is the potential of the aesthetic in any moment or setting in daily life. The precious stage and painting gallery exist as churches to the aesthetic, but beauty is certainly possible in the most normal and routine interactions of our day (Spence & others, 2016). Where the fine arts exploit their galleries and concert halls for the aesthetic, the various fields of design can play in the personal, intimate, hidden moments of living. Design-global has the greatest potential to reveal, nudge, and make possible the aesthetic of daily living.

The three lenses of experience I have laid out are all factors contributing to the progression of anaesthetic to aesthetic.

> The enemies of the esthetic [sic] are neither the practical nor the intellectual. They are the humdrum; slackness of loose ends; submission to convention in practice and intellectual procedure . . . [Every] integral experience moves toward a close, an ending, since it ceases only when the energies active in it have done their proper work. This closure of a circuit of energy is the opposite of arrest, of *stasis*. Maturation and fixation are polar opposites. (Dewey, 1934, p. 42)

Dewey led the charge in describing a spectrum of experience. At the far end of his range is the concept of the anaesthetic. The anaesthetic presents as a lack of cohesive experience; cohesive as an indicator of initiated motion, a lack of the *Lens 2* type of vectorial gesture. In the Deweian model, an interaction cannot amount to *an experience* until the participant (at least to some degree) perceives the action and the action is believed to have intention or arc. Both the idea of *perceives the action* and his wording of "moves toward a close, an ending" will benefit by some exploring.

Aesthetic

The requirements of *an experience* are the same as for the aesthetically understood musical phrase. Musicians play successions of notes. What is it that separates these successions of notes from any other succession of sounds? What is the difference between these successive noises and the noises of traffic or bird song or riotous crowds? I hold that if the notes are perceived (composed, performed, or listened to) with a cohesiveness that allows for a cohesive succession of, *start → move forward → and "moves toward a close, an ending"*, then the musical gesture (phrase) is revealed and we have the grounds for *an experience*. Quoting Dewey again, "To put one's hand in the fire that consumes it is not necessarily to have an experience. The action and its consequence must be joined in perception" (Dewey, 1934, p. 46). It is not enough for events to order in a manner of potential. *All the stars aligning* in designed or serendipitous space do not make a constellation until they are recognized as such. Recognition is the realization of feeling [*Lens 1*] + trajectory [*Lens 2*]. Then it is embodiment(-*with*) [*Lens 3*] which allows for the significance of *an experience*.

Oliver Messiaen, the 20th century French musicologist, composer, and organist, might also argue that the only difference between noises of traffic, bird song, or the symphony orchestra, is the intention of the composer, performer, or listener. Messiaen was an ornithologist as well as a world-class musician, supremely interested in birds and particularly interested in the songs of birds. He transcribed many bird songs and questioned the musical worth of the melodies. For whom are these successions of notes music? The music (the experience) is found for anyone who can understand the succession as belonging to an arc of gesture. The experience must be felt as a gesture or it amounts to no more than a random grouping of sounds; noises, a group without motion. If, on the other hand, the succession of sounds is begun and completed as the "closure of a circuit of energy" (Dewey, 1934, p. 42), or even if they are begun and drive-*toward* but never complete the circuit, they enter the space of aesthetic experience.

In summary:

(1) Even a well-composed succession of individual points in time does not guarantee that a *gesture* has been achieved. *Gesture* requires *Lens 2 attention*, cohesiveness and forward motion, a trajectory, or inertia to the experience.

(2) The proof of *an experience* lies *in* the actor[19] [*Lens 1 attention*] in communion with the placed happening [*Lens 3 attention*]. Cohesive experience requires the actor be in union (empathetic projection) *-with* the sounds, words, moving images, thoughts, or motions and empathetically feel the presentation as an unfolding gesture, with a beginning point searching for its resolution. The *-with-ness* of these happenings are experienced as a union, a *long-ing* of self-*with*-self, self-*with*-other body, self-*with*-thing, or self-*with*-environment.

Anaesthetic

The absence of *long-ing* is the *anaesthetic* interaction. These interactions possess no cohesiveness from moment to moment. They are disconnected from the shared *-with* gesture of *Lens 3 attention*. There is nothing to close as there was no arc begun. The anaesthetic experience is all too common. Our days are full of the unnoticed, unfruitful, exceedingly mundane types of interactions of normal living. I unknowingly brush against a spoon while reaching in the silverware drawer for a knife. I take no notice of stranger after stranger I pass on my way to lunch. The background noises and Muzak are all around me, yet remain unnoticed. They are all in my field of vision, yet unseen as I do not draw them in to the communal space. Each of the *interactions* are experienced without gesture. They have no start and no *yearning-forward* to a conclusion. Without gesture they cannot be embodied-*with*, so they manifest as forgettable noise, quite the opposite of musical line or aesthetic experience.

Recall the quote from Todes,

> Such indeed are the visual and tactile experiences that occur without movement, as, for example, by staring fixedly or by resting our hand inertly on an object. These experiences alone, however, are not sufficient to give us a sense of Space, but only of isolated points in space. (Todes, 2001, p. 48)

19 (who may or may not be the designer)

Here Todes implies a spectrum of experience when noting that visual and tactile experiences can occur with or without movement. This term *movement* is *movement-as-gesture*, movement with an intention that manifests as having a beginning and a desired, searched-for conclusion. I do not dispute that there are other "experiences" that contain or reveal no gesture. These all-too-common occurrences are experienced as individual, separate, "isolated points in space". Without gesture, embodiment is impossible, and therefore it is impossible to end up somewhere different than where you currently are (Hildebrand, 2015). One cannot transform or transcend [*Lens 3 attention*] without the *Lens 2* gesture that would take them somewhere new. This lack of embodied vectorial gesture is the definition of the anaesthetic, static and disembodied.

> [G]enuine aesthetic engagement . . . must engage the physical senses, otherwise what is produced isn't *an experience*, the dynamic synthesis of sensation and cognition which engages the *whole* participant . . . We cannot grasp any idea . . . in its full force, until we have felt and sensed it, as much so as if it were an odor or a color . . . Whenever an idea loses its immediate felt quality, it ceases to be an idea and becomes, like an algebraic symbol, a mere stimulus to execute an operation without the need of thinking. (Dewey, 1934, p. 125)

Dewey's *an experience* must be prefaced by the actor actively participating in a happening. It is the felt sense of participation, the trajectory of intention that is necessary. It is not required that the participating actor be able to describe the happening with high fidelity or clear language. Describing requires analysis, and analysis demands some literacy in the field of inquiry. Most of us have no Soma Literacy, we are not rehearsed in clearly noticing or describing our bodied experiencing. This presents as a hindrance to anyone attempting to create, guide, or nudge the experience of self or other. I will present a specific experiential analysis tool in chapter four, offered as Soma Literacy, where we will see that an awareness of *Lens 2* (gesture) and *Lens 3 (*embodiment-*with*) provide a palette from which the designer may pull when aligning the stars toward *an experience*.

Meaning-Making

> I cannot attempt to describe my feelings and thoughts during these events. I was surprised to find myself very cool and collected. I hardly thought it possible we should escape, and I remember thinking it almost foolish to save my watch and the little money I had at hand. (Wallace, 1905, p. 305) —*Naturalist Alfred Russel Wallace writing to his friend the botanist Richard Spruce in 1852*

> A sneer, however, whether covert or open, had now no longer that power over me it once possessed: as I sat between my cousins, I was surprised to find how easy I felt under the total neglect of the one and the semi-sarcastic attentions of the other—Eliza did not mortify, nor Georgiana ruffle me. (Brontë & Oates, 1981, p. 216) —*Jane Eyre, describing a visit with her cousins*

When analyzing experiences for meaning, we seem to focus primarily on the worded reflection of an event where one describes the happening and what significance (emotional, social, cultural, historical, etc.) it holds for them. Kazmierczak writing in 2003 states that, "'Meaning' stands for a thought induced in the receiver, which is originated by the contact with a design" (Kazmierczak, 2003, p. 47), and Don Norman, writing in 2004, notes that emotional resonance comes after an appraisal of the interaction (Norman, 2004). These common understandings are describing *a posteriori* meaning. This understanding of meaning is demonstrated as worded reflective descriptions of what happened, and the connections one draws between the reflection and prior reflections of earlier experiences. This definition of meaning overlooks the prerequisites to worded reflections and, of even greater significance, the pre-reflective, pre-worded, *a priori* meanings that only resound in the soma.

In order for any happening or event to be recognized as having happened at all, the happening must engage the soma. The happening has to register through the *Lens 1* feeling and possess *Lens 2* trajectory. Without meeting these thresholds, the happening cannot register as actually

having occurred, and therefore it will not mature via a post-happening narrative, as meaningful. It is because of *a priori*, pre-reflective feelings that one is able to be surprised by the *a posteriori* emotions or reflections one learns as the event passes and matures in the memory. Alfred Russel Wallace was in a position of bodied tension, only to, after the fact, come to a place of calm. Jane Eyre found herself in a meeting filled with micro-aggressions, a bodied situation of anxiety, only to learn that the emotional result of calm was accumulated in spite of her cousins' sneers.

The *a priori* meaning of any interaction is discovered by the finding of oneself in the interaction. This is experienced both literally and figuratively. *A priori* meaning is discovered in the performative gesture of the interaction. If the interaction unfolds with authentic vectorial motion, the gesture will be engage-able and the experiencing actor will have the opportunity to literally participate-*in*, to feel the engagement of the happening. This carries an *a priori* meaning all of its own, and this meaning is regularly sufficient, needing no additional wording to clarify the happening. Given some time (a moment or a lifetime) to mature, the *a priori* meaning may give rise to *a posteriori* reflections which can result in a variety of emotions and/or understandings of significance. As one draws connections between the current reflection and prior experiences, one can, like Wallace, figuratively *find oneself in the interaction*. I can look back and see the version of myself that only makes sense looking backwards. Noting that these reflective meanings can at times surprise the actor is just a way of pointing out that *a priori* meaning already existed and was significant enough to be of surprise when the reflective worded meaning appeared to contradict the original pre-worded feeling.

Dewey's requirement for embodiment highlights the multidimensionality of *an experience*. Rather than a flat single monolithic *happening*, experience is affected by a multitude of variables and results in often surprising outcomes. Western culture has encouraged us to think of happenings as carrying single meanings. To the soma literate analyst, one sees interactions as multi-layered, and can even find examples of conflicting meanings occurring in the same actor at the same time.

A noteworthy example of multi-layered meanings in conflict was recognized in the most recent presidential debates. When asking a viewer to recall the meaning of the candidate's reply to the moderator's question, the viewer expressed immense frustration at the illogic of the candidate's statement. The moderator asked a very clear and direct question about subject X and the viewer positioned themself ready for a logical reply. Instead, what the candidate offered was a rant about subject Y, an obvious ruse to avoid the requested subject. The meaning generated for the listener was an *a posteriori* narrative citing the illogic of the candidate's reply and a general frustration pivoting on the obvious avoidance tactics of the candidate. The worded, logical, reflective *meaning* to the listener amounted to the emotion of frustration.

However, in addition to the rhetorical attention described above, there was another layer of meaning that occurred jointly in the listener witnessing the debate. The listener was not only listening and logic-*ing* the reply of the candidate. *The listener was also feeling and body-ing the reply of the candidate*. At this soma tier of meaning, the listening body is not processing specific words or becoming frustrated with the evasive techniques allowing the candidate to move from subject X to subject Y. At the bodied level, the listener is trying to find the cadence of the oration. There is a gait to the speaking not unlike the unfolding phrase in a piece of music. If the listener, pre-reflectively, is able to find the gait and cadence of the oration, they will predict, feel, and entrain to the shifts of weight in the happening, the rise and fall of the speaking, and will thus be satiated at the final cadence of the statement, regardless of how illogical the rhetoric may seem. I do not mean to claim that the salient overriding emotion the listener is left with is one of stability or calm, only that, if the candidate speaks with a recognizable cadence and aligns the variables of oration in such a way as to permit the listener to recognize/predict/feel/ride the cadence, they, by their engagement in the performance cannot help but feel the finality of the concluding statement. It is for this reason, that while most everyone seems able to spot the rhetorical trickery, the candidate is permitted a pass, and the non-answer is counted as enough of an answer to demand a pivot to the next question. We are not only judging the debate experience

based on the *a posteriori* worded reflections. We are, by virtue of our very humanness, as inhabitants of these very bodies, processing the world through our felt perceptions at least as much, if not more than the visual, auditory, and logical biases we claim so dear.

Zdravko Radman, who writes about philosophy of mind, language, and aesthetics describes this understanding with great aplomb:

> 'Every action, therefore, that consists of perception and operation imprints its meaning on the meaningless object and thereby makes it into a subject-related meaning-carrier in the respective Umwelt (subjective universe)' (von Uexküll [1940] 1982, 31). In this respect, the moving, feeling body has a constitutive role, for every action is affectively replete with concernful, values-realizing exploration within the immanent habitus of the agent. (Radman, 2013, p. 335)
>
> This emphasis on the body is important because an agent's action constitutes an affectively laden interrogation of its world, that is, a nonpropositional somato-sensory questioning of how our world is for us now and how we anticipate it will continue to be, and this is facilitated by our kinaesthetic and enkinaesthetic engagement. What we discover in this fundamental action is not, at first, an utterable knowing—it is not associated with speech or formal conceptualization; it is preconceptual. (2013, p. 331)

Csikszentmihalyi makes the same clarification by naming the *content* of an aesthetic experience as separate from the *structure* of said experience. In Csikszentmihalyi's wording, *structure* is universal, it includes the bodied, felt qualities of clarity, freedom, wholeness, and (I will add) trajectory or shifting of weight. *Content*, on the other hand, is the communicative elements (cultural, emotional, intellectual) which can reflectively communicate something (or nothing) to the participant (Csikszentmihalyi & Robinson, 1990).

Whereas I join many researchers in asking questions around the emotional response or personal narrative generated from a given interaction design, this thesis is firstly concerned with the pre-conditions for *a posteriori* meaning-making, that is, in recognizing the variables which must be aligned before such a reflective narrative is possible.

Summary

By defining the three experiential lenses and setting them within Dewey's explanation of *an experience*, I am offering the designer of experiences a clarifying set of attentions. Rather than treating experience as a single flat gestalt, the layered attentions of the thee lenses allow the designer to focus on and analyze the multidimensionality of any encounter. From the analytical point of view, it is of interest to recognize that (1) there is a touching that must occur [*Lens 1*]; if the experience is to register as a happening of any significance, it must feel. This is literal feeling in both the cases of *bodies-bumping* as well as in the thought encounters that are of enough significance as to tip into the feeling body ("*your words touched me to the core*"). The analyst will also note that (2) touching requires motion [*Lens 2*]. There is no feeling that is without motion. One can think things without motion, but if the thinking or doing is to reach a threshold of significance, the experiencing will be felt, and motion must exist. Motion, with an intentional arc, is a universal requirement of any meaningful encounter. Motion, bereft of the intentional gesture, is anaesthetic and as such carries no promise of meaning. Lastly, it is of interest to acquire (3) an attention to the *long-ing* of embodiment.[20] To embody a happening is to participate *-with* [*Lens 3*], and this joint participation carries a potential for transcendence and profundity.

Experience is generally assumed to be one flat layer of happening and it is also regularly described as though it is a completely minded activity. The present study reveals the shortcomings of both of these assumptions. This study into the phenomena of experience reveals both the depth of experience (as feeling + trajectory + embodiment) and the centrality of the kinaesthetic body critical to this threshold of *an experience* and the generation of meaning.

Understanding this framing reveals opportunities for continued research in the experience of the sentient body. Before the information presented throughout section 2.3 will be applicable to the designer,

20 I will discuss the Four Bodies of Embodiment and the amplification of the felt experience that results in the following section.

a practical literacy in the above-mentioned concepts will be necessary. This Soma Literacy provides the analyst/designer the skills to recognize the three phenomena of Lens 1-2-3 as distinct attentions, each able to be manipulated independently, and each carrying resulting aesthetics in the participating sentient body.

In the following four parts of section 2.4, I present a detailed account of the body as the fundamental constant in IxD, and supporting conversations surrounding the body's essential placement in all temporal, rich, and cohesive interactions.

2.4 Corporeal Design

In the following chapter I present the *soma*, the feeling body, not as an optional variable in experience, but as the single fundamental constant in any interaction or experience design.

- In **A Bodied Knowing**, I look deeper into the research from Lakoff & Johnson, Todes, Verbeek, Núñez-Pacheco, and Gallese to present the soma as *the* lens through which we come to know and create our worlds.

- In **The Embodied Experience**, I add the perspectives of Dourish and Spence to discuss bodied vs. embodied knowing, intimacy, empathy, and engagement. I then present a more complete account of *the four bodies of embodiment* (self/self, self/other, self/thing, self/environment).

- In **The Body in Design**, I present a brief survey of body-based attentions and methods used in current design practices, and then offer a critique of the designerly attentions to the soma, the performative body, and the current biases that are preventing the field from utilizing the body-centric palette of interaction variables.

- Lastly, in **Corporeal Design Agenda**, I lay out the principles, values, ideals, and variables of a soma-aware attention to experience. The Corporeal Design agenda recognizes the ubiquity of participatory bodies, the experiential depth to which these attentions can attain, and thrusts this attention to the fore of design decisions.

A Bodied Knowing

Creating worlds
Propositional knowledge
Designing Falsehoods
Logical vs. Bodied

Buchenau & Suri of IDEO San Francisco, writing in 2000, pointed out how the interaction fields were rapidly evolving to include interactive systems, "spaces, processes, and products for people" (Buchenau & Suri, 2000, p. 424). In response to this evolving reality, they proposed *Experience Prototyping*, a new mindset applied to prototyping where the emphasis moved from discrete objects to the experiential aspects of interacting with the space, process, or product under investigation. Rather than investigating products, spaces, or systems, Buchenau & Suri reframed prototyping as the revealing of the felt experience when engaging -*with* the designs.

Camille Moussette's *Simple Haptics,* Umeå Universitet, continued the conversation:

> As new products and services increasingly get more complex and start to pervade all domains of life, it becomes more important for designers to explore and try to define integrated and holistic experiences rather than working out physical and technical attributes of individual artifacts. (Moussette, 2012, p. 74)

Moussette was attempting in 2012 to refocus design practice's attention on the gestalt experience, rather than on discrete qualities of artifacts. Before one teaches the design of interactions, or offers a new space, process, or product for people (Buchenau & Suri, 2000), they would do well to take Moussette's lead. Look to the experience if you would like to know the true value and meaning of any designed interaction, and then consider *what* and *where* is this experience. The proving ground for all experience is the human body—the sentient, kinaesthetic and enkinaesthetic body.

Creating Worlds

Our world is known directly through tangible interactions and indirectly through metaphors of bodied experience.

> [R]eal people have embodied minds whose conceptual systems arise from, are shaped by, and *are given meaning through* living human bodies. The neural structures of our brains produce conceptual systems and linguistic structures that cannot be adequately accounted for by formal systems that only manipulate symbols. (McGilchrist, 2009, p. 357)

It is these "living human bodies" which breath, beat, feel, move, and respond-to that become not just the filter of our experiences, but the sounding board for them. It is only the interactions that resonate in the living body that become audible to the experiencing being, and therefore actively shape the ways in which we come to know our worlds (Núñez-Pacheco, 2018).

Here, I am following in the paths that were established by Merleau-Ponty's praxeological perspective. In his phenomenology, the body is the "[central] means by which I communicate with [the world]" (Merleau-Ponty, 1983, p. 517), and the implicated "natural and social situation[s]" (183, p. 517) are absolutely significant in the creating of this world.

> Phenomenology interprets intentionality as not only a distance from and involvement with world, but as reflexive with respect to world. This is to say . . . what we eventually come to know of ourselves is strictly reciprocal with what we come to know of the world. Without world there would be no self; without self, no experience of the world (1983, 53). (O'Brien, 2017, p. 126)

George Lakoff and Mark Johnson speak of the ways in which our integrated, sensorimotor bodies are central to the creation and knowing of our worlds. In their analysis, one's world is first revealed through the reaching out, touching, tasting, hearing, and seeing of the infant. These *primary*, direct interactions inform our original understandings of the environment and shape the *knowable world*. These original interactions then provide fodder for metaphorical extension of experience into more abstract realms. We are only able to conceptualize the abstract, nonphysical

world—including time, causation, morality, and the mind (Lakoff & Johnson, 1999)—relative to the concrete physical experiences we have amassed. As these most critical concepts of shared experience, such as "human emotions . . . mental activity, time, work, human institutions, social practices, etc." (Lakoff & Johnson, 1980) are abstract and therefore not readily, primarily tangible, we use other concepts, such as spatial orientations or experiences with objects to create understanding.

> We have a system of primary metaphors simply because we have the bodies and brains we have and because we live in the world we live in, where intimacy does tend to correlate significantly with proximity, affection with warmth, and achieving purposes with reaching destinations. (Lakoff & Johnson, 1999, p. 59)

> To put it simply, the producer and repository of representational content is not the brain per se, but the brain-body system, by means of its interactions with the world of which it is part. (Gallese, 2018, p. 33)

Lakoff and Johnson's work demonstrates how as specific individuals in specific environments and cultures grow, explore, and come to know the world, it should only be expected that the world that they come to know is specific to them. *We create our individual worlds*. That is, we have to make sense of our environments, and we do this by finding meaning in the different elements in our world. The primary tangible elements and those secondary abstract elements we correspond to tangible experiences are what comes to be understood as our world. There are other, unrecognized elements, individuals, and phenomena which exist, but not for us. If we have no conceptual system into which an element is placed, then it is nonexistent—it cannot be in our world.

It is in this way that Lakoff and Johnson describe our understanding of our experiences as acts of creating "*experiential gestalts*, which are ways of organizing experiences into *structured wholes*" (Lakoff & Johnson, 1980, p. 81). Built into this activity is the collecting of all relevant information necessary to make a structured whole. This is an action of inclusion and exclusion; we choose what in the experience carries meaning and ignore (to the point of denial) all remaining factors (Festinger, 1957; L. & Festinger, 1965). Our environment includes walls and furniture and

the air we breathe. It also includes phenomena of time and sound such as music or conversation, but only if these variables are congruent with the conceptual reality of our *structured whole* (Lakoff & Johnson, 1980).

Propositional Knowledge

Todes' *world* is specifically noted to be the world that is revealed to the participant through his body. While we all may live in the same world, or city, or room, the environment is not identical for any two of us. It is always personal as it can only be revealed through the individual's senses, and as per the Lakoffian critique, it is only understood through the lens of our past tangible experiences. We are only able to know what our knowing body has revealed to us (Verbeek, 2005). These bodied experiences reveal cumulative understanding to us as both concrete and abstract truths.

Cognitive neuroscience has shown that upon entering a space the motor cortex system of the brain defines an *Umwelt* around our bodies that maps all of the opportunities for bodied participation in the space (Gallese, 2018). This mapping is not arbitrary, but exceedingly personal. The mapping is not a static ledger of the objects in the room, but, rather, an accounting of the potential dynamic participations in the room. Our understanding of our inhabited spaces is seen not in the *appearance* of the environment, but through the ways that we might participate in the spaces. Stated differently, what we conceive of as the *appearance* of things around us, are not static pictures, but are instead scripts waiting to be enacted. We are wired for engagement with our world.

These scripts (1) aspire to interaction and (2) are unique to the specific actor. Because our literal placement in the environment is different, we all see different perspectives, literally. No two of us can occupy the same socio-material position at the same time (Hui, Schatzki, & Shove, 2016). Our situated bodies create worlds for us that are actually individualized and personal.

> Even when performing an allegedly purely 'inner' activity, one is bodily situated and thus has to adopt a posture that constitutes a specific attentiveness and 'inner' attitudes of absorption and thoughtfulness. (Hui et al., 2016, p. 15)

It is this individualized and personal knowing that starts to account for differences between any two people who witness the same event. Our literal view of the world is situated, and as a result our interpretations cannot be the same.

A second account of differences between actors who enter the same room or witness the same event is the prior bodied understandings collected over the years of living. Lakoff and Johnson's primary and secondary interactions mean that varied actors can have wildly varied foundational impressions of the world. It is through these primary interactions and secondary metaphors that the environment becomes known and further differentiates one actor's world from anther.

A third basis of situated-ness is the culture one is raised in and the actor's "position in the social space of a given society and in the trajectory of his or her life" (Hui et al., 2016, p. 15). Again, we find an example where "Design designs" (Willis, 2006, p. 19). The layout of our surroundings, built and social, determine the perspectives we are able to have when viewing and creating our image of our world.

Lastly, the *Umwelt* we are all living with is not itself a static set of scripts, pre-drawn and rigid; rather, our attention to our world is dynamic. We are constantly shifting and reacting to our new situated-ness as we move about. We are adjusting our doings to both the rules and structures of our environment but also to the affordances of others in the room (human and non-human) (Hui et al., 2016).

> As studies of sports practices demonstrate, such attention is the affair not of an isolated mind, but of an embodied agent in its sensual-material interplay with a concrete world. The body is not only an extended 'thing' (res extensa) with clear, visible outlines, but also a lived body that is exposed to the world, that can be affected in (e.g. Riedel, 2012) and by (Lindemann, 2017) concrete situations and that responds to those situations by 'incorporating' other participants into its 'space of muscular sensation' (Wittgenstein, as quoted in Gebauer, 2009: 64) on the basis of its kinaesthetic experience (Noland, 2009) and sensorimotor skills (e.g. Christensen, Sutton and McIlwain,2016). Understood as a lived body, the human body comes to the fore not only as 'raw material' (Moore and Kosut, 2010: 1) that is shaped

> in social processes, but also as an 'unexceedable mode of human experience' (Bedorf, 2015: 139) orienting and guiding people's acting in the world. In this sense, it is passive and active, a patiens and an agens at the same time. (Hui et al., 2016, p. 16)

These *in time* reactions to the ebb and flow of living are absolutely essential to one's successful and satisfying participation in their world. This critical concept of *in time* will be explored in detail in section 4.2, Soma Literacy Concepts.

Individuals develop unique world-views because the conceptual systems that they acquire throughout their life are their own personal, exclusive filters through which they come to understand their world. These filters may render unison physicalities of the world as entirely different realities to a second participant with a divergent set of inferences. Our understanding and participation in *our* world is specific to us (Newen et al., 2018). While our specific criteria for truth and reality can only be understood through our personal, exclusive filters of metaphorical inference (Lakoff & Johnson, 1980), it is our situatedness and culture, or the shared sets of experiences, or sets of metaphors common to a community, that allow us some amount of shared continuity.

Designing Falsehoods

> The knowable world . . . is the human body's world, and only those elements that have some kind of affinity to the human body can enter it. (Todes, 2001, p. 42)

Samuel Todes, writing in *Body and World*, lays out a deep case for the body as the one constant requirement for the creation of a "knowable world". The integrated, moving body is the observer, translator, and actuator of the life-lived. It is the only lens with which we are able to know our concrete and abstract, real, and virtual world (Todes, 2001). It is critical that the reader consider the wording, "affinity to the human body," as it is essential for the present thesis. **"[O]nly those elements that have some kind of affinity to the human body can [become known]."**

In order to build an experience for an actor, the designer must begin with a goal of something that can actually be experienced by the human actor. We have no affinity for cell division, or nuclear fission, or the digital change from a 1 to a Ø. That is to say, we have no way to *feel* these things, so if the goal is to make them *known*, the designer has to offer a primary interaction or secondary metaphor to foster the knowing.

The 1980s video game and movie series *Tron* was based on the story of a human trying to inhabit a digital world. It makes the point by showing the lead character Sam taking a ride in the digital cyber-world car. The car is digital—it follows the rules of 1s and Øs, so when Sam gets in and takes a ride, he is thrown into the wall of the car every time it makes a true 90° turn. The digital has no affinity for gracious curves and interstitial yearnings. The digital is either on or off, here or there, with no attention to the *yearning-toward* or *falling-away-from*. As human actors we are quite the opposite. We not only find true 90° turns bruising, we have no manner of understanding them at all. The experience of traversing a literal 90° turn is unfathomable to the human experience. *We have no affinity for such an interaction*. As human actors, aspiring for felt understanding, we can only participate in our worlds in the manners that our bodies, on this earth, within these laws of physics permit. We can only participate in that which we have an affinity for.

It is all built into the word. *Inter-action* is the realities of the inner-actions. First there are *actions*, that ebb and flow, dynamic and known only through motion. And there are the *inners*, the interstitials, the *yearnings-toward* and *fallings-away-from* which become the stuff of life. Let us consider these *Actions* and *Inners*.

Actions. Todes' *body* is not a body of stasis or a mere image of a body but, is a body of actions, a participant in its world. The ideal-in-living, an acknowledged living, a self-actualized living, acknowledges a dynamism of experience. Contrasting with this are the lives of mundane repetition, of lack of control, or lost free will, are lives of incomplete experience. Consider how some most simple and equally terrible forms of torture require only the removal of one's dynamism, as in the denial to be an

integrated, moving body (Todes, 2001). Without inflicting cutaneous or subcutaneous harm, one can create great agony by merely binding or caging the body. The living body knows nothing of stasis. It has no more affinity for binding than it does for 90° angles or 1s and Øs. The human body is a body of intention. This yearning, striving body is the body-dynamic; and it is in this dynamism where we find the foundation for idealized experience. To present a design that ignores the affinities of the human body is to present a bruising, binding experience. It amounts to a designed loss of agency, removing the felt dynamism from the interaction, not unlike the tortures of binding or caging. Design holds the power to challenge the tortured or diminished experience. Freedom is the ability to participate in the dynamism of life.

Inners. Attention to the *inners* is merely the recognition that *motion moves through*. The *inners* are the interstitials, the yearnings-*toward* and fallings-*away-from* which are the stuff of living. One cannot merely be—one can only become by traversing some territory. These yearnings-*toward* and fallings-*away-from* become central to the concepts of Soma Literacy. Any design of interaction that does not recognize and foster the traversing-actions becomes a falsehood, as bruising as the Tron cyber-car.

There is a style of beginning piano instruction that values the technique of the 5-year-old hand above all else. The student is instructed with great precision to place the thumb "just so" in order to build the very best technical habits into the future. The finger exercises are drilled and drilled until there is no room remaining for the young student to attack a key with less than laser-beam precision. What this strategy gets right is the grounding of a technical apparatus that will serve the musician for a lifetime of expressive, efficient, and healthy note playing. What the strategy misses is the overarching *yearning-toward* that is the stuff of musical experience. Rather than fostering the deep and rich idealized experience of music, the finger exercises overtly encourage a shallow and diminutive life experience for the student. They actively bind the child by limiting the dynamism of life to a very few discrete precise finger motions. Is it any wonder that a majority of 5-year-old pianists give up the lessons long before achieving fluency? There is a design prompt in

the story that has been ruminated over by piano teachers for ages. The solutions all involve a revised strategy whereby the active-inners are embraced, encouraging the student to participate in the experiential gestalts that music holds in potential.

We all, like the 5-year-old pianist, yearn for harmony, entrainment, and communication with our worlds. *Experience is not a noun*. Living is the participating-in our worlds.

> [I]t's not about one touch—rather, it's about how many touches build a relationship with a customer over time. (Risdon et al., 2018, p. 93)

Risdon's recognition that individual touch points (like thumb exercises) are not enough in themselves to create cohesive experience comes close to understanding the interstitial. He has an attention for the collection of "many touches" to aid in the creation of the larger experience, but what his and the majority of other design theorists miss is that a static collection of static points will only equal a still static monolith collection of points (a collection of finger motions not yet amounting to a song). The important part of the recipe is that each of these touchpoints have a functional *yearning-toward*. Touchpoints, like notes on the piano, are not nouns. They are wants, desires, visionary, and searching. They forecast into the near and far future and attempt to reach it. In order for the young pianist to find the experiential gestalt, they would have to find the wants and desires of each of the notes *yearning-toward* idealized resolutions. If one can redirect the attention, and if design practice can rewrite the rhetoric to recognize that *experience* is not an artifact, but rather a trajectory [*Lens 2*], it will redefine the project. Yearnings are manifest in the body. We know what the yearning is as we have a body that has experienced the non-stop wants and desires since our first day on the earth. Some yearnings are conscious ("I desire the ice cream cone") and others are foundational, inherent, the grounding base context for living.

> *I pick up my foot to take a step forward.*
> *I tip my body weight forward.*
> *For a split moment I am in free fall,*
> *yearning toward the soft earth, expecting it to catch me,*
> *allowing my forward trajectory to continue*
> *uninterrupted until I come to rest in the step.*

Logical vs. Bodied

> I shall reconsider human knowledge by starting from the fact that *we can know more than we can tell*. (Polanyi & Sen, 2009, p. 4 emphasis added)

There is a story from the early days of handheld digital assistants when handwriting analysis became a significant goal (Moggridge & Atkinson, 2007). The plan was to allow the actor to use a stylus to write freehand script on the screen and the mini computer would recognize the handwriting and convert it to type, but the early attempts were full of glitches. The software was able to recognize some digits and not others. It could recognize some users' handwriting, but only see gibberish in others. As the technology started to even out, one could write a fair bit without problems until a software problem would interrupt the transcription. Technology interrupting the intentions of the actor is a classic frustration that every user has encountered. It is frustrating for all of the obvious reasons but also for at least one reason that is regularly overlooked. The obvious source of frustration comes from the recognition of bad code. "The software is not what it claims. It is supposed to recognize my handwriting!" This is correct and logical and is understood at the cognitive level.

There is a second frustration that is processed at the soma tier of attention. When the bodied gesture is begun, in this case a bit of writing *yearning-toward* recognition, it anticipates the bodied resolution. The body of anticipation, is in suspense, hanging out, attempting to complete the gesture, a *yearning-for* resolution. This resolution is felt in the soma as a completion, a resting, a releasing, a micro-calm. The whole gesture is processed separately from the logical dilemma, with no implicated cognitive load. The experience of the gesture is purely visceral. In the same way that,

> *I pick up my foot to take a step forward.*
> *I tip my body weight forward.*
> *For a split moment I am in free fall,*
> *yearning toward the soft earth, expecting it to catch me,*
> *allowing my forward trajectory to continue*
> *uninterrupted until I come to rest in the step.*

I am also *tipping my weight forward* in the initiation of the writing on the PDA [note the *Lens 2 attention*]. The way that one participates in their world is through a series of gestures: the gesture of smelling, the gesture of writing, etc. Gestures, as seen through *Lens 2 attention*, are vectorial and possess intention. They *aspire-to* a conclusion and any interruption of the *yearning-forward*[21] is experienced as bodied discomfort.

Núñez-Pacheco notes the bodied discomfort when describing the frustration of mis-matching a name to a face:

> [W]hen we see a face that looks familiar yet we cannot remember where we have met this person before **this recognition comes as a physical discomfort somehow telling us that we should know.** There is a pre-cognitive knowing trying to jump out towards the explicit, and the bodily feeling appears as something that knocks the door from our inner labyrinth of existing, unarticulated knowing. The body is able *to feel this situation directly,* in non-conceptual ways (Dewey, 1934; Gendlin, 1993; Johnson, 2013; Merleau-Ponty, 1962), which gives everyday experiences part of their complexity. Without even noticing, our bodies perceive these experiences and respond accordingly. (Núñez-Pacheco, 2018, p. 27 emphasis added)

When the handwriting analysis fails, there are both logical frustrations (*because it should work!*) and there are soma frustrations (*I pick up my foot to take a step forward, the gesture yearns for completion, but is interrupted in some manner*) as the *gesture* of the writing is interrupted before it matures. This is *bodied* because there is an arm and a hand and movement of the stylus. It is even more-so bodied because there exists an inner gesture that begins a shift of weight in anticipation of a specific trajectory, and when the interruption appears, it reveals a feeling, not in the hand, but in the core, soma-deep.

The bodied knowings, understood at the soma tier of experience, are not worded. They are pre-cognitive and experienced as gestures, as yearning shifts of weight. We work with these tacit knowings day in and day out (Polanyi & Sen, 2009). The body is constantly involved in anticipations, aspirations, gestures yearning for completion, gestures of the soma, separate from any logical rumination (Merleau-Ponty, 1962).

21 The full gesture includes both a yearning-*toward* and also a fall-*away-from*. The detailed account of this phenomena is laid out in section 4.2 Soma Literacy concepts.

Donald Schön wrote extensively about tacit knowledge and knowledge through action. In a paper that presented the presence and validity of the tacit knowing of architects, he offers the example of the bicycle rider:

> I propose another possible response . . . based on the notion that rigorous professional knowledge does not consist only in the application of science to practice. There is also . . . knowledge in practice. People have in their doing a tacit kind of knowing. They know more than they can say and, in zones of uncertainty, uniqueness and conflict, they are sometimes able to reflect on what they know but cannot say. When I ask bicycle riders which way they turn the wheel in order to keep from falling, for example, many give the wrong answer, although they perform the right actions. Their knowing-in-action is incongruent with their descriptions of it. (Schon, 1984, p. 3)

Eugene Gendlin, the American philosopher known for his 'philosophy of the implicit', utilized the idea of "inner movements and shifts" (Perlstein & Frolinger, 2008) to explain what I am referring to as soma-deep gestures and the implicit dimension (Gendlin, 1999) to describe the soma tier of experience. One of Gendlin's greatest projects was to set up his Focusing Technique agenda which encouraged meaning generation through self-awareness. Contrasting with Gendlin, this thesis points out that meaning is constantly being generated through the body's yearning gestures (Banes & Lepecki, 2012; Merleau-Ponty, 1962), whether one is self-aware or not. These yearnings are implicated and situated in relations within the actor's world. The difficulty of explaining the experience of experience (Bardzell & Bardzell, 2015), and the neglect, mistrust, and misunderstanding of the bodied experience in design (Núñez-Pacheco, 2018) has created openings for new research in design and HCI. The Cartesian bias in Western cultures for the logical obscures these bodied knowings—knowings that are not static reflective descriptions, but rather unfold *in time* in the felt sense of the body.

The Embodied Experience

Cartesian vs. Embodied Theories of Knowing
Bodied and Embodied
True Empathy
The Four Bodies of Embodiment
The First Design (design of the self)

This thesis identifies with the approaches to knowledge that recognize the inseparable body-mind unity. Descartes was wrong in that at the level of knowledge, there is no mind without the situated body, and no world without mind/body connected. The mind itself is formed, implicated, and situated, in a mind/body/world stew that cannot be separated (Ihde, 1990).

> Mind has the characteristics of a process more than of a thing; a becoming, a way of being more than an entity. Every individual mind is a process of interaction with whatever it is that exists apart from ourselves according to its own private history. (McGilchrist, 2009, p. 20)

However, at the level of experience, some doings appear to be contained primarily in the mind (i.e. basic logic will often manifest as siloed thought). Again, the mind was formed in this situated body, and the world that the mind *thinks* through is absolutely situated in and bound to the physical, however, it is possible to "be in my head" and ignore the felt experience. As embodied agents, we have the ability to amplify or diminish the experience of *body-with* [*Lens 3 attention*], and it is to this set of concepts I now turn.

The amplification and diminishing that I am speaking of is in contrast to Don Ihde's use of the terms *amplify and reduce*. Ihde uses these words when describing the ways that technology will extend the senses of the actor. As the technology *withdraws* into the actor, it acts as a mediating agent allowing the actor to know the now extended world (Ihde, 1990). I am in full agreement with this critique of the mediating affordances of technology, however this is not the main point I am investigating. Instead, I am looking at the nature of the actor's personal felt experience

and how the bodied experience of the actor can be amplified or diminished as the variables of the soma tier of attention are adjusted. I am interested less in what the blind man's cane allows him to do ('see' the terrain), than the ways in which being *in ensemble* with the cane changes the experience of being the man (now an amplified man via the *with-ness* of an extended body).

In the following section I will define embodiment and situate the term relative to the intersecting philosophies of Heidegger, Dreyfus, Winnograd and Flores, Lakoff and Johnson, Shilling, Todes, and Dourish, and investigate the connection between *embodiment*, *action*, and *meaning*.

Cartesian vs. Embodied Theories of Knowing

Cognitivism holds that, "thinking is information-processing" (Searle, 1990, p. 26) and therefore knowledge is gathered by the objective collection and discernment of facts, objective associations between stimuli and responses. The ideals of the modern cognitivist agenda began with the cybernetics of Wiener and Tolman's cognitive maps in 1948 and were built upon, broadened, and refined over the following twenty-five years (Mandler, 2002; Miller, 1956; Neisser, 1967; Newell, Shaw, & Simon, 1959; Pinker, 2011). The agenda became Cognitive Science as the invention of the computer afforded the theorists a vocabulary and examples they needed to clearly present a model of computational knowledge (Pinker, 2011). Theorists who hold a strict cognitivist view believe that it does not matter if the information processing system that produces the knowledge is human or mechanical. Thinking can occur in a human brain, an analog or digital computer, or other medium (Marshall & Hornecker, 2013), a brain is just a computer after all. From a cognitive science disposition, thoughts, memories, goals, and emotions are considered beyond the abilities of science to address. As they cannot be reduced to measurable quantities, their causes are not easily definable, and they are 'subjective' (i.e. vary from individual experience to experience), they are not taken to be valid sources of knowledge. The Cartesian separation of mind from body assures that no concern is given to the ebb and flow of contextual factors (Marshall & Hornecker, 2013). Subjective interactions are seen

as wholly separate and of no consequence to information processing. The cognitivist attention to action amounts to what Heidegger refers to as a *present-at-hand* knowing (Heidegger, Stambaugh, & Stambaugh, 1996). *Present-at-hand* requires the objects of action to be attended to as distinct entities, separate from their context, objectively definable and rational, separate from the experiencing body. Heidegger points out that while such an attempt at perspective is possible, our regular interactions with our worlds are more likely defined as *ready-to-hand*, where the technologies (analog and digital) absorb into the body and are not considered as objects separate from the experiencing body. I will add that not only is *ready-to-hand* the fundamental manner of participating in the world, it is the preferred manner of participation. As participating actors, we aspire to a *ready-to-hand* interaction with our world. *Present-at-hand* is experienced as an interruption, frustrating, and significantly less-than-ideal. We actively skill through our lives to avoid this less-than experience.[22]

Merleau-Ponty's phenomenology of the body was greatly influential in recognizing the sensing body and placing it as the primary site of knowing the world. His theories were presented as a repudiation of the cognitivist stance that placed consciousness as the source of knowledge. Instead, his concept of unthematized bodily consciousness allows the body to access meaning directly through its own gestural sense, claiming that the body and the world that it perceives cannot be disentangled (Merleau-Ponty, 1962; Núñez-Pacheco, 2018).

American philosopher Hubert Dreyfus built on the ideas of Heidegger and Merleau-Ponty, continuing the repudiation of the base claims of the cognitivist approach (Winograd & Flores, 1987). In Dreyfus' critique, "intelligent action is grounded in a complex history of skillful bodily experiences in the world" (Marshall & Hornecker, 2013, p. 146). He denied the dualism of Cartesian thinking and instead claimed that all knowing is situated in time, place, body, and environment. There is no knowledge separate from the contexts in which the action is gained, and the base variable of these experiences is the feeling body.

22 I mean this in the most mundane manner. We 'skill' our walking such that we do not trip over every pebble we encounter. We 'skill' our manipulation of utensils to keep the soup off of our shirts, etc..

Don Ihde, Dreyfus, and then contemporaries such as Terry Winograd and Fernando Flores, leveraged this perspective to write extensively about the burgeoning role of technology and artificial intelligence in society, culture, and applications to the everyday (Winograd & Flores, 1987). Their post-phenomenological position considers relationships between bodies and technologies and investigates the ways in which technologies change our experiences (O'Brien, 2017) and mediate our relations (self/self and self/Other) (Verbeek, 2005). Their work has continued to resound within design studies and HCI, requiring a perspective where the bodied, the contextual, the situated, the historical, cultural and societal be understood and valued as grounding variables for any knowing.

A cognitivist attention to interaction cannot recognize the motion-filled *yearning-toward* of experience and as such can claim no understanding of *engagement*. While there are those in the science community such as the 4-E Cognition Group (Froese, n.d.), who seek for a cognitivist approach to embodied, embedded, extended, and enactive cognition, the traditional cognitivist requirement to reduce understanding to data points strips the *being* out of the experiential being-in-the-world and is left with only theoretical, static 'interactions'. In the same way that lived interactions require an affinity to the human body to be felt, only the interactions that acknowledge human *being*, what Heidegger referred to as *dasein*, can contribute to human experiential knowing.

Where Dreyfus and Winograd & Flores have used this point to describe a critique of and philosophical stance on the evolving significance of technology in our everyday lives, this thesis takes these ideas one step further. I hypothesize that their work has missed a critical viewpoint when considering the body's role in all of experience. In the rush to understand the significance of and reaction to technology, the Anthropocene, and the built environment to our humanity, I believe the academy has overlooked a grounding attention. Engagements with built technologies are just one set of examples that highlight the implicated-ness of being. Noticing the ways in which our engagement with our tablet devices push and pull and politicize our knowings is just a more recent example of the ways in which the body has always been implicated in its many

participatory technologies. Don Ihde's post-phenomenological philosophy of technology argues that tools extend (and limit) *our abilities*. I point out that if taken at this definition, all technologies must be technologies of the body. Building on this premise, I argue that technologies are not only the digital or mechanical, but can also be seen as social, cultural, and deeply personal.

Our bodies feel. The most meaningful accomplishment of the Heideggerian critique of technology is not to help us understand our role in a built environment, but instead to reveal the root experience of all experience. *Hammer-ness* is not contained in the static image, definition, or description of a hammer, rather it is in the *thrownness* (Heidegger et al., 1996) of hammering. Heidegger, and then Dreyfus, and Winograd & Flores' attention to the mediating role of technologies serves not only to reveal the exceptionalities of modern technology and the ways that we need to adjust to meet the novel call, but also serves to highlight the experience of human experience. Design's attention to experience must encompass more than just the mediating roles of technology. If it is to ever understand the promise of rich interactions or meaningful discourse, it must look to the technologies of experience in all modalities, whether it be between the self and a device (me and my iPhone, Self/thing), or self and a landscape (me and the hiking trail, Self/environment), or the self and a partner (me and my wife, self/other), or self and my intention (me and my yearning-*toward*, self/self).

Bodied and Embodied

In an attempt to clarify further the varied aspects of experience, I would like to look closer at the terms *portrayal, engagement, and embodiment*, as these specific terms are sometimes tossed about lightly in the design fields and not always to an agreed upon definition.

Pulling from *Performative Experience Design*, the idea of *portrayal* is helpful to clarify. A portrayal is the bodied demonstration or performance used for narrative communication (Spence & others, 2016). In portrayal, the focus is on the demonstration and the story being relayed. It is dependent

on a communicating body, but the goal of a portrayal is to simply give information to a separate body. The focus is not on what the portraying actor is doing, but only on how the doing results in a receiving in a receiving actor. Portrayal carries no focus on the experiencing of either actor. It is a solely utilitarian focus on the performative transferring of information.

Engagement is similar to portrayal in that there is a bodied participation, but the focus becomes more personal. Merleau-Ponty (1962) used the term engagement to describe the act of coming to know our world. In his rhetoric, engagement is the intermediating happening that connects the body and the world outside of the body. The American philosopher of technology, Albert Borgmann uses the term engagement to describe the coming together of worlds. *Things* have worlds and *bodies* have worlds, and it is through engagement that these worlds come together and create shared commodities greater than either single actor (Borgmann, 1987). If we again look to Spence and her Performative Experience Design, the term engagement refers to the ways in which actors adopt roles in their interaction with devices or systems (Spence & others, 2016). 'To act', 'to come together', 'to adopt'; these are all the aspirational doings of engagement and consistent with the current project's usage of the term. For the purposes of this thesis, engagement assumes a *yearning-for* connectedness, collaboration, synchronization, and entrainment. It is what allows the blind man's stick to become an extension of his arm. The stick and arm engage or entrain *-with* in such a way that the separateness of the individual parts is removed, and the idealized experience can be realized. Engagement does not guarantee the idealized experience; it is merely the *yearning-toward* the experience. What engagement is *yearning*-toward is simply the aspiration for *with-ness*. Engagement is the desire for *embodied*.

Lakoff and Johnson, writing in *Philosophy in the Flesh*, present the *embodied experience* as that experience that arises from "sensorimotor and other body-based forms of inference" (Lakoff & Johnson, 1999, p. 77). In their estimation, *all* understanding is embodied in that we can only understand the world as concepts concrete and abstract, through inferences of motion-enacted body-based experience.

A selective account of implicated research offers the following definitions:

> Embodied phenomena are those which by their very nature occur in real time and real space . . . Embodiment is the property of our engagement with the world that allows us to make it meaningful. (Dourish, 2004, p. 126)

> Embodiment denotes a perception or experience through a technology as a tool synthesises with a body in a particular way. (Ihde D., as referenced by O'Brien, 2017, p. 122)

> Embodiment [is] the act of meaning making while immersed in mundane, everyday experiences where the lived body enacts and perceives. (Dourish P., as referenced by Núñez-Pacheco, 2018, p. 43)

> Embodiment typically refers to our being living, feeling, bodily entities situated in a physical world . . . [which then] shape how we perceive, feel and think. (Marshall & Hornecker, 2013, p. 1)

Paul Dourish introduced the idea of Embodied Interaction in his book, *Where the Action Is*, in 2001. He notes that embodied interactions must carry with them the reality of bodies as living and breathing beings which (a) "occur in real time and space" (Dourish, 2004, p. 126). Additionally, embodied assumes (b) some synthesis of body+ (O'Brien, 2017). To be embodied is not to merely *feel* but to *feel-with*. Lastly, (c) embodied interactions carry the promise of *meaning-making*, even in "mundane everyday experiences" (Núñez-Pacheco, 2018, p. 43), which shape how we perceive, feel and think (Marshall & Hornecker, 2013).

a) actively bodied, occurring in real time and space

b) requires a synthesis of body+

c) leads to meaning generation

In order to ground the full agenda, it will be helpful to briefly visit each of these points in turn.

a) actively bodied, occurring in real time and space

The case for the body-dynamic has been presented in earlier pages of this document. To restate: While it may appear obvious, embodied requires the body, and this body is not a static picture or frozen idea of a body, or body as data, but the living breathing gesturing body that is enacted in real time and space. Any attention to body as noun risks missing the ever-dynamic body bodying. Embodied can only be a valid concept as it refers to the dynamic gesture-enacted body.

b) requires a synthesis of body+

Central to the concept of embodiment and to this thesis is the "interconnectedness" of an individual to their environment. Dourish, Lakoff and Johnson, Todes, and Shilling all speak to this idea. Embodiment is not just that *I feel*, but that *I feel as*. Embodiment—at the *deeply-embodied* end of the spectrum—is the purest form of empathy. I identify with some aspect of my environment to such an extent that *I feel as* the thing or person or phenomena around me. The experienced world becomes an extension of myself. It is me. Merleau-Ponty's blindman's cane is not a stick grabbed by the hand, it becomes an extension of the hand and serves as a feeling, communicating limb. There is no inside/outside of experience. To have Dewey's *an experience* is to make the experienced, part of myself. It is a world-increasing activity. It does not just change the knowing-you (logically), it changes the sentient-you (somatically). Your world, your feeling-as-the-world is changed. This is a somatic kind of knowing. My bodied participation informs my world differently than my logical knowing can.

Shilling writes that the "integrated, moving body," mandatory in making our world *knowable*, achieves its desire, not by a domination over its environment, but through what he calls the "*interconnectedness* of the embodied subject and this environment" (Shilling, 2008, p. 21). The embodied experience is revealed as an act of balance and integration-in, rather than any experience of body and environment separated (disembodied).

> [I]t is the *interaction* between, as well as the existence of, the external and internal environment that is vital to our understanding of embodied action. (Shilling, 2008, p. 11)

Interconnectedness with the environment runs in great contrast to the opinions of many of the great thinkers of the ages. For Aristotle, Plato, and then for many philosophers from Descartes onward, the body was viewed as just one material, among all of the materials in the world. It played no role except to house the intellect of the man, and in this way, it was possible for the man to be isolated from the world. He had only to command his body to carry his intellect away from extraneous distractions to realize his solely inward isolated experience.

However, most would now agree that Descartes was wrong to think of mind and body as two separate substances (two 'whats').

> Mind has the characteristics of a process more than of a thing; a becoming, a way of being more than an entity. Every individual mind is a process of interaction with whatever it is that exists apart from ourselves according to its own private history. (Descartes, as quoted by McGilchrist, 2009, p. 20).

Even Descartes recognized the dilemma when he wrote:

> I am not merely present in my body as a sailor is present in a ship . . . but, am very closely joined, and as it were, intermingled with it, so that I form with it a single entity. (2009, p. 20)

What Lakoff and Johnson establish is that one cannot have intellect about those things that there are no bodied primary experiences with which to compare them.

> [O]nly those elements that have some kind of **affinity to the human body** can enter [the knowable world.] (Todes, 2001, p. 42 emphasis added)

Dourish, Todes, and Shilling all write of the range of bodied experiences in which we participate, where embodied marks the threshold of *interconnectedness with the environment*—here, environment can mean the walls and air and three-dimensional built environment, but also includes emotions, abstract concepts, time, social practices, etc.

Dourish clarifies the point in that he differentiates two poles of experience.

> Distinguishing between inhabited interaction in the world on one hand, and disconnected observation and control on the other, is at the heart of the embodied interaction proposal. (Dourish, 2004, p. 102)

Here he highlights that while all experience, in a Lakoffian sense, may be bodied, there still remains a difference between those experiences which are *inhabited* and those which are *disconnected*, merely seen from afar, as outside of the body. In Dourish's definition, embodiment is *inhabited* experience.

Embodied experience is larger than just the isolated self. Rather than a *disconnected* thing or a state, embodied is always the *process* of *embodied-in*. The *deeply-embodied* experiences are those in which the external and the internal are merged, where we find an intimacy with the environment. It is found in the "dynamic interactions and transactions that occur between the external and internal environments," as Shilling refers to it (Shilling, 2008, p. 162). While there has been continuous debate in the academy about these notions, it is a notably common sentiment in popular culture: the musician who is one with her instrument (a merging of self with thing)—the surfer who is one with the waves (a merging of self with environment)—the biblical definition of marriage where spouse is one with spouse (a merging of self with other)—these are experiences that acknowledge and strive for the heightened and (literally) embraced reality of embodiment.

c) leads to meaning generation

I again recall Flusser and his comments on the aesthetic experience. He describes the *process* of *embodied-in* when writing about the experience of listening to music (Flusser & Roth, 2014). With great insight he presents an environment not of sound on the outside of his body surrounding him, but of tactile vibrations that mix within him. He describes the parts of the body ("belly . . . chest, sexual organs, head—all body parts disposed to oscillation" (Flusser & Roth, 2014, p. 114) literally vibrating in sympathy with the sound waves. This experience is not one of outside/inside, where one only considers the sounds around oneself, rather,

this is the sensation of making the outside integrated, of experiencing the vibrations in unison with oneself.

> The human body is permeable to sound waves, but not in the same way it is to X rays . . . [sound waves] can be felt, one is aware of being subjected to them. In Greek, this knowing subjection is called *pathein*. The reception of music in the [body] is *pathos*, and its effect is [somatic] empathy with the message. The acoustic message alone literally has this pathetic character. In all other messages the effect is only metaphorical. In listening to music, a person is "touched" by a message in an entirely physical (not a metaphorical) sense; he is empathizing with the *pathos* of the message. (Flusser & Roth, 2014, p. 114)

This experience of *pathein*, or the "knowing subjection", is a joining of the body with the surrounding world. It is a *participating-in* rather than mere *observation-of* the world.

Flusser continues:

> This is possible because the acoustic vibrations don't just penetrate but also set up a resonance with the body's skin . . . transmitted on to the intestines, to the "inside," is "ecstasy," the "mystical experience." . . . For he and the world do not appear as a contradiction between subject and object but as "pure relationship," namely, as acoustic vibrations. (Flusser & Roth, 2014, p. 116)

The *participating-in* of Flusser's "acoustic vibrations" amounts to a literal empathy with our surroundings. As I mentioned in Section 2.3, empathy deserves specific attention. A minimal empathetic act is richer than the majority of mundane experience, and this "pure relationship", this *literal empathy*, this *pathein*, is quite possibly the most powerful of all our human potentialities.

It should be noted that this kind of attention to/through the world amounts to a specific kind of knowing, a literacy unto itself. This Soma Literacy, which I will lay out in Chapter 4, is concerned with the felt/participatory knowing of *pathein*. It notes the ways in which things (happenings, phenomena, events, opportunities) on the outside, separate from me, can shift into a felt experience; felt as part of myself. This is

an entirely different way of knowing compared to a scientific knowing where one names and categorizes in a sterile and distant way. Rather than remaining isolated or separate, *objectively* appraising an event as an impartial observer, experience, in its idealized form *pathein*, is messy, implicated, and participatory. In this manner, I claim that there is no *objective knowing* of experience. One can only participate *subjectively* in the event. One must shift the sterile categorizable potentiality on the outside into a messy, implicated, situated happening of outside/inside combined and felt.

True Empathy

> *Engagement* is the act of *yearning-toward*. It is the attempt at transcendence. *Embodied* is the threshold where one feels-*with*, where body+ (transcendence) is achieved. This body+—this feels-*with*—is the actual *empathetic* state.

The design fields have expressed a great deal of interest in the concept of empathy (Ashworth & Lucas, 2000; Chapman, 2015; Kolko, 2014; Kouprie & Visser, 2009). It is through empathy that we come to deeply know something of the other. Yet, any attempt at or claim to empathy without the implicated—literally feeling—body can only result in a list of attributes of the other. It is an aim in the direction of actual knowing that is doomed to miss. To *know* another is first of all an action, and the act requires an intimacy, a giving of oneself to the interaction, a lowering of boundaries, and opening to the deeper experiencing. True empathy is embodied, and embodied is bodied+ or bodied *in ensemble*.

Pulling from the field of hermeneutic philosophy, the term *enkinaesthesia* expresses this concept of deep, or true empathy.

> '[E]nkinaesthesia' [is founded on the] experiential entanglement of our own and the other's felt action as the sensory background within which all other experience is possible. Enkinaesthesia emphasizes two things: (i) the neuromuscular dynamics of the agent, including the givenness and ownership of its experience, and (ii) the entwined, blended and situated co-affective feeling of the presence of the other(s), agential (for example, human, horse,

> cat, beetle) and non-agential (for example, cup, bed, apple, paper) and, where appropriate, the anticipated arc of the other's action or movement, including, again where appropriate, the other's intentionality [*yearnings-forward*]. When the 'other' is also a sensing and experiencing agent it is their—in this case, the pair's—affective intentional reciprocity, their folding, enfolding, and unfolding, which co-constitutes the conscious relation and the experientially recursive temporal dynamics that lead to the formation and maintenance of the deep integral enkinaesthetic structures and melodies which bind us together, even when they pull us apart. Such deeply felt enkinaesthetic melodies emphasise the dialogical nature of the backgrounded feeling of being. (Stuart, 2012, p. 1)

The sharing-in of these deeply felt "enkinaesthetic melodies" (Stuart, 2012, p. 1) is the threshold for true empathy. Contrast this idea to the empathy that is often spoken of or implied in trade articles such as *Design Thinking: Getting Started with Empathy*, where "[empathy is a] deep understanding of the problems and realities of the people you are designing for" (Dam & Siang, n.d.-a), or *How to Develop an Empathic Approach in Design Thinking*, where "[we learn] to put aside our learning, culture, knowledge, opinions, and worldview purposefully in order to understand other peoples' experiences of things deeply and meaningfully" (Dam & Siang, n.d.-b). These *Design Thinking* definitions of empathy, while well meaning, very likely miss both the realities of enkinaesthesia and the transformative properties of such intimate connections. The disposition of these articles assumes an awareness of others but falls far short of the potential ways that we can actively draw the presence of others (agential and non-agential) into ourselves and thereby transcend the scientific static siloed self.

This enkinaesthetic nature of being is supported by the discovery of mirror neurons in the macaque monkey brain as well as through evidence for the existence of a similar mechanism in humans (di Pellegrino, Fadiga, Fogassi, Gallese, & Rizzolatti, 1992; Rizzolatti, Fadiga, Gallese, & Fogassi, 1996). These discoveries created a renewed interest in embodied models of simulation (Gallese & Sinigaglia, 2011). A core claim of embodied simulation models is that we undergo the same internal processes whether we are experiencing our own actions, emotions, or sensations, or if we are to observe someone else performing an action or feeling a specific emotion or sensation (Gallese, 2018). We are wired to feel intercorporeality.

The neuroscientist Vittorio Gallese has published extensively about the embodied roots of empathy, intersubjectivity, and aesthetic experience.

> The discovery of [mirror neurons] gives us a new empirically founded notion of intersubjectivity connoted first and foremost as intercorporeality – the mutual resonance of intentionally meaningful sensorimotor behaviors. The ability to understand others as intentional agents does not exclusively depend on propositional competence, but it is in the first place dependent on the relational nature of action. According to this hypothesis, it is possible to directly understand others' basic actions by means of the motor equivalence between what others do and what the observer can do. Thus, intercorporeality becomes the primordial source of knowledge that we have of others. (Gallese, 2018, p. 34)

From both a neurological and a phenomenological perspective, we experience the simulation, or the shared experience, regularly and as a matter of daily occurrence. This is the participating *in ensemble* that was presented earlier in section 2.1.

Lakoff and Johnson speak of *empathy* and *empathetic projection* as "the focused, imaginative experience of the other" (Lakoff & Johnson, 1999, p. 566). "Imaginative" in this sense is not to the exclusion of *the real* or *tangibly felt*. The mark of true empathy is the focused experience one gains when involved in the interaction, the *pathein* that Flusser introduced. Empathy is the *participating-in* of the other's experience. It is a form of transcendence (Lakoff & Johnson, 1999) in that one can feel past the assumed physical boundaries of the self and participate in union with the other. It is not an experiencing-*on*, or -*at*, but -*in*. Empathy is felt. It is our felt "sense of being present *in* the world" (Lakoff & Johnson, 1999, p. 565 emphasis added).

Of particular interest to this thesis are the gestures of enkinaesthesia. The reader will note the motion-filled, kinaesthesia, as the basis for the term. Again, I highlight that experience cannot be a noun. The enkinaesthetic is an unfolding series of shared, jointly performed gestures, and gestures are not merely synchronized moments in time—entrained—but are matching momentums, *yearnings-toward* of matching gates, sympathetic frequencies. True empathy is the harmonizing of enkinaesthetic melodies, as bodies-*with*.

From the perspective of the design fields it is notable that these deep interactions can happen as (1) matter of pre-reflective daily living, or (2) serendipitous chance meetings, or as (3) pre-planned immersions.

> *Engagement* is the act of *yearning-toward*. It is the attempt at transcendence. *Embodied* is the threshold where one feels-*with*, where body+ (transcendence) is achieved. This body+—this feels-*with*—is the actual *empathetic* state.

Consider the goals of the theater. The theatrical experience strives to engage the audience, that is, to spur a *yearning-toward* connection in them—to pull them into the drama of the story. If successful, the audience member embodies the action, where they feel the gestures of the action, the tensions and releases, enkinaesthetically in their own, literal body. It is in this way that they might be drawn to tears at the sadness of the character's story or feel their heart race at the climax of the narrative. This deep participation occurs without the audience's explicit permission. While an audience member may have agreed to purchase a ticket, attend at the assigned hour, and look in the prescribed direction, there is no 'consent form' to fill out that expresses how deeply one agrees to feel.

As the theater and contemporary culture have co-evolved, it is now a regular occurrence to find theatrical events that push the audience member into a deeply empathetic position of cringe or unease or even pain. The term "non-consensual audience participation" is an established headline (Burnell, 2018; Wingenroth, 2018). The examples can take the form of overt physical interactions, such as being literally grabbed and lifted out of your seat, or they can take the form of being subjected to enkinaesthetic witnessing, and therefore feeling events that are more uncomfortable than anticipated.

To *feel* the uncomfortable-ness or the exhilaration, or to catch yourself mouthing words being spoken in the movie, or to experience the tension in your chest, soma-deep, in concert-*with* a witnessed event is to embody the event. All embodied interactions are non-consensual; that is, the feeling of felt interactions is established pre-reflectively. It is impossible to bound the interaction once the door to enkinaesthetic participation

is ajar. Recognizing that design can create or nudge these events into the felt realm opens ethical questions as is noted in the news articles above (figures 1 and 2).

Dewey also writes of the unison of world and body, describing the embodied interaction as a "complete experience," and manifesting a "wholeness" (Dewey, 1934, p. 61).

> Experience in the degree in which it is experience is heightened vitality. Instead of signifying being shut up within one's own private feelings and sensations, it signifies active and alert *commerce with the world*; at its height it signifies complete interpenetration of self and the world of objects and events. Instead of signifying surrender to caprice and disorder, it affords our sole demonstration of a stability that is not stagnation but is rhythmic and developing. Because experience is the fulfillment of an organism in its struggles and achievements in a world of things, it is art in germ. Even in its rudimentary forms, it contains the promise of that delightful perception which is esthetic experience. (Dewey, 1934, p. 19 emphasis added)

Flusser's *pathein*, Lakoff's *present in the world*, and Dewey's *commerce with the world* are all pointing at a similar notion. There is no "heightened vitality" without a communion of body and world. True empathy is not just a new- or hyper-awareness of the other, but is "completed" in the intimate coming together of *embodied*.

The Four Bodies of Embodiment

Don Ihde's post-phenomenological exploration of the mediating properties of technology is greatly influenced by the phenomenological philosophies of Heidegger and Merleau-Ponty, each of which take stands about the human body's intertwining with tools and how these relations shape and modify experience (O'Brien, 2017). Ihde speaks of embodiment relations where an artifact blends into and extends the doing of the literal body. i.e. eye-glasses extending our sight, bicycles extending our mobility, or the dentist probe extending our reach (Verbeek, 2005). These examples—like Merleau-Ponty's cane and Heidegger's hammer—present technologies as tools. The tool exists to extend the reach or the productive accomplishment

Culture > Theatre & Dance > Features

Immersive theatre may be sexy – but we need to start talking about consent

After reports of audience members sexually assaulting actors, it's time the boundaries in this most hedonistic of art forms were redefined

Emma Burnell | Monday 28 May 2018 10:45 | 671 shares |

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5

Sam Donnelly and Jessica Guise in 'The Great Gatsby' (Helen Maybanks)

Figure 1. "Immersive theatre may be sexy–but we need to start talking about consent", The Independent (Burnell, 2018).

of the body. Extending the doings of the body is a utilitarian framing, where the goal becomes aiding the body to accomplish more than it might in a comparative circumstance. If embodied is described as the threshold whereby the tool is integrated as a transparent extension of the body, then our understanding of embodied relations is bound to begin and end with *things*: artifacts as tools.

I would like to push on and build upon this notion by positing that the actual potential of embodiment relations is not to aid a body in doing more, but to aid a body in being more. I do not yearn to *do* more, I yearn to *be* more. If we were to assume that the result of embodied relations is

the increasing (or decreasing[23]) of self, then we would gain permission to look further afield than only the examples of bodies with things.

Recall the playground swing from section 2.3, *Lens 3 attention*.

> When you ride the playground swing, you experience a *long-ing* of self; a gaining and shedding of weight that is greater and lesser than your actual static weight. This is the transcended experience, the literal feeling of more (or less) than your static self (felt in the body via *Lens 2* motion and *Lens 3 -with*) . . . The kind of experience that the swing affords merges on the profound as it transforms the actor, not by trading one experience for another, but by *long-ing* the actor to more-than. This amplification of the individual is a literal transcendence, it is a *long-ing* or extending me beyond static me.

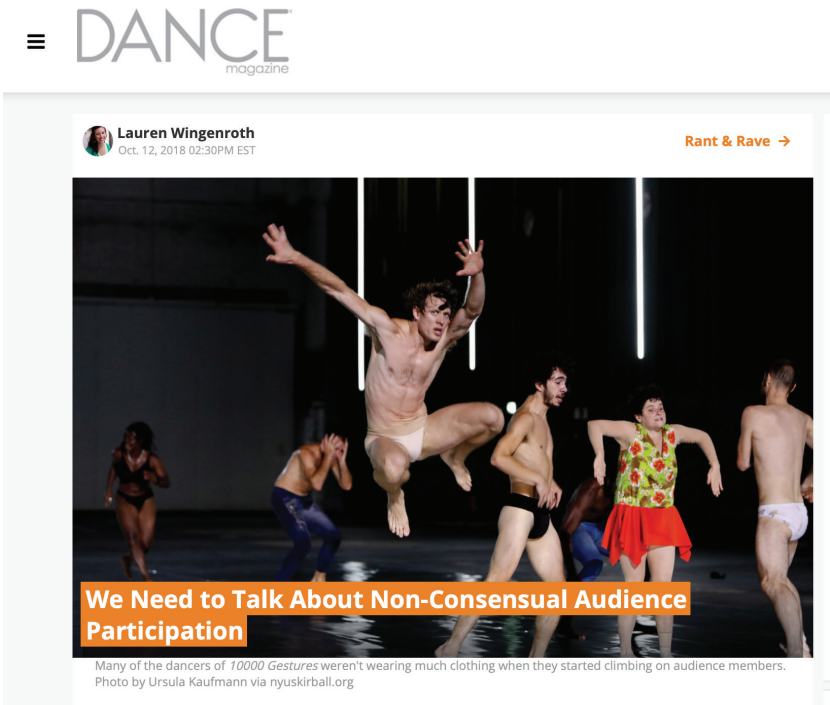


Figure 2. "We Need to Talk About Non-Consensual Audience Participation", Dance Magazine (Wingenroth, 2012).

23 It should also be mentioned that embodied (as utilitarian or aesthetic) does not guarantee an additive sum. Our bodied parings with other technologies can have the result of removing agency and suppressing aesthetics in the actor. Literal bindings as in a jailed setting, poorer functionality as in the comparison of the burnt tip of a stick vs. calligraphy nib, or architectural features such as a cave-like hallway vs. a grand lobby can all remove utility and aesthetic via embodied relations. Ihde writes of the concept of amplification/reduction in *Technology and the Lifeworld: From Garden to Earth* (1990).

The *long-ing* embodied relation can be found in our intertwining with things (hammers, canes, eyeglasses, dentist probes), but *long-ing* also exists in our embodied relations with environments, with others (agential beings), and within ourselves.

Chris Shilling describes the *long-ing* of embodiment as such:

> The emotional experience associated with creativity is at its height during sudden experiences of revelation or epiphany when someone is gripped by the realisation that their relationship with the environment could be radically different. This feeling is often associated with religious insight or conversion, and is clearly not understood adequately solely as a cognitive event. As James (1982 [1902]: 113) argues, revelation and epiphany emerge from specific situations and problems, and can strike the individual with a physically and emotionally palpable force. They can feel like a 'bolt of lightning,' increasing an individual's heart rate and blood pressure, and making them unable to contain themselves . . . The 'peak experiences' associated with feeling 'at one' with a demanding physical activity have been experienced as 'life changing events' in which a harmony is achieved between the participant, the activity and the environment (e.g. Baker and Moreno, 2001: 15–17). (Shilling, 2008, p. 20)

Central to the present critique is the difference between the ideas of feeling "'at one' with [an] activity . . . in which a harmony is achieved between the participant, the activity and the environment", and the profundity of "life changing events" (Shilling, 2008, p. 20). While regularly conflated as the same concept, I recognize the *in time* bodied/embodied attention (*a priori*, *Lens 1, 2, 3*) as separate from the (*a posteriori)* "life changing" meaningfulness ascribed to the specific actor after the interaction.

- Self with environment.
- Self with thing.
- Self with others.
- Self with self.

I have established this categorization to aid the analyzing of varied embodied experiences. While we regularly process embodied experience as a flat concept, there are benefits in exploring the multidimensionality of the concept. By naming these four different avenues of engagement, we are permitted a deeper analysis of and richer context for embodied experience.

As human actors engaging in our worlds, we attempt *to read* the situations in which we find ourselves. This *reading* requires some amount of engagement which falls on a spectrum of noticed to deeply felt [*Lens 1*]. To engage is to strive for *ensemble*, a harmony of potentialities, an entraining of momentums [embodied, *Lens 3*]. Engagement requires noticing, then an opening of self to the other. Beyond this, engagement *yearns-toward* embodied [vectorial intention, *Lens 2*]—that is, the threshold whereby the self-world is changed. Rather than a siloed body, unchanging and static, *living* is the realizing of the embodied-self, and this embodied-self is actualized in the *-with* of one of the four bodies of embodiment.

Examples of *self with thing* are the most commonly discussed examples of embodied relations. Again, Merleau-Ponty's cane, Heidegger's hammer, and Ihde's glasses and dentist probe are all examples where the actor is not only near the artifact, or just in possession of the artifact, but can feel-*with* the artifact. The embodied relation with the thing creates a symbiosis whereby the thing is absorbed into the body, and transparently serves to change the capacity of the actor. At the union of thing and body, the actor becomes *more-than* (or *less-than*) the uncoupled-self. This coupling is a body+time reality. It cannot be understood as a static image of a couple, rather, it requires a dynamic coupling, realized *in time*. Embodied relations can only be temporal, performative, and shared, proven in the feeling body.

Self with environment engagements are also commonplace in design (C. Alexander, Ishikawa, & Silverstein, 1977). Design practice has a high attention and rich history of attention for the built environment and the ways that it nudges bodies to perform and feel. Whether built or natural, the human actor attempts to *read* the environment, searching for harmony with our surroundings. At the shallow end of the spectrum are mundane activities like engaging in the environment enough as to not trip over broken cracks in the sidewalk.

> *I walk down the sidewalk, taking no time to reflect on the aging infrastructure of the city walkways, yet yearning-for enough harmony with my surroundings so as to not trip on the jagged cement pieces under my feet.*

At the far other end of the spectrum are the examples where the environment is deeply embodied. These at-one-*with* experiences would include the absolute sense of calm or serene found in the awe of nature (i.e. when returning to the beloved childhood vacation lake, or in nature walks, or seeing the Grand Canyon) (Piff, Dietze, Feinberg, Stancato, & Keltner, 2015). The point being that what occurs in the embodied relation is more than just seeing. One can see the Grand Canyon and feel nothing, or one can engage in the canyon, open the self to a shared performance, resulting (in the case of the canyon) in a union of environment and body, a *more-than* the uncoupled-self.

Self with others has only recently come into design attention as research implicating interactions (bodies+time) have become more the norm (Spence & others, 2016). The fields of Service Design (SD), User Experience Design (UX), Interaction Design (IxD), Human Computer Interaction (HCI), and Experience Design (XD) all see the body as implicated, and regularly look to the relations between others in addition to the relations between self and artifacts. Attention to *with-others* follows the same recipe as described above. As human actors we search for ways to engage with our environments. As one notices other agential bodies near us (physically or mentally), we can attempt to engage with them or not. *To engage* requires not only that one speak to, or point at, or look at the other (all outwardly focused actions), but that they open themselves to the interaction (a step *-toward* intimacy). At the shallow end of the spectrum are embodied relations of self-*with*-other such as in the taking-turns or sharing behaviors one learns in kindergarten or in the simple nodding of the head that acknowledges one is listening to a friend's story. At the profound end of the spectrum are the true empathetic relations described in the last section such as, "brought to tears", or "so full my heart would burst". Being intimately connected so as to feel-*with* the other is the mark of deeply embodied.

Self with self is likely the least studied or understood of the quartet and will play a vital role in the following discussion of Soma Literacy. Whereas in each of the prior three examples, there is a clear Other to describe when analyzing the couplings, *self with self* requires a bit more attention. In all four of these listed relations the body+time realities are the same. Embodied relations are temporal and performative—in short, embodied relations are gestures.

To review, *gesture*, in the manner of which I present the term, is an aspiration to a whole arc of intention. It is experienced as motion, in the same way that we feel the motion on the playground swing. Once in motion, the swinging *yearns-toward* equilibrium. All gestures not only have beginnings and endings but begin with the *intent* to finish. Gestures must possess the *Lens 2 inertial vectorial intention* that we experience as shift of weight, as when swinging or in taking a step forward, if they are to be experienced as authentic gesture.

Self with self analysis requires an attention to the *yearnings-forward* that we are involved in throughout our daily lives. (For instance, the gesture of smelling begins with an authentic forward motion that aspires to a resolution or cadence in the receiving of the sweet tangy aroma.) Each gesture of living aspires to a cadence of resolution. This occurs in all four of the bodies of embodiment. In the cases of the opening three examples, any breakdown in the gesture is then noticed as the aspiring transparency of *self with Other* becomes opaque, *present-to-hand*, disembodied. At this juncture the *yearning* is frustrated and the experience breaks down. As the attempt to embody the Other loses its shared vectorial gesture, the Other becomes seen as separate from the actor, and the goal of true empathy is failed.

This same phenomenon exists in solely individual contexts. The *self with self* examples all carry the same *yearning-for* authentic resolution. These examples are all of the self involved in doings that are not dependent on outside Others.

> *I aspire to keep my cool under pressure.*
> *I aspire to walk and not trip over myself.*
> *I aspire to speak and not lose my train of thought.*
> *I aspire to 'juggle' the literal and figurative balls in the air.*

There are *natural, authentic* unfoldings of these gestures that we *yearn-to* realize. I do not want to only trade the juggling balls between my hands, I want the trading to unfold in a tossing/catching/directional *natural* manner. Juggling, once enacted, does not pause to consider or regroup. Successful juggling unfolds, *yearns-forward*, *in time*. A cognitivist appraisal of a personal agenda may be described as an ordered list of *doings*. A *Soma Literate* appraisal will note how the body/mind

in time-aspiring is not merely ordered doings (trading of balls between hands), but unfolding doings *in time*. The successful juggling gesture permits the flying balls to be felt as an extension of the body, integrated in a harmonious momentum. If the harmony breaks down, the approaching balls falling toward a lagging body create a momentary bottleneck, where the time required to manage the many parts into one is too fleeting for success and the aspired-to communion is broken apart and revealed as separate parts.

> When the self, becoming a pure inactive spectator, retreats from the body, detaching itself as a disembodied visual point of view, its body feelings become inert "in" the body. . . . One's body . . . comes to seem to be a set of parts-outside-of-parts; a set of limbs fitted onto one another . . . no more than a curiously (inexplicably) animated corpse. Consequent to this loss of a basic feeling of unity in the body, is the loss by body feelings of their capacity actually to mobilize the whole body into action. This involves loss of coordination. The person who lacks a feeling of the unity and wholeness of his body can act only by moving parts of his body at a time. He is thus awkward, ridiculous and jerky in his movements, trying to do something with one part of his body while "getting in his own way" with another part of his body. (Todes, 2001, p. 46)

All of the thinkings/doings/feelings/sharings/engagings/noticings of living aspire-to harmony—harmony with the Other—but supremely harmony within ourselves. As I juggle the various parts of me, whether it be my thoughts and my moving limbs, or my physical walking momentum with my reaching momentum, or my educational momentum with my marriage momentum, I aspire to harmony within myself. S*elf with self* is the realization of natural bodied gestures of living.

The achieving of embodiment is the feeling of completeness. That is, as I attempt to engage [*yearn-toward*], I aspire to an embodied me [self/self, self/Other]. In achieving the embodied state, I feel complete, satiated, whole in my achieved communion.

Contrasting with embodiment, Shilling argues that the state of *crisis* arrives as disembodiment. Feelings of less-than-complete, as in interruptions, hesitations, or awkwardnesses, create crisis. This soma crisis is an alert that our gestalt experience (Lim et al., 2007) is disrupted as we search

for a way to be remade whole. He writes, "pragmatism maintains that all action is caught in the tension between 'unreflected habitual action' and the experience of disruption and crisis as circumstances change and habits become ineffective" (Shilling, 2008, p. 19). The embodiment ideal of intercorporeality with the Other is what allows the *unreflected habitual action* to continue unquestioned. Disruptions can manifest in such a way as to rob the self of its integration with the environment or Other and/or of its literal or figurative mobility, leaving the actor-experience disembodied. The experience of disembodiment is one of revealing the individual parts of a machine that aspires to be made whole.

In a state of crisis, we can only see the parts. The separate variables of our experience and the integration with our surroundings and within our own bodies is revealed or severed. In periods of crisis, I not only experience instability, as one might picture an unskilled clown struggling to stay on the ball, but actually experience a loss of self. Be reminded, my embodied world is not just an entraining of two separate objects. My union with my world is created by bringing the thing that was on the outside of my body, separate of my body, *into* my body, in a shared inertial momentum. The thing, the other, the environment, the agenda, is not separate from me, *it is me*. This integration of the Other (self-*with*-self, self-*with*-other, self-*with*-thing, self-*with*-environment) is an expansive action, actually increasing our world. We are not endowed with a set capacity for the whole or a predetermined flat edge of the world.[24] We gain expansion through our life experience, formally and informally.

A clear set of self-*with*-self exemplars occur in settings of pain, as these descriptions work well to reveal the various ways that we yearn for harmony. Crisis occurs in two formats, *pain+* and *pain–*.

Pain– is the removing of me from me. These examples fit into two sub-categories. The first is the self-*with*-self crisis descriptions already made above. If I am yearning for harmony (embodiment) and there is a breakdown in the unfolding gesture, then the aspired-to *whole* is revealed as separate parts. In this case the expanded, amplified,

24 see note above. Ihde amplification/reduction.

embodied me is broken, and I am left with a *less-than* version of self. It is in this way that we see experience of crisis is not merely a revealing of the transparent (as in noticing the parts as disembodied), but actually painful as a severing of me from me, self-*from*-self. Pain in crisis is the pain of the wrenching apart of one's self (Todes, 2001). It is the middle state between something being integrated as part of the body-whole and something being severed as separate from the body. Pain in my foot is the middle stage between my foot being an integrated part of the whole and my foot severed, completely removed from me. *Pain–* is the pain of the aspired-to whole self being severed. It is revealed in my inability to juggle the various literal or figurative balls with which I aspire to harmonize. It is also experienced in every breakdown of self with Other, and it is noticed in the most visceral examples of bodily breakdown, where the physical parts of the body become variously disembodied through infirmity.

A second version of *pain–* occurs in the examples of binding as have also been mentioned earlier. In a case of literal binding, the ties holding the individual down restrict the free being of self. The individual *yearns* for life and living is vectorially mobile. Any restricting of the free motion of the body is a micro or macro torture in that it causes pain by not permitting the self to be actualized. These examples occur in dungeons and jails, but also when forced to sit in restricting school or work chairs, in restrictive clothing as in formal wear, or in designed screen interfaces where the only motions permitted invite no affinity to the moving, gesturing human body.

Pain+ examples include the situations where one is *forced* into an embodied state [body+, *Lens 3*] that results in a variously traumatic *self* through *long-ing*. Embodiment is not always consensual, and this understanding is most noticeable in situations of trauma. The non-consensual audience participations mentioned in the prior section are examples of *pain+* through embodied *long-ing*. The audience member achieves a fidelity of embodiment beyond what is asked. Looking to a wartime example, the practice of waterboarding is another interaction that forces an embodied participation beyond the will of the participant. Waterboarding is a body+

in that the victim is forced to feel more-than, and it is *pain+* in that the embodied is traumatic, emotionally. The PTSD research characterizes the trauma as at least partly being a "failure to extinguish" (Lissek & van Meurs, 2015), unable to bodily uncouple from the deeply-felt *long-ing* of the traumatic embodied event.

Some pain is pain of the removing of me from me, the opposite of *-with*, pain– through disembodiment. Some pain is the pain of unrealized me, a limiting of *-with*, pain– through an inability to self-actualize. Other pain is the pain of embodied via trauma, a pain+ through *long-ing*.

The First Design (design of the self)

Deeply set within the exposition of Shilling's sociological analysis is the "immediate response" of the actor to adjust to the dynamic shifts of a life lived.

> We possess the capacity to reflect practically on our dealings with the world, and to exert a degree of control over how we view ourselves and choose to act on our environment. The source of this **practical reflection** is related to the intentional orientation that we adopt to our surroundings – an orientation which requires regular adjustment and change as a result of the dynamism of life itself – and is founded on **the immediate response of embodied subjects** to their dealings with their world (Mead, 1962 [1934]: 175; Dewey, 2002 [1922]: 249). (Shilling, 2008, p. 11 emphasis added)

The instinctual responses to our environment in mundane things such as how to walk through a dense forest, or when to raise one's voice, or when to increase muscular force in anticipation of moving an object, are all examples of "practical reflection". Each of us, striving for integration, entrainment, or equilibrium with our environment begin as present-at-hand—that is, we begin awkward and disconnected or unintegrated. We aspire to a harmonious connection to our world and at every breakdown of that goal, it is notably visceral and experienced as pain, the pain of being separated from our-greater-selves.

> *I aspire to entrain with the hammer—to strike the nail in a seamless fashion. In order for this to occur, the hammer must become an extension of myself. The hammer must become my hand. Integrated, my world is larger, and my agency is greater. Unintegrated, the hammer and my body do not commune. We are not one. I experience the failed attempt at hitting the nail, the failed attempt at a larger and greater world as disconnection, as pain; not the cutaneous pain of hitting my thumb with the hammer, but the pain of struggle to integrate, the pain of unrequited intimacy.*

Separated from our-greater-selves we have the option to give up on the idealized self or attempt an intervention. The mindful acts of intervention are demonstrated when the actor chooses his or her response by intention over instinct. This choosing through intention is the first, most primitive, and most important example of what I call *the first design*. This is the primary example of one's own free will, of personal agency. This is the beginning of empowerment, of personal contribution, and presents as the base germs of artistry (Dewey, 1934, p. 61).

The Two Transcendents

The actor choosing their response by intention over instinct is the *first design*. It is individual, personal, empowered, intimate. It manifests as an increasing of my world, and is therefore transcendent *through self-motivated creativity*. Contrasting with this is a different increasing of my world: transcendent *through forced novelty* (i.e. torture or nonconsensual theater). These both increase my world, and can therefore be profound, but one is design-of-self, and the other is design-from-outside. The ballet choreographer (or the theme park designer or the Spanish inquisition torturer) is creating an experience for the actor who has minimal control over the situation. To the extent that it is a novel embodied experience, it will increase (or bind) the world of the actor, but it is not empowering as the actor is slave to the choreography. The actor can feel the interaction, for better or worse, but has little ability to adjust it to their desire. This is contrasted with the act of *first design* which puts the actor in the designer chair and not only permits the actor to feel the interaction, for better or worse, but also allows them to adjust it to their desire.

Vilém Flusser writes about the relevance of these choices in his collection of essays titled *Gestures*. "It is not effectiveness that separates gestures from other movements but the fact that they express decisions, that they are phenomena at the ethical level of reality, expressions of being–in short, that they are "motivated" (Flusser & Roth, 2014, p. 61). A *gesture* for Flusser is not just a *design*, as in a blueprint or step by step plan, but rather an *intention* that has a beginning and searches for its conclusion. The moving of an arm does not become a gesture until the movement is with intention. One needs to start the motion at a point and attempt to complete its course. These self-motivated courses are the primary ubiquitous designs that we all enact.

What are the parts of our body mentioned above? In what ways might one engage self-*with*-self? Certainly, our mind processing with limbs (as a batter swinging a bat or a drummer tapping a beat), but there are also mind processes that can sync with other mind processes (as in recognizing my inclination to overreact and countering the instinct before it manifests as anger).

The premise of this thesis is to investigate the full range of *embodied*. Here, I am concerned not only with the embodying of technology (of the modern, digital variety), but also with the *technologies* of the natural environment, the *technologies* of the other living beings around us, and the *technologies* of our own living-breathing-thinking-doing bodies. In crisis as well as in communion, the struggle is for wholeness of self. We share a need for harmony with our environment and a life dynamically lived. What remains is the artful performance of this life—an artful performance that can be aided, at least in some minute ways, by the foresight of design.

Bodies in Design

Body as Input
Body as Data
Body as Methods
Critique—routines and gaps
The Fundamental Constant

Human Centered Design, User Experience, User Interaction, Human Computer Interaction, etc., are all, clearly, looking for ways to engage the person. Built into the very names are bodies (human/user) + actions (using/interaction) + aesthetics (experience/feelings/results). The modern design fields recognize the centrality of experience to third- and fourth-order design, and the proliferation of *bodies* in current research, practice, and pedagogy is impressive. There is now quite a list of ways that the design fields have worked to embolden their impact by paying more attention to body-centric variables.

In the following section I will briefly review the three primary categories for the current applications of *bodies in design* and then present a critique of these applications, providing a list of gaps the present attentions continue to leave unaddressed. I conclude the section with a discussion of a fourth framing for the body in design largely missing from current practice—the body as the fundamental constant in experience. Where the initial three categories, Body as Input, Data, and Method each carry obvious bodied implications, none of them recognize this body as the central proving ground for experience. Rather they each use bodies for other ends. In the final part of this section I present the body as the fundamental constant in experience and discuss the absolute necessity of the sentient body in any experience that aspires to significance.

Body as Input—gestural/haptic/AR/VR

> Some interesting developments in terms of bodily engagement has [sic] occurred over the last ten years or so, mostly in the field of computer gaming, with for instance the Nintendo Wii and Microsoft Kinect platforms, but also with the rise of touch-based input devices such as tablets and larger multi-touch surfaces. **Yet, while these systems come to use the human body directly as an input device, they are generally not designed to be able to use the human body also as an output device.** Hence, what we might call 'rich' or more elaborate haptic feedback interfaces still remain within the confines of research labs. (Moussette, 2012, p. 199 emphasis added)

> The tangible turn, as a response, seeks to give modern computing an expanded physical presence to better match with human capabilities and understandings. (Moussette, 2012, p. 202)

Interaction Design's introduction to the body came through such early projects as the invention of the mouse and stylus pen as early input devices (Moggridge & Atkinson, 2007). Harnessing tacit knowledge in the performative body allowed the user a more intuitive interface and speeded the adoption of advanced technologies in the general public. By creating input interfaces built with an affinity for the human body (feeling, gesturing, analog-motion) interaction engineers have harnessed bodied knowing to encourage the technology to *behave* in a manner consistent with the actor's bodied world. Rather than requiring punch cards or UNIX code commands to manipulate the technology, the actor engaging through a gestural, haptic, AR, or VR interface can aspire to a more natural interaction.

The variety of body-implicated input/output technologies appears to be multiplying every week. Currently we are familiar with external devices such as mice, stylus pens, gloves ("HaptX | Haptic gloves for VR training, simulation, and design," 2019), vests ("Woojer rygTM: The Most Powerful Accurate Gaming VR Vest.," 2018), rings (Lin & Park, 2017) and bracelets (e.g., MYO armband (Boyali, Hashimoto, & Matsumoto, 2015)), as well as "mid-air interactions such as gaze controller (Thiebaux, Marsella, Marshall, & Kallmann, 2008) or hand gesture recognition (e.g., Microsoft

HoloLens)" (Bermejo & Hui, 2017). These use a combination of hardware manipulations and audio, visual, and vibration feedback modalities.

TABLE I: Haptic Device Classification

Group	Type	Characteristics
Cutaneous/tactile	Cutaneous	Haptic on the user's skin (i.e., fingertip)
	Active surfaces	Communication large-scale forces and shapes and tactile information
	Mid-air	Tactile feedback without contact (i.e., air, ultrasound devices)
Kinesthetic	Manipulandum	Grounded devices with 3 to 6 Degrees of Freedom (DOF)
	Grasp	Simulates grasping interactions at the user's hand or fingers
	Exoskeleton	Grounded on the body, provide forces on natural DOF of the body

Figure 3. "A survey on haptic technologies for mobile augmented reality" (Bermejo & Hui, 2017, p. 2).

Bermejo & Hui, presenting a survey of state-of-the-art technologies in 2017 report, "[While] input interactions have improved during the past few years owing to the advances in computer vision, tracking, and image capturing devices such as cameras and infrared devices, the feedback provided by such environments are still primitive" (Bermejo & Hui, 2017, p. 1).

The recognition of feedback interfaces—or what Moussette calls *output devices*—begin to acknowledge the range of the experiencing body. The fields of design are in a period of near constant innovation, implicating performative bodies as input and output facing entities. The "primitive" critique is simply a recognition that while the varied interfaces continue to aspire to *natural interactions*, the promise of *deeply embodied interactions* continues to be difficult.

For instance, the most ubiquitous of haptic feedback is created through simple vibration motors which are generally programmed to turn on and off. They create touchpoints but have difficulty relaying any of the interstitial spaces necessary for human motion understanding. Without the interstitial *yearnings-toward* and *fallings-away-from* the feedback is experienced as a jolt or poke, not as evolving, unfolding motion. The actor receiving the feedback cannot engage/entrain/embody the feedback any easier than they can an unexpected dog bark or clap of thunder. Without forecasting the touchpoint via the interstitials, the actor can only react to the happening after the fact, they have no way to engage *in time*. This dilemma is described and explored in section 3.7, the Haptic Enviro-Sensing Metronome study, and described as somatic knowing in section 4.1, Soma Literacy.

Body as Data

A second inroad for IxD and HCI to bodies has been the proliferation of bodied data mining (Agrawal & Psaila, 1995). As all variety of sensors and noticing/recording/analyzing technologies have become mainstream a new commodification of bodies has been created with significant implications for medicine (Harvey et al., 2012), privacy (Shringarpure & Bustamante, 2015), health (Armstrong, 2016), insurance (Verma, 2015), and security (Marx, 1998).

The noticed/analyzed body can yield an infinite number of data points including genomic (Oliver et al., 2012), microbiome (Harvey et al., 2012), respiration and muscle strain (Trung & Lee, 2016). Personal activity trackers such as the Fitbit (Tsubouchi, Kawajiri, & Shimosaka, 2013) yield not only the number of steps in a day, but also record this information making it useful for insurance (Verma, 2015) and legal (Olson, 2014) applications. Human GPS tracking (Michael, McNamee, & Michael, 2006), facial recognition (Richards & King, 2014), social network tracking (Taylor, 2016), and purchase history (Wang, Guo, Lan, Xu, & Cheng, 2016) are all readily available technologies in 2019, each of which present new opportunities, interventions, and histories for the design fields with which to contend. The addition of these technologies has rendered the body a newly valuable commodity (Koulopoulos, n.d.). Anticipating an acceleration of such attentions as computing power continues to increase in power while reducing in size, the role and ethical position of the design fields is more influential than ever.

Body as Methods

The Design Research Society (DRS) was founded in London in April 1966 with the mission to share and expand the methods of the burgeoning design research movement (Bayazit, 2004), and was introduced to the world at the 1962 Conference on Design Methods, "which enabled a core of people to be identified who shared interests in new approaches to the process of designing" ("DRS History," n.d.). Of the hundreds of varied tools and techniques that have been developed since the formal establishment of design methods, there are many 'hands-on' approaches to aid the investigation of physical problems (Oulasvirta et al., 2003). Possibly the most famous of these 'hands-on', enacted, bodied tools would be Bodystorming.

> The term bodystorming was coined by Burns et al (1994) while designing a computer workstation for a hairdresser who insisted that a computer 'would not help her to run her business.' Burns et al created a small-scale project studio where the design team acted and improvised based on collected observational data. They used low-fidelity mock-ups to present design ideas in the course of innovation. They conclude: 'By designing in an enactive way, we were able to build an increased empathy for the people that we had identified as the users we were designing for.' A year later, Burns et al (1995) defined bodystorming as 'reenacting everyday peoples' performances and living with data in embodied ways by performance and improvisation.' (Oulasvirta et al., 2003, p. 126)

Methods that make use of performative bodies have become commonplace in contemporary design research (Loke & Robertson, 2011) and new methods are proposed and tested every year. A selective list of bodied methods is offered below.

Body Mapping

"Body maps are projective graphical tools that support expression through intuitiveness, allowing those who craft the instruments to tell stories about themselves (Gastaldo et al., 2012). Participants are encouraged to complete their body maps with coloured pencils, photos from magazines and any other material useful to represent their symbolic world" (Núñez-Pacheco, 2018, p. 66).

Body Scanning

"a type of somaesthetic reflection without any voluntary physical movements" (Lee et al., 2014, p. 1057).

Bodystorming (Gray, Brown, & Macanufo, 2010; Oulasvirta et al., 2003; Schleicher, Jones, & Kachur, 2010)

"is used to help designers sketch ideas for movement-based interactive systems by engaging physically in a co-design play-based ideation activity with peers. The exploration of the design space focuses on both digital and non-digital mediating artefacts, on the arrangement of contextual elements in physical space, and on the 'physical core mechanics' at work. This . . . allows designers to develop ideas from scratch" (Segura, Turmo Vidal, Rostami, & Waern, 2016, p. 6017).

Corporeal Empathy

Contrasting with Embodied Sketching (Segura et al., 2016), the method does not attempt to simulate disabled or elderly people. "It is about meticulously considering the somatic conditions . . . and directly experiencing those conditions: user's posture, attention, anticipation, and the physical interaction going on between the body and the surroundings" (Lee et al., 2014, p. 1062).

Embodied Sketching

Often used to simulate disabled or elderly people, "Embodied sketching encompasses ideation methods that are grounded in, and inspired by, the lived experience and includes the social and spatial settings as design resources in the sketching . . . harnessing play and playfulness as the principal way to elicit creative physical engagement" (Segura et al., 2016, p. 1).

Embodied Storming (Schleicher et al., 2010)

"As a variant of traditional bodystorming, *embodied storming* replaces emerging 'ideas' with 'scenarios', enacting different scenes as a design troupe in order to support continuity and flow" (Núñez-Pacheco, 2018, p. 69).

Empathic Modelling

"is the method whereby an individual, using various props and scenarios, is able to simulate the deterioration of physical and perceptual abilities in everyday scenarios, for example, by using spectacles that feign the effects of reduced visual acuity . . . the person is encouraged to attempt coping strategies and adaptation techniques . . . The aim is to encourage students to think about how we take our senses and abilities for granted and how the reduction or removal of a sense or ability can drastically change our perception of an environment or activity" (Nicolle & Maguire, 2003, p. 2).

Experience Modeling

". . . creates gestural protocols for physiological data transfer. Participants generate movement vocabularies by negotiating permission and control of their own physiological data. Gesture [is] utilized as an expressive indicator of intentionality, extension of body image, permission, control, exchange and play" (Schiphorst & Anderson, 2004, p. 1).

Experience Prototyping

Simply, the using of built artifacts with the intention to understand "existing user experiences and context, explore and evaluate design ideas, and communicate ideas to an audience" (Buchenau & Suri, 2000, p. 425).

Focusing-oriented Bodystorming

The "re-living [of] situations through inner focus . . . reflecting on experiences [to reveal] new aesthetic qualities . . . contributing to further generation of meaning" (Núñez-Pacheco, 2018, p. 141).

Focusing-oriented Ideation

"a generative ideation technique . . . uses representational bodily knowing to explore an endless variety of topics inspired by everyday interactions" (Núñez-Pacheco, 2018, p. 166).

Informance Design

The researcher "render[s] scenarios as plays and interactive environments. Designer "actors" role-play as users with simple prototypes employed as "props". These performances open up informed dialogues between designers and an audience, to further explore the design issues raised" (Burns, Dishman, Johnson, & Verplank, 1995, p. 1).

Somaesthetic Ideation and Reflection

"involves . . . an organized inward-looking inquiry by the individual about his or her bodily perception . . . to heighten somatic awareness . . . [It] is regarded as a means to help designers develop the sensibility of aesthetic experience of bodily interaction" (Lee et al., 2014, p. 1055), "to improve the ideation process of interactive product design by improving designers and developers' sensibility of haptic, dynamic, and invisible qualities of movements" (2014, p. 1055).

User-case Theater (Schleicher et al., 2010)

"a variation of bodystorming that involves actors, and props, to simulate the activity for which to design" (Segura et al., 2016, p. 6015).

Each of the listed methods has proven its worth in rigorous academic study. They each have generated new knowledge, but the knowledge is less about the nature of bodies in experience and instead has served to create scenarios and insights for product ideation. The bodies listed above are all utilitarian. These methods present the *body for ideation*—that is, they are not methods for bodies: they are methods that use bodies.

Body-based design research methods amount to a third category of current *bodies in design*. While these different body based methods are useful for data collection or ideation, they afford less understanding of user experience as would be helpful in either second/third-wave[25] HCI (Harrison, Sengers, Tatar, & Sengers, 2007) or third/fourth-order

25 "the first [-wave including] engineering/human factors with its focus on optimizing man-machine fit, and the second [-wave] stemming from cognitive science, with an increased emphasis on theory and on what is happening not only in the computer but, simultaneously, in the human mind...[third-wave including attention to] embodiment to situated meaning to values and social issues." (Harrison, Sengers, Tatar, & Sengers, 2007, p.1)

design (Spence & others, 2016). Interaction design scholar Yvonne Rogers wrote in 2009 of the evolving focus of design to value the "emotional, eco-friendly, embodied experiences [as well as] context, constructivism and culture" (Rogers, 2009, p. 1). Attempting to find an understanding (language, aesthetic, role) of the embodied experience was a stated goal even before 2009, yet in 2016, HCI and performance researcher Jocelyn Spence was still citing the gaps concerning the embodied user and called for new methodologies that "push the bounds of understanding user experience" (Spence & others, 2016, p. 16).

If we are to learn more about user experience, then the focus must continually be brought back to the nature of *users* (human, bodied, temporal) and *experience* (*yearnings-toward*, cohesion). While design practice has embraced body-based methods as listed above, a difference should be noted between these types of utilitarian methodologies and the root variables of experience that this thesis works to clarify. This thesis attempts to describe *why* bodystorming, embodied storming, experience prototyping, empathic modelling, and body mapping all 'work', and to reveal some of the latent power and potential in varied body-based attentions.

Likewise, while the body is central to all versions of haptic interfaces as well as integral in the burgeoning data mining possible via new sensing technologies, neither of these examples of *bodies in design* are the focus of the current investigations. I have briefly listed these three sets of examples only to point out that current designerly attention to bodies is extremely general and runs the risk of missing critical insight if allowed to continue the blurring of modalities, roles, and goals. Furthermore, I posit that the most valuable attention to bodies in design, that of the body as an intimate, feeling, embodied, world-creating entity, is regularly overlooked and misunderstood. This misunderstanding amounts to a severe loss of insight as it is only in the vectorial *yearning-toward* body that experience is proven. There are no interactions (or worlds) outside of the first instrument: the body, the fundamental constant in experience.

My research is not creating a method for ideation, or any method at all. My examples are not the examples of athletics, or haptics, or utilitarian gestures, but below these at the root experience of experience. I am describing a base reality, a lens for noticing the world. While a soma-literate attention will aid in ideation (in that it opens-up a palette of new variables), it first needs to be understood as a mode of being, interwoven in every moment of the day, whether conscious or not.

Critique—routines and gaps

Recognizing the above three categories of *bodies in design* (interface, data, methods) as the primary bodied attentions in design practice, one can then cite specific gaps in the general design dispositions to the experiencing body.

ROUTINE: Assuming the attitude that a moment is a distinct thing like a cup is a distinct thing.
GAP: Missing the realities of interactions or happenings as unfolding gestures.

Here Annemarie Lesage offers a common usage of the word:

> Flow being an overwhelming psychological state, it often lasts far beyond the autotelic episode, yet Dewey's *an experience* demands that we stay focused on the **moment of interaction**. (Lesage, 2015, p. 53 emphasis added)

In the current critique, there is no such thing as the *moment of interaction*. What is significant here is that in order to even begin the conversation concerning *moments*, *happenings*, *events*, or *encounters*, one has to remain focused on the gesture of interaction.

There is a prevalent visual bias in the traditional ways that design is taught and practiced. This bias obscures the kinaesthetic truth of the body. The visual bias sees the world through static images, snapshots, sketches. These all pin down the experience of living to instants in time. An instant has no time element. It cannot be experienced.

It requires the temporal realm for an experience to be lived. How are we to design for an instrument that is assumed rather than analyzed and understood? What are the root experiences of the living body? **If the most common tools of designing are bound in the static (visual, snapshot, sketch), how are they to capture the dynamic (temporal, felt, lived experience)?**

A shortcoming of design attention is the inattention to the interstitial. The very notion of 'touchpoints' (Patterson, 2010) speaks to the shallow understanding of unfolding experience. Touchpoints are nothing more than crusic instances that can only come to being via the interstitials of anacrusis and metacrusis.

ROUTINE: Interactions are designed as static artifacts or a series of static touchpoints.
GAP: Design practice has no framing for the interstitial gestures of living.

In their 2018 book, *Orchestrating Experiences*, Risdon et al. (2018) offer an invaluable contribution to the field of Service Design in a book full of insight, instruction, field-tested experiences and methods. However, it continues to frame experience/happenings/events as static moments seen through snapshots and touchpoints. Current and historic design biases render the interstitials of experience (which are the only real *stuff* of experience) invisible.

In a chapter titled "*Identifying Opportunities*", Risdon lists ways to *optimize* Service/IxD/UX interactions as is quoted here:

> Optimization in this context means systematically overhauling an existing product or service journey to be more consistent, cohesive, and complete. These changes often don't mean major new investments, but rather smarter use of existing or planned investments by orchestrating activities across teams. A few common examples:

- Removing customer touchpoints that add no value
- Changing existing touchpoints to work better as a system
- Creating new touchpoints that support core customer needs better
- Extending touchpoints into more appropriate channels
- Building better bridges between channels and contexts
- Applying common experience principles to all parts of the end-to-end experience
- Creating stronger starts and ends to a customer journey
- Attacking a low point and amplifying a high point
- Cooperating across silos to have different channels work together to serve a touchpoint
- Creating a smoother transition between journey stages (Risdon et al., 2018, p. 178)

This common disposition to experience has no trouble citing the touchpoints as instants, moments, or snapshots, but has a very limited vocabulary for the interstitial *yearnings-toward* or *-away-from*. Only in the "building better bridges" and "creating smoother transitions" is the unfolding, forward-*yearning* interstitial even hinted at.

In 300 pages that are prefaced on the notions of *orchestrating* and *experiences* there are only two paragraphs that come even close to the ways in which one might begin to understand, think about, and work with these interstitials:

> **Ignored or underserved journey stages.** Many products and services are designed to support only use cases divorced from a greater context. For example, visiting a museum includes more than just experiencing the exhibits. The journey stages before and after offer great opportunities to provide new value and extend the museum experience. (Risdon et al., 2018, p. 179)

and

> **Crafting Stories.** The one-idea-per-paper approach in visual brainstorming has the advantage of generating many ideas quickly, but it limits concepts to a single expression or a singular moment. The opportunities to improve or invent new end-to-end experiences should also be explored in formats that support thinking through experiential flow better. This means generating ideas for new sequences of customer interactions from need to need, touchpoint to touchpoint, or channel to channel. Stories provide the best form for this type of ideation. (Risdon et al., 2018, p. 214)

While Risen et al. seem to have the instinct that there is more to experience than the instant of the touchpoint, there is no designerly vocabulary or formal concept for them to pull from to explain or frame the experiencing of experience. While Risdon mentions, "building better bridges", "creating smoother transitions", "the journey", and "stories", this highly acclaimed book offers no insight into how to address these spaces. What it misses is everything—everything is before and after. One cannot *experience* the touchpoint; one can only experience the drive-*toward* and -*away-from*.

ROUTINE: Utilizing the body as only interface, data, or inspiration (through methods).
GAP: Missing the recognition of the body as the foundational constant for all experience, the primary proving ground for all interactive designs.

Body as interface, data, or inspiration are all perfectly acceptable utilitarian activities, but they are not authentic performances of living bodies. They ignore the primary relevance of the body; it is the proving ground for all experiencing. Currently the conversation surrounding bodies in design appears confused by presenting the body as either an interface (as in haptic feedback), as a tool for ideation (as in bodystorming), or as a commodity to mine for data. Even in examples where the attention is claiming to see the body as the fundamental constant, as is the case in the Somaesthetic Interaction Design (K Höök et al., 2018), the tools hyper-value the reflective, after-the-fact, kinds of knowing and still have a severely limited attention to the *in time* unfolding of experience.

Again, if we aspire to aid in the experiencing of experience, it will require an attention to the dynamic, unfolding, motion-filled *in time* bodied experience.

ROUTINE: The presentation of experience as a flat entity, a result, a product.
GAP: Design practice has no framing for multidimensionality of experience or how to attend to the experiencing of experience.

Forlizzi & Battarbee (2004) offer a survey of *experience* definitions in their 2004 paper, "*Understanding experience in interactive systems*". They cite (1) Product-centered models which provide "guidelines for understanding experiences and applying them in user-centered product concept development" (Forlizzi & Battarbee, 2004, p. 262), (2) User-centered models which exist to help designers understand the people who will use their products. These methods leverage the user's goals, motivations, and actions, in an attempt to understand the user experience. And they write of (3) Interaction-centered models which comment on the ways in which people interact with products. Each of these models present experience as a completed action and offer no language or insight as to the user's actual experiencing.

While the presentation of the varied models was timely and informative, offering perspective previously unpublished in the design fields, it continued the bias of treating experience as a completed, monolithic, flat product.

Hassenzahl, writing the "User experience and experience design" entry in *The Encyclopedia of Human-Computer Interaction*, speaks of experience as "meaningful, personally encountered events" (Hassenzahl, 2013, para. 11) and "stories of use and consumption" (2013, para. 35). Don Norman continues the definition by writing that experience is the end state of an interaction—it is the 'stories we tell' (Norman, n.d.).

These definitions go a step further in getting to the experiencing of experience, yet still fall terribly short of any description of the options, the avenues, the variables, and the thresholds of experiencing *an experience* as have been covered previously in this thesis (*Lens 1-2-3 attention*, meaning-making, *yearnings-toward*, etc.).

ROUTINE: The presentation of meaning in experience as only the worded, reflective variety.
GAP: Design practice has no framing for multidimensionality of experiential meaning or how to attend to the pre-reflective meanings in experience.

> This multiplicity of meanings is linked to the concept of *ambiguity as a resource for design*, which rather than being a property embedded in artefacts, corresponds to a quality of interpretation (Gaver et al., 2003). **In the same way, aesthetic qualities of interactive experiences do not reside in artefacts, but instead are linked to the meaning these elicit** (Petersen et al., 2004). (Núñez-Pacheco, 2018, p. 247 emphasis added)

Rather than meaning residing in individual artifacts, Gaver and Peterson write about interpretation and the individual meaning that must be anticipated in any designed interaction (Gaver et al., 2003; Petersen et al., 2004). Where they have fallen short is in treating meaning in experience as a single thing, as though experience is only the one reflective assessment rather than finding a multidimensional appreciation for the layers in experience.

The *meaning* of any experience is not only discovered in reflecting on a happening. *Meaning* or *knowing* is also generated pre-reflectively via the *Lens 1*, *Lens 2*, *Lens 3 attentions* which are appreciated through different modalities than dialectic 'meaning'. The *Lens 2* directional *yearning-forward* shift of weight that one experiences as central to any gesture (i.e. the gesture of a handshake or of smelling an orange) is a knowing in and of itself. The shaking of hands or inhaling of sweet aromas can have a variety of reflective meanings after the event, but there are also pre-reflective *meanings* unfolding in the *in time* performance of the interaction. It possesses intent, vision, tempo, and cadence as all gestures do. There are also other *knowings* worthy of analysis when the interaction is viewed through the other experiential lenses. Soma Literacy attention is a way of bridging the gap from experience to meaning. It gives us lenses/attentions with which to design by recognizing the multidimensionality of experience.

ROUTINE: Design decisions are made without affinity to the human body.
GAP: Design practice has yet to recognize experiential affinity to the experiencing body resulting in often awkward, narrowed, or dulled life-experience (Dewey, 1934).

1. Looking back at Risdon et al. in *Orchestrating Experiences* in reference to "optimization" of the designed experience, they state:

> Optimization in this context means systematically overhauling an existing product or service journey to be more consistent, cohesive, and complete. (Risdon et al., 2018, p. 178)

The goals of "consistent, cohesive, and complete" are all bodied ideals. If one recognizes "an existing product or service journey" (2018, p.178) to be lacking in consistency, cohesiveness, or completion, it is the *journey* aspect of this design that is lacking. The journeying of a user experience is proven in the body of the participating actor. It is likely that a design will not even be recognized as inconsistent, incoherent, or incomplete design until experienced in the participating actor. It is the experiencing of the experience that will need to be addressed, as opposed to the *product* of the experience.

If the experience of the design results as inconsistent, incoherent, or incomplete, it has at some point missed part or all of the *Lens 2 attention* to natural gesture. We can only experience through the *yearning-forward* gesture. If the design severs the arc of the gesture, the design will be left as inconsistent, incoherent, or incomplete.

2. Poor screen effects and poor screen metaphors lead to poor interactions. This obvious statement has been understood from nearly the beginning of IxD practice. Much effort has been dedicated to finding the best metaphors and smoothest animations to make the screen interactions intuitive. There are a variety of reasons these metaphors and effects work or not. As interactions, the soma literate attention recognizes that they all engage bodies. Or, better worded, the body constantly attempts to engage-*with*, entrain-to, and embody its world (self/self, self/thing,

self/other, self/environment). Yet, one can only embody that which has an affinity to the human body.

The Mac OS X Genie Effect interface is a design choice that brought this affinity to the interaction. The difference between a window flashing open/closed vs. zooming/shrinking/expanding as an animation allows the actor to *feel* the interaction (Chow, 2013). The human body cannot *flash*, therefore any attempt to entrain to a *flash* will prove limiting, binding, or impossible. The body can only *move through* the interstitial spaces. Building an animation that creates an analog metaphor for the closing of a file permits the pre-reflective body to *participate* in the interaction.

This insight can be transferred to all interactions— not only screen-based, but all variety of service, experience, and transition interactions.

ROUTINE: Treating experience as only occurring in the now, again as in a binary on/off snapshot, now vs. not now.
GAP: Design practice has yet to recognize that experience is (1) ever-unfolding and (2) about feeling the future.

The attention to *Lens 2* reveals that all experience is vectorial and proceeds with inertia. This builds anticipation in the performing actor, an anticipation of the completed gesture. I lift a foot and expect a floor under it as it free falls back to the earth. I know where I intend to walk for lunch—the path is anticipated. The pendulum swings toward the bottom and rises in the predictable arc. The body is attuned to the cadence and rhythms of the world and builds pre-reflective, predictive models for the unfolding future in anticipation of it.

The bodied experience is defined by the anticipated gesture. We aspire to make the IxD as intuitive, as able to be anticipated, as gravity pulling my foot. The anticipation of how a UX behaves is felt in the body more deeply than it is considered in the mind. The parts of the design must cohere in order to be experienced as gestalt.

> A successful UX is one in which the user's expectations are anticipated in advance. (Garrett, 2018, p. 103)

There are dialectic user expectations—that is, the list of worded goals that the actor has decided upon, and there are pre-reflective, tacit expectations, which are the *yearnings-toward* of *Lens 2 attention*. As I lift my foot to take a step, I already anticipate the future, *I feel the future*, and my *experience* is rich and full or shallow and flat as the design meets, exceeds, or falls short of the future I have anticipated—all processed at the pre-reflective soma-deep level.

The real gap here is in design's continued inattentiveness to the multidimensionality of *experiencing* and the role of the body in any experience. Somatic expression (Núñez-Pacheco, 2018) is not only one thing. The utilitarian role of the body in a setting like bodystorming (a theatrically expressive act) vs. the gestures of walking, or turning toward the heat of the sun, or reaching for a handshake (all pre-reflective yearnings of the soma) are significantly different from one another.

The soma literate attention is one of *awareness in action*. It is recognizing that the actual experiencing of experience is motion-filled and carries trajectories (*yearnings-toward*) that in most instances are pre-reflective. To the extent that body-centered methodologies in design and HCI utilize a reflective framework, they miss the nowness of the action. Rather than focusing on what the bodied experience makes me think about after the fact (and what emotional resonance it carries), this thesis is primarily concerned with the *in time*, in the moment, yearnings and searchings (trajectories) that is the reality of the experiencing body. Stated differently, while I acknowledge that the emotional resonance of a given interaction is a primary concern to the designer, it is not possible to achieve any resonance without first feeling literal vectorial motion (Larson, 2012) in the soma. It is this simple, base reality that the thesis reveals, explores, and codifies.

ROUTINE: The presentation of interactions as mere transactions.
GAP: Without a soma literate understanding, the designer can miss the proving ground for interactions: the resounding body.

The goal in an interaction is not to merely have a transaction, as in the bank ledger's noting of money changing hands. The goal of an interaction is to occasion a *long-ing* of the actor. The proof of the rich interaction is not in the accomplished utilitarian transaction, but in the embodied, felt, participation; *outside* becoming *inside* motion. The ideal in interactions are embodied, which is personal, intimate, bodily felt.

ROUTINE: Haptics are recognized as the interactions with the cutaneous surfaces of the body.
GAP: Design practice has yet to recognize the inner sensations of soma-deep as also tactile. These inner soma-deep haptics are all experienced as shifts of weight, heavy/light as inertias/g-forces.

> [While] input interactions have improved during the past few years owing to the advances in computer vision, tracking, and image capturing devices such as cameras and infrared devices, the feedback provided by such environments are still primitive. (Bermejo & Hui, 2017, p. 1)

> To some extent, we are still in the stone age of haptic interaction design, especially as we compare it with the level of finesse and proficiency interaction designers deal with visual representations. (Moussette, 2012, p. 215)

> Thinking more broadly about this issue, I then realized that this unfamiliarity with the world of haptics is not limited to designers but in fact applies to more or less everyone: it seems that we collectively have a very limited capacity to talk about and communicate haptic sensations clearly. While we very clearly recognize different haptic sensations, for instance how particular materials feel when we sweep over them with our hands, we cannot elaborate on the details of this experience in our language. For everyday living and going about our business this is of course not a major problem, but for specifically seeking to design haptic experiences, this lack of vocabulary and shared terminology was itching at me. (Moussette, 2012, p. 103)

Each of these quotes demonstrates the recognition of a gap yet offers no path to address the shortcomings. The design fields regularly display a lack of Soma Literacy. Without said literacy, there is no language or discourse to present and debate solutions that implicate the human body.

In the case of haptic interfaces, the binary on/offs of phone vibrations and the severely limited aesthetic of fingers on glass are the dregs of touch-based interfaces. Their ubiquity, while productive, has only served to produce more isolated, bound, less-human humans. Rather than encouraging the actor *to feel, to yearn-forward*, as one might in daily relations with our worlds, they each limit the ability to feel down to the least interactions possible. The binary on/off pokes by the pancake vibrator motors and fingers on glass *occasion* only the lightest and least inertial interactions possible. Even in the more 'big-body' interactions of VR or Kinect-type technologies, the attention is diffuse without a basis in Soma Literacy. Separate from the understanding of shifts of weight and inertial g-forces and the interstitial, these promising technologies can be misdirected into focusing on generic gyrating, rather than directional, weight shifting, entrained, cohesive *gesture*, proven in the body soma-deep.

The Fundamental Constant

In this thesis I am not trying to 'use the body' to create something new as in ideation or data or method. I am instead directing the reader to recognize *knowing* already built into the human body. I am claiming that you already have a body, it follows certain laws, it reveals certain things about the world to you, and so there is a tacit knowing already in place, a lens through which we see the world that is regularly unnoticed and underutilized in design attention.

The body is the center of feeling. If I feel elated or worn down, it is in my body. If I feel included and part of the team, it is in my body that this is proven. My intimacy with the Other is dependent on the opening of my bodily motions to the motions of others and anticipating a harmony rather than a dissonance. If I offer a hug and you do not return the gesture, we

have an awkwardness that is recognized deeper than the façade of our appearances; we have a felt gesture that is left without the ideal cadence.

Consider how outraged one can easily become when, in earnest, we reach out a hand for a handshake, and the partner brushes us off. It is hurtful because even a gesture as common and simple as a handshake is also immediately *personal*. Handshaking is not an exercise in visual reciprocation. To reach out is to open my body and invite the other into my body-space. This invitation is not just an invitation of *appearances*, as in a snapshot photograph where our pose was either met or not in static time, rather, by reaching out, I aspire to a shared somatic momentum, a dance, a bodied union with the other. There is no shallow union. Union requires the participant to be vulnerable, exposed, and in search of completion *-with* the Other, which is proven in the motion-filled cadence. Completion *-with* the Other is embodiment and is the ideal in experience.

The design of experiences is not the design of snapshot poses or glimpses of time. The design of experiences is the design of moving, feeling, soma-deep bodies, intimate, vulnerable, searching, and harmonizing. The design of experiences can only truly be accomplished through an understanding of the variables of experience, and specifically the single fundamental constant of experience, the living body.

Corporeal Design Agenda

Corporeal Design Introduced
Rich Interactions
The Temporal Body
Cohesion
Principles, Values, Ideals, and Variables

Throughout chapter two I have asked how one's fleshy carriage adds to the creation of their world (embodied), how might one reveal the invisible space between named points of experience (touchpoints vs. interstitials, statics vs. vectorial inertias), and what are the varied thresholds for *meaning* (*Lens 1-2-3*). These ideas when brought together create a foundation for a designerly stance that values the embodied-*with*, gestalt gesture as the singular proving ground for Dewey's *an experience*.

This stance is what I title "Corporeal Design." In the following pages I lay out the Corporeal Design agenda as *principles, values, ideals, and variables* all presented through a Soma Literate bias.

Corporeal Design Introduced

To begin, I offer a statement from Cameron Tonkinwise concerning the position and responsibility of the interaction designer.

> [Designer's] capabilities and responsibilities extend beyond the design of things **to the design of relations between humans and things**. Whether they are conscious of it or not, designers do have the power to influence how people relate to things. Design semantics constrain, map and afford not just the instrumental use of what is designed, but how the designed is perceived and valued. [9] Designers *can, do and should* design patterns of behaviour like rituals of care.[10] **They cannot design these in the way they specify materials and components,** but they do, every time they design, **emphasise, promote, and foster certain practical dispositions** toward what they have designed. (Tonkinwise, 2003, p. 2 emphasis added)

Tonkinwise redirects our attention to "relations between" as the interactive elements of any design. It is through these *relations between* that one might "emphasise, promote, and foster certain practical dispositions" and reinforce or present new "patterns of behaviour". This is to be accomplished not in the same way that a product designer might "specify materials and components," but instead, through some other set of *relational* criteria.

Lim, Stolterman, Jung, & Donaldson, writing in 2007, offer a similar argument but implicate the body as part of this *relational* criteria.

> Petersen et al. [33] emphasize the importance of aesthetic experience as **interdependency between** mind and body experiences, and claim that the aesthetic interaction is not to be found in the artifacts but is what "emerges from the personal and interpersonal sensations, experiences, and reflections that is connected to the system . . . [33, p.271]" This perspective supports our perspective of interaction, which is that interaction is not something inherent only to the artifact but something that **emerges through the interplays between** people and artifacts. (Lim et al., 2007, p. 244 emphasis added)

In the prior sections of this thesis I have presented a series of attentions that comment on the *relational* opportunities in any experience defined through *the four bodies of embodiment*. Lee, Lim, & Shusterman also commented on this type of attention and the general importance of such a focused attention, writing in 2014:

> The soma's felt sensory experience has been largely neglected [19, 48] [even among the experience-centered design researchers]; it has been dialogically conceptualized [47, 48] rather than experientially crafted . . .emphasis on somatic experiences [such as user's posture, attention, anticipation, and the physical interaction going on between the body and the surroundings] distinguishes [our attentions] from bodystorming and other similar approaches [2, 30, 39] . . . What it implies here is that **if we do not properly understand the user's somaesthetic condition (bodily and mental altogether), we might end up failing in delivering the experience that we intended.** We believe improved somatic empathy (through heightened body consciousness) could improve our ideation not only in movement-based interaction but in any interaction that deeply engages our body. (Lee et al., 2014, p. 1062 emphasis added)

Lee, Lim, & Shusterman's call for soma literacy as a prerequisite for thoughtful, successful design of experience is the central theme of the Corporeal Design agenda.

(body + time) * cohesive = RICH

Each of these terms, **body**, **time**, **cohesive**, and **rich**, all have prior standing in the IxD attentions. There is no shortage of theorists, researchers, and practitioners recognizing the implication of the four terms in the design fields (as cited in the prior and following sections). However, within common IxD attentions:

(a) these terms do not commonly carry a soma literate informed definition and

(b) these terms have not been collected and presented as implicated, part of a complete codependent agenda.

Any IxD attempt to discuss these four terms separate from their literal bodied implications amounts to a shallow and incomplete disposition. I present the four terms as well as points (a) and (b), not as a thought-provoking bit of variety to the IxD lexicon, but rather, as what should be a central set of definitions and attentions. There is no experience without the body+time, and there is no rich experience separate from the cohesive, forward-moving, embodied-*with* gestalt gesture.

In the following pages, I review these terms from the perspective of Soma Literacy in order to present an agenda that denies any recognition of the separate terms as separate entities, or of separate terms as separate from the experiencing body. A soma literate appraisal of these terms will recognize them as absolutely implicated in each other, forming the foundation of the Corporeal Design Agenda.

Rich Interactions

Rich interactions require an attention to the aesthetic over the functional and aesthetic requires the feeling body.

Kees Overbeeke observed that when analyzing designed interactions, three skill sets appear: perceptual-motor skills, emotional skills, and cognitive skills (Overbeeke, Djadjadiningrat, Hummels, & Wensveen, 2002). Historically, our interactions with built systems required and embraced all three of these skill sets. Prior to modern technology, a whole body was required to participate in accomplishing a majority of the base tasks necessary for survival. One only need consider earlier methods for achieving food, shelter, and clothing. Hunting, gathering, building shelters, and making clothing were all tasks in which every person was required to be involved. Such tasks demanded an investment from all three of Overbeeke's skill sets.

As technology increases, it presents a range of new options for interacting with our environments and meeting our needs (basic and otherwise). Overbeeke notes these new options stating, "[w]here the earlier products were more likely to address all of people's skills [perceptual-motor, emotional, and cognitive], the new electronic interactive products mainly address people's cognitive skills" (Overbeeke, K., as quoted by Sarkar & Roy, 2015, p. 506).

The ever-increasing options for technology-aided interactions were recognized in 2006 by Joep Frens as a grand opportunity sadly missed. Once technologies had progressed to such a point as to permit a separation between the actual machine and its actor controls, a new world of possibilities should have opened up. Designers were no longer bound to the mechanical restraints of the artifact. They were in a position to design interactions with the environment anew, taking full advantage of these newfound freedoms, building upon and transcending the mechanical restraints, achieving deeper, richer, amplified experiences. Yet, the interactions did not increase in tangible depth or what Frens called "richness." Instead, Frens cited the trend toward reduced interactions, as in the pushing of a labeled glass button (Zimmerman & Forlizzi, 2014).

Frens investigated ways to engage the sensuous body, allowing people to utilize their full range of senses as channels for input and feedback from interactive systems. This was what he called *rich interaction* (Frens, 2006, p. 170). Now, thirteen years later, it is still only the minimalist interactions that are most prevalent. *Fingers on glass* is by far the most common interface currently, while the promise of ubiquitous rich interactions remains largely unfulfilled, and even the threshold for *rich* remains in debate. As our interactions with products are permitted to be more and more abstract, we become more and more separated from the embodied engagement-*with* [*Lens 3*] the artifact. Frens wrote that this type of attention to designed interactions fails "to account for people as sensual beings" and fails "to consider aesthetics as a critical component of interaction" (2006, p.170). Designing with affinities to the human body is a rare prompt; a specific design attention directing the designer to this and complementary concepts had not been codified or collected into a single argument until Kristina Höök's recent publication of *Designing with the Body, Somaesthetic Interaction Design*.

Frens' definition of rich interactions required the utilization of the "full range of senses as channels for input and feedback from interactive systems" (2006, p.170). Frens offered up significant perspectives and examples of multi-sensory interactions, but he did not state clearly the ways in which the full range of senses was to be defined, reached, or exemplified. Corporeal Design recognizes the "full range of senses" as an aspiration to the aesthetic. Rather than reading the prompt as a checklist of visual, haptic, olfactory, auditory, or gustatory modalities, this agenda carries the soma literate bias, claiming that before any of these modalities can achieve any level of significance, they will have to tip into the intertial unfolding experiencing soma-deep body.

> The idea of occasioning an experience is a far richer prospect than the idea of transmitting information . . . Far from being frivolous, aesthetics are 'the paradigm' for all experience according to Mead and Dewey . . . **Aesthetic experiences have the potential to tap precisely the types of non-task-oriented, emotional, affective, and interpersonal realms that third-wave HCI[26] tries to investigate**. I argue that any

26 "third wave, sees these interactions as 'non- work, non-purposeful, non-rational', concerned with culture, aesthetics, emotions, and a pragmatic approach to experience" (Spence & others, 2016, p. 1-2).

> framework of experience design or user experience that fails to account for the aesthetic in this sense is incomplete. (Spence & others, 2016, p. 40 emphasis added)

The threshold for aesthetic, as defined in this thesis, is not to have merely touched the body, as in the least examples of visual, haptic, olfactory, auditory, or gustatory interactions, but one that becomes a part of the feeling body, one that is embodied.

> We are interested in understanding how design can provide users with rich product experiences—experiences that go beyond **one-dimensional pleasure**. (Fokkinga, 2015, p. 47 emphasis added)

> The notion of hedonic motivation does not clearly address intrinsically motivated experience; it is too "loose-fitting". There is a gap in our knowledge at that point. Knowing why an unsuspected experience becomes **intrinsically rewarding** may hold a clue into what turns a good experience into a memorable one. (Lesage, 2015, p. 36 emphasis added)

"One-dimensional pleasure" vs. "intrinsically rewarding" is the difference between an experience noticed as shallow, light and distant on the outside of me[27] and a participating-*with*, understood as something on the inside of me, embodied (*Lens 3 attention*).

> The appraisal of the sense-making and aesthetic experiences is the bridge between the outside world and an emotional response (Desmet and Hekkert, 2007). (Lesage, 2015, p. 29)

Annemarie Lesage is also on the hunt for a rich experience when she asks, when does an unsuspected experience become intrinsically rewarding? When does the outside world become significant enough to trigger an emotional response? What contributes to an experience becoming memorable (Lesage, 2015)? The Corporeal Design stance holds that before the unsuspected can turn into rich experience, it must start with "being able" to be felt. "Rich" requires an affinity to the human body. If the designed interaction has no natural gesture to it, then it cannot be felt. "Rich" is the engagement of the sensual-inward-feeling body, soma-deep, not to be confused with mere engagement of the body façade.[28]

27 either cutaneously on outside of the literal body, or completely separated from the body, disconnected.

28 where an interaction implicates a body, but does not tip into the soma-deep sensation.

Designing for rich experiences has been a goal in IxD from the beginning. Each of the varied solutions have included the authentic soma experience as central to the recipe. For example, Ross and Wensveen (2010) list "satisfying dynamic form" (2010, p. 4) and "actively involves [sic] people's bodily, cognitive, emotional and social skills" (2010, p. 1) as two of their four principles for aesthetic interactions. In Djajadiningrat, Gaver, and Frens's concept of *interaction relabeling* (2000), interaction richness is defined as the existence of an "interesting and variable flow" (2000, p. 1). And recall Löwgren's four characteristics of aesthetic interaction: *pliability*, *rhythm*, *dramaturgical structure*, and *fluency* (Löwgren, 2009). Each of these reveal the felt dimensions of experience and support the Corporeal Design agenda.

In *Performative Experience Design*, Spence notes the liminal dimension as a central component of the aspired-to rich interaction.

> Both of these first two components may alter 'the physiological, energetic, affective, and motoric state' (Fischer-Lichte 2008b, p. 177) of the audience, meaning that they can create physically perceptible emotional changes and 'enable experiences that always carry a liminal dimension' (2008b, p. 176). (Spence & others, 2016, p. 57)

Spence's inclusion of the liminal dimension is a way of describing the *yearning-forward* of *Lens 2 attention*. Truly rich experiences cannot be things, experiences are unfoldings, transitionings and it is in the soma-deeply felt *yearn-forward* where the actor's experience shifts from an outward *noticing* to an inward, embodied *feeling*.

By giving attention to the *felt dimensions of experience*, *creating interesting flows*, *involving people's bodies*, Interaction Designers have already shown an attention to the Corporeal Design agenda. Emulating real-world physics as a way to encourage the soma experience is a standard in IxD. The *pushing around* of windows or *throwing out* of the file trash are more than metaphors. They are also *pushings* and *throwings*, *droppings* and *draggings*, all of which are able to be felt. The genie effect is an overt attempt to make the digital 'feel' analogue by introducing a visual with an affinity to the motions of the human feeling body.

Ross and Wensveen's (2010), "Designing behavior in interaction: Using aesthetic experience as a mechanism for design," uses the phrasing, "'designing for Aesthetic Interaction through Aesthetic Interaction', referring to the use of aesthetic experience as a design mechanism" (2010, p. 1). A primary struggle of this research was to get a handle on these concepts and organize them into a cohesive frame. The attempts by Frens, Djajadiningrat, Gaver, Lesage, Löwgren, and others to design for the felt dimension of aesthetics are all working toward similar goals, yet they pursue these goals without any consistent dialogue, rhetoric, or framing.

Kristina Höök's 2018, *Designing with the Body, Somaesthetic Interaction Design* lays out the first cohesive frame for a bodied-awareness in design. Pursuing the goal to "spur improved aesthetic engagement for our end users" (K Höök et al., 2018, p. xvii), Höök presents a case for Somaesthetic Design and lists three advantages of such a program. She claims an attention will (1) change me (the actor) in my body, (2) change the ways that I see and aesthetically appreciate the world, and (3) foster empathetic engagement with others. She draws on the work of Richard Shusterman as a major inspiration for her investigations. As mentioned earlier, Shusterman's somaesthetic philosophy has served as an inspiration for a number of researchers in the fields, myself included.

Professor Höök's agenda runs parallel to mine in many ways. We agree on nearly all of the claims in her agenda when stating:

- One must engage the sentient body in order to have a somatic experience.
- This work is not spiritual but highly practical.
- The body-mind is inseparable.
- Somatic engagement is the path to aesthetics.
- Doing and reflecting on doing are two vastly different modalities.
- Language is "postkinetic" (quoting Sheets-Johnstone, K Höök et al., 2018, p.34).

- A wholly new designerly posture is necessary to move to the "experiential, felt, aesthetic stance" (2018, p. 6), a requirement for a design cycle looking at bodies and motion.

This thesis starts from a similar set of biases as Höök[29] while codifying, collecting, and expanding the implicated concepts into a comprehensive taxonomy. My Corporeal Design agenda is the collecting and naming of these concepts under one heading. In this manner it is possible to direct attention in all formats (screen-based and non-screen-based) to the affinities of the human body.

Any discussion or analysis of *rich*, separate from the soma, misses the only place where richness can be proven. The Corporeal Design agenda is focused on the inner haptics of soma-deep, authentic soma experience via affinities to the human body, and employs a soma literate bias at the front when considering any interaction. It is in this manner that the body's role in experience can be highlighted and placed front and center, not only in screen-based designs, but even more so in the non-screen-based designs of interaction, experience, service, and transition.

29 Their discussion centers on all "movement based interactions" where my conversation attempts to comment on all experience, experience of outwardly moving as well as inwardly moving attentions.

Pulling from the Feldenkrais practices of Shusterman, Höök lists a *slowing down of design* as one of the four primary elements of Soma Design. This appears alongside the other listed elements of *lived experience*, *testing and retesting against the desired aesthetic*, and *sociodigital materials*.

"An important part of the somaesthetic philosophy is the notion that to achieve a better understanding of your body you have to actively interfere with your daily unconscious routines and create room for reflection" (K Höök et al., 2018, p. 88).

Höök's Soma Design focuses primarily on built digital interactions between humans and artifacts, with little conversation about service, social innovation, or transition design.

The Temporal Body

> The [interaction design research] community is increasingly recognizing that an interaction aesthetic needs to be dealing with the temporal aspects, the behaviors, the way the interaction feels over time (as opposed to considering only the sensory gratification of its static appearance). (Löwgren, 2009, p. 15)

The Corporeal Design agenda focuses the designer's attention on the body, not on the generic body, but on the feeling body. The soma literate bias requires attention to this body as a body active, a body dynamic, a body ever in motion—in short, a temporal body.

The ancient Greeks had two words for time: kairos and chronos. Kairos is often defined as *the opportune moment*, whereas chronos is the term for linear, chronological time. Chronos is the version of time where every moment carries the quantitative measure of a second, or a minute, or an hour. In these appraisals, there is no hierarchy to the moments as they pass, they are all understood by their duration and order, quite objectively. Kairos, on the other hand, is the *time* which is *yearned-toward*, an idealized time where certain variables must align to create this *opportune moment*. It has been stated a number of times in this dissertation that the feeling body *yearns-toward* the moment of crusis. It is in this framing that the concept of kairos is able to be understood. (Or it may be the concept of *yearning-toward* is finally made clear through the idea of kairos!) Dewey's *an experience* occurs not in a timed fashion of stop watches and statistics, but rather in an expectant, idealized vectorial kairos-ian gesture.

An attention to time as chronos sees the hours drag on, with no potential energy, no goals, no desire, no yearning. Chronos is often connected to the story of Father Time, an old man with a long beard who steadily takes time away from the living with no heed for moments or seasons of significance. Kairos, on the other hand, has been portrayed as a handsome god with wings on his feet carrying either a razor or a set of scales. The implication is that he is running toward the opportune moment which is decided on the edge of a knife. Kairos is not describing

generic time, but the exact, precise, *yearned-toward*, idealized moment that is created in the perfect balance of variables.

While it is the payoff of kairos that designers of interactions would like to achieve, the common designerly bias is often attentions and implications of chronos, the objective life-depleting stopwatch version of time, too often the default. Any scientist knows how to record the chronos of an interaction or a happening. Building toward the experience of kairos, occasioning (Spence & others, 2016) the opportune moment requires an attention, a literacy in the aesthetic of body+time, an attention to the flow state of kairos over the piecemeal interactions of chronos.

> **Service design** [like all third and fourth order design] **operates in the realm of emergent and dynamic relationships** – among people, between people and things, and between those differently situated. Relationships in service design are also created by imaginations of what things, spaces, places, and people could or should do in the future, and how access to those futures are framed . . . (Agid & Akama, 2018, p. 800 emphasis added)
>
> **We argue that shifting from materiality of objects to focus on immaterial experiences and infrastructures requires a fundamental shift in this worldview . . .** We suggest that turning our attention to the mess of emergent, unfixed knowledge, experience, and positions might allow for an approach to service design that makes more room for people and **our relationships to human and non-human actors**. (Agid & Akama, 2018, p. 809 emphasis added)

Corporeal Design values an orientation to this specific version of temporality, a temporality of the performative body. It is only through the experience of performativity, the unfolding *yearning-toward* of kairos that the flow state of *an experience* can be discovered.

An example of Corporeal Design's kairos-focused attention can be found in the analysis of *whitespace* in any time-based design. Holmlid and Hertz (2007) talk about this concept in their paper "Service-scape and white space: White space as structuring principle in service design". They draw a parallel between the literal Communication Design whitespaces on printed paper with the figurative whitespaces in service designs. They define whitespace as a space of absence, a retreating from content which in turn gives emphasis to the 'content' by its novelty.

> Modeling and prototyping are central in service design as in many other design disciplines. These activities are closely related to service development activities, such as documenting the servicescape (Bitner, 1992), performing blueprinting (Shostack, 1984), and defining touchpoints (Zeithaml, Parasuraman & Berry, 1990)... **Given the nature of services as being processes over time carried out in space, two tentative categories of white space would be physical white space and time white space.** If we also consider that actions are carried out within these processes, we could anticipate that non-activity could be regarded as white space... For example, for a form or a receipt the white space of graphical design is crucial... The white space indicated consists of periods of waiting for the customer. (Holmlid & Hertz, 2007, p. 3-4 emphasis added)

By contrast, the Soma Literacy framing notes the bodied experience of whitespace as highly active content in its own right. Rather than assuming that nothing exists in the places where there is nothing to see (the common visual bias of the design fields), the soma literate designer will search for and note the highly active bodied content present in the interstitial space between the noted touchpoints of the service blueprint. In the Corporeal Design agenda, there is no absence or abyss or emptiness inside of an active experience. All experience aspires to be experience-*toward* or -*away-from*, wrapped up in, *flowing-toward*, kairos. Temporal whitespace is not empty. The living body *performs-through* all time. Corporeal Design values this bodied-time (body+time) as central to the formula for rich interactions.

Cohesion

> Into the awareness of the thunder itself the awareness of the previous silence creeps and continues; for what we hear when the thunder crashes is not thunder *pure*, but thunder-breaking-upon-silence-and-contrasting-*with*-it. (James, 1892, p. 159)

J. J. Garrett, writing in *The Elements of User Experience*, notes that successful design encourages the eye to move around the page with a "smooth flow" (2018, p. 145). This is a common point of critique in communication design, yet the model for smooth flow is not exactly

clear and the pedagogical avenues for teaching "smooth flow" are not consistent. It is the position of this thesis that one must have a bodied understanding of flow before this statement is useful. Separate from a soma literate definition of flow, "smooth flow" can be mistaken for steady flow, or just uninterrupted flow, as in the second hand on a ticking clock. It ticks uninterrupted, so it has *a* continuity, but this amounts to a chronos-type of being, quite un-human, as opposed to the *yearning-toward*, kairos-type of being, the prerequisite for cohesive experience.

> David Kelly . . . [traces] the development of interaction design from screen graphics to **complete experiences**. (Moggridge & Atkinson, 2007, p. 241 emphasis added)
>
> A successful design . . . should form a system that operates as a **cohesive, consistent whole.**" (Garrett, 2018, p. 150 emphasis added)
>
> [The goal is] **end-to-end experiences** that unfold gracefully over time and space. (Risdon et al., 2018, p. 89 emphasis added)
>
> [How to] create **continuity and consistency** across the end-to-end experience. (Risdon et al., 2018, p. 96 emphasis added)

In order to find an interpretation of these mandates, the Corporeal Design agenda places the attention to the sentient body front and center. Cohesiveness seen through the view of Corporeal Design is not any generic cohesiveness, it is *cohesiveness in soma literate experience*, which is a highly specific setting. Experience in this setting claims motion, momentums, inertias, vectors, and the implicated body riding through all of these. When speaking of lived experience, one cannot merely collect variables of a kin and declare them a cohesive set. The Corporeal Design agenda highlights how cohesive interactions must roll-together, achieving the inertial shared momentums of *ensemble*. Cohesive interactions cohere in that they form what Lim et al. (2007) describe as an *interaction gestalt*.

> We argue that any interaction takes on a *gestalt*, a composition of qualities that "creates a unified concept, configuration or pattern which is greater than the sum of its parts" [47] . . . we argue that

> this way of thinking about interaction as an *interaction gestalt*[30] better invites designers to more concretely and explicitly explore the interaction design space to create aesthetic interactions, especially when comparing to current approaches that blur the relationships among user experience, interaction and an interactive artifact. **In any interaction, the interaction gestalt is experienced by a user and evokes the user's subjective experience of the quality of the interaction [23,43]. However, only thinking about the user experience cannot fully guide designers to explore a design space of possible aesthetic interactions in a concrete way. This means that designers should have knowledge of how to shape aesthetic interactions in a more visible, explicit, and designerly way. This is a kind of knowledge we are currently missing in HCI. . . .** but we further explore what those intrinsic properties are by closely analyzing and defining the shape of interactions, namely interaction gestalts, which has not yet been addressed in current research. (2007, p. 240 emphasis added)

> [I]t is essential to define and research what the shape of interaction is, which we call *interaction gestalt*, so that we can help designers articulate and manipulate this unusual type of phenomenon which does not have tangible shapes, and is flexible, ungraspable, and easily changeable. (2007, p. 245)

Recognizing Lim et al's attention to the *full shape of an interaction*, I support their searching for the complete cohesive interaction. However, the attention of Corporeal Design reveals a gap in their attention; a soma literate understanding notes that experienced parts do not merely go together or belong to a common set unless they serve the same single, forward-moving, *yearning-toward* gesture. The given parts or touchpoints of a designed interaction do not achieve completeness, consistency, continuity, or cohesion by occurring in order or occurring in near proximity to one another. The multiple variables of any interaction design achieve cohesion as they build toward a shared single momentum. This is the soma literate definition of an interaction gestalt. Lim et al's attention to "tangible shapes . . . flexible, ungraspable, and easily changeable" is useful when noting the modality that experience exists within, but what they are calling *interaction gestalt*, I am calling general *experience*. I am reserving the term *interaction gestalt* for the cohesive experience of shared momentum.

30 not to be confused with Lakoff & Johnson's Experiential Gestalt which is the ways in which our own primary interactions create our specific personal worlds.

Consider the "*thunder*" quote from William James at the start of this section. Thunder is not the instant of a hit, but the collection of the pre-thunder silence, the gaining of sound and vibration, the driving toward the hit of the thunder clap, the rolling away, and the return to active silence. The experience of thunder is not any one of these touchpoints or even in the collection and ordering of these touchpoints, but rather it is in the single gestalt; the thunder-*ing* is afforded through the cohering of these moments into a single authentic gesture. It is through this same attention that we are to see all felt experience. The gesture, the inhabiting of the whitespace, rolling-, *yearning-forward* into the moment of crusis and immediately rolling through and past and onward to decay is the interactional gestalt. Again, the experience of swinging is not any proper naming and ordering of the varied moments on the path of the moving playground swing, it is the coming together of the multiple variables into a shared momentum. Experiences cohere as they form a single unfolding, felt gestalt.

Principles, Values, Ideals, and Variables

Corporeal Design is not a new field of design, but rather a new framing for the collection of body-implicated attentions, many of which already exist in the varied design fields. This agenda is made up of principles, values, ideals, and variables, all of which keep the experiencing body at the fore revealing the bodied implications of various design choices. Corporeal Design depends on a literacy of felt experience in order to recognize, analyze, and manipulate the soma variables.

Recall the use of literary criticism's term "resonant passage" as applicable to interaction criticism from section 2.1:

> *Literary criticism uses the term "resonant passage" to describe the moments in a text where the critic recognizes that word choice, pacing, and/or context hold particular power to bring about a significant shift in the reader. Where should we look for the equivalent of a "resonant passage" in IxD, XD, SD, etc?*

Carl R. (Rod) Nave, Associate Professor of Physics emeritus at Georgia State University defines resonance as:

> [A] natural frequency of vibration determined by the physical parameters of the vibrating object. This same basic idea of physically determined natural frequencies applies throughout physics in mechanics, electricity and magnetism, and even throughout the realm of modern physics. Some of the implications of resonant frequencies are:
>
> 1. It is easy to get an object to vibrate at its resonant frequencies, hard to get it to vibrate at other frequencies.
> 2. A vibrating object will pick out its resonant frequencies from a complex excitation and vibrate at those frequencies, essentially "filtering out" other frequencies present in the excitation.
> 3. Most vibrating objects have multiple resonant frequencies. (Nave, 2016)

All interactions that adhere to the Corporeal Design agenda aspire to the "resonant passage." That is, Corporeal Design is a valuing of the performative bodied participation in experience and makes the same assumptions as Professor Nave lists. Specifically, Corporeal Design assumes that experiences must tap into the pre-determined resonances of the human actor before the actor can embody the interaction; affinity for the human body permits feeling.

In service of *resonant frequencies* and *significant shift in the actor*, Corporeal Design utilizes a set of principles, values, ideals, and variables.

Corporeal Design **Values** are high-level concepts like community, intimacy, flow, fluency, pliability, and beauty. Many values are socially derived and culturally shaped.

Corporeal Design **Principles** are truths, understandings, and heuristics that aid in specific design choices. These include many commonly studied design principles such as *anthropomorphic form, contour bias,* and *depth of processing*. The varied research projects associated with this dissertation have yielded a number of new, Corporeal Design-specific, design principles such as the *interstitial*, *attentional hierarchy, the golden gesture*, and *kinaesthesia and enkinaesthesia*.

Corporeal Design **Ideals** are the expert readings or models that the designer attempts to achieve. These are the idealized future states such as: *good flow, lack of frictions, natural interstitials, wholistic/gestalt attention*.

Corporeal Design **Variables** are the manipulable elements that occur *in time* as effect the gestalt gesture. These are the variables that, when aligned, *occasion* the "resonant passage", adding to *an experience*.

I will present a detailed listing of these concepts with many examples in Chapter 4.2, Soma Literacy Concepts. As the Corporeal Design agenda is expanded in the coming years, I am excited to learn of the ways our community of practice and research debates, vets, and adds to this initial collection of principles, values, ideals, and variables.

Corporeal Design Summary

Our world is first understood in the experience of our body in our body; we then extend our body outward to embody phenomena as our world. That is, the individual parts of the first instrument (the body) need and strive for a unification, an integration, an entrainment, a harmony of self/self, self/other, self/thing, self/environment so as not to be experienced as individual parts; no longer separate digits on a hand or a hand that is removed from a torso, but all part of the one whole. On the spectrum of experience, *disembodied* is a shallow interaction, a common breaking of the idealized-whole into separate parts—disembodied as dis-integration.

Embodiment is the deep engagement in experience which attempts to bring what is on the outside of my body into/as my body[31]. I am making the not-me, me. To embody is to experience-*with-a-connection*: to integrate, to share-in. The more complete this sharing, the more I am able to forget any difference between it (or you) and me. It is through embodiment, the deep embrace with realized aspects of my environment, that I come to *know my world*. **Embodiment is the deepest form of empathy.** Without the bodying of Lakoff and Johnson the world is hidden or just nonexistent. Without the embodiment of Dourish, Todes, and Shilling the actor could be (falsely) viewed as independent or isolated. Without embodiment there is no empathy and all of the revealed world is foreign; possibly seen and noticed, but still alien. Bodied allows meaning. Embodied creates a shared, dynamic, personal meaning by enlarging my world through the body body-*ing*; the realizing of gestures as self with self, self with other, self with thing, self with environment.

Persisting visual biases and scientifically objective measures and methods continue to represent experience as a status or static achievement rather than the dynamic, messy, forward-moving, unfolding, living ideal as is understood through a soma literate attention. Corporeal Design recognizes the wide spectrum of experiences that we all encounter and specifically, the degrees to which we are aware of and can even control, nudge, or design for said felt experiences.

31 see Shilling's "equilibrium" (Shilling, 2008).

Any attention or practice involving experience that does not value the temporality and embodied nature of interactions risks missing the only part of the happening that carries any promise of authentic engagement. The palette of the Corporeal Design agenda is temporal and embodied. Design pedagogy has yet to establish a specific attention, protocols, and agreed upon language concerning the body+time. The Corporeal Design agenda is a recentering of design attention toward the somatic realities of experience. It is an attempt to recenter the community of practice and research toward these principles, values, ideals, and variables. While some of the varied concepts of the agenda have been noted in prior settings, the conscious collecting of the ideas and the placing of them as foundational and central to the understanding of interaction has not. While many designs have tipped the experiencing actor toward significant interactions, the design practices have no vocabulary or context with which to notice, discuss, and analyze the successful somatic nudging. It is my the hope that the highlighting and defining of these concepts will prove a fruitful redirection of design attention, leading to a more efficient, a more deeply felt, and richer practice.

2.5 Discussion

In this chapter, I have summarized the foundational perspectives on experience necessary to ground the concepts surrounding Corporeal Design and the upcoming chapter on Soma Literacy.

Recognizing idealized experience as one of body in commerce with the world, and realizing that aesthetics are not merely thoughts or figurative *feelings*, but manifest as *resonant passages* soma-deep, and noticing that the participatory, kinaesthetic, somatic knowing highlights a specific way of being in the world places the actor or designer in a position ripe with potential. Attention to the aesthetic opens a space that can be leveraged into the transcendent, a world increasing activity.

Spence's *Performative Experience Design* (2016) carries a mandate to which I believe all of the design fields aspire to, that is, to "create potentially transformative experiences" (2016, p. 47). The beginning of this thesis sought to define experience and recognize the centrality of the soma in the realizing of *an experience*. I then built upon the basic definition to present the ways that embodiment with the Other can amplify the self as to create these transformative experiences. While the embodiment of our worlds is a regular occurrence and serendipitous engagements come about of their own accord, it is within the power of design to create and then *occasion* (guide or nudge) novel events into the felt realm. By highlighting the soma as an under-realized under-utilized palette full of potential, this thesis hopes to *occasion* the design fields' collective attention to this play-space.

Frens et al were definitely on the right track in 2006. They were studying tangible interactions and the senses of the participating actors. They recognized that experiences which envelope the senses carried greater impact. While their research continues to be important in the design research canon, it grossly underestimated the magnitude of the variables they were investigating. The term "tangible interactions" is a misnomer. It refers to a set of specific design interventions that involve some aspect

of the participating body. There are whole tracks of study and research labs dedicated to this title. However, any attention given to a subset of interactions that are tangible, implying that the rest of the known interactions are intangible, misses a major point. All human interactions aspire to be tangible. Anything less than tangibility or felt-ness or embodied involvement-in amounts to a meaningless, world-excluding, non-experience. If the body is not implicated in the experience, it is not shallow: it is anaesthetic. Tangibility or the felt-ness of experience is the definition of a human experience. This is how we make sense of our world, through the sensuous. If one ignores the bodied participation, they may diminish or even negate the self-actualization of the living participant. The sensuous body, the body-engaged is the requirement for the life well lived. The free life. The actuated experience.

It might be noted once again that the focus of this dissertation is on the range of experiences in which we all participate and the attention here is on the participating actor's aesthetic. This is to be contrasted with a focus that would only be on the ways that designers design experiences. In most circumstances, experiences cannot be *forced*, they can only be *occasioned* (Spence & others, 2016), and the proof of occasioning is in the body of the participating actor. Without a formal mechanism to recognize, discuss, and analyze the resulting aesthetic in the participating actor, the design fields can only fall short, chasing the elusive *resonant gesture* with no way to ever know if they have found it. The design fields, and IxD in particular, should be asking what feels. Focusing on how a body feels, over what it sees, hears, or thinks, opens new paths for the design of experience.

How might one tip an interaction from feeling like it is just my finger pushing buttons to the feeling that it is actually *me* participating?

How might one tip an interaction from feeling like the Other is outside and foreign to finding it has become personal and intimate?

How might an initial interaction that was light, superficial, and of no real consequence on the outside of you turn into an inward experience, causing something deeper, something personally felt?

What is required to engage the sensual-inward-feeling body?

This shift from outside to inside is the primary concern of Corporeal Design.

In the Corporeal Design critique, section 2.4, I listed the following gaps in IxD attention:

a. The design fields fail to recognize the body as the foundational constant for all experience, the primary proving ground for all interactive designs.

b. The design fields have no framing for the interstitial gestures of living.

c. The design fields have no framing for multidimensionality of experience or how to attend to the experiencing of experience.

d. The design fields have no framing for multidimensionality of experiential meaning or how to attend to the pre-reflective meanings in experience.

e. The design fields have no framing for experiential affinity to the experiencing body resulting in often awkward, narrowed, dulled, or missed life-experience (Shilling, 2008).

f. The design fields have no framing for experience as (1) ever unfolding, and (2) about feeling the future.

g. The design fields have yet to recognize the soma-deep haptics.

h. The design fields have no formalized soma literate understanding.

These gaps (a–h) can be reduced to three fundamental questions:

1. When is the soma ignored?
2. When is the life experience assumed to be static?
3. How do we reveal and foster the kinaesthetic arcs of experience?

In chapter three I will present and reflect on six research studies, each of which have contributed insights to address these three questions. The studies aid in closing the eight gaps mentioned above, and recognize the possibility and need for a study in Soma Literacy. In chapter four I will formally present the field of Soma Literacy and list its initial 45 concepts, before concluding the dissertation by sharing the contributions to knowledge and opportunities for future research.

3.0

RESEARCH STUDIES

3.1 Introduction to the Research Studies

In 2009 I completed my tenth year teaching the Dalcroze Eurhythmics required coursework at the Carnegie Mellon School of Music. It was in this year that it started to occur to me that many of the most significant concepts I was teaching, while of central importance to the music curriculum, were somehow larger than music. This was a confusing position in which to find myself, as my job description was music professor, and the Dalcroze Eurhythmics course is listed as a core music course. Yet in many cases I found myself teaching concepts that transcended the specific music modality and could be applied in a variety of contexts. The Eurhythmics program at Carnegie Mellon University has persisted as a major pillar of the undergraduate music curriculum since 1921 and maintains its strong stance due to the plethora of high-level musicianship skills and attentions that it offers to the aspiring performers. Through their 150 hours of instruction in the body-based, movement-filled, participatory kinaesthetic and enkinaesthetic (Radman, 2013) exercises, the students gain great insight into music, performance, interpretation, communication, and their roles as artists. The course is internationally understood to be a music course with roots in the music conservatory and applications almost exclusively pointed at music making. Yet, after having amassed roughly 5000 contact hours as an instructor using these methods, I became convinced that the lessons I was teaching, while of great value to the performing musician, also held great potential to comment on other parts of my and my students' lives.

The Eurhythmics classroom starts with two entities, the materials and an ideal. The human body is presented as the base material for doing/making/feeling/experiencing/performing, and music is presented as an ideal to achieve. The coursework does not assume either of these entities. The body is not assumed but, rather, explored, tested, nudged, and embraced as the base material, the root palette of all experience. Music is understood not as a series of black dots on five lines in a manuscript, but rather as the ideal in living. Music is the state that we strive to achieve. It is not a thing, but a goal, a status, a threshold, an ephemeral being that one must have some skills to create, reveal, and participate in.

It was around 2009 when I started to get the first indications that what I wanted to explore was not only more examples of music achieving musicality, but all of the ways that my coming to know musicality (the ideal), commented on and informed the extra-musical moments of life. I started to notice how it was possible to have a more or less musical conversation, or musical commute to work, or a musical interaction in the restoration of my 1948 Studebaker truck. I began to frame the relationships, interactions, services, and routines in my day as either meeting this bar of *musical* or falling short, and it then became imperative that I started to define—both for my music instruction and for my own extra-musical curiosity—what were the variables of experience that I was actually valuing, noticing, and managing?

On a given summer afternoon in 2010 it was time to mow my lawn and I considered, *what would it mean to mow the lawn more musically*? If I am to meet this ideal in experience, currently described as musical, *what attentions would I require, what literacies must I possess, what variables could I manipulate?* It was through these attentions that I began my explorations. The fields of design are supremely concerned with the mundane moments of life; design values the everyday and recognizes these often-overlooked moments as possessing a potential for the artful—that is, there are preferred futures, or what Shusterman (2018) simply describes as *better ways of living*.

While the inspirational ideas of my project were incubating as early as 2009, the formal research agenda was established with the commencement of this dissertation in 2014. Over the past five years I have searched for a framing, a vocabulary, and a taxonomy that encompasses the ways in which our bodies are the base materials of any experience and how experiences exist on a spectrum in varied and contrapuntally overlapping layers. The work necessary to arrive at and test the present concepts was achieved through a rich series of investigations. These included a set of investigatory workshops, two iterations of a new course for undergraduate designers, a series of exploratory fictions, a digital wearable, and a wholly new set of attentions in my ongoing music teaching.

In the coming chapter, I start with an introduction to the work of Émile Jaques-Dalcroze—the founder of the music-centric course work, Eurhythmics—which inspired a majority of the following investigations. I have included the introduction to Jaques-Dalcroze here, in the Research Studies chapter because it is his philosophy, methodologies, and framings that have driven the fundamental trajectories of the research. After placing and presenting the relevant attentions of Jaques-Dalcroze, I then describe a number of workshops and courses that I have led which served to discover, test, and highlight the concepts that became the Soma Literacy principles. I have chosen to include a short set of vignettes that I wrote in the second and third years of research as autoethnographic explorations into a variety of these Soma Literacy concepts, and I conclude the research studies with a presentation of the Haptic Enviro-Sensing Metronome Project, a wearable device that highlights and tests a subset of the central concepts of this thesis.

3.2 Émile Jaques-Dalcroze

Molly Wright Steenson recounts the planning for the 1972 IDCA conference in Aspen, CO, where Richard Saul Wurman presented his *Invisible Cities* project. Wurman, an architect, recognized that the parts of cities that he wanted to focus on were difficult to see, difficult to name, and even more difficult to study and teach about. They demanded a different framing, a new kind of attention.

> Changing the city required a shift from nouns to verbs, to the "performances" and "processes" of a city. Rather than focusing on police cars, Wurman advocated framing the question in terms of safety, for example, which "might be a combination of *performances*—Of people, and lighting, and of buildings" that would make for a different kind of experience in the city. "It is difficult to talk about interest, about comfort, about communication, or safety, or lighting, or learning. It is easy to talk about light poles, schools, cars, roads, parks, cops, etc.," he said in an interview about the 1972 IDCA. "And that's why I say the Invisible City is invisible because the performances are invisible." The conference was a conversation about making a city's performance visible. (Steenson, 2017, p. 99)

Richard Saul Wurman recognized that the common biases to the visual and to the thinged (noun) interpretation of elements in the city skewed the analysis and understanding of what happens in cities to such an extent that the city planners and designers of the day were not able to recognize or even talk about the happenings (verbs) that were unfolding every minute. The happenings were, as a result, invisible to the planners. By reorienting the attention of the designers to the active, experienced, unfolding temporal "performances" of the city, he was able to redirect the designerly attentions to new understandings, new analyses, and

new solutions—a new palette from which to design.
This kind of attending to the invisible is central to the priorities of this thesis. Where Wurman was attempting to make the temporal systems of cities recognized, I have explored the ways that the aesthetic accomplishment of participating (performing) in experience is not to be found in the static picture of any design, but rather, in the unfolding temporal resonance in the participating body. My years teaching musicianship to undergraduate performers exploits this kind of knowing, as music is not seen. The common disposition towards musical performance is to focus on sound, yet if one allows a single modality to obscure all others (i.e. the sight of a city or the sound of an orchestra), that bias can overwhelm attentions and knowings that might prove to be helpful and in some cases even critical for understanding the event.

In the following pages I will introduce Émile Jaques-Dalcroze and present a selective account of his priorities as supports this thesis. This is not intended to be an exhaustive conversation of all of Jaques-Dalcroze life's work, but instead a curated description of the ways in which his explorations have shed light on the invisible experiencing of experience.

Biography

Émile Jaques-Dalcroze (1865-1950) was a master musician, composer, performer, teacher, pedagogue, and philosopher, deeply concerned with the ways in which a thoughtful education *in and through music* (Bachmann et al., 1993) can transform the student, both on and off of the performance stage.

He began his career as a pedagogue with his appointment as Professor of Harmony, Solfège, and Composition at the Geneva Conservatory in Geneva Switzerland in 1892 (Mead, 1994). Upon arriving at the conservatory, he was appalled at the lack of musical depth his students brought to his classes. Each of his students had passed auditions to enter their studies at the conservatory; the young musicians were technically advanced on their various instruments, but they lacked an attention to the fundamental expressive variables of performance. The traditional training of the day emphasized a fragmented theoretical foundation of rules without valuing the performative, participatory, enacted reasoning for these rules. He believed that this highly theoretical style of training left too many holes in the education of the young musicians and he felt a mandate to address the deficiencies in the training system.

In response to what was, in his estimation, a failed system, Jaques-Dalcroze began a series of *experiments* with his students searching for ways to "establish a more direct communication between the feeling and the understanding, between the sensations which inform the mind and those which recreate sensorial means of expression" (Mead, 1994, p. 1). His *experiments* began with singing exercises in the solfège classes, then with silent singing (audiation), and then with gesture and big body movements designed to reinforce inner hearing/feeling.

In 1910, Jaques-Dalcroze was invited to bring his new approach and ideas to a noble social experiment: Hellerau, a new utopian city on the outskirts of Dresden, Germany, based on the principles of "social equality, liberal and universal education, and the revival of unalienated art and labor" (Beacham, 1985, p. 158). At Hellerau, Jaques-Dalcroze

explored his ideas with a wider audience that included children and adult laborers in the Hellerau community. He collaborated with theater directors, lighting designers, and dancers, all to highlight the difference between the mechanical directions of a musical or theatrical score and the potential opportunities involved in an art form that would allow "expression through the body [to become] a deeply personal and liberating experience" (1985, p.160). Rather than being satisfied with mere technical accomplishment, he strived for authenticity in performance, what he described as the "deeply personal and liberating experience" (1985, p.160).

The Jaques-Dalcroze methods exploit common gestures of the body such as walking, swaying, clapping, and leaning to reveal *natural* models for artistic expression. By leading the students through varied participatory exercises, his techniques gradually shift the focus of attention from assumed aesthetic biases of vision or sound (which can be judged on completely technical terms) to the root *experiencing of experience*, the shifts of weight in the experiencing body (only analyzable via the feeling body). Rather than music being framed solely as a collection of sounds reverberating on the outside of a body, it is re-presented as experience, visceral and personal. In this framing, music (and by extension all of experience) is able to be created, appreciated, understood, and analyzed as an unfolding, temporal, participatory set of gestures that resound in the body, permitting the "deeply personal and liberating experience" (1985, p.160).

Today, the techniques he initiated have quickly evolved to group settings with students of all ages: children, adults, and senior citizens. The methods explore musical concepts but are also valuable for general aesthetic understandings. The most recognizable techniques of a Jaques-Dalcroze education involve bodies and motion in group settings with constant music, most often improvised by the teacher from the piano. The classes are traditionally experienced barefoot in open rooms without tables and chairs, and largely without paper and pencil. The students are led through various exercises, events, riddles, or challenges which require the student body to *feel* the experience via participation. By setting up

musical moments that begin and arc forward, the teacher is able to improvise music that reinforces the students' expectations or create micro-frictions in the classroom that force the students to question their assumptions, thus bringing these assumptions to light and creating an opportunity for direction, redirection, analysis, and learning.

Jaques-Dalcroze's experiments continued for the rest of his life until his death in 1950. There is a vibrant world-wide community of Dalcroze educators who continue the search for renewed entrées into the aesthetic experience via the feeling participating body.

> The ideas of the Swiss Émile Jaques-Dalcroze [created] perhaps the most rigorous, detailed, comprehensive, and teachable program for creating body consciousness at any time during this century—a completely rationalist physical education system whose practice anywhere has much deeper consequences on individual bodies than the platitudinous national objectives prefacing almost any invitation to study "the body" in any Western culture during the early twentieth century. (Toepfer, 2000, p. 266)

While the vast majority of the world's Dalcroze professionals are musicians teaching musicians lessons in musicianship, the work cannot help but comment on the extra-musical as the lessons unfold. Jaques-Dalcroze himself stated that his work was an education *in and through music* (Bachmann et al., 1993), meaning that while there were lessons to be learned that expanded the students' understanding of musical performance, any participation in his body-in-motion, kinaesthetic and enkinaesthetic methods would also reveal understanding about life at large. At Hellereau, Jaques-Dalcroze believed that his mission transcended music instruction to encompass not only instruction in musicianship, but his work also contributed to a "global education reform, the 'rhythmization' of human life" (De Michelis & Bilenker, 1990, p. 145). In a reaction to the modern industrial society, Jaques-Dalcroze coined the concept of arrhythmia, concluding that there was a "'general arrhythmia' of the human condition in the modern world" (1990, p. 145) that could be reversed with what became known as Eurhythmics.

Philosophy

The First Instrument
Natural Gesture
Eurhythmic vs. Arrhythmic
Kinaesthetic and Enkinaesthetic
Entrainment
Amplification Through Gesture
Empathy
Knowing vs. Re-cognition
Biases Obscuring the Root Experience

Through Jaques-Dalcroze's 50+ years of research, working with shoes-off bodies-in-motion in a classroom of students of varied ages, backgrounds, and expertise, he arrived at a comprehensive method that transformed music education and inspired countless creatives over the last century. Now with nearly 70 years of new research and practice in the methods that he established, it is possible to stand back and see a series of underlying principles guiding his legacy. The concepts and principles that I will discuss here are a selective survey of Dalcrozian ideas that carry specific relevance to extra-musical experience. Jaques-Dalcroze's full contribution is massive and attempting to describe all of the insights would amount to a wholly new dissertation. I am not discussing here a specific music literacy instruction or traditional Dalcroze pedagogy. My goal in this survey is to present some of the most cogent examples guiding my current research agenda and highlight the designerly attentions contained within.

The First Instrument

> I place the body—instead of action or interaction–as the central materiality of experience. As we necessarily interact with and through our bodies, stressing the primacy of the body might seem unnecessary, yet making evident this distinction can help us to reveal some gaps in the existing body of knowledge. (Núñez-Pacheco, 2018, p. 46)

Émile Jaques-Dalcroze's first students were 20-year-old music conservatory instrumentalists. They possessed technical facility on their instruments of choice (violins, pianos, clarinets, etc.), but Jaques-Dalcroze was alarmed at the ways in which a myopic attention to technique can overwhelm what should be the primary goal of music making: expressive communication. Even today, a common disposition of novice instrumentalists is to become so intent on manipulating the technique of the instrument that the idea of communicating anything can become lost in the struggle to play the *correct notes*. Dalcroze recognized many of his young musicians were assuming the role of a cog in a machine rather than that of the artist realizing their own vision. This was not only a life-depleting proposition, but central to the new industrial problems of his day.

In his estimation, in order to foster the empowered expressive man (the artist mentality), it was immediately necessary to redirect the students' attention to the center of agency, their own bodies. The violin or piano exists not as the product, but as a vehicle to communicate the aesthetic that the musician already feels. The goal in music making is to create *an experience* (Dewey, 1934). The aspired-to experience is not contained in the literal instrument; the violin or cello or trumpet only exists as a translator of the literal feelings resounding in the musician's *first instrument*—the body.

The body as the first instrument is a central concept in the Dalcrozian mindset. Any analysis of unfolding experience separate from the *resonant passage* in the experiencing body can only be critiqued as distraction, misdirection, or façade. Experience, of the fidelity that both Jaques-Dalcroze and Dewey speak of, can only be understood in the experiencing body. Recognizing this *soma*, this feeling body, as the *first instrument* is Dalcroze's way of keeping the priorities in line.

Natural Gesture

> *The right feeling:* One of the main challenges in building haptic interfaces and one that is central to the work being discussed in this thesis resides in attaining what I term as *the right feeling*. This is first and foremost a designerly goal. As a goal, it is knowingly quite vague and naturally depends on a plethora of considerations, but it is the role of the designer to work out and craft the details of the interaction that come together to provide the user with just the right feeling . . . What ultimately emerges from this review is that all these scientific results and descriptions of haptics are very useful, but are not in and by themselves sufficient to develop "**the right feeling**" we crave for as designers. No amount of technical prowess or neuroscience will guide us directly towards designing pleasant, enjoyable and purposeful haptic interactions. For attaining this goal, we have to first ask ourselves what is the right feeling that we want? (Moussette, 2012, p. 61 emphasis added)

> *Embodiment of sensory information:* Once the interaction starts, [problems] may occur [such as] [t]he stimulus on the body could be perceived as too removing or distracting, therefore meaning making might not be achieved. In the original cycle of present-at-body awareness (Núñez- Pacheco & Loke, 2014b), this part of the process would be represented by biofeedback 'not making sense' to the wearer, for instance a display showing fast-appearing visualisations of heart rate contradicting the calm state of the wearer. In such a case, the feedback could be interpreted as fake or unreliable, causing the wearer to stop paying attention. (Núñez-Pacheco, 2018, p. 274)

Gesture is natural. By this I only mean to point out that to be involved in a gesture is to participate in an action that the body is able to participate in. Contrasting with all manner of thoughts, words, musical notes, descriptions, and algorithms, which can manifest with more or less affinity to the aspiring participating body, *gestures* are by their very nature, embodied. They achieve the threshold of *natural*, contain *trajectory*, and permit the *felt* in the soma.

The designer of experiences, as much as any stage performer, aspires to create experiences that can be experienced. This is where it must begin. If the haptic technology lines up a series of variables but does not achieve "the right feeling" then it is a non-starter. This is what Dewey is speaking of when he claims

that aesthetic experience is inherently driven by "normal processes of living" (Dewey, 1934, p. 9). These normal processes are imbued with the germs of the aesthetic, whereas "object[s] set apart from any mode of experience" (1934, p. 9) are anaesthetic, unable to be embodied. Likewise, Jaques-Dalcroze points out that when the musician lines up a series of variables (pitch, timbre, rhythm, tempo, dynamics, etc.) but they do not achieve the *resonant passage*, they fail before they begin. Only those experiences that resonate in the experiencing body can be recognized, participated in, and resound as aesthetic.

Gesture is both the model and the goal. A true gesture carries the interaction gestalt, the vectorial arc, the inertial momentum that allows the soma to engage and embody. It is with attention to the authentic gesture that a designer/composer/performer can *line up* experiential variables that *occasion* the experience. "Natural gesture" is a misnomer; in order to achieve the threshold of *gesture,* the motion must present in a *natural* model. It must have an affinity to the human body. It must be capable of being felt.

1. Experience is felt in the first instrument, the body.
2. The body can only feel motion.
3. If the motion is to achieve the aesthetic, it must manifest as gesture (motion with trajectory).

Jaques-Dalcroze's methodologies of singing, moving, and improvising all carry the ideal not only of manipulating variables, but forming them into complete gestures, complete phrases, interactional gestalts.

Eurhythmic vs. Arrhythmic

Jaques-Dalcroze chose the title Eurhythmics to name his most famous contribution to the canon of arts instruction, his bodies-in-motion course-work. The literal definition of *eurhythmic* is found by breaking down the term into its various parts: *Eu-* is the prefix that comes from the Greek term for "good" and *rhythmic* means rhythm, flow, measure, proportion, or symmetry. Simply put, *eu-rhythmics* is good flow, or "harmonious proportion and movement" (Pennington & Jaques-Dalcroze, 1925, p. 8).

Jaques-Dalcroze's models for exercises in the Eurhythmics class all strive to demonstrate and realize the latent potential for eurhythmy in every moment of life. Whether the moment under analysis is a passage of sung music or is the unfolding of digital application on a handheld computer, the participation *in time* comes with an ideal for *right fit—right feel*. The design professions (and by this I now include everything from architecture to IxD to choreography and music composition) have searched for ways to understand, describe, analyze, and teach *right fit* and *good flow* for ages. Jaques-Dalcroze recognized that such ideals cannot be truly understood as reflective acts after the fact. The ideals of *good flow* and *temporal right fit* can only be known *in time*, proven in the experiencing instrument: the body.

He noted that the eurhythmic was not an oddity in the natural rhythms of life. Eurhythmic interactions can be noted all around us. Walking with a smooth gait or seeing the way in which a leaf falls from a tree are perfectly natural, requiring no effort to realize the good flow or right fit for their temporality. The difficulties only start to appear when one attempts to impose gestures on the world, as in designed interactions. For instance, assigning a series of "expressive gestures" to a dancer, or prescribing a series of pitches for the musician, or designing an order of events in a service design queue do not always come with the ideal *fit* or *flow* to which we aspire. The ideal *fit* for a temporal action or experienced *flow* in an interaction are descriptors for the experience of eurhythmy, or the uninterrupted, vectorially yearning interactional gestalt.

Shilling (2008) writes of a *fractured experience* being any interaction where the gesture is interrupted or compromised. These compromises are revealed as the ideals of *fit* or *flow* are compromised by friction or interruption. It is what both Émile Jaques-Dalcroze writing in the 1910s and Henri Lefebvre writing in 2004 refer to as "arrhythmia" (De Michelis & Bilenker, 1990).

> When relations of power overcome relations of alliance, when rhythms 'of the other' make rhythms 'of the self' impossible, then total crisis breaks out, with the deregulation of all compromises, arrhythmia, the implosion–explosion of the town and the country . . . signifying surrender to caprice and disorder. (Lefebvre, 2004, p. 105)

Shilling's *fractured experience* spans the beginning and middle of the *Lens 2 attention*. At the far end is the anaesthetic, static being which, because it is without motion can find no gestalt, no connection, no trajectory or *yearning-forward*. In Lefebvre's version of the fractured experience quoted above, one may begin the gesture, see the ideal conclusion and eventually arrive there, but only after more struggle than intended.

Friction, interruptions, and fractures can, of course, be beneficial as in cases of safety or signaling. They may also be designed into interactions in order to serve a larger agenda that might not be appreciable at a more molecular level.[32] However, arrhythmia is noted in examples of awkwardness as in tripping over a pebble, or in the case of the speech stuttering *disfluency* (Ambrose & Yairi, 1999) where the fracturing serves only to sever the gestalt experience. The gesture is begun and *yearns-toward* its resolution. It searches for the touchdown or the signed contract or the arrival at Thanksgiving dinner or the classical musician's authentic cadence. It is initiated with intention but becomes interrupted or *fractured* in the process. The resolution in these cases is often jarring and leaves the participant yearning for the originally envisioned conclusion. This is less than the aesthetic experience that Dewey describes and can be so fractured as to be experienced as anaesthetic.

32 There are other cases where a surprising or clever redirecting of the gesture resolution creates delight as a novel resolution is realized. The novel resolution may be created when one finds a way to pivot from an original trajectory-resolution to a new trajectory-resolution. Any attempted gesture marked as a missed entrance, or one that was noted as a false start, re-start, or unexpected start would all be examples of fractured experience (the aspired-to arc of experience is interrupted) and hold the potential for a pivot to a novel resolution.

The comic is well attuned to the fractured experience. The set-up is one of creating a gesture that foreshadows a beautiful resolution only to then intentionally fracture it and force a restart. The artful comic is able to manipulate the variables such, whereby they reveal a potential beautiful resolution, then sever the gesture and replace the original intention with an unexpected, but similarly or even transcendingly beautiful resolution, thus pivoting a fractured experience into a new gesture. In some cases, the recovery or new-start can transform into a fully formed gesture and even create profundity—change, transformation, catharsis, or transcendence [Axis 3 experience] where the actual resolution transcends the vision of the original resolution.

Kinaesthetic and Enkinaesthetic

> Stasis, the opposite of change and flux, is incompatible with life, and leads only to separation and disintegration: 'even the potion separates unless it is stirred.' (McGilchrist, 2009, p. 270)

> Music [like all participatory experience] is an activity: it is something done, an experience lived through with varying intensity, by composer, performer, and listener alike. (Sessions, 1950, p. 8)

Jaques-Dalcroze's methods all exploit the root requirement of any experience: felt motion. Zeyneo Çelik Alexander, writing in *Kinaesthetic Knowing, Aesthetics, Epistemology, and Modern Design* defines kinaesthetic knowing as the "non-discursive and non-conceptual knowledge assumed to be gathered from the body's experiential exchanges with the world" (Z. Ç. Alexander, 2017, p. 32). It is this kind of knowing around which all the Jaques-Dalcroze methodologies center. Only by literally engaging the body in motion can a student become aware of the qualities of experience that are only definable *in time*. A kinaesthetic knowing is a recognizing and valuing of experience based on the bodied resonance of the interaction. An interaction that does not resound in the body [*Lens 1 attention*] is understood to carry less aesthetic meaning, whereas a happening [*Lens 2*] that is felt in the body can become deeply personal, embodied [*Lens 3*].

An awareness or literacy in kinaesthesia permits the actor a sensitivity to *shifts of weight*. The *shift of weight* is the manner in which the actor becomes aware of the gestalt of an experience rather than any distinct static moments or pictures of a happening. To notice a *shift of weight* requires the actor to embody the approach—the yearn-*toward*—the crusis—the falling-*away-from*. The tipping of the *shift* occurs at the moment of the crusis, but the concept is only made real in the full gestalt gesture. A Jaques-Dalcroze education shows that all interactions can be analyzed as simple shifts of weight[33] and it is the shift that one should pay attention

33 While this wording is not common in the traditional Dalcroze pedagogy, the concept should be familiar to the Dalcroze educator. i.e. in a solfège curriculum, the techniques involve first investigating the aesthetic 'quality' of the varied solfège syllables, rather than their function or memorized sounded pitch. Or in the Eurhythmics classroom, the enacting of meters through conducting or walking and changing directions is again focused on the experienced shifts in the body that render one moment as significant from another. Or in the common 'quick reaction' exercises, it is the feelings of anticipated weight in the body that are reinforced or challenged as the valued tier of attention. The Jaques-Dalcroze protocols repeatedly drive the student's attention not to the seen or the sounded, but to the felt, and the specific quality of these feelings are codified in the shifts of bodily weight.

to. Feeling requires motion—motion is felt in the body as the shifting of weight from point a to b.

Of equal importance to the Jaques-Dalcroze strategies is the concept of enkinaesthesia, or the shared motion with others. A Jaques-Dalcroze classroom is traditionally a group setting where students participate not only in the exercises offered up by the teacher, but also *in ensemble* with other bodies in the room. It is here that the *four bodies of embodiment* start to become clear. An awareness or literacy in enkinaesthesia permits the actor a sensitivity to the shared, embodied *shifts of weight* which always occur *-with*. The most common examples from the Eurhythmics class include the actor embodying the steady beat of a musical example, feeling it in their body and entraining not just their thought to the regular pattern, but the bodied, inertial, shifts of weight in the *soma* to the music. Beyond this, the student is not only entraining mind to body, but mind/body to teacher, to sound, and to neighboring student. The enkinaesthetic is an awareness of the Other, a syncing, entraining, or sharing in the momentums of the not me—making the not me, me.

Entrainment

Jaques-Dalcroze's biases all value entrainment *-with*. The participating actor is constantly challenged to entrain-to the Other. The Other can be any of the *four bodies of embodiment*, that is, self to thing, self to environment, self to other actor, and/or self to self. Unlike other analysis of experience (in the performing arts or in the design fields), Jaques-Dalcroze's strategies always keep a primary focus on the feeling-*with* the Other. It is not sufficient to merely be aware of or to describe the Other. The ideal in experience (as modeled in a musical interaction) is the *in time* eurhythmic experience *in ensemble*. The body must entrain to the Other in the shared vectorial momentums of the interactional gestalt before they would actually *know* their world.

Amplification Through Gesture

A Jaques-Dalcroze bias to experience requires an attention to the *soma*, the *yearning-forward* feeling body. As a somatic literacy is built, the Jaques-Dalcroze student is able to recognize the *shifts of weight* in all variety of examples, both musical as well as in the extra-musical examples of their worlds. The practice progresses from mere literacy to artful design as the soma literate individual begins to understand that these *shifts of weight* do not only exist throughout the actor's world as pre-defined aesthetics, but that the individual actor is also able to exert some intention into their world. The soma-aware actor is not only a slave to the *shifts* around them (as in the industrial cog in the machine), they can also exert enough sway to choose the shifts they intend to engage in (a free person, empowered and expressive). At this point the actor becomes the actor/designer/composer/choreographer. Rather than a passive rider on the roller coaster, the soma literate can begin to harness, guide, nudge the gestalts around them, striving for a eurhythmy of lived experience that meets their vision.

A skilling in Soma Literacy can be accomplished in a number of avenues. In the Jaques-Dalcroze classroom, attention is not only given to the mundane shifts of weight that we are constantly subject to (such as walking or leaning); the techniques regularly involve the student in gross motor actions, so large as to not be ignored. In this way the kinaesthetic and enkinaesthetic body can be used as a teaching tool, amplifying the interactional gestalt, revealing what to the untrained is regularly overlooked. The body is not only the proving ground for experience, it can also serve as an instructional tool, speaking so loudly to the student as to not be ignored. Interactions presented in a Eurhythmics class are often enacted to amplify what is already happening. The goals of a Eurhythmics class are not to brainstorm new ideas through a body (-storm), they are instead to highlight or reveal the concrete, felt experience already present, nearly-present, ideally-present. *What is the experience of experience? Let us amplify it by asking you to participate in a gesture that highlights the attention.*

Empathy

I am highlighting again *empathy* as a central concept to this thesis as it is at the very root of the Jaques-Dalcroze agenda. The ideal in musicianship, or what my classroom regularly describes as *deep musicianship*, is the awareness of the felt. This is the overlapping of the soma literate attentions of *what is* with *what can or should be*. This attention analyzes the unfolding experience at the level of shared motion. When analyzing a musical score for the first time, my students are challenged to "discover and reveal the motion" in the score. The musical score is not "set", as though there is only one possible result to the ordering of the notes. Rather, it is understood to be an outline full of potentials, any one of which could be performed and participated-in as authentic.

The Jaques-Dalcroze attention asks the performer to make a critical reading of the score at the level of the experiencing body. This is a pre-cognitive reckoning, a valuing of the score based on the possible bodied gestures, searching for the beautiful shifts of weight—the eurhythmic solution. The ideal in experience, as seen through a Jaques-Dalcroze attention, is to find the felt, or to feel-*with* the Other. This is the true mark of empathy; not a seeing of the Other, or naming of the Other, but an authentic enkinaesthetic participation-*with*.

Recall the wording from section 2.4:

> It should be noted that this kind of attention to/through the world amounts to a specific kind of knowing, a literacy unto itself.[34] The felt/participatory knowing of *pathein* involves shifting things (happenings, phenomena, events, opportunities) on the outside, separate from me, into a felt experience; felt as part of myself. This is an entirely different way of knowing compared to a scientific knowing where one names and categorizes in a sterile and distant way. Rather than remaining isolated or separate, *objectively* appraising an event as an impartial observer, experience, in its

34 Jaques-Dalcroze saw his methods as part of an educational revolution that would "train children to become conscious of their personalities, to develop their temperaments and to liberate their particular rhythms of individual life from every trammeling influence. More than ever they should be enlightened as to the relations existing between soul and mind, between the conscious and the subconscious; between imagination and the processes of action. Thoughts should be brought into immediate contact with behavior. The new education should aim at regulating the interaction between our nervous and our intellectual forces" (Pennington & Jaques-Dalcroze, 1925, p. 11-12).

> idealized form *pathein*, is messy, implicated, and participatory. In this manner, I claim that there is no *objective knowing* of experience. One must *subjectively* participate in the event. One must shift the sterile potentiality on the outside into a messy and implicated happening of outside/inside combined and felt.

A Soma Literate empathy is not concerned with thinking of the Other. It is a literal feeling-*with* the Other. Rather than reflecting on a situation or event or interaction after the fact, this is an empathy *in time, in ensemble with* the Other.

Knowing vs. Re-cognition

> In addition I will re-present Woelert's claim that Kant's arguments, in this early period, anticipate claims for the constitutive force of the body, yet these are claims that are more usually associated with the phenomenology of the early twentieth century. This emphasis on the body is important because an agent's action constitutes an affectively laden interrogation of its world, that is, a nonpropositional somato-sensory questioning of how our world is for us now and how we anticipate it will continue to be, and this is facilitated by our kinaesthetic and enkinaesthetic engagement. **What we discover in this fundamental action is not, at first, an utterable knowing—it is not associated with speech or formal conceptualization; it is preconceptual.** (Radman, 2013, p. 366 emphasis added)

Central both to a Soma Literate knowing and to Jaques-Dalcroze's bias is the recognition of *in time* knowing. Different than the cognitive, reflective, after the fact, naming of events, this thesis recognizes a knowing *in time*, a knowing of the active unfolding of experience as it unfolds. A significant theme of the Jaques-Dalcroze strategies is that the knowing generated through the feeling body is firstly pre-conceptual. The methods exploit the fact that motion is a language of itself; "gestures slightly anticipate speech" (McGilchrist, 2009, p. 189) and "gestures do not merely reflect thought but help constitute thought . . . without them thought would be altered or incomplete" (2009, p. 190). It is with an allegiance to these ideas that a Jaques-Dalcroze education requires the student to experience before analyzing any concept (Bachmann et al., 1993).

I believe that Jeffrey Bardzell is attempting to drive attention to this kind of knowing when writing in "Critical Reading Strategies, Or, How to Do a Close Reading of an Interaction Design." In that post he lists six strategies for thinking critically about interaction designs. Of his six strategies, the second is the following:

> Seek out the affective. It's no secret that information, cognition, and disembodied universalizing knowledge have been dominant in interaction design for decades, often excluding emotion, affect, embodiment, desire, etc. HCI is belatedly addressing this, and critics, I think, are uniquely positioned to help interaction designers become more sensitive to these thoroughly subjective phenomena. Interaction is personal. Make that visible. (Bardzell, 2008, para. 5)

His sentiment, "Interaction is personal," recognizes that the actual experiencing of experience resounds in the actor's subjective body. Jaques-Dalcroze's biases recognize that the affective is both relevant and realized preconceptually *in time* as aesthetic in the body.

Here again we are reminded how John Dewey rejected the spectator theory of knowledge. He refutes the belief that truth exists separate from the act of knowing; "The traditional conception, according to which the thing to be known is something which exists prior to and wholly apart from the act of knowing" (Cahn, Cahn, Dewey, & Boydston, 1988, p. 164). McGilchrist explains this idea by stating that we experience through two realities. The first knowing of our world is live, complex, embodied, interdependent with motion and flow, whereas the second kind of *experience* sees the parts of our world as isolated, inert, static, or mechanical (allowing us to reflect on the unfolding as a 'spectator', after the fact). The first is pre-reflective and sees the world through undivided gestalts, where the second reflective knowing can only see the world divided up into bits. This is the difference between actively "being in the world" and "thinking about the world" (McGilchrist, 2009, p. 31).

In the introduction to Kandinsky's *Concerning the Spiritual in Art*, Michael Sadler (1888-1957) attempts to highlight these two separate realities in Kandinsky's approach to painting. He compares Kandinsky's artistic allegiance to the act of music making, noting that it is not the reflective

content of the painting that is of importance, rather it is the *in time* expressive qualities for which Kandinsky is striving.

> [T]he power of music to give expression without the help of representation is its noblest possession. No painting has ever had such a precious power. Kandinsky is striving to give it that power, and prove what is at least a logical analogy between colour and sound, between line and rhythm of beat. (Kandinsky, 1977, p. xx)

Here we might begin to understand the unique contribution of the Jaques-Dalcroze methodologies to the design fields. Jaques-Dalcroze, like Kandinsky, recognized that a musical kind of knowing values the *in time*, pre-conceptual, participatory bodied tier of experience. By jumping to the more common reflective, descriptive, snapshot-analysis of experience, one is likely to miss the most personal, most intimate knowing of an interaction: the bodied aesthetic.

Biases Obscuring the Root Experience

> Many of my haptic sketches were initially realized with transparent acrylic top panels, thus exposing the inner working of the units. This feature was intended to help check and debug the actuation mechanisms without having to constantly open the boxes. **However, having the mechanism visible was rather quickly found to be detrimental to the haptic experience** in general as the users being exposed to the sketches quickly became overly interested in the functioning of the device more than anything else. The haptic interaction and its qualities were then of secondary interest, at best. (Moussette, 2012, p. 131 emphasis added)

Jaques-Dalcroze's theories arrived out of the time and culture that questioned the disembodied knowings of the enlightenment and proposed other kinds of knowing. His mother was a student of Johann Heinrich Pestalozzi (1746-1827), the Swiss educational theorist and pedagogue who espoused a learning program:

> . . . based not upon concepts but rather upon such primary actions as "striking and carrying, thrusting and throwing, drawing and turning, encircling and swinging," bureaucrats, artists, architects, museum officials, schoolteachers, and university professors, among

> others, invented new pedagogical techniques or reconfigured old ones on the foundation of the alternative epistemological principle of kinaesthetic knowing. (Z. Ç. Alexander, 2017, p. 22)

The German Romantics were aggressively debating the different kinds of knowledge and paths to gaining insight, or what the German designer, painter, and theorist Wilhelm Debschitz (1871-1948) described as the difference between form-knowledge (*Formweissen*) and form-feeling (*Formgefühl*) which can only be acquired through experience (Z. Ç. Alexander, 2017). The designer, architect and teacher August Endell (1871-1925) and founding member of the German expressionist Jugendstil movement believed that aesthetics was "not a matter of knowledge but, first and foremost, of bodily habit" (2017, p.123). Endell posited lived experience as an "unconventional yet legitimate mode of knowledge" (2017, p.123). Endell's curriculum (the beginning of design education) and Jaques-Dalcroze's curriculum (profoundly influential to modern music education) anticipated the curriculums of the Bauhaus, Laban, Kandinsky, Obrist, Orff and Suzuki. Johannes Itten's 'basic course' taught at the founding of the Bauhaus was considered radical by many because of his attention to this bodied level of knowing.

> Itten himself incorporated physical exercises into his courses, and required his students, for example, to swing their arms and bodies in circular movements before attempting to draw freehand circles. . . . these non-verbal, tactile, analogical experiences were intuitively correct aspects of design education. Most of the Bauhaus innovations are now severely watered-down in conventional design education, usually retaining just a few vestiges of exercises in colour, form and composition. With the possible exception of the Hochschule fur Gestaltung (HfG) at UIm in the nineteen-sixties, there have been no comparable innovations in curriculum development in design education since the Nazis closed the Bauhaus in 1933. (Cross & Studies, 2006, p. 44)

Experience, like fire; is not a thing, it is a process, an unfolding (McGilchrist, 2009). Jaques-Dalcroze highlighted the unfolding *in time* musical experience in an educational methodology. He recognized that there is a musical kind of knowing that is enacted. Rather than looking for the something-known in a reflective, after-the-fact attention, his bias considers the verb-ed know-*ing* found only in unfolding experience.

The unfolding experience is most deeply recognized in the feeling body, yet the Western biases to the visual (like the aural and logical) regularly obscure any attention to the actual experiencing of experience. The primary interactions of the Jaques-Dalcroze Eurhythmics class are designed in such a way as to direct and redirect the student to this musical (bodied, felt, *in time*) kind of knowing. While Jaques-Dalcroze's initial inspirations were all in music, and the continued practice of his methodologies are almost exclusively taught to musicians, it is my position that this is not exclusively a *musical kind of knowing*. His bias to the bodied, felt, and *in time* is critical in any temporal interactive praxis. Where Kandinsky recognized the spiritual in music as an idealized way of being in the world, I am pointing out that it is not the *spirituality* of music that makes it such a useful modality. Rather, it is that music readily encourages the engaged *soma* pre-reflectively. The majority of musical interactions are enacted without the distractions of words or visuals, and it is because of this that the participant can be nudged closer to the root experiencing of experience. Jaques-Dalcroze was aware of the difference between "thinking about the world" and "being in the world," (Heidegger et al., 1996; McGilchrist, 2009, p. 31) and his methods seek to reveal the often-hidden personal meaning unfolding *as* bodied, felt, *in time*.

I am offering the Jaques-Dalcroze disposition to the design professional as a way to consider the different lenses that we analyze lived experiences through, noting how our common biases to the cognitive, the visual, and the aural often obscure the soma, the actual proving ground for experience.

Eurhythmics

> I have explained that it is wrong to think of learning as the *transmission* of a ready-made body of information, prior to its *application* in particular contexts of practice. On the contrary, we *learn by doing*, in the course of carrying out the tasks of life. In this the contribution of our teachers is not literally to pass on their knowledge, in the form of a ready-made system of concepts and categories with which to give form to the supposedly inchoate material of sensory experience, but rather to establish the contexts or situations in which we can discover for ourselves much of what they already know, and also perhaps much that they do not. In a word, we grow *into* knowledge rather than having it handed down to us. (Ingold, Russell, Winton, & Gallery, 2013, p. 13 emphasis in the original)

The traditional Eurhythmics classroom is a large open space with a large grand piano and without tables and chairs. The students and teacher participate barefoot in order to direct attention to the somatic experience above any other modality of awareness. The teacher creates short participatory experiences which can take the form of simple engagements, games, riddles, or challenges. All of the exercises are presented in a group setting. They regularly require collaboration with peers in the classroom and are led as the teacher improvises music from the piano. The teacher offers incremental directions to the participants who attempt to entrain to the goings-on through any variety of physical actions such as walking, clapping, swaying, singing, or tapping.

This style of learning is the *learning by doing* that Ingold mentions above. The guided experiences are microcosms of global experiential principles, broken down into morsels that are specific and repeatable, unlike daily experience at large where we are regularly confronted with many overlapping stimuli. A primary advantage of the Eurhythmics classroom is it is a guided experience, where specific concepts can be explored in depth without so many competing calls for our attention. The concepts regularly explored are the basic (and advanced) variables of experience. These include terms such as *tempo, accent, phrase, crusis, the interstitial, groove, beat, cadence, gait,* and *flow* (a comprehensive list of these concepts are presented in section 4.2, Soma Literacy Concepts).

The ideas are explored not for their reflective titles and definitions, but instead for their *in time* experiential knowing. All concepts explored in the Eurhythmics class are participated in before naming and analyzing. The focus is always on the *in time* knowing. Any amount of listing, charting, or talk about titles and symbols before the experiential knowing is gained runs the risk of obscuring the root definitions of the concepts. So an idea such as *tempo* is explored first by being subjected to a happening that requires the participant to entrain to a given *tempo*, then through a variety of techniques, the *tempo* will be changed and challenged as the student attempts to stay in sync with the evolving motion. The understanding that the Eurhythmics class builds around a concept such as *tempo* is not first a worded definition of a vocabulary term; it is first about the bodied experiential knowing of unfolding *in time* entrainment.

Overcoming the visual-aural-logical biases of our culture while redirecting the learner's attention to the experiencing of experience is not a simple task. The modern Eurhythmics class is built upon methods that are highly unorthodox compared to the normal routines in secondary and postsecondary education. Yet, without engaging the body in enacted, participatory, kinaesthetic and enkinaesthetic happenings, the learner is left only with static, reflective, still photographs, attempting yet failing to account for *in time* experiencing. In the Eurhythmics class the primary goals are to hear, feel, invent, respond; sense and imagine; connect, and remember, and only after this do we then read and write and interpret music. Performance through improvisation, sight reading, prepared compositions, and rhythmic dictation are integral to the course.

The content of the Eurhythmics class is only limited by the content of experience at large, which is to say, it is limitless. There is no shortage of ideas and concepts that can be explored through these methods. The most common subjects of music that are explored in the Eurhythmics class may include:

> time–space–energy, tempo, dynamics , articulation, beat/pulse (binary, ternary beat-units), divisions and multiples of beat-units (regular and irregular), rhythmic patterns based on binary and ternary beat-units, metric organization based on binary and ternary

> beat-units, complementary rhythm, augmentation, diminution, accelerando, ritardando, phrasing, anacrusic and crusic phrases, repetition, imitation leading to canon, ties, syncopation, structure, form, accents (metric, dynamic, agogic, tonic, timbre, harmonic), meters combining binary and ternary beat-units, mixed meters using same metric unit, mixed meters using different metric unit, hemiola, cross-rhythms (3:2, 3:5, 5:2, 3:4, 4:5), rhythmic sight reading/ dictation/ improvisation all rhythms to the level of the 32nd note, and metric transformation (3/4 vs. 6/8 or 8/8 vs. 4/4, etc.), and the rhythmic vocabulary of Oliver Messiaen (ametrical, additive, augmented and diminished rhythms, retrograde and nonretrograde rhythms) (Neely, 2019)

The reader familiar with the subjects of music will note that there are both musical and extra-musical applications of nearly all of the concepts listed above. It is with this realization that the explorations of the current thesis began. While the terms noted are nearly all among the most common vocabulary terms taught in schools of music, the Eurhythmics modality cannot help but reveal a litany of extra-musical insights that are regularly overlooked in traditional music educations.

It was only through being a student and teacher in the Eurhythmics course work that I was challenged to consider:

- The role of the internal feeling body versus external stimuli.
- The juxtaposition of feeling versus seeing, sounding, or thinking.
- An attention to the body as the primary instrument,
  - the source of the aspired to communication with others.
  - the proving ground for successful entrainment with the Other as embodiment.
- The role of the major instrument (violin, piano, etc.) as a vehicle for sharing what we feel internally rather than as a utilitarian machine removed from expression or communication.
- how virtuosity permits artistry only by granting greater expressive range.
- how a mere ordering of temporal variables does not constitute an interactional gestalt. Phrase requires vectorial motion, not the simple hitting of ordered notes. Without an attention to momentums, there can be no temporal coherence.

- how our world view is tied closely to our specific literal physicality. We see the world through the lens of our own temporal *yearning* bodies. A mosquito or a blue whale would interpret the events of our day from a completely different worldview.
- how different visions of my world are amplified or diminished as I engage through varied physicalities. Engaging the tip of my finger versus a full body motion reveals different qualities of my world. The designer can adjust the living/performing/experiencing tempo by utilizing a range of different models/artifacts/tools.
- how experience requires an affinity to the body. Mosquitoes, blue whales, infants, and athletes all have different affinities.
- how somatic knowing can permit the literate to
  - recognize the *in time* concepts around them
  - choose and manipulate aspects of their experiencing. It is possible *to will* oneself to feel.
- how somatic knowing can permit the literate to recognize varied tiers of attention. Through study it is possible to engage/empathize/feel-*with* the Other. This includes all of the *four bodies of embodiment* and as such permits some affinity-for/empathy-*with* mosquitoes and blue whales.
- how somatic literacy can permit the skilled to offload gaits of experience into the purely embodied, freeing up cognitive attentions to focus on alternate, contrapuntally overlapping, *in time* priorities.
- how my literal feeling in a performance/interaction is not the same thing as my thinking about a performance/interaction. These can be aligned (as in feeling excited about the fascinating ideas) or they can be in conflict (as in enjoying the disgust of a horror flick). Being able to separate feeling from the dialectic meaning is a central skill of Soma Literacy.

Jaques-Dalcroze recognized a need for alternative methods due to the common misconceptions and problematic biases that are often brought into the music hall. If the musician is to create *an experience* that is to have some resonant range in the listening/participating audience, then the design of the performance must have affinity to the experiencing bodies. Yet it is highly possible to confuse the proper ordering and executing of temporal variables with the interactional gestalt desired in expressive performance. These misconceptions and problematic

biases are not music-specific. In fact, they are quite generalizable to all participatory experience (see the gaps listed in section 2.4, Bodies in Design).

Musicians often find value in the Eurhythmics class because it overcomes the biases toward the symbol and the solely reflective by redirecting the performer's attention to the *in time* unfolding of experience. It presents the many variables of experience not as separate, distinct, static vocabulary terms, but instead as *in time* variables in the service of a *coherent gesture*. The Eurhythmics methodologies offer the actor (musician/designer) awareness of the *authentic coherent gesture* and technique to manipulate the dynamic variables *in time*.

As a Eurhythmics teacher, I spur my students to explore interstitial spaces, performative entrainment, and awareness of the experiencing body as a lens into the little-discussed soma tier of experience. I hold that attention to this soma tier of experience, an underrealized and underutilized lens full of potential, reveals an enriched palette for design practice.

Eurhythmics and Somaesthetics

I introduced the somaesthetics of Richard Shusterman in section 2.1 and again in 2.4.

Shusterman has collaborated with many individuals from various fields and geographies around the world. There is a community of researchers in the HCI fields very keen to apply his ideas in their digital/human studies. His pragmatist perspective has proven to be both provocative and inspiring as the current trends in HCI lean ever more toward the embodied, situated meaning, values, and social issues (Harrison et al., 2007). In a 2014 study, "*Practicing somaesthetics: exploring its impact on interactive product design ideation*", Lee, Lim, and Shusterman (2014) present somatic empathy (through heightened body awareness) as a key to unlocking understanding of any deeply felt interaction. They use a technique that was derived from the Feldenkrais Method (Feldenkrais, Beringer, & Zemach-Bersin, 2011) and the psychology of William James that they title Somaesthetic reflection.

> Somaesthetic reflection is guided by six strategies that . . . serve to heighten attention and interest:
>
> 1) *Questions*: Asking questions about different aspects and relations of what we perceive.
>
> 2) *Division into parts*: Subdividing the body and directing our attention to each part, one by one.
>
> 3) *Contrasts of feeling:* Discriminating the different feelings in one part from those in another.
>
> 4) *Associative interests:* Making the noticing of what we are trying more precisely to feel a key to something we care about.
>
> 5) *Avoiding distracting interests*: Warding off competing interests to what we are trying to attend to and feel.
>
> 6) *Pre-perception*: Preparing our attention to notice what we are trying to discriminate in what we feel. (Lee et al., 2014, p. 1056)

I present these as a point of reference. While I am in full support of Shusterman's agenda, it differs from the Jaques-Dalcroze sensibilities in a number of ways. The Feldenkrais attention to the subtle, divided, discrete, and contemplative make attentions to the *in time* kinaesthetic and enkinaesthetic gestalts a challenge to comprehend. Where Feldenkrais lessons have specific ameliorative goals that lead to a more healthy and skillful *performance* of the body, the Dalcrozian agenda cares about these same goals in the opposite direction. The Dalcrozian agenda places attention to the unfolding experience and skillful performance at the front and reaps ameliorative benefits as a result. Where a traditional Feldenkrais lesson is often strictly paced and regimented to move from one part of a lesson to the next, the Jaques-Dalcroze exploration values a spontaneity driven by the performance of the participating students, lead through improvisation from the teacher. A Dalcrozian setting involves bodies in gross motor movement in community with other movers, quite like much of lived experience. Where somaesthetic reflection requires a calming of the body and a precise noticing of the reacting/feeling body, the Eurhythmics interaction is an exploration into experience that can only be investigated *in time* and involves a significant amount of effort in training/skilling the actor to act/react/will and adjust their first instrument to the various *in time* opportunities and ideals. The somaesthetics of Shusterman and the Eurhythmics of Jaques-Dalcroze are not in opposition in any way; however, they reveal different qualities of experience. Both value the body as the first instrument and both build Soma Literacy while their modalities and methods vary greatly. I have found that my forays into Feldenkrais, Alexander technique (F. M. Alexander & Maisel, 1990), and Andover Bodymapping (Conable & Conable, 2000) have all proven to be highly complementary foci of study. There has been some call for the Dalcroze and the Feldenkrais communities to collaborate as the separate agendas are mutually beneficial (Cole, 2014).

Focusing on how a body feels over what it sees, hears, or thinks, opens new paths for the design of experience. Jaques-Dalcroze's methods open a path along which one can learn to recognize the evolving, unfolding, *in time* gaits of experience (musical or otherwise). Rather than focusing on the tension in my left shoulder, or discovering what emotional resonance this shoulder tension might mean to me (both relevant and helpful attentions), a eurhythmic bias to experience reveals the often overlooked interstitial spaces between the crusic moments of life. It calls one to reevaluate time and experience through unfolding literal feelings, the aesthetics of active interactions which include the heavy and light swings experienced in my body while listening to a Chopin prelude, or in the sharing of a conversation with my partner, or in the felt aesthetic of the architecture hall.

The soma awareness that Jaques-Dalcroze's agenda encourages is both:

- a way to analyze my experience (analyze why a moment was or was not impactful) and
- a way to create or foster an experience
  - by willfully participating (or not) in the heavy/light that surrounds us or
  - by designing with these soma variables in mind.

These points create the basis of an active Soma Literacy which is the foundation of this thesis. Soma Literacy gives one a significant lens to see through and participate in the world. It reveals tiers of experience that are hidden to many. Surfers, yogis, athletes, and many performing artists have found such an attention to experience through their varied modalities. This thesis attempts to bring the varied soma attentions under a single heading, and express both the validity and the opportunities for the design fields in gaining such an understanding.

Conclusion

> If one had to sum up these features of modernism they could probably be reduced to these: an excess of consciousness and an over-explicitness in relation to what needs to remain intuitive and implicit; depersonalization and alienation from the body and empathetic feeling; disruption of context; fragmentation of experience; and the loss of 'betweenness.' Each of these is in fact to some degree implied in each of the others; and there is a simple reason for that. They are aspects of a single world. (McGilchrist, 2009, p. 397)

It took many years of teaching before I realized that I was teaching musicians how to *design* their performances by manipulating variables of experience. We *sketch out* quick ideas through improvisation to explore and test, not unlike the ways product designers are taught to make a series of iterative prototypes or communication designers are required to generate 100 thumbnails before honing in on one or two. The significant difference between my *sketching* in the Eurhythmics studio and the *sketching* of a product or communication design student in their studios, is that the Jaques-Dalcroze variables are all ephemeral, unfolding, *in time*, felt happenings, whereas the traditional design disciplines' palette is primarily filled with static visual artifacts. The design fields have been searching for ways to codify, teach, and analyze ephemeral, unfolding, *in time*, felt happenings, and I hypothesized that a Jaques-Dalcroze attention is a useful starting block.

Jaques-Dalcroze was a theorist, pedagogue, and philosopher, but he was first a practitioner who was constantly in the studio with students, exploring, testing, and making adjustments. He was a philosopher, but his work was highly practice-based. I placed the introduction to Jaques-Dalcroze here in chapter three because my research is an extension of his research. In the following studies that explore the body+time as a designerly palette, I worked to exploit the Dalcrozian attention, an attention wholly concerned with an analysis of experience understood as bodied, motion-filled, inertial and vectorial, wholly contained in the interstitials of life, kinaesthetic and enkinaesthetic, and aspiring to the eurhythmic.

3.3 Bodies-in-action as a Medium of Design

Workshop Description
Workshop Results

Fellow design researcher Kakee Scott and I began a collaboration in 2016 to explore the role of the body in design. Rather than merely stating that the body matters or that the body feels, we wanted to study and explore the ways that *design of experience designs bodies*. We considered the ways that the body amounts to a medium of design, commensurate with other designerly materials such as wood or type. We hypothesized that by viewing the body through this somewhat provocative lens, we might come to some deeper understanding of both the extremely wide variety of ways that bodies are implicated in design choices as well as the ethical implications of such designs.

In designing the studies, we spent a few months meeting and discussing the variety of ways that design praxis overlaps with bodies. We then extended the research to include all variety of bodied interactions. We threw as wide a net as possible, collecting examples of bodies that can be considered "designed". We started with obvious examples like corsets, high heels, tattoos, and piercings, then moved on to the sculpting of athlete bodies and yoga practices, and then became aware of the ways that common actions like *leaning into the wind*, or a *lunch counter sit-in protest*, or *holding a baby* serve not only utilitarian functions but also mold the implicated bodies in the process. Through our pre-study research, we began to notice the extent to which our bodies are malleable, adjusting to and integrating with the physical, emotional, social, intellectual, and spiritual environments, and are implicated in all significant experience.

Starting with the ideas generated from our initial research, we then designed a workshop that was presented three times in 2016. The script for the workshops remained largely consistent with only minor improvements to the protocols in each successive iteration.

We first presented the workshop to the Carnegie Mellon School of Design Graduate Research Methods Seminar on April 12, 2016. We worked with a group of twenty-five graduate students in design.

We then presented the workshop at the Design Research Society International Conference, DRS 2016, in Brighton, UK on June 27, 2016. We worked with a diverse group of twelve professional designers and design academics from around the world.

Then, on November 15, 2016, we opened the workshop to the Carnegie Mellon community. A mixture of twenty undergraduate, graduate, PhD, and faculty members from the campus attended.

Figure 4. *Bodies-in-action as a medium of design* workshop, DRS 2016.

Workshop Description

DRS2016
Brighton, UK
June 27, 2016

Title: Bodies-in-action as a medium of design
Presented by: Stephen Neely, and Kakee Scott, Carnegie Mellon University

The workshop titled "Bodies-in-action as a Medium of Design" was held over four hours with a diverse panel of 12 participants. The participants were led through a series of provocations asking them to consider the role of the body in common acts of designing and to contemplate our biases and assumptions regarding the body in these settings.

The workshop began by reviewing a card stack containing 100 images of bodies-in-action from a wide-ranging set of fields. The cards contained examples as diverse as athletics, prostitution, politics, entertainment, martial arts, bodystorming, and whistling. The participants were asked to familiarize themselves with all 100 cards and begin a conversation about the contents of the pictures. This conversation began the critical discussion that included biases and assumptions about these noted bodies-in-action. The participants were repeatedly challenged to see the bodies-in-action not only as participants in the photographed events, but as the medium manipulated in a designed act.

The participants were first challenged to group the cards into ad hoc categories as a method to study the contents and start the conversation. The cards were then grouped a second time, paired with a specific set of 40 terms from the design discourse. This list of terms is presented below.[35] These terms served as prompts to again consider the 100 cards of bodies-in-action and now place them into established design practices, as examples of designed medium.

35 terms such as: device, affordances, task, patterns, blueprint, vignette, mockup, scenario, montage, sense-making, communication, visualization, context, narrative, insight, strange-making, reframing, metaphors, ambiguity, agile, lean, experimentation, generative, scripts, prompts, triggers, usability, iterative, intuition, tacit knowledge, synthesis, prototyping, mapping, charette, modeling, sketching, tinkering, iteration, simulating, heuristic.

As we worked through the four hours and the examples were debated and organized, arranged and rearranged, issues specific to the proposed medium became apparent. The participants were prompted to consider how each of the photographed examples might be understood differently if one were to acknowledge the human body as the medium of design as opposed to the more common readings of these events that analyze the designs through different biases. *i.e. is the medium of design a suit jacket (material of clothing) or the body that is nudged into a specific posture? Is the medium of design the lining up of groups and banners at the spectacle of a nationalist parade or is it the enkinaesthetic prideful bodies moving in lockstep?*

In the third hour the participants were prompted to speculate about future design scenarios where this medium of bodies-in-action might be applicable. Participants were to propose new speculative fields of design and then physically act out mini scenes/dramas/stories to demonstrate examples of these new unfounded fields.

After three hours of exploration and debate, many speculative fields of design were proposed and included:

Bodies-in-action as a Medium for Survival
Bodies-in-action as a Medium for Designing
Bodies-in-action as a Medium for Movement + Expression
Bodies-in-action as a Medium for Prototyping/Experimentation
Bodies-in-action as a Medium for Conformity/Social Acceptance
Bodies-in-action as a Medium for Cultural Cohesion
Bodies-in-action as a Medium for Identity Communication
Bodies-in-action as a Medium for Reproduction/Survival
Bodies-in-action as a Medium of Interaction, Immersion/Entertainment
Bodies-in-action as Performance Optimizer & Best Possible Offspring Creator

The session concluded with Kakee Scott drawing connections between the workshop exploration and her research agenda of *design as a dispersed practice*, and Stephen Neely sharing his research agenda around the *role of the body* and *kinaesthesia in designed experience*.

Workshop Results

The workshop was designed with a hypothesis that bodies are being nudged/manipulated/designed every time one participates in a happening. While traditional designerly attentions are quick to notice and describe the *artifacts* involved in a designed happening, it is uncommon to think of the body as one of the *artifacts*. In each of the three workshops we found that it was a challenge to change the focus of attention from traditional designerly visual static attentions to the motion-filled, *in time*, visceral attentions of bodies-in-action. The card stack proved to be a very useful tool. With the 100 examples, it was possible to discuss *participation* or *interaction* on a spectrum. Over the course of the 4-hours we developed a shared vocabulary for this attention to the body-in-action as a medium of design.

The first hurdle was to see *bodies* as the *bodies-in-action* version of bodies, as opposed to the static pictures of bodies that we are in the habit of discussing. To the extent that a body is treated as an unmoving, unfeeling object, it is not participatory, and therefore it cannot be part of an experience. On every card, there was both (1) the literal static picture of a body and (2) an embodied, *in time*, unfolding experience that was collected. The card sorting exercises permitted the participants many examples and ample time to separate the picture from the experience and build an enriched attention to the ideas surrounding embodied experience.

Once we recognized the designed artifacts as living, breathing, feeling, and containing specific affordances and limits, a different set of responsibilities and liabilities became apparent. This shift in attention was among the most significant outcomes of the workshop. In all three workshops, the participants ended up exploring the politics of the body far more than was anticipated. The new set of attentions reassigned power to the active body rather than seeing it as a static object. A static object has no *in time* agency. If it is only treated as an artifact, there is no need to consider the felt implications of the design. However, when this active, sentient body is a being—a life—then one cannot help but see the designs as highly political, forcing ethics and morality to the front.

It was in these workshops when the conversations around the *binding of bodies*, as through obvious artifacts such as handcuffs and corsets, was extended to also notice the ways in which primary school chairs or suit jackets can also *bind* the individual (see the mentions of binding in Section 2.4). A modern conversation concerning the ethics of binding prisoners or Victorian women is not such a stretch for common design sensibilities, whereas in the workshops we started to notice the ubiquity of designed interactions resulting in similar *bindings of bodies*. The free and empowered individual is easily overlooked when all attention is on the jacket they are wearing or the tool in their hand. It was only when we started to notice the ways that designed interactions nudge or manipulate the participating body that such moral and ethical concerns started to arise.

Through our pre-study research, we began to notice the extent to which our bodies are malleable, adjusting to and integrating with the physical, emotional, social, intellectual, and spiritual environments, and are implicated in all significant experience. Again, the focus of this dissertation is not merely that bodies feel, but that bodies are designed by designers whether the designers know it or have vocabulary to describe it or not. This early study was useful in fleshing out a vocabulary or a way of talking about the body as a designed artifact. Specifically, it spoke to the design of bodies not as static objects, but as dynamic, ever-moving, sentient entities.

This series of studies became the first steps in establishing the Corporeal Design agenda.

Figure 5. *Bodies-in-action as a medium of design* workshop, CMU, April—2016.

Figure 6. *Bodies-in-action as a medium of design* workshop, Brighton, UK, June—2016.

Figure 7. *Bodies-in-action as a medium of design* workshop, CMU, November—2016.

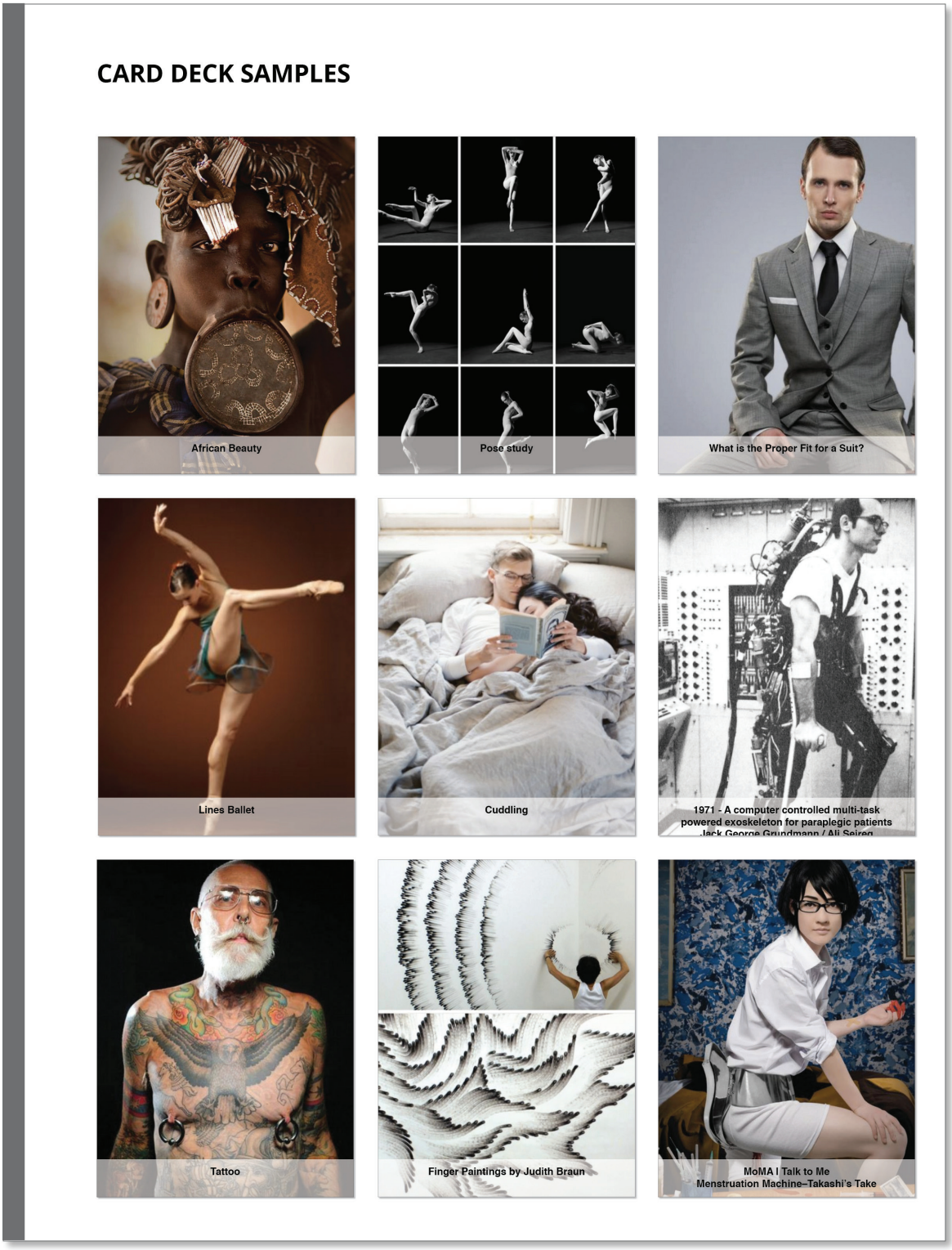


Figure 8. *Bodies-in-action as a medium of design*—card deck examples.

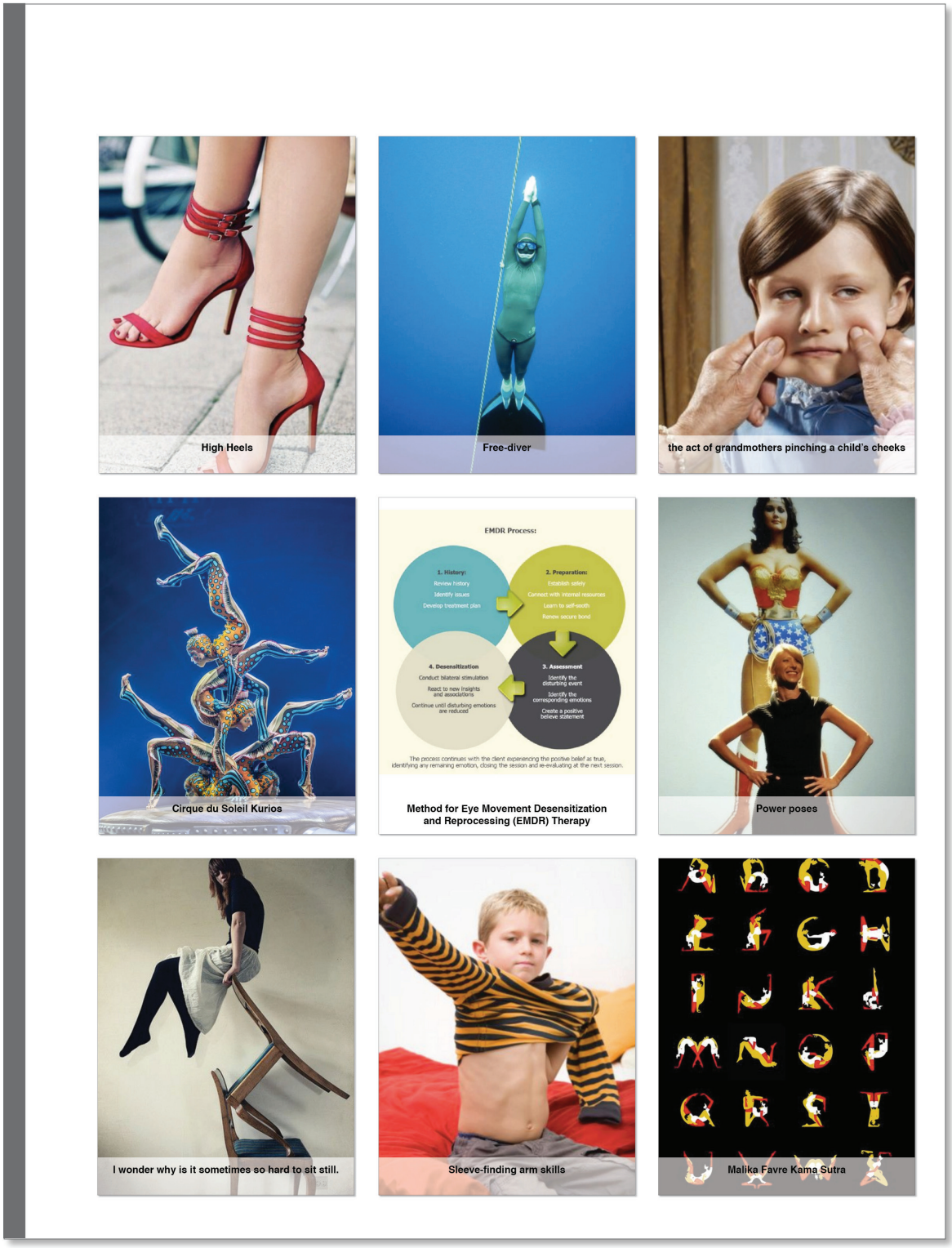


Figure 9. *Bodies-in-action as a medium of design*—card deck examples.

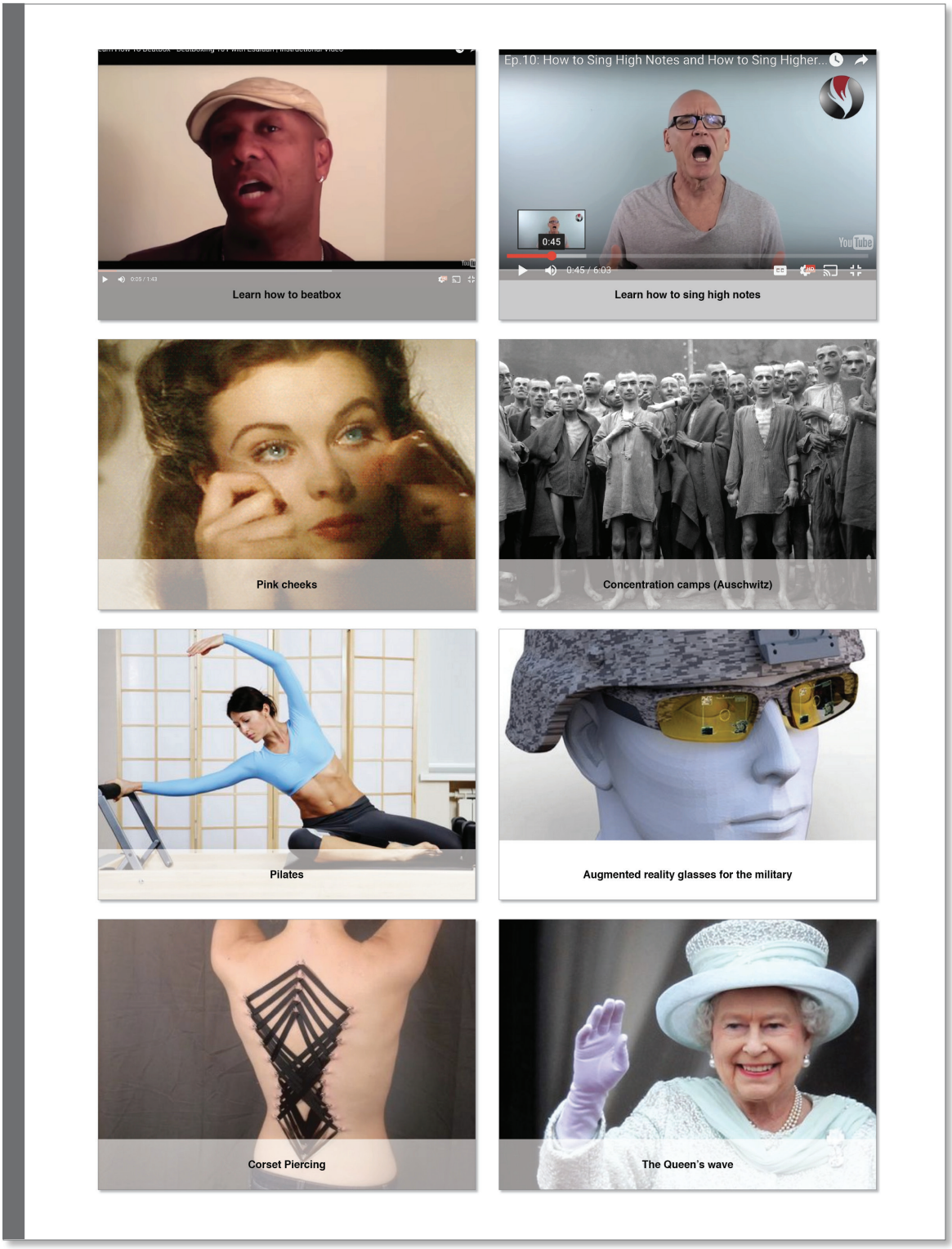


Figure 10. *Bodies-in-action as a medium of design*—card deck examples.

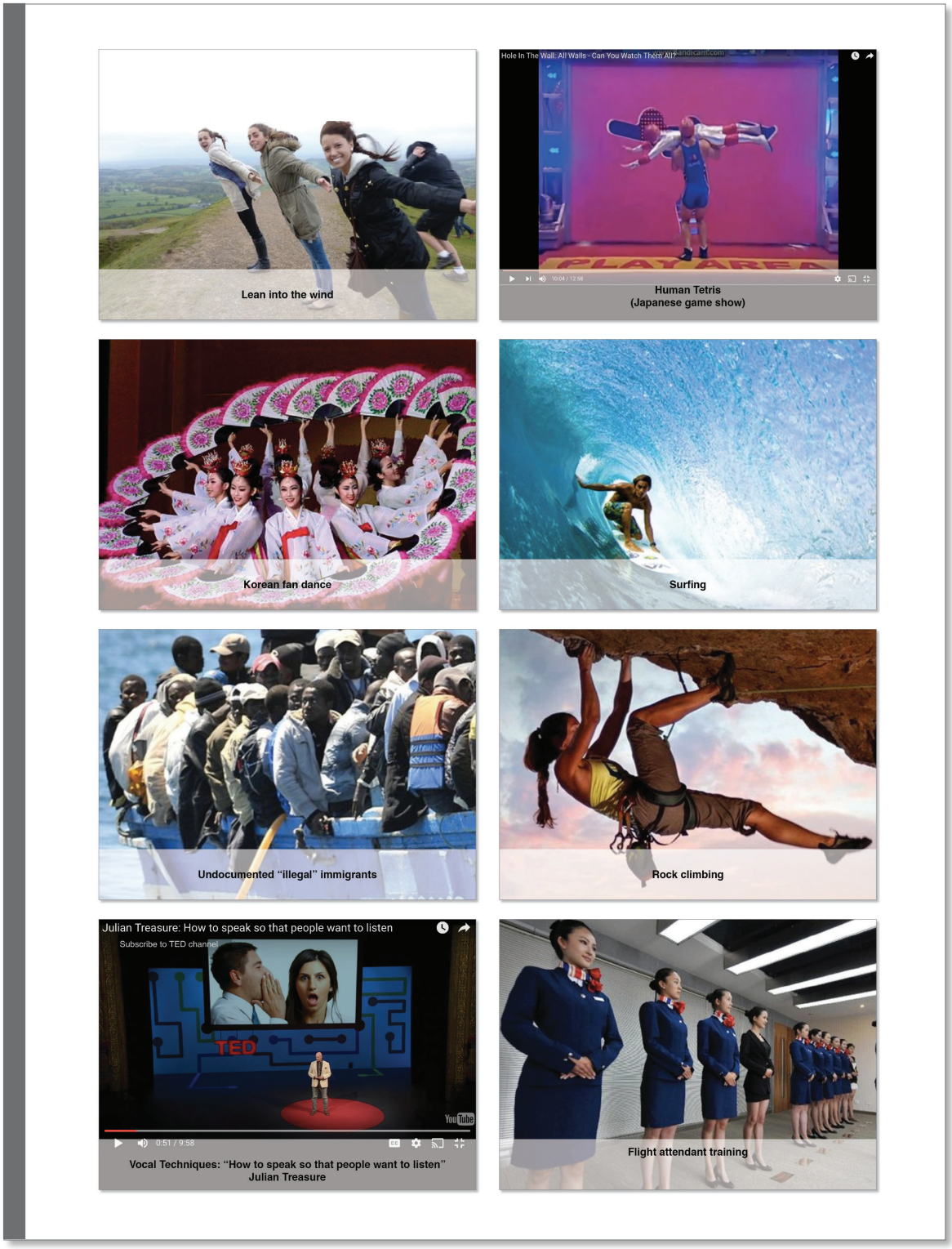


Figure 11. *Bodies-in-action as a medium of design*—card deck examples.

3.4 Fundamentals of Experience

Course Description
Concepts and Lessons
Surveys
Results and Summary of main points

Fundamentals of Experience is an 8-week course module that I developed at the Carnegie Mellon School of Design. It was taught in the spring terms of 2017 and 2018 to all of the undergraduate third year design majors, embedded within a larger course called *Persuasion: Design, Experience, Influence*. The *Persuasion* course offered an ideal setting to both test the pedagogical interventions and vet the burgeoning concepts of Soma Literacy as the studio environment allowed performative experimentation with a wide range of design students.

From the introduction to the *Persuasion* course:

> Persuasion . . . Your ability to put across your message, to get other people to agree with you, to value your work, and to want to work with you, . . . understanding what persuades you and others—how we are influenced by other people, by media, by our environment, by design—is a crucial reflective skill to develop in better understanding yourself, those around you, and more widely, society . . . we will explore persuasion from a range of perspectives, some focused on design specifically, and some looking at insights from other disciplines and applying them within a design context. (Lockton, Carter, & Neely, 2018, p. 1)

The course was arranged in seven modules: Fundamentals of Experience—Introduction to Persuasion—Design with Intent—Persuasion in our Environment—Metaphors, Imaginaries, and the Mind—Yourself as a Persuader—Ethics and Influence.

In each of the modules, different contexts and variables were explored to offer perspective and knowing that contributes to the many ways that we are persuaded. While many of the modules looked at readily discussed techniques common to marketing, propaganda, built environments,

and human psychology, we began the course with the *Fundamentals of Experience* module which attempted to reveal and identify the base variables of any experience and the ways in which we are subconsciously striving for harmony with our world.

> The *Fundamentals of Experience* module is an introduction to some of the base variables that make up *an experience* recognized at the soma tier. The expectation is that as the designers develop skills in Soma Literacy, they will be able to use this new perspective to recognize and manipulate (design) the given variables. The work is presented acknowledging that while one cannot guarantee a reaction to a given arrangement of variables, a designer can certainly *nudge* an actor toward a desired sensuous state or goal. . . . In these 8 sessions we will present fundamental concepts of experience such as tempo, cadence, beat, meter, range, crusis, phrase, rhythm, agogics, tension and release, rhythm, flow and interruption, ease and efficiency. The concepts are presented as participatory, extra-linguistic, kinaesthetic and enkinaesthetic (social) experiences before any cognitive reflection is invited. (Lockton, Carter, & Neely, 2018, p. 1)

As the students were introduced to these concepts—and made aware of their own subconscious strivings for harmony with their worlds—it was possible to recognize examples where we are persuaded to *do*, not because of what we *see*, *hear*, or *think*, but solely because of what our pre-cognitive body *feels*.

The *Fundamentals of Experience* course module was undertaken with two research goals in mind.

The first was to explore the basest elements of any experience, recognize patterns, name concepts, and attempt to locate the results within multiple tiers of experience (visual, aural, logical, soma). Armed with a number of insights from my years of teaching the experience of music, I began the study with a short list of concepts, unproven with a non-musician audience and directed at non-music modalities. These concepts, as named above in the syllabus excerpt, are concepts that can be recognized in any temporal interaction. They were all first inspired from musical contexts, but I hypothesized that they could be used as base analytical elements in any temporal interaction. The course module aspired to introduce these concepts to the students and provide them with the

beginnings of a literacy, or way to recognize, discuss, feel and manipulate the variables of an experience at the soma tier. With a base knowledge, or beginner-level Soma Literacy, the student designers would be in a position to both analyze the soma-nudging taking place in any interaction and then use this understanding to influence their design decisions. As we worked through the 8 weeks of exercises, we not only found the initial concepts to be relevant to extra-musical experience but uncovered quite a few more concepts that I will highlight in the following pages.

The second goal of the project was to develop methods for sharing these insights with design students. *How does one effectively and efficiently teach someone how to notice that what they feel?* The *Fundamentals of Experience* course module borrowed techniques from the Eurhythmics of Jaques-Dalcroze to aid the students in participating in the concepts rather than merely thinking or talking about them. The participating was all 'soma' engagement; that is, it all required a moving, improvising, feeling body as the primary intervention. In addition to offering the students an experience, it was also hoped that the study would aid the students in generating personal insights and self-discoveries.

The study utilized these Dalcrozian techniques to build upon an understanding that Lee, Lim, & Shusterman established in their 2014 somaesthetic study.

> Crafting the experience of such bodily interaction requires aesthetic sensibility of haptic, dynamic, proprioceptive, and other invisible qualities, and developing such a "sense of quality" is considered to be an important part of interaction design ability [10, 25]. Along with this, there is a growing interest in developing tools and methods that help designers capture, articulate movement qualities and design expressive movement-based interaction [3, 9, 15, 19, 24, 32, 38, 39]. These methods take phenomenological approaches related to dance and somatics [11, 26, 40], and they are distinguished from theater-based techniques [2, 30, 33] like role playing and improvisation by deliberately focusing on the felt experience of movements. . . . The potential that we see here is that the practice of somaesthetics could be a means to help designers develop the sense of those qualities, and utilize that sensibility for designing. As Noë [29] puts it: "what we perceive is determined by what we do or what we know how to do", the importance of tools and methods for quality perception is critical [17, 25]. (Lee et al., 2014, p. 1055)

The analytical theories of temporal interactions are still nascent as is demonstrated by the attempts to describe the *in time* unfolding experience above; *invisible qualities*, *movement qualities*, *expressive movement-based interaction*, and the *felt experience of movements* are all attempts to describe the embodied sentient experience. The difficulty persists as temporality has not yet been recognized as an established palette with an agreed-upon language of its own.

Annemarie Lasage writes of the "designer's expertise in appreciating the nonverbal codes of material culture" (2015, p.13), stating:

> [Yet,] in a context of experience design, the designer's relationship to materiality is not the central focus, but it remains its primary or elemental language; *designers are immersed in this material culture, and draw upon it as the primary source of their thinking. Designers have the ability both to 'read 'and 'write' in this culture* (Cross, 2007, p.26). It is a means to an end. . . . The notion of materiality addresses the five senses as well as the sense of time (rhythm, pacing, and developing over time) and the sense of space (place, positioning, mapping or developing in space) in the real or virtual world. (Lesage, 2015, p. 13 emphasis in the original)

The *Fundamentals of Experience* course module aspired to build on the tacit materiality knowings that the student designers brought to the classroom. By engaging in participatory exercises that drew attention to the ways that the soma engages with the world, the more abstract modalities of "time (rhythm, pacing, and developing over time) [and] space (place, positioning, mapping or developing in space)" (2015, p.13) can start to be understood as a new material to play in, improvise and design with.

The *in time* participatory methods of Jaques-Dalcroze are well suited to revealing these abstract concepts of temporality. Where design practice and education have for a century looked to the 2-D and 3-D materiality of communication and product design, there is now a need for a renewed palette. This new palette is temporal and abstract. It is felt, but not seen or heard, and the cognitive/logical descriptions of this tier of experience are of little help in pinning down the actual experience-*ing* of the experience. The *Fundamentals of Experience* course module was designed to keep the student in this *in time* soma tier of experience.

Dalcroze recognized that musicianship is kinaesthetic. It is not a kind of knowing that is cognitive. It is a kind of knowing that must be experienced, not unlike drawing, riding a bike, or swimming. Design education has valued the *doing* over the *talking* since the beginning. The Bauhaus style of education—like the music conservatory—pushes the student to *do*, to participate, to make, much more so than sitting in a lecture memorizing theory. However, there is no established pedagogy for a kinaesthetic knowing in design. Where the pedagogical ideas for the Bauhaus-type modalities of 2-D and 3-D materials are well established, these experiential modalities, which must be recognized as temporal and judged by the somaesthetic body have no agreed upon canon from which to draw. The *Fundamentals of Experience* course module was a study into the kinaesthetic teaching methods and content.

Course Description

In spring 2017 and 2018, the Carnegie Mellon School of Design, presented a new unit of study titled *Fundamentals of Experience*. The course introduced the design students to an initial list of the base variables that make up *an experience* recognized at the soma tier. The expectation was that as the designers developed skills in Soma Literacy, they would be able to use this new knowing to recognize and then manipulate (design) the given variables in new ways and to new ends. The work was presented acknowledging that while one cannot guarantee a specific common felt reaction to a given arrangement of soma variables, a designer (like a music conductor/composer or staging director or choreographer) can certainly *nudge* an audience/user/actor toward a desired state or goal.

Fundamentals of Experience was presented as an 8-week module, required of all undergraduate Junior design students (Communication Design, Product Design, and Environments foci). Taking inspiration from the somaesthetics of Shusterman, performance as practice of Jaques-Dalcroze, pragmatic philosophy of James and Dewey, I presented an investigation of the kinaesthetic and sentient body (soma) as the experiential core of perception and action (Bukdahl, 2015).

The initial prototype of this course was completed in the spring of 2017. The teaching techniques are all inspired by the Eurhythmics of Émile Jaques-Dalcroze, the Swiss pedagogue and musician from the first half of the last century. While his work is most often presented as basic training for musicians, in the current conversation it was re-characterized as soma literacy for designers. The Eurhythmics style of instruction is presented in a large open studio without tables or chairs. Students and teacher are barefoot to encourage the sensing-body to be brought to the front of consciousness. The students are led through many small physical events/exercises/games/riddles that challenge the student to entrain to the leading teacher and/or to one or more of their student peers. The work is motion and gesture filled, and traditionally led from a large piano where the teacher improvises music to guide the group through the exercises. Jaques-Dalcroze expected the interactions to be joy-filled, motion-filled, ever-evolving, and constantly challenging.

In a standard interaction, the students are introduced to a simple task or challenge (i.e. please walk along to the given beat), allowed to find a strong connection and accurate entrainment, only to have some aspect of the given event change, thus requiring the student to recognize the disharmony and attempt to re-harmonize with the teacher/partner/class. The protocol reveals that it is often not the sound or the sight that requires syncing, but at root level, it is the soma that yearns for harmony. When one is able to feel the entrainment, a deep threshold is met and the turn to *an experience* is opened.

Through repetition and guided instruction, the students incrementally develop an awareness of the bodied sensations, separate from any cognitive descriptors that they may also accumulate. Permitted enough time and repetition, students can develop not only awareness of these base sensations of experience, but they can gain skills in the variables at play such that they can manipulate the variables and as a result change the affect of the experience. At this level, *the participants are designing their own experience*.

Figure 12. Carnegie Mellon Junior design students participating in the *Fundamentals of Experience course*.

Through the eight-week course we explored fundamental concepts of experience such as tempo, cadence, beat, meter, range, crusis, phrase, rhythm, agogics, tension and release, rhythm, flow and interruption, ease and efficiency. The explorations were realized as participatory, extra-linguistic, kinaesthetic and enkinaesthetic (social) experiences before any cognitive reflection was invited.

Over the ages, the practice of composing and performing music has evolved to utilize, manipulate, and understand many variables of lived experience so as to evoke a visceral reaction in the music participant (composer, performer, listener (Sessions, 1950)). The *Fundamentals of Experience* course isolated a subset of these experiential variables inspired from music, then presented, explored, rehearsed, and eventually understood the concepts as silent, bodied, purely-felt interactions.[36] Early interventions in the 8 weeks were presented through traditional music-filled, piano-led models, but as the semester progressed, the examples used shifted into all variety of mundane experiences where the examples studied included simple prose, phone numbers, bar conversation, the alphabet, nature walks, etc.

36 This is the contribution Jaques-Dalcroze made to the music world as well. The cultural biases/disposition toward music assumes that it is a sounded art. That is, that the primary, or even, only value of the form is found in the noise that is created and witnessed by the ear. The Eurhythmics methodology of instruction of Jaques-Dalcroze directs the participant to consider how the environment, in this example, music, effects the soma, the feeling, sensing body.

Concepts and Lessons

Over the eight sessions the *Fundamentals of Experience* course module touched on a number of experiential concepts. All of the following were introduced, and most of these were eventually named and discussed.

> tempo, cadence, beat, meter, range, anacrusis–crusis–metacrusis, coherence/phrase, rhythm, agogics, tension/release, rhythm, flow/interruption, ease and efficiency, the interstitial, entrainment, rubato, accelerando/ritardando, canon, accent, static/dynamic, inertial and vectorial, the *yearning-toward*, ensemble as empathetic-*with*, shifts of weight, levels of scale or attentional tiers, embedded phrasing

The Eurhythmics method requires the student to viscerally experience any concept before any naming or discussion as it is the visceral knowing that is the focus of the method. *i.e. In order to ride a bike, the worded description biking is of no use. Bike riding is only understood as a visceral, bodied, participatory, in time interaction.* The eurhythmic style of instruction strives to foster this unfolding bodied knowing as the primary teaching strategy.

A Eurhythmics class, whether it is Eurhythmics for musicians, or Eurhythmics for designers, architects, or dancers, follows no one specific regimen. There is not a book of lessons that one can pick up off of a shelf and there is no prescribed order for concepts to be arranged by. Instead, the instructor is to find a starting point from which the class can begin that does not create any real challenge or stress and then quickly build from there. So a common starting place for a group of beginners would be to ask the class to *walk*. Walking is participatory. It occurs *in time*, and it requires no instruction. It is an ideal starting point as it regularly allows a whole class to participate immediately.

An introductory lesson

The first day of *Fundamentals of Experience*, I asked the class to walk about the room. Once we got over the micro-awkwardness of what seemed to many as an odd request, I was able to manipulate the request by building some challenges on the simple instruction and slowly morphing it into a deeper and deeper experience.

The simple "walk about the room" was incrementally adjusted to include:

> *"Walk with direction (Stake out your own path, do not walk in a circle)"*
> *"Look where you are going (not at the floor)"*
> *"See the peers that you pass"*
> *"Greet a peer with a smile, a high-5, or a handshake as you pass"*
> *"Adjust your tempo to match the tempo of the music from the piano (teacher improvises music from the piano)"*

Over a period of about four minutes, we were able to progress from the initial awkward directionless walking around the room to an enkinaesthetic series of interactions that required a specific kind of attention. With each small instruction, the students were drawn/nudged/persuaded toward a more entrained, more embodied interaction and drawn/nudged/persuaded away from common biases of sight/sound/thought. The enactive techniques (Bruner & Bruner, 1966) foster an attention to the soma, to the bodied, to the participatory, moving, *in time*, shared experience with others. This is a *knowing* that cannot be understood easily through books (or through this description), it is a knowing that, like riding a bicycle, will only truly be *known* through the gaining of somatic experience.

An attention to the interstitial

On a separate occasion, the students were asked to listen to music from the piano . . .then to tap the beat . . . then to walk that beat . . . then to tap while walking the same beat . . . then to find a partner, face the partner and "patty-cake" the beat . . . then to press your hands on your partner's hands and push and pull, back and forth, in a sawing-type motion.

Figure 13. Carnegie Mellon Junior design students participating in the *Fundamentals of Experience course*.

The beginning instructions of "tap the beat" etc., regularly reveal a common bias to the *snapshot* version of experience. When asking classes to analyze/demonstrate what they are paying attention to, it is standard that students will define *the beat* by the moment of the hit, the moment when their hands come together. This is the *crusic* moment and is the common default in most all settings, with designers and musicians alike. It is the same attention that was critiqued in section 2.4 when discussing service design blueprints. If the only things we are able to see in this music game or in the service design are the *crusic* instants, then we run the risk of missing the experience-*ing* of the experience. The *cruses* exist, but they can only be *understood* when the interstitial *yearning-toward* is embraced. Every *crusis* has a temporal *drive-toward* and *fall-away* that is the actual experience surrounding the moment of the hit. It is in these interstitial vectorially inertial periods where the designer has the most agency and where all performative artistry happens.

The push and pull gesture serves to highlight the interstitial, experienced as gesture. It was necessary to invent many exercises over the eight classes to highlight this central concept as it requires a redirecting of attention away from the logical and toward the somatic.

Gesture as anticipatory gait

The instructions are as follows:

Part A

Turn to your neighbor.
Enact the following scene:

You are at a bar. One of you approaches the other and says, "Hey there...can I get your number?"
The other of you says, "Sure!" and then simply recites their phone #.

Part B

Now switch roles and repeat the scene, only with one change. When the second individual recites their phone #, change the gait of the phone number. In the US, our phone numbers are grouped xxx-xxx-xxxx. Change that grouping to anything different. Maybe relay the numbers as xx-xxx-xx-xxx.

What is the result?

The results were immediate laughs, smiles, and conversation. The energy in the room was instantly transformed and enlivened as the students instinctually needed to discuss how the simple change of gait had transformed the experience.

What it revealed was that we attempt to entrain to our world. We do this by anticipating the swings/cadences/gaits around us and then subconsciously attempt to embody these gestures. When I ask for a phone number, I anticipate a set of ten digits. I expect them to come out as xxx + xxx + xxxx. But there is more than a simple counting of ten or even a *snapshot* grouping of the numbers. I anticipate the *gesture* of the

sharing. I ask for your numbers, and in addition to the logical expectation of ten digits, I also expect a specific series of three gestures. They feel like *swing—swing—longer swing,* not unlike the push-pull exercise above.

The five-minute phone number exercise burst into immediate laughter and conversation because it revealed the taken-for-granted, invisible somatic tier of experience, a tier that we depend on to anticipate, entrain through, and come to know our world.

The phone number exercise was then followed up with many attempts to reveal these swings, these somatic gestures in other examples. The interstitial cadences are deeply significant in all experiencing. It takes only a bit of training before they start to become apparent. We investigated them through prose, reciting of the alphabet, and through all manner of common actions like rowing, throwing, writing, winking, waiting in line at the amusement park, and hand-shaking.

The overriding goals of the *Fundamentals of Experience* course were to investigate and reveal the somatic tier of experience. We commonly notice the visual, aural, and logical tiers. We have extensive vocabulary and praxis surrounding these layers of experience but there is little acknowledgment of the somatic knowing other than flippant accounts of tacit knowing and utterances of "*it's like learning to ride a bike*" etc. In actuality, somatic knowing can be achieved as a skill. Through thoughtful efforts and guided instruction one can become aware of the experience-*ing* of experience and girded with such skills, one can will many of their own experiences and nudge/persuade/design experiences for others.

2017 Experience Blueprints

In the first iteration of the *Fundamentals of Experience* course module, I asked the students to create an *experience blueprint*. This was to be contrasted with the more common *service blueprint* which regularly notes cruses but has no standard language for the interstitials of service or experience at large.

Figures 2.3 and 2.7 from *Orchestrating Experiences: Collaborative Design for Complexity* by Risdon, Quattlebaum, & Rettig demonstrates the default attention to journeys–stages–moments–touchpoionts (Risdon et al., 2018, p. 30). The industry standard has no language for trajectory or inertias.

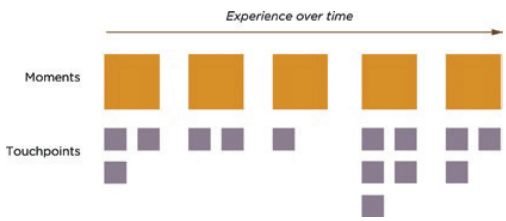


FIGURE 2.3
Touchpoints appear in one or more customer moments, playing specific roles in each.

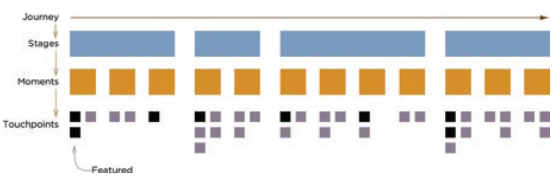


FIGURE 2.7
Touchpoints represent fundamental building blocks in the journeys of customers as they interact with a product or service in multiple channels over time.

Figure 14. . Touchpoint diagrams (Risdon et al., 2018, p. 27, 30).

Here an example of a journey map from Polaine, Løvlie and Reason (2013) offers a complex analysis and prediction of an individual actor's journey, yet it can only comment on the snapshot version of the journey. It amounts to a complex list of Rail Europe touchpoints (cruses), as opposed to the kairos driven, unfolding experience of riding Rail Europe.

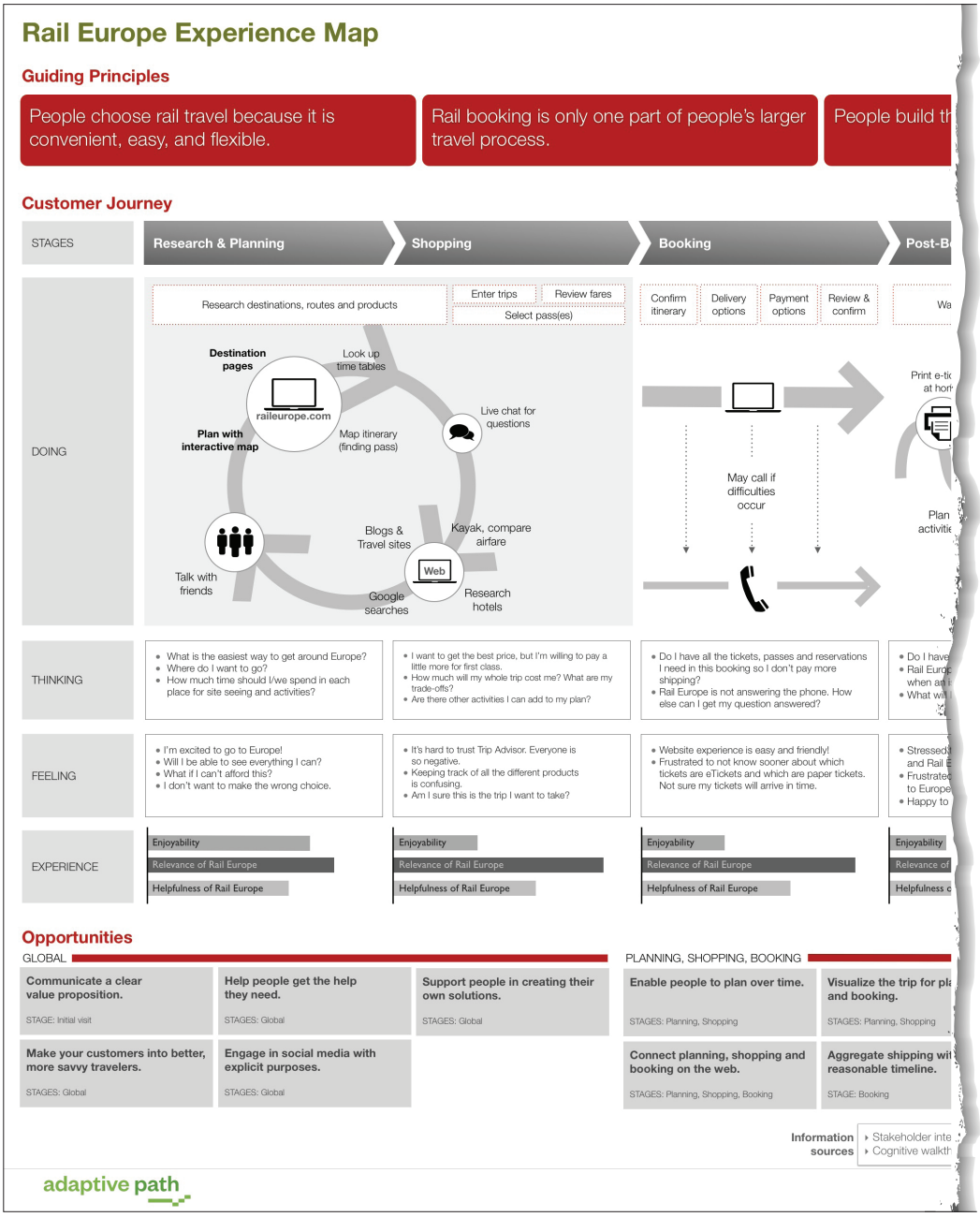


Figure 15. Rail Europe journey map (Polaine et al., 2013)

Following the critique of Agid & Akama, we entered into a conversation and critique of blueprints that sought to:

> . . . call attention to how we orient to things like listening and sensing, and how we choose to work with, or cast out, answers and experiences that are unexpected or that fundamentally challenge questions or goals with which we begin. If we engage in the work of understanding how people that are differently situated might experience, desire, or dread engaging with a service system, we can begin to treat these maps as placeholders or catalysts with known limits. They do not suggest representing the 'real' or the 'whole system' but can be used in context and in action to reveal or produce meaning. (Agid & Akama, 2018, p. 808)

And we also were influenced by Risdon, Quattlebaum, & Rettig's philosophy of mapping as a tool rather than a deliverable.

> Yet, an experience map represents more than a synthesis of insights. Early in the strategy and design process, an experience map identifies new opportunities, generates ideas and concepts, and clarifies the gap between the current state and a desired future state. . . . To get this value, however, you must approach the design of your experience map as a *tool*, not a *deliverable*. (Risdon et al., 2018, p. 108)

The goal of the assignment was to harness the somatic knowing from the participatory class work in order to reveal the felt interstitial. The actual assignment instructed the students to re-present a service or any designed experience through a graphic (blueprint) that would make this knowing explicit.

The assignment was simply worded as follows:

1. *Choose an event/experience/service that can be analyzed to reveal multiple, overlapping tiers of phrase/cruses.*
2. *Define the overall beginning and ending of the event/experience/service.*
3. *Within the overall event/experience/service phrase recognize the sub-phrases and sub-phrases inside of sub-phrases. Identify these multiple tiers. Identify the different phrase lengths and the cruses of the varied phrases.*
4. *Chart or sketch your analysis demonstrating the multiple levels, the multiple cruses, and the one primary, overall arc/phrase that leads to the one primary crusis.*

I learned two significant lessons by working with the students on this assignment. The first was being reminded that attention to the somatic tier of experience is not common and not every student will be able to redirect their attention easily. In many cases, the lessons have to be taught and retaught, then presented from a different angle and then re-presented again before the lessons can catch hold and a student can learn to reprioritize their attention in this manner. A second challenge was in inventing 2-D models of motion. The very nature of a 2-D rendering is that it is not in motion, yet, the design disciplines (identical to the music disciplines) have found great use of the written symbol on the page. The third year design students found some clever solutions to this challenge, yet it was not without some struggle.

2018 Experience Blueprints

In the second iteration of the *Fundamentals of Experience* course module, I again asked the students to create an *experience blueprint* by analyzing a mundane experience through the lens of the body-in-motion (the soma tier of experience). We spent much more time in this semester trying to decode the felt gestures of experience and to notice them as vectorial inertial *gestures*. I also prompted the students repeatedly through the semester to start to consider how "*that experience that you just participated in*" might be represented on paper.

In this version of the assignment, I expanded the instructions to explicitly include two prompts. The first was identical to 2017 in that the students were to chart out the interstitials of a chosen experience. The second prompt was to then redesign the experience by adjusting any of the soma concepts we had studied and predict the outcomes.

2018 EXPERIENCE BLUEPRINT ASSIGNMENT

In week 6, students will be assigned the task of creating an experience blueprint to be presented before mid-term. Different from a service blueprint, the experience blueprint is a design/analysis of an experience that reveals not only the touch-points of the experience, but more importantly the unfolding, lived, building and decaying, driving toward and away-from, space between these touch-points.

The specific medium and scope of the blueprint is at the discretion of the student, but all presentations must reference the concepts presented in the Fundamentals of Experience module, and specifically demonstrate understanding of the "interstitial space".

Assignment Part A

1. Choose an event/experience/service that can be analyzed to reveal multiple (and possibly overlapping) crusis.
2. Consider that each crusis is not only a flash event, but rather, it is contained within a PHRASE of effort that drives toward and away from the crusis. Define the overall beginning and ending of each of these phrases.
3. Within the overall event/experience/service phrase search for sub-phrases and sub-phrases inside of sub-phrases. Identify these multiple tiers. Identify the different phrase lengths and the crusis of the varied phrases.
4. Represent your analysis of the event demonstrating the action phrases noting not only the crusis but also the drives toward and away from the crusis.
5. Then write-up a description of the happening or micro-events using any of the vocabulary we have discussed these past 7 weeks (tempo, meter, crusis, accent, agogics, entrainment, phrase, rhythm, and the attention toward and away from the crusis).

Assignment Part B

6. Considering the full event...offer an intervention or provocation that in someway redesigns the experience.

   How could you persuade the participant to pay attention to THIS over THAT? How could you emphasize or deemphasize some aspect of the happening? How might you use any of the concepts we have worked through to reimagine or redesign the happening to a slightly or grossly different end?
7. Present your redesign and write a description of the concepts that you are utilizing.

CONCEPTS: tempo, meter, crusis, accent, agogics, entrainment, phrase, rhythm, and the attention toward and away from the crusis, kairos

Some links:

Here are examples of musicians attempting to represent the interstitial through graphical scores:

https://cmu.box.com/s/y2fmo4cec57a2c30pejmu715g7t9tsym

Here is are two video solutions that reveal the passing of time via the interstitial:

https://www.youtube.com/watch?v=02tkp6eeh40&list=LLQhlnM-fPHzdxlSsjpkwW4g&index=17

https://www.youtube.com/watch?v=RIz3klPET3o

SUMMARY:

Part A has two deliverables:

#4 asks for a representation of the event. This is your Experience Blueprint. It can be in any modality you like, but I am looking fo you to show that you are aware of the things described in #s 1-3.

#5 asks you to write about your solution. Describe the event using some of the vocabulary we have been working with.

Part B also has two deliverables:

Please offer an intervention and then present your Experience Blueprint with the imagined redesign. This can be nearly an exact copy of #4, just reflecting the redesign and then write about how your intervention might persuade the user to a different end or attention or experience.

The graphical scores I shared were just one set of solutions, pulled from music, where people have attempted to show events over time in a graphical format. Your representations in part A and B can be graphical, or you might choose to make a short video or an app or an animation or maybe something we have not thought of.

Figure 16. 2018 Experience Blueprint assignment (Lockton et al., 2018)

Surveys

At the conclusion of the full 15-week Persuasion course, the students were petitioned to comment specifically on the *Fundamentals of Experience* module. The responses were all collected at least seven weeks after their last participatory experience.

Please note any of the specific concepts and explain briefly how they have changed your behavior or your attention inside or outside of the design context.

I remember crusis the most, because it was like learning to be able to articulate about things I used to just "feel." However, my most tangible applications are probably related to motion design and use of white space in visual design, drawing from tension and ways to draw emphasis.

Crusis is definitely one that I think is interesting, because in experience design, we as designers want to find where cruses are happening and how to design around them or for them.

Increase spatial awareness.

It is interesting to think of them in the context of communication and motion design. Definitely very helpful.

I'm much more aware of the pace I'm walking and the sound it makes. I'm also more conscious of the consistency of sounds and if there are out of place pauses or tempo changes among them.

I notice these principles in my day-to-day life and now have language to describe the various aspects on an experience.

Sometimes I walk with a rhythm and notice it.

I've found the way I analyze things to be different. I've found the concepts most applicable to media but haven't quite noticed as much a difference in my day to day interactions or other design work.

Sometimes when I am making a to do list it helps to think of the drive toward the crusis, the crusis itself, and the fall away from the crusis.

pacing, how you build to a moment (crusis)

Significant moments in an interaction which are built to (crusis).

Thinking about when an interaction should intentionally not be smooth. When the environment interrupts the person's flow so they notice something.

Being aware of when a crusis happens or should happen has been helpful in presentations as well as designing an experience in an environment.

how imagery works with sound to create sense of tension and release

I am a musician; by understanding how these terms apply to my own movement, I was better able to understand how it affects how I read/perform music. In the context of design, I have applied this knowledge to my service blueprinting, noting the pause/time between actions, etc.

I wouldn't say my behavior was changed. But I noticed more patterns in the outside world, more than before.

Please tell us about any suggestions you might have for improving the module, other things or concepts you would like to learn about, or other ways of linking these ideas to design.

More examples of the concepts in the real world, i.e. Disneyland, retail experiences, etc.

The addition of visuals would be really helpful to the whole process.

I think this module is worth extending for a longer amount of time, because I feel like we just scratched the surface before we had to stop.

i liked this class. it was fun and new. later in the day though would be better!

This is a very interesting space for design and something your classes made me aware of. I appreciate learning about this and wonder how it can be applied to service and experience design to better engage the body and make for more meaningful experiences in users.

I think it would really helpful to somehow link these body experiences we do in class, to something about how the built environment changes that. I also think it would be more excited to have students creatively think and make their own exercises, instead of always following given exercises throughout the module.

I think you need to bring design into the process of teaching us these methods. Maybe start drawing (representing) or prototyping new ideas with the new developed modalities at the same time. I think without a language for representing the experience, it will stay in the air and be difficult to design with.

An unintended consequence of the module was that it allowed us to be silly and vulnerable with our classmates, which brought us closer and was a fun way to reduce tension.

I want to also note that I enjoyed this class. It pushed me outside of my comfort zone; because of that, many of the lessons are rather unforgettable. Hope the feedback helps!

I feel like I had difficulty applying these concepts to design. Most of it was understandable, and I knew how it felt to act out the concepts, but actually applying it to examples was more difficult to me (creating, rather than just finding examples in the real world.)

Thanks so much for teaching this course. I gained so much from the weekly lectures and workshops. It's helped me think a lot about design and the kind of work I want to do. I was just telling my parents last night about the exercises we did in the gym with Stephen. I never realized how much of a relationship there is in UX Design and how it relates to Music. They were really intrigued and happy to hear that we have such a class at our school.

Results and Summary of Main Points

> This work has argued that *to design haptics is to feel haptics*, the claim being that to move forward in the haptic design process you need to be able to directly feel and experience the stimuli you are designing. Designing haptics without haptic feedback is like drawing with your eyes closed—you might end up with something that others can see what it is supposed to portray, but it is far from its full potential. With your eyes open, metaphorically speaking, haptic stimuli instead become the perceptual qualifiers. If it feels right, it is probably right, haptic-wise. If it feels wrong, your haptic attributes are probably off. (Moussette, 2012, p. 228)

> Cultivating sensibility or awareness to movements is known to require considerable efforts [7]. Thus, it would be valuable to investigate what the impact of a long-term practice of somaesthetics would be for design ideation and other aspects of design. Developing a pedagogical program or an idea exploration method also seems promising. (Lee et al., 2014, p. 1063

As was noted in the *Bodies-in-action as a Medium for Design* study, this thesis looks to Soma Literacy as a tool to notice how experiences, by default, design bodies. **The literal body is implicated in happenings**, and is actually tossed and turned, squeezed and released, entrained or separated from the world around it. This knowing offers a different kind of body-*ing* from the majority of body-implicated *design methods* that use the body as a tool for iteration (i.e. Bodystorming). While the *Fundamentals of Experience* course affords this type of ideation, this was not among the stated goals. The course instead provided the students with an attention and a discourse with which to analyze unfolding *in time* experiencing, an attention to ways in which experience-*ing* designs the participatory bodies.

These initial runs of *the Fundamentals of Experience* course module demonstrated to the design students that (1) there is an extra-linguistic tier of experience that they can recognize, (2) this tier of experience is full of distinct variables that can be isolated, analyzed, and manipulated, and (3) with even a basic understanding, the designer can offer interventions at this tier of experience, nudging a user/audience toward preferred states.

The initial challenge in planning the lessons was in finding and naming the concepts that we might explore. As there is not a commonly agreed upon list of temporal ideals, principles, values, or variables that I could pull from in design practice, I looked to the Jaques-Dalcroze music biases and strategies to engage the students. Jaques-Dalcroze ranked improvisation among the most important modalities for his students to participate in. The traditional design equivalent to improvisation is *sketching*. Throughout the *Fundamentals of Experience* classes, we looked for the temporal equivalent to sketching: improvising through movement. It was in this way that we began to extract the aesthetic qualities of everyday experiences and codify these through a different kind of attention, a somatic awareness. Different than designing the mere ordering of doings or technology of doings, here we focused on the variables that affect the feeling of doings as they unfold.

Risdon, Quattlebaum, & Rettig overlap with these ideas when writing about the ideals in UX as aspiring to "enable frictionless transitions", "be proactive & timely", "play well with others", and "cultivate relationships" (2018, p. 151). They recognized that *good flow* can occur or be disrupted at the level of interaction, information, and/or context. The *Fundamentals of Experience* classes sought not to comment on these aspirations, but to embody the ideals contained within.

Frictionless transitions and *good flow* are highlighted the moment that the body is engaged in motion. The Eurhythmics strategies ensure that the participant's attention is on the somatic body-in-motion kinaesthetic knowing which derives its aesthetic from the achievement of natural shifts of weight or interruptions to the vectorial inertial moments.

The *timeliness* and *proactive* stances that make UX design seamless are recognized as successful again, in the body. We studied concepts such as anacrusis–crusis–metacrusis, phrase, *yearning-toward*, tempo, cadence, beat, meter, and attentional tiers all in service to the ideals of *timeliness* and *proactive*. The advantage in a participatory setting such as the *Fundamentals of Experience* classes is that rather than describing these ideals in an analytical, after-the-fact manner, the training builds

first hand, *in time*, attentions to and experience with the variables in play. Risdon's third note for UX ideals, *plays well with others*, is another shared aspiration with the *Fundamentals of Experience* classes. All of the Dalcrozian strategies use the enkinaesthetic, social, shared participation with others as a central guiding advantage. As was noted by one of the survey repondents, the shared interactions reinforced ideas around team building, a welcome addition to the traditional studies of a Carnegie Mellon designer. The Dalcrozian strategies support team building in a variety of ways by:

- Presenting all of the content through group settings which not only encourage joint participation, but more-so a deep empathetic entraining of *self-to-other*.
- Pairing students with multiple partners and small groups every class.
- Using a spirit of play to push everyone to improvise, create, perform, share, and reflect in *speed-round* succession.

Pedagogical notes

> This skill acquisition process is particularly complex in the case of somatic techniques, where the personal development of the facilitator's sense of self is intimately connected to the experience of practice. Schiphorst (2011) discusses the role of the facilitator's skills as influencing design outcomes, particularly as somatic qualities can be transferred and communicated through practice. Part of the facilitator's somatic sensibility can be transferred, particularly the *ability to notice* (ibid, p.148). (Núñez-Pacheco, 2018, p. 97)

The *Fundamentals of Experience* course module was not without shortcomings or hurdles for future researchers to build upon.

This style of instruction requires an open clean space suitable for movement and it also requires a classroom culture that is welcoming to less traditional styles of instruction. Each of these, while obvious, should not be overlooked. The size, organization, cleanliness, and appropriateness of a space to the work that is to be undertaken can be a critical factor

when planning any experience. This is amplified when stressors such as grades and academic reputations come into play. Likewise, the culture of a school, classroom, or group of students is also not to be underestimated. For one institution, reading my descriptions of the 8-week module it may seem an exciting and fruitful venture, while to another it may seem a tenuous stretch. In the coming pages, I will list six more student bodies where I have taught *Fundamentals of Experience* concepts. Each of these involved different students with different institutions and different expectations. None of them considered themselves *movers* or had any institutional experience learning through these methods, yet in each case, they were received with much enthusiasm.

The primary limitation to others wishing to recreate the module is just the familiarity with the Dalcrozian strategies. These techniques aspire to a teaching session with the same UX ideals that Risdon noted above. The teacher in a Dalcrozian experience also strives for *flow, timeliness,* and *empathetic ensemble* as guiding benchmarks. The 45 min, or 90 min, or day-long event is seen as an experience of its own and must be presented with the same ideals of any UX interaction. This is complicated by the fact that every class is different, with different students, in varying moods and with varying expertise, backgrounds, and interest. The teacher strives to bring the class into a shared experience (often something as simple as enkinaesthetic entrained walking) and then works to keep the *flow* going, *proactively* anticipating frictions, timing the transitions, and working with the students in inclusive and shared experiences. For the Eurhythmics professionals of the world, generally an apprenticeship of 5-10 years is required to find such an ease with the techniques that will permit a seamless instruction and interaction with students.

This stated, there are many aspects of such a class that can be readily recreated, even by just reading my short descriptions. What is of most importance here is not that a reader will be able to match a Dalcrozian ideal in pedagogy, but only that they might recognize the novel focus that this study brings to design curriculum and instruction.

Summary

The *Fundamentals of Experience* course module focused the students' energies on how a body feels, over what it sees, hears, or thinks thus revealing the soma tier of experience and opening a new analytical discourse and added palette for the design of experience.

Through the eight sessions we revealed the invisible space between moments in time and searched for ways to reevaluate time by its literal feelings (kairos vs. chronos). I provided embodied participatory examples demonstrating how the student's fleshy carriage adds to the creation of their worlds and we noted a variety of ways that we strive for harmony-*with* our things, our environments, our partners, and within ourselves, and that we are nudgable sentient beings.

The building of these attentions and analyses to the *in time* feeling body amounted to a primer in Soma Literacy. While the eight 45-minute sessions did not turn any of the students into soma literate virtuosi, it allowed them to see the somatic tier of experience and use this knowing analytically when considering the outcomes of specific interactions.

3.5 Six Soma Literacy Workshops

Workshop 1: Time, Motion & Communication

Workshop 2: Environments Studio IV: Designing Environments for Social Systems

Workshop 3: Transition Design Short Course and International Design Symposium

Workshop 4: Advanced DP3: Special Topic: Actions and Traces

Workshop 5: Design Tactics and Operations

Workshop 6: Bok Center for Teaching and Learning

I presented a series of workshops from 2016-2018 that allowed me to investigate the Soma Literacy concepts with varied stakeholders. The workshops were all presented as special events within courses already in progress. In each case I contributed to their conversations by offering *base concepts of temporality* presented through *participatory strategies*. All of the sessions used the Dalcrozian methods that included large groups, in motion, shoes-off, in playful exercises starting very simple and ramping up quickly to draw the participant's attention to the experience-*ing* of the experience.

The concepts that we focused on in each of the settings were chosen based on the class' prior agenda, the time allotment, and the choices the students displayed as the class(es) unfolded. In line with the philosophy of a Dalcroze education, while I began the sessions with a plan in mind, I was open to adjusting the pacing, strategies, and content in order to meet the students where they were and to capitalize on unforeseen opportunities as they arose.

I approached each of the different stakeholders with different goals in mind based on their prior interests and biases. My hosts each had some idea of my research and my teaching methods. We discussed what they were working on in their classes and we worked together to find opportunities to test the ideas from this thesis in their agendas; to reveal the hidden, to feel the interstitial, to notice the gesture, to act-*with* their peers *in ensemble*, to have their attentional priorities challenged, to present base variables and focus on the body's role in experience.

Workshop 1: Time, Motion & Communication

September 19, 2016

Dan Boyarski, Professor Emeritus
Carnegie Mellon University School of Design

> **51-428 Time, Motion and Communication**
> This course focuses on designing and presenting time-based messages on screen. The differences between paper-based and screen-based communication are discussed and become departure points for projects. Working with word, image, sound, and motion —in Adobe AfterEffects—students develop responses to a variety of project briefs. Brief histories of animation, experimental films, and title sequences, as well as experimental music provide conceptual models to our discussions. An attitude of exploration is stressed, with an emphasis on visual voice, performance, and communication. (Boyarski, n.d.)

Professor Boyarski started teaching type-in-motion projects in 1994 and then ran the *Time, Motion and Communication* course at CMU from 1996 to 2016. It was one of the first kinetic typography courses taught in this country and became one of Professor Boyarski's most significant contributions to communication design education global. The course used state of the art software to manipulate two dimensional representations with time and motion to aid in visual communication. From the first iteration of the course, Dan recognized that the software, type, and pictures alone were not enough to make for a successful kinetic design. The student had to develop some awareness of, some feeling for, time and motion. His students found inspiration in all sorts of experience (music, dance, nature, the commotion of city life, etc.) and then worked to replicate these gestures in their designs.

I was invited to work with the *Time, Motion and Communication* course a number of times over the past 10 years, most recently in the fall of 2016. In this iteration, we scheduled a 90-minute session for me to work with Dan's students, and only discussed the most general of possible concepts to dwell on. I came to the class thinking about base concepts of experience as related to the title of the course and the types of projects I knew the students were working on.

Every time I encounter a new group of students, an introduction to the teaching strategies is required. This Dalcrozian introduction is not one of titles and bios and accolades but instead is an introduction that gets the body moving. As was mentioned in sections 3.2 and 3.4, it is first critical that I find a way to get the group in motion, *in ensemble*, and with low stress so as to create a safe enough space to allow for more challenging growth as the class progresses. We often begin with simple walking to a beat which then can be teased out to an infinite number of exercises.

Because I understood that many of the student projects generated in the course used music as a base building block, I decided in advance that I wanted the *Time, Motion and Communication* students to start to notice how listening to music is not all aural, but somatic at the same time. With this as my primary goal for the 90 minutes, I lined up roughly 15 exercises that all directed the attention to the sentient body and compared what they were feeling with what they were hearing.

Once the introductions were largely accomplished and the students were brought to a place where they were willing to move around the room and entrain to their peers and to my music from the piano, we began a progression of micro-experiences that aided the students in noticing the bodied effects of time and motion of sound. In this lesson I started by singing a short song for the group and asking them for nothing but to listen as they normally would. Then we went through a series of music+movement experiences where I coached them into performing simple gestures *in time* to the music. These gestures of walking, swaying, pushing/pulling, etc. were enacted in such close ensemble with the music that it becomes difficult to discern if the impetus in the room is the sound or the gesture. The participant is listening and they are moving, and yet when the ensemble is tight, when the performance is embodied, it calls into question the common biases of sight and sound removed from the feeling body. Listening while moving in tightly coupled gestures changes the default priorities of the listening experience. Sixty minutes into the class I sang the original tune again, only this time the students experienced it differently. Having spent the last hour noticing

the motion created by a variety of sounded examples, my singing became less about the sound in the room and much more about the personal, intimate, motion felt in the listener/participant's own body. By the end of the 90 minutes most of the students were able to *feel the music* in their own bodies without any audible sound being played in the room. At this point, we are at an ideal junction, where we could discuss the role of sound and the realities of time+motion in a live experience.

The short workshop introduced the base experiential concepts of *entrainment*, *shift of weight*, *ensemble*, and *gesture*.

Workshop 2: Environments Studio IV: Designing Environments for Social Systems

March 20, 2017

Stephen Stadelmeier, Associate Professor, Associate Head
Austin Lee, Assistant Professor
Carnegie Mellon University School of Design

> **51-360 Environments Studio IV: Designing Environments for Social Systems**
> Develop high fidelity proposals and demonstrations of multi-modal hybridized physical-digital environments based on rich information content and principles of user experience design. ("Environments | Carnegie Mellon School of Design," n.d.)

Steve Stadelmeier and Austin Lee team taught the Carnegie Mellon School of Design Environments studio in spring 2017. The Environments track is one of three foci for undergraduate design students offered alongside the Communication Design and Product Design foci.

> In this design track, you'll learn to design interactions taking place within complex environments that exist in the digital, physical, and multi-modal realms. . . . Environments include showrooms, virtual spaces, automotive interiors, hospital rooms, and other workspaces where furniture, equipment, and devices work together to support productivity and enhance human experience. . . . We investigate environments as integrated and dynamic systems that require the design of interactions at multiple levels of scale. Students acquire a diverse set of skills that includes a deep understanding of spatial relationships, designing with and for emerging, multimedia technologies, and an understanding of the cognitive challenges presented by multi-modal spaces. ("Environments | Carnegie Mellon School of Design," n.d.)

Professor Stadelmeier approached me as they were preparing for a unit on *time in environments*. They were looking at time as one of the designable variables in an environment and they were interested in expanding their student's concepts around *time*. We met in advance of the workshop to discuss our various assumptions about *time* and to debate the ways that *time* is experienced and can be manipulated as a variable in the creation of an experience.

We agreed on a four-hour workshop spread out over four sessions. The 4-hour plan afforded a very nice amount of time to get well past the introductions and into the requested content. Recognizing that all of the concepts explored in a Dalcrozian class are experienced *in time*, the focus is always on the subjective experience-*ing* more so than on the after-the-fact reflective descriptions. While there are many avenues to gaining the dialectic understanding (through books and lectures, etc.), the felt knowing can only be found through participation. The strategy in a Dalcrozian lesson is always *experience before analysis* with the belief that one cannot come to know the actual experience-*ing* without some concrete hands-on felt participation.

In the first hour we worked through the introductory prerequisites of basic moving, movement entrained to a beat and entrained to others, simple attention redirections, and setting up a spirit of playfulness, allowing for deeper risk taking in the following three hours.

In the second hour we explored the concept of *time–space–effort*. *Time–space–effort* is a basic concept that notes how one cannot change one of the three variables without implicating at least one of the remaining two. The exercises all start with the students in motion, which guarantees that the three variables are all in play. Then the teacher adjusts one of the variables and notes the result in the other two.

> *Walk at a given tempo (time) in ensemble with the piano and note the distance of your stride (space) and the energy you exert (effort). As the piano speeds up, attempt to maintain the entrainment, and note the resulting performance. (As speed increases, the stride will shrink and the effort will increase, etc., etc.)*

The rest of the second hour was filled with a succession of exercises based on this same notion. Some of the exercises were led from the piano, others were led by students with or without sound. Some were experienced as solo performances others required partners or small groups. Each time we explored the *time–space–effort* concept, not as a written explanation as you are reading now, but as an embodied concept, understood as a somatic reality unfolding *in time*. These

teaching strategies value the bodied performance significantly above the dialectic. There is no rush to talk about the bodied knowings until a hearty amount of experience-*ing* has been collected.

In the third hour I directed the students to consider their own experience-*ing* of time. Again, this is the active *in time* knowing gained only through body-in-motion participation. We started with the concept of *crusis*, understood through the progression of *anacrusis–crusis–metacrusis*. These exercises all exploit the *interstitial* experience and note how the "in-betweens" are vectorial. The *interstitials* are only somatically observable because they create vectorial inertial motion toward or away from the crusis. It was through these exercises where I started to understand how all experienced time is either *yearning-toward* or *-away-from* a crusis. The last half of this session introduced the concepts of *kairos* and *chronos* and again, looking for the *in time* revealing of these concepts rather than merely describing them as I presented in section 2.4 Corporeal Design Agenda. In the classroom setting, it is possible to isolate and contrast the concepts and then re-present the concepts from multiple viewpoints through varied exercises. We bounced and tossed balls, we walked *toward* and *away from*, we leaned *into* and *out-of*, and noted versions of time that seemed to care only for *cruses* or touchpoints (all *chronos*), vs. the versions of time that lost all sense of counting in service of the *yearning-* or *trajectory-toward* the "opportune moment" (the experience of *kairos*).

In the fourth hour we reviewed the concepts presented in the opening sessions. First through new participations and eventually by sitting on the floor and discussing the prior 3.25 hours of work together, we named the varied concepts and attempted to codify our bodied knowings.

The four-hour workshop introduced and tested the base experiential concepts of *entrainment, shifts of weight, ensemble, gesture, kairos and chronos, time–space–effort, yearning-toward, anacrusis–crusis–metacrusis,* and *the interstitial*.

Workshop 3: Transition Design Short Course and International Design Symposium

June 20, 2018

Terry Irwin, Professor and Head of the Carnegie Mellon School of Design
Gideon Kossoff, Adjunct Professor of Design
Cameron Tonkinwise, Professor of Design Studies, Director Design Innovation Research Centre, University of Technology, Sydney
Cheryl Dahle, Distinguished Adjunct of Professional Practice, founder and CEO of Flip Labs

Schumacher College, South Devon, UK

> **Transitioning Together: Transition Design Symposium and Short Course**
> The need to seed and catalyze systems-level change and entire societal transitions toward more sustainable futures is one of the most important and urgent challenges facing us in the 21st century. In June, 2016 Dartington, Schumacher College and Carnegie Mellon University hosted the second Transition Design Symposium that brought together academics, researchers, activists, artists and people working in the non-profit sectors, among others, to discuss the need for intentional, societal transitions. The June 2017 symposium, held in Barcelona, Spain looked at southern perspectives on transition. The 2018 symposium aims to bring together a diversity of viewpoints and approaches to inform a broader discussion and connect representatives from these major movements. The symposium will take place on the historic Dartington Hall Estate in South Devon, UK, where Schumacher College is located. (Irwin, Kossoff, & Tonkinwise, 2018)

The Transition Design team from Carnegie Mellon School of Design presented the third Transition Design ten-day short course in 2018, hosted by Schumacher College, South Devon, UK. The course brought together twenty-five professionals from around the world specializing in varied fields related to design (architecture, communication design, urban planning, education, government, products, systems, etc.). The 10-day course was a deep dive to the burgeoning field of Transition Design, a design practice focusing on more sustainable futures through systems-level change.

> The idea of intentional (designed) societal transitions has become a global meme and involves an understanding of the complex dynamics of whole systems which form the context for many of todays wicked problems (climate change, loss of biodiversity, pollution, growing gap between rich/poor, etc.). Through a mix of lecture, readings, classroom activities and projects, students will be introduced to the emerging Transition Design process which focuses on framing problems in large, spatio-temporal contexts, resolving conflict among stakeholder groups and facilitating the co-creation of desirable, long-term futures. (Irwin et al., 2018)

Entering into a Transition Design project is daunting as the problems Transition Design focuses on are *wicked problems* (Rittel & Webber, 1973), with no clear, discrete, bounded solutions. The overarching program is massive and requires patience, humility, and a perspective on "whole systems," employing a transdisciplinary approach to foster transitions toward more sustainable futures.

The Transition Design agenda includes a framework of four interrelated areas of focus. These areas are 1) Vision; 2) Theories of Change; 3) Mindset & Posture; 4) New Ways of Designing (Irwin & Kossoff, 2019). I hypothesized that the Soma Literacy concepts and Dalcrozian strategies both contain insight that is valuable to the Transition Design student, particularly looking at the first three areas of focus: Vision, Theories of change, and Mindset & Posture.

At the conclusion of the short course, I presented a 90-minute workshop where I used the Dalcrozian strategies to highlight the personal, bodied, intimate, *in time* knowing that much of the Transition Design course's lectures had sought to define. Our teachers took much time to name and present living systems, harmony between stakeholders, empathy, scales & horizons of time, dynamics, ecosystems, relationships between people, a designer's own mindset and posture, and calls for the reintegration and re-contextualization of diverse transdisciplinary knowledge, among many more topics of significance. These nine concepts all have exact parallels in the Soma Literacy discussion already presented in this thesis. Many of the ideas are the same concepts I presented in the the *Fundamentals of Experience* course and the prior two workshops.

In this workshop I opened with the introductory work that brought the group together through some playful activities, reforming a sense of community and mutual respect. Then we spent time noting the enkin-aesthetic shifts of weight and harmony between stakeholders. These exercises create the deep empathy necessary for any true community. While the shared empathy generated in the workshop cannot make someone (let alone a whole government) see all of the implications of a newly enacted policy, it does afford the participants an authentic attention to the relationships between people and the ways in which we are interconnected if one possess the literacy to notice.

We spent other parts of the workshop focusing on the kairos/chronos versions of time, recognizing that the difference is found in the individual performer. It requires a change of mindset, a posturing to be in a position to see the change and orient oneself to the forward trajectories of time. Rather than thinking about horizons of time in a purely chronos definition of 1 minute, 5 days, 7 months, 50 years, we recognized that the kairos attentions search for bodied gestalts, where any amount of stopwatch clicks can be reframed as a single forward-yearning gesture.

Living systems and ecosystems are interrelated and dynamic, ever ebbing, flowing, and constantly in motion. I spent some time in the workshop focusing on the idea of dynamics, pointing out that the human body is by its very living nature, always in a state of dynamics. We attempted the impossibility of statics for a moment, then quickly returned to the joyful, playful, life-supporting dynamics of being. While there is a tacit knowing for the human body, and by extension the living world as ever in motion, there are assumptions built into much of our culture that assumes that static is both possible and desirable. Through these parts of the workshop we highlighted the fallacy in this thinking and again pointed out the *in time* participatory knowing that is felt before it is described. Offering a literacy for this experience was reported as profound by a number of the attendees in the workshop.

The traditional teaching methods of read and lecture and write and debate are all as valid and rigorous academic strategies as ever. My research

does not attempt to argue with these traditions in any way. Rather, I am only noting that there is a second kind of knowing, a knowing that is not often revealed through dialectics. There is an understanding of experience that will most efficiently be known by experience-*ing* rather than by talking about experience. These knowings are revealed *in time*, in the personal feeling body. The opportunity to research this hypothesis with the 25 professional attendees from the 2018 Transition Design Symposium was a great joy to me personally. The participants reported that the bodied exercises revealed a depth to the concepts that was not achieved through the discussions alone. It was, simply, the difference between talking and doing.

Workshop 4: Advanced DP3: Special Topic: Actions and Traces

September 24, 2018

Kimberly Beck, Associate Professor of Art
Carnegie Mellon University School of Art

> **60-474 Advanced Drawing—Painting—Printmaking—Photography: Special Topic: Actions and Traces**
> Working in an expanded field of print media and drawing, students will explore how gesture, performance and action leave marks and traces behind. To roll, to crease, to squeeze, to weave, to protest, to walk the artist Richard Serra once said, drawing is a verb. From Alison Knowles to Dieter Roth, artists have long explored the relationship of process and artifact. In this class students will develop their own projects using traditional and inventive processes, from monotype to footprints, silkscreen to grease stains. (Beck, 2018)

Professor Beck's *Actions and Traces* course was an exciting investigation into the ways that gesture is imbued into the fabric of the world and how the work of visual artists often record these gestural motions. "To roll, to crease, to squeeze, to weave, to protest, to walk", each leave a trace and her course sought to notice these "marks and traces", revealing something about the worlds we live in.

Kim approached me after learning something about my research into bodied motion. Her course was interested in gesture and in the varied ways that one might consider the term. We focused on this base concept as the focus for a 90-minute workshop in the fall of 2018.

As has been mentioned previously, each new group of students unfamiliar with these teaching techniques requires a simple introduction to the teaching strategies. This introduction serves to prime the participants with the type of attention that can reveal the somatic tier of experience. I greeted her students and immediately set forth on our shoes-off, unorthodox teaching with moving bodies, in and out of time with one another. The class was based roughly on the same ideas as the 2016 *Time, Motion and Communication* workshop, but with less need to define the

music-specific happenings. In the 2016 workshop, the students were using music excerpts in their animations and we felt it necessary to help them notice the somatic happenings in an embodied listening example. Here in the *Actions and Traces* workshop, the music played was simply an example of a less obvious gesture for the art students to come to know, not unlike the other gestures their class was attempting to see; the gesture of a walking gait, of a cloud trail, of a breathing sigh, of a musical line, they all leave a trace. A basic philosophical tenant of Soma Literacy is that for experience to tip into significance (Dewey's *an experience*) it must resound *soma-deep* in the experiencing body. *Soma-deep* is only noticeable as motion, and meaningful motion requires a vectorial inertial *gesture*. *Gesture* is not any generic gyration or vibration; *gesture* is the arc that *yearns-toward* completion. It is the aspiring musical phrase. It is the *cohesive interactional gestalt*. Rather than simply defining *gesture* with words, it was the performative definition of gesture that we sought to embody through the workshop.

The exercises that we worked through in the 90-minute workshop introduced the base experiential concepts of *entrainment*, *shift of weight*, *ensemble*, and specifically the difference between generic motion and the *yearning-toward arcs of gesture*.

Workshop 5: Design Tactics and Operations

October 18, 2018

Northeastern University

Mary Hale, AIA, Assistant Teaching Professor of Architecture
Northeastern University

> **ARCH 5310—Design Tactics and Operations**
> Encourages students to develop the connections between critical attitudes and techniques in design, through important historical texts. Offers a kind of "great books" approach to the integration of design and history, introducing the writings and seminal designs of Alberti, Palladio, Wright, Le Corbusier, Semper, Sitte, Rowe, Colquhoun, Moneo, Koolhaas, Rossi, Frampton, Venturi and Scott Brown, Scarpa, and Lynch. (Hale, 2018)

In the 90-minute workshop with the architecture students enrolled in *ARCH 5310—Design Tactics and Operations* at Northeastern University, Boston, we explored the notion of *fit*—good fit vs. bad fit—in a temporal design. Christopher Alexander was quoted as saying "Good design is the absence of bad fit" (Steenson, 2017), and I thought that we would use the session to try to get at the difference between a mere succession of design moves, and the accomplishment of a cohesive gestalt experience.

Again, we opened with introductory, *getting-to-know-you* exercises. These activities are all short, easy, collaborative, and pleasant. We noted throughout the introduction how even the most-simple actions can spontaneously erupt into smiles and laughter and conversation if I guide the experience "just so." We then took the examples of the experiential gestalts that I fostered in the introductions and built parallel moments throughout the following 80 minutes of exercises. We experienced personal successes and partnered successes. We felt the nudging of the piano sounds or the musical tempos or collaborative groups. We spent the 90 minutes considering the variables of experience that were in the room, yet none of them bricks and mortar. While the three-dimensional artifacts in the room such as the doorways and the ceiling height and the windows encourage certain aesthetics in the participating actor,

so too do the tempos, accents, agogics, and arrangement of temporal variables aid in creating the *gestures* of the experience-*ing*. The workshop was a pleasure to hold. The students and their participating faculty members were excited to explore *time–space–effort* through collaborative participatory exercises. While 90 minutes is not enough time to award every student a badge of Soma Literacy, it was just enough time to open the door and make the participants aware of the soma tier of experience as a designable focus of attention.

Workshop 6: Bok Center for Teaching and Learning

October 19, 2018

Harvard University

Marlon Kuzmick, Director of the Learning Lab
Harvard University

> **The Derek Bok Center for Teaching and Learning**
> By supporting experimentation, innovation, and evidence-based practices, the Derek Bok Center for Teaching and Learning seeks to create transformational learning experiences for faculty, graduate students, and undergraduates in Harvard's Faculty of Arts and Sciences.
>
> Our mission includes:
>
> - discovering new and better ways to teach by partnering with faculty and students to catalyze creativity, experimentation and innovation;
> - cultivating excellent instruction through effective training and support for faculty, graduate students and undergraduates in teaching and scholarly communication; and
> - researching what constitutes effective practice by conducting rigorous assessments of teaching and learning methods in person and online. ("About | Derek Bok Center, Harvard University," n.d.)

In the same trip that brought me to Northeastern, I was also invited to present a 90-minute workshop at Harvard's Bok Center for Teaching and Learning. The participants in the workshop were all Harvard Bok Center Graduate Fellows. The graduate fellows collaborate with Harvard faculty and students to aid in designing the instructional strategies and methods of courses throughout the university. In this workshop, rather than looking for applications of the previously noted concepts in the design fields, the focus was on both the teaching methodology and the concept of *in time* knowing.

Over the 90 minutes, we built *ensemble* through *entrainment; entrainment* with me, the music, and with each other. We noted the somatic attentions to *entrainment* and how the feeling body played a greater role in the *yearning-toward* harmony-*with* than any cognitive willfulness exerted by the graduate students. We reserved about 20 minutes at the end of the session to discuss the instructional strategies that I employed through the workshop: participatory, improvisational, collaborative, dynamic, evolving, and mounting. The conversation generated by the hands-on work was both intense and exciting. The idea of *in time* knowing paired with methods designed to foster such understandings was both a novel playground for the Fellows and permitted me another opportunity to attempt to frame and describe my teaching attentions.

Summary

The workshops tested and vetted both concepts and strategies for instruction. The *in time* nature of this literacy requires that the participants actually involve themselves in the knowing if they are to start to understand the concepts. The Dalcrozian strategies have little to no history of being used to teach extra-musical concepts separate from a parallel agenda of music instruction. Without any history to pull from, I entered into the workshops, like the *Fundamentals of Experience* course, with no exact agenda or proven set of temporal concepts. Every class was testing through trial and error. These were exploratory settings where my list of concepts was tested, redirected, and expanded, and my strategies and list of exercises was also lengthened and challenged.

The Dalcroze Eurhythmics pedagogy assumes an intense focus on the specific students in the classroom and an ever-adjusting reaction to their performance. Sometimes students ask questions or offer a specific conscious choice in the process of working that provides an opportunity for redirection or a novel interaction. In many other cases, the students are merely trying to get through the prescribed activity and the thoughtful teacher is able to recognize, redirect, and capitalize on serendipitous events over the course of the workshop. A side comment, a chance pairing of students, a misunderstanding of an instruction, or a simple stumble of the foot can each offer the opportunity for a new activity or reveal a new concept worthy of investigation.

The workshops were successful in that they provided tangible learning experiences to the attendees and they helped to refine the ideas and test the hypotheses of this thesis.

In *Workshop 1: Time, Motion & Communication*, I introduced the base experiential concepts of *entrainment*, *shift of weight*, *ensemble*, and *gesture* through participatory exercises where the attendees were led to *feel music* in their own bodies separate from any audible sound. The exercises called into question the common biases of sight and sound removed from the feeling body and highlighted how the somatic experience is

personal and intimate, felt as motion in the listener/participant's own body. The session concluded at an ideal junction, where we were then permitted an insightful analysis of the role of sound and the realities of *time+motion* in a live experience.

In *Workshop 2: Environments Studio IV: Designing Environments for Social Systems*, we worked through and tested the base experiential concepts of *entrainment*, *shifts of weight*, *ensemble*, *gesture*, *kairos and chronos*, *time–space–effort*, *yearning-toward*, *anacrusis–crusis–metacrusis*, and *the interstitial*. The focus was on the global concept of *time*, and I directed the workshop hours to build to a intimate understanding of *kairos* and *chronos*. By doubling down on the concepts of *time–space–effort*, *yearning-toward*, *anacrusis–crusis–metacrusis*, and *the interstitial*, the students were left in a position where *time* was less a dialectic than an unfolding. The *in time* knowing of the workshop revealed the aesthetic of *time* over the logic of *time*.

In *Workshop 3: Transition Design Short Course and International Design Symposium*, we specifically explored the concepts of *dynamics* and *kairos/chronos*. Here, where the agenda was on fourth order design with a focus on the participant's own mindset and posture, we were able to *make felt* many of the ideas that were introduced in the prior 10 days. Where for days we talked about and read about the living earth and the dynamic properties of life, in the workshop, we were permitted an *in time* definition of the self as *dynamic* and the *ensemble* of participants as belonging to a living, evolving, *dynamic* whole. It afforded the participants an authentic example of the relationships between people and the ways in which we are interconnected by introducing a literacy of noticing.

In *Workshop 4: Advanced DP3: Special Topic: Actions and Traces*, the art students were interested in seeing the hidden gestures all around us. We dwelt specifically on the concepts of *yearning-forward* and *cohesive interactional gestalt*. We explored the differences between a generic motion and a felt *gesture* understood *soma-deep*, and recognized this difference as a significant threshold when considering the lived experience.

In *Workshop 5: Design Tactics and Operations*, the architecture students explored the notion of *fit*—good fit vs. bad fit—in a temporal design. I led them through events that unfold *in time* and shaped the experiences to make some fit well, and others less so. The *fit* of a temporal happening is judged in the individual body, and it requires a body-*ing* to allow an analysis of worth. I nudged their moving bodies into situations where the entrainment and the empathy were easily won, and I nudged their moving bodies into situations that caused some kind of discomfort (of either self-*with*-other or self-*with*-self). Having participated in the unfolding experiences, we were then able to talk about the experience of experience-*ing* and point to specific concepts that reach out and manipulate the actor. Through these explorations we discussed *fit*, *in time*, *time–space–effort*, *tempos*, *accents*, *agogics*, *entrainment*, and the enkinaesthetic reality of *ensemble*.

At Workshop 6: Bok Center for Teaching and Learning, I worked with a group of learning theorists, keenly interested in teaching methods and ways of learning. We focused our energies on the overriding concept, prevalent in all of the workshops, of *in time* knowing. We explored and then discussed the kinds of knowing that one can gain from words and ideas, logics and theories, and compared these to the kinds of knowing that is revealed in an unfolding experience, the experience of experience-*ing*. We were able to participate in somatic meaning and contrast this with the after-the-fact reflective meaning that we are all so accustomed to value. Through the class we experienced and then discussed the concepts of *in time knowing*, *yearning-toward*, *entrainment*, and again the enkinaesthetic reality of *ensemble*.

Generally, students, like any actor in any designed interaction, cannot be forced to feel anything. They have to come to the experience open and attentive enough to find the learning. However, one does not need to be a design academic to reap some benefit from an engagement. Even the most novice participant, if they choose to participate, will have participated. They did the things and saw the sights. They heard the words and felt the feelings that they were ready to feel. While this may sound flippant, I mean it quite seriously. In all interactions, academic

or otherwise, the designer cannot guarantee the profound experience. We can manipulate and place every variable "just so" and the participant may still not find the intended result. What they will find is their result, and it is folly to expect anything more. The goals of the designer can only be to nudge the actor closer to preferred futures and to improve their own knowing and strategies in the process.

The participants in these workshops were extremely receptive to both the strategies and the concepts. The participants came from a wide range of backgrounds in art, design, architecture, policy, government, not-for-profit, and general pedagogy. The workshops showed that the concepts are relevant and foundational to any group that is considering temporal interactions or experience. The workshops helped to test, expand and set many of the concepts that were eventually collected as Soma Literacy concepts which I will present in section 4.2.

3.6 Autoethnographic Soma Literacy Vignettes

How a body can...
...feel a painting.
...walk across a meadow.
...understand a song, a speech, a poem, or the stock report.
...understand a silence.
...stand up straight.
...ride a skateboard.
Reflection

> These vignettes are devices providing entry points for readers to imagine this experience together, using an auto-ethnographic technique . . . The stories are 'anecdotal . . . as a way of creating accounts for entry points into experience . . . there is a fictocritical quality to the fragments in order to accentuate moments . . . It echoes John Mason's (2002, p. 57) Discipline of Noticing to give 'brief-but-vivid narrative', and Stacy Holman Jones' (2016, p. 229) critical autoethnography, where; 'Instead of stories or theory, aesthetics or knowledge, art or autoethnography, we need a language that unsettles the ordinary while spinning a good story.' (Agid & Akama, 2018, p. 802)

The following collection of short vignettes were written in 2016, during the early stages of my research to serve two purposes. Initially, the vignettes were written as thought experiments; autoethnographic investigations (Custer, 2014; Ellis, Adams, & Bochner, 2011; Kristina Höök, 2010; Spry, 2001) into simple happenings with a keen attention to the sentient body and a re-analysis of the overall experience when the soma attention is factored in. Each of the vignettes explores a different set of soma concepts which are always intertwined with other tiers of experience. It is this intertwining that continues to keep the soma tier of experience

hidden. The Soma Literacy project seeks to create an awareness of the bodied realities of an experience as distinct from the visual, aural, and logical modes. Each of the following examples note multiple tiers of possible attention and then attempts to highlight the often-obscured soma tier of experience.

Secondly, they serve as a teaching tool for a reader attempting to understand the soma as distinct from overlapping intertwined attentions of experience. **In order to serve this purpose, the vignettes have to be read thoughtfully. In this case, skimming will not suffice.** While the designer (in this case the writer) cannot guarantee or force desired experiencing in the actor (reader), these vignettes strive to highlight and clarify a number of the variables of a soma literate attention.

Whether they accomplish this goal for the reader or not will be a matter of debate. In the writing of these vignettes, I used literary fiction to research soma awareness for critical interpretations. I have recorded here only a subset of the full list of vignettes. The titles of the full list are all variations on "How a body can..."

How a body can...
...understand a song, a speech, a poem, or the stock report.
...feel a painting.
...feel a silence.
...walk across a meadow.
...stand up straight.
...ride a swing.
...shave or glaze a window pane.
...be estranged.
...build IKEA furniture.
...ride a skateboard.
...draw a line.
...puddle jump.
...entrain.
...edit a movie.
...join a handshake.

Less stories than scenes, these fictions strive to highlight somatic attentions, separate from the competing visual, aural, logical attentions, necessary to find the root experience-*ing* in the described events.

It was here, in the writing of these scenes, where I first confronted the difficulty in relaying the *in time* experience-*ing* through a purely dialectic model. When attempting the aesthetic through words, the challenge is and has always been to create the somatic from the literary. In an attempt to do just this, the vignettes aided me in exploring, naming, and defining a number of the Soma Literacy ideas, concepts, and variables. In the following pages I have reprinted six of these vignettes to record my early investigation into soma literate awareness and note the challenge of creating a visceral knowing from a worded modality.

How the body can… feel a painting.

Growing up as an aspiring musician and stage performer, Stephen studied piano and voice and ballet and acting. Early on, he also developed an interest in visual art and gravitated to the impressionists—Monet, Cassat, Degas. He was aware of other schools of painting, but paid little attention to them, with the least attention to the most abstract artists. He felt no need to argue about the validity of their status, and at the same time, he did not find any connection with their paintings. They were absolutely foreign to him.

As a young adult, he had reason to be in New York City and planned a trip to the Museum of Modern Art. He was excited to see the variety of paintings on display, particularly his impressionistic heroes. As he approached the Jackson Pollock gallery, he thought to himself what he assumes are rather common sentiments from the uninitiated: *Here we go again…a bunch of splatters on a canvas…a 4-year-old could do this…what do people even SEE here?*

And then he entered the gallery.

The Pollock splatter paintings are given a whole area to themselves. They are massive canvases, one to a wall, and there is a bench strategically placed about 15 feet back from one of the largest paintings. He entered the gallery, happy to look, but expecting nothing more than a few glances and moving on. He was completely unprepared for the experience that was created for him.

As he found his footing, planting himself in front of *One: Number 31, 1950* [https://www.moma.org/collection/works/78386], he finally *felt* what he found impossible to *see* in the reduced formats of wall posters, desk calendars, postcard prints, and textbooks. He had been familiar with this painting for years, but he had never actually participated in the seeing.

Standing in the gallery, in the presence of the massive 8′ 10″ x 17′ 5 5/8″ canvas, he became intoxicated. He felt as though the image was pulling him in. It seemed to be alive with motion. He was suddenly able to vision the artist throwing the lines of paint and overlapping the next layer with another layer. The seeing of this painting in the end had very little to do with the picture his Polaroid could capture. In the end, it was not a visual experience at all. It was purely kinaesthetic. He could follow certain colors and felt the sway and lean and fling and *motion* to such an extent…realizing the bench in the middle of the gallery was there not for the weary, but for the overwhelmed.

The lesson learned is that there are multiple modalities or *tiers* that one can participate in. Experience is not a single-layered façade, obviously alike for every actor/participant. It is a rich, multi-dimensional playground that most of us rarely explore.

How the body can...walk across a meadow.

I picture the loveliest of meadows. Calm, serene, tall grass and wildflowers. Bees and birds and paths in the tall soft brush from larger animals. The sun just beginning its descent, the temperature cooling off.

We begin our walk on the established path. Nothing new of interest, only a familiar scene and a comfortable gait. Walk, walk, Walk, walk, Step, step, step, Step, step, Step.....R, L, R, L, R, L, R, L...it is a smooth and fluid, normal, natural kind of walk. There is no specific effort beyond the overall trajectory of starting at the trailhead and concluding at the trail end. Walk, walk, Walk, walk, Step, step, step, step, step, step.....R, L, R, L, R, L, R, L...the gait is normal, natural, steady. It is a series of micro-gestures, embedded within simple arcs of intention. Steps toward and past the hawthorn, steps toward and past the great oak, steps toward and past the goldfinch.....Walk, walk, walk, walk, Step, step, step, step, step, step.....R, L, R, L, R, L, R, L... not rigid or tense or fatigued, but steady....driving forward toward the simple resolutions of place.....and then, an unexpected, solitary, bloom.....Trillium... unexpected for two more weeks. The sight of the bloom, special but not unheard-of, beautiful but not unique..... it draws out my next step or three ever so slightly.... R, L.., R..., L., R, L, R, L, R, and I am on my way. There was a tear in the time-space continuum, a bending, a warping of what was anticipated to be the most normal, clear and well-rehearsed of trajectories. An anomaly whose manifestation was found in the slightest stretching of time. A stretching that the body feels as stretching... a motion-filled yet suspended stretching that, of course, resolves into the same familiar gait of the meadow...Walk, walk, walk, walk, Step, step, step, step, step, step.....R, L, R, L, R, L, R, L...

How the body can…understand a song, a speech, a poem, or the stock report.

> Gestures are expressions of thinking which complete that thinking. (Radman, 2013, p. 296)

Songs, like poems and speeches and stock reports, start with a beginning and conclude with an ending. The most common versions of these examples then contain a series of embedded beginnings and endings within the confines of the large work. It is further possible to have even more layers of beginnings and endings within each of the prior layers. This nesting of initiations and resolutions (or partial resolutions) is in large part what determines the complexity of a given aural work.

When speaking of beginnings and endings, I do not mean exclusively the beginnings and endings of sentences, or worded thoughts, although these are one example of what I am describing. Rather, I am speaking of aural gestures, the sounds that are arranged in such a way as to call attention to a novel direction and direct one towards a conclusion, however brief or substantial. These aural gestures can be full of worded language, or may be sung pitches, or pitchless sighs or any utterance human or otherwise. This aural gesture becomes *a gesture*, whenever it is an expression that proceeds with intention toward a completed goal. We often think of gestures as overt externally recognizable swings of arms and flicks of wrists etc. These are fine examples of *gestures*; in that they all involve a novel initiation with an uninterrupted trajectory toward a completion or resolution.[37]

Of the examples this chapter offers, the stock report might be the most simple and clear. Please thoughtfully read and consider the following. Take your time:

37 I will investigate the specific details of the uninterrupted trajectory in *How the body can ride a swing.*

> The broader market closed out the week with losses. Leading the decline, the Dow Jones Industrial Average shed 131.01 points (-0.71%) to 18261.45. The Nasdaq Composite was down 33.78 points (-0.63%) to 5305.75, and the S&P 500 lost 12.49 points (-0.57%) to 2164.69. This week's moves leave the three major US indices +4.8%, +6.0% and +5.9% YTD, respectively.
>
> At the end of the day, Technology (XLK 47.49, -0.42 -0.88%) was one of the worst performing sectors, ending the day near lows. Component Salesforce.com (CRM 70.39, -4.20 -5.63%) was the worst performer in the sector today on the back of reports that the company and Twitter (TWTR 22.62, +3.99 +21.42%) may be in talks. Other sectors as measured by the S&P closed XLRE +0.39%, IYZ +0.15%, XLU -0.08%, XLY -0.23%, XLV -0.31%, XLP -0.45%, XLB -0.50%, XLF -0.51%, XLI -0.57%, XLFS -0.61%, XLE -1.36%. ("Tech Stocks from Briefing.com," 2016)

If one reads the report, there are obvious and clear beginnings and endings of each sentence embedded in the beginnings and endings of each paragraph, which are embedded in the whole report. Of particular note for this example is the string of symbols and their respective percentage gains or losses: "XLRE +0.39%, IYZ +0.15%, XLU -0.08%, XLY -0.23%" etc. These symbols are embedded within the sentence and contain their own beginnings and endings.

Read the line to yourself... "XLRE +0.39%, IYZ +0.15%, XLU -0.08%, XLY -0.23%", there is a gait to the reading. Each of the mini-statements being so similar in content and size create a pattern that is predictable. This predictability is what constitutes the trajectory of each mini statement and this trajectory, with its clear beginning, resolution and continuity within is how the reading can be understood as aural gesture.

If one were to loosely swing an arm side to side in front of yourself, after a few passes, the gesture would gain an element of predictability. It becomes vectorial, goal oriented, and can be judged on whether it presented a tangibly understood beginning, trajectory, and completion before releasing into the next identical gesture. This is a parallel exercise to the reading of the noted stock ticker line. Each of the mini-statements can be seen to be of similar length and composition. This information combined with the fluency of a tenured reader will then present the reading with a temporal gait thereby highlighting the composition of the line.

Read the line again, slower… "XLRE +0.39%, IYZ +0.15%, XLU -0.08%, XLY -0.23%" and note the naturalness to the pacing and predictability of the unfolding information. The fluent reader will resolve each mini statement after each comma and begin anew with the next symbol. The *fluency* of the fluent reader is found in the obvious and predictable cadence. We may not be able to predict the exact numbers that are about to be read, but we certainly have an expectation for the length of the statement, the way it will begin, and the driving, arcing gesture to the end.

Poems, speeches, and songs all contain the same types of information as the stock report. To say they *contain* is to say that they all have the same potential for a bodied (felt) fluency found in the stringing together of the aural gestures. The possibility of a natural flowing gait is present, and it is the task for the performer/reader to discover the implied gait and ride along to it.

More difficult than the stock ticker line would be any succession of phrases of differing lengths. Poems of irregular meter, like the types of sentences found in speeches are less predictable. It is the task of the performer/orator to be familiar with the implied cadences of the presentation so that the performance is understood as fluent. In more sophisticated repertoire, sub-gestures can be contained inside of gestures which are themselves contained within meta-gestures, and so on. The skilled presenter is aware of these embedded arcs of intention and adjusts their gait to suit the counterpoint composed in the line.

It is quite possible that a novice reader (or a novice reader of stock reports) will be unable to find the implied cadences or experience them as clumsy or full of frictions. It is in this example where a novice reader might say all of the words correctly yet miss the natural cadence and thereby miss the intended meaning in them. Fluency is not achieved in the confident oration of individual words. It is contained in the rocking aural gestures of groups of sounds/ideas/words/pitches, each with their own embedded and often overlapping trajectories. The fluent reading of the thoughtful composition will start in the opening line of the meta trajectory and eventually resolve in the final cadence of the last statement.

The disciplines of music and dance are premised on these notions. The literal, overt gestures of the dancer and the noted, linked, successive, forward moving phrases of the musician allow what in list form could seem like an account of individual pitches or separated twitches of the body to become fluid, fluent examples of dance and music.

The performance of any of these examples has the potential to be experienced much more like a child's play, than a drudgery of monotone monotonous non-events. The child's play, full of bodies rising and falling, swinging and resting, driving towards and falling back...these are the models for the bodied performance.

How the body can...understand a silence.

Isn't it interesting how silences are contained in both the lists of the most joyful desirable events and the most fearful dreaded events? At the end of a hectic day or year, we often search out some quiet and solitude. Yet the prospect of being buried alive is among the most quiet and terrifying prospects imaginable.

Silence, stillness, rest, quiet, suspension, limbo...on the surface these terms are easily differentiated. Silence is the absence of sound, stillness the absence of motion. Rest is a period of recovery and quiet is a degree on a scale of amplitude. Suspension can be experienced as potential energy, often paired with silence, limbo can be experienced as stuck-ness, the in-between, a moment without resolution, not unlike the scarier versions of stillness.

At a deeper level, all six of these terms speak to a common set of bodied realities. The mark of an experience is found in the arc of a gesture. Often gestures can be seen, but the root of experience is not the visually noted swinging of an arm or torso, rather it is in the kinaesthetic engagement. To recognize the kinaesthesia of a gesture is to understand the momentum, the directionality, and the weight shifts that are created. These weight shifts are noted in the dynamic properties of a body in motion. The moving body experiences shifts in heaviness/lightness that match the arc of the gesture. By moving through these shifts, the body is able to recognize itself as moving, in motion toward a resolution (or goal or peak or new shift). This is the mark of vibrancy, the proof and sensation of being alive.

Silences are peaceful and refreshing as long as they are experienced fluently as motion in the groove of living. A silence at the end of a busy day is the common resolution to the gesture of waking. It is ripe with calm and comfort because of the fluid and predictable manner that we (hope to) arrive at the bedtime hour and in the understanding that it is the beginning of the gesture of sleeping, a gesture that has its own momentum, its own arc/trajectory/resolution. We welcome the silence of bedtime with a specific gesture pre-bodied. This time in the day is a *gesture* in that it is goal driven; it begins and arcs forward to a (hopefully) predictable resolution.

Obviously, silences are terrifying when they are understood

to gesture toward our demise. They are also terrifying when the experience is without a recognized trajectory. If we happen upon a moment of utter silence and it is not explainable why; if we find ourselves in a period of silence that we are not able to break; if the world that is supposed to be *our world* does not reciprocate by supporting the resolution to our attempted gesture (as in attempting to scream only to have nothing come out)....these would all be terrifying. They are terrifying not just because they are odd. They are terrifying because they remove us from our world.

Silence is a welcome friend as long as it is grounded in the continuous experience of living in our world, our world that is connected to and part of ourselves. To the extent that silence is an indicator of a severing of ourselves from our world, from our ability to exert some control over (trajectory in) our world, the foreignness can be as suffocating as being buried alive.

How the body can...stand up straight.

Who first told you to stand up straight? I am not sure who it was in my history, but I hear a matriarch and a declaratory tone... *Stand up straight!*

The body is a curious instrument. So much more complicated than most anything else we ever would manipulate, and yet, for most of us, there is no instruction, no training, no thoughtful skilling-up of the basic instrument into most of its everyday mundane activities. Aside from some common instructions that are delivered as though obvious, most of our living body techniques are self-taught.

Stand up straight!

The implication is one of arrival. Complete the action of standing with the resolution of straightness! Start, proceed toward, and then arrive at straightness...and then hold it...don't let it go.

Living is a dynamic sport. Never still, always moving, the living body experiences periods of rest and other calm moments that register on a spectrum of stillness, but we will never be actually still until the last breath has left us. The body is so very much in a state of perpetual motion that any period of even *less-motion* is noted as significant.

We consider sleep as the most still time in the day, yet our heart continues to pump, and our lungs continue to inhale. Well beyond that, we know that during sleep the body is involved in a complex and rich network of tasks from recovery to renewal. We toss and turn, and our body runs through unconscious arcs of processing. The sleep cycles, from quasi-conscious to Delta to REM and back again are all constantly in motion and while we are not running literal marathons "at rest", we are far from static.

Awake is much the same. The respiration and circulation provide a constant background noise, mostly ignored but occasionally conscious. They each have a tempo, a micro-arc, mini-trajectories that resolve over and over throughout each minute of the day. Often assumed to be insignificant beyond keeping us alive, we actually entrain many aspects of our waking life to these tempi. Respiration

has obvious pragmatic implications to our speaking tempo and phrasing. It also serves as a baseline for the temporality of common thought. That is, common, mundane thoughts are more likely to be expressed in the space of a breath, where anything that takes longer to express (thus stretching the arc beyond the most rehearsed and common tactile experience of the performer) is understood as *more-than*. Not just more time or more words, but it is noted as requiring a larger investment to understand, larger than the mundane.

Heartbeats are also personally significant in our understanding/forming of our world. Even though the heartbeat goes largely unnoticed, unheard, and unfelt as unique pulses, it still serves as a filter for the sense-making of our world. Music of almost any tradition is known to contain the *beat*. Embedded within that beat is a subdivision of the beat that, if chosen, could supersede the originally named *beat* and instead be dubbed *the beat*. Likewise, there is a larger pulse that can be recognized at 2x the length of the originally named beat that, if chosen, could supersede the originally named beat and could instead be named *the beat*, and this optioning of tiers of attention continues theoretically, in both directions to infinity. Of the infinite options (of larger and larger or smaller and smaller beats) presented to a listener who must choose which of these beat levels to tap (as the primary; *the beat*), they first have to weed out all of infinity that is either too fast to be humanly possible to physically articulate, or too slow to maintain a coherence of beat from moment to moment (anecdotally, this period is often thought to be at its limit around a period of 12 seconds). These are the only tempos that we as humans can appreciate as *the beat* because they are the only options that present as having a relationship to the founder of our personal world, our own specific body. But even given this still wide range of possibility, it is most common for the average actor to choose the beat level most similar to their own heartbeat tempo (which, incidentally, is also quite similar to our normal walking tempo).

We are in motion from the moment of conception until the day we die. Any attempts to deny this or suppress this is an act of violence against the body. One can no more easily “be still” than one can just choose in the moment to “stop living”.

Do the experiment. Be still..... Be very still..... Be as still as possible.

We start by eliminating the movement from our limbs, then our eyes, then our respiration, and little by little we are *self-bound*. The sensation is one of anti-life. It can enter into the realm of the tortuous. It is a violence against the living, breathing, motion-filled body.

Rather than bind the body into a static position that has no relevance in the world of the living, it is more appropriate to instead note the constant motion that we, the living, are enveloped in.

Stand upright! Not rigidly, not with excess tension, but with the sensation of lengthening the space between your vertebrae by breathing and feeling tall. Attempt to shake out the excess tension in the body. It is OK if the shaking causes you to bend and sway and be less than your most extreme height. You are not attempting to be the tallest. You are trying to stand upright and to find some flexibility in the spaces between your vertebrae by breathing and feeling tall.

Then consider your balance. While standing upright, lean slightly forward. Then slightly backward. Then push your weight slightly to the left leg, then the right, then search for the feeling of balance in the middle. Note that the middle is not a place. You cannot hold on to the middle. You will always bob in and out, right and left of the middle. You can build skill that limits the range of the bobbing, but you will always bob. Instead of attempting a tortuous, life-challenging experience of stagnancy, notice the dynamic arcs of motion in and out, right and left, front and back. You will not be able to statically "stand up straight". It is not part of the vocabulary of the body. You can, however, be upright in the most appropriate manner possible. Experiment with upright. Play with tall. Search for the feeling of the base of your skull floating tall above the top vertebrae and allow the body balance to be dynamic.

How the body can...ride a skateboard.

Sam grew up on a dirt road in a decade that had not quite yet embraced skateboarding. Growing into adulthood, he was aware of skate culture and knew some teenagers in his neighborhood who enjoyed the sport. On more than one occasion he watched these teens zoom down a sidewalk, only to thrust themselves out into semi-busy intersections, behavior that appeared more dangerous than would be wise. The event was always rationalized as youth, immaturity, and thrill seeking.

Some time later, in his 37th year, he had occasion to learn to long-board, and through several serendipitous events found himself using the long-board to commute two-thirds of a mile, to and from his place of work. Participating in the daily practice revealed a whole new perspective on skateboards than he had ever considered. He too found himself zooming down sidewalks, only to be presented, mid-momentum, with semi-busy intersections and a split-second decision; "Will I stop the inertia—stop the earned momentum—interrupt the grand literal gesture of my ride, or will I thrust myself out into the intersection and allow the gesture a more natural conclusion (hopefully not to be confronted with a fast-moving truck)?" While it is possible that immaturity and thrill seeking could factor into such a decision, it became strikingly clear that there was another element at play, another tier of experience, an extra-linguistic, bodied, soma-deep reality that not only existed, but in this particular case, defined the interaction. The gesture was begun and yearned for an organic resolution. Jumping off the board and halting before the intersection, halting before the natural closure of the phrase would prove as uncomfortable and anaesthetic as the rudest of interruptions.
This yearning to complete the phrase could not be attributed to immaturity any more than could an opera singer wishing to complete an aria or a novelist aspiring to conclude the chapter. The yearning for completion of a line-in-motion is the most natural of human instincts and worthy of acknowledgment and study, a study that must involve the soma tier of experience.

Reflection

The vignettes exercise revealed many of the base concepts that forwarded the work over the five-years of study and research. Based on a lifetime of music and Eurhythmics work and a series of hunches and instincts, I was interested in exploring this kind of attention to experience. At the beginning of the explorations I did not have wording for Soma Literacy, or *gesture*, *tier of experience*, *soma-deep*, *vectorial motion*, or *static vs. dynamic*. I only possessed the 'high' of live performance *in ensemble* with others on the operatic stage, and the recognition that at fortunate times in my life I was able to recreate that 'high' in everyday, off-the-stage acts.

In brief, I found the following concepts while exploring these six vignettes:

> *How the body can...feel a painting* explored multiple modalities or tiers of experience that one can participate in: visual, aural, logical, vs. somatic.
>
> *How the body can...understand a song, a speech, a poem, or the stock report* focused on fluency, gesture as a concept, gesture as extra-visual (recognized in the felt aesthetic of sound or sight rather than dance or overt motion), embedded phrasing, cadence, and vectorial motion.
>
> *How the body can...understand a silence* highlights gesture as trajectory, the multiple tiers of experience and the dynamic vs. static.
>
> *How the body can...walk across a meadow* was an attempt to describe kairos vs. chronos, and the feeling of suspended and *yearning-forward* arcs.
>
> *How the body can...stand up straight* sees the body as the first instrument, the body dynamic, and body-in-motion.
>
> In *How To...ride a skateboard*, it is not the video of a skateboarder that is firstly significant in this vignette, it is the embodied soma-deep felt sensations of heavy and light kinaesthetic awareness that can only be created by a body-in-motion. Only the soma-aware individual would be able to separate these sensations of forward momentum from the far more obvious descriptions of sidewalks and skate boards and traffic and teenagers.

Throughout the process of writing the vignettes, I sought for ways that experience becomes tangible. Achieving tangibility is what creates our worlds. Soma Literacy is a framing that highlights the richness of our mundane experience—it notices how often common moments of the day, which come with common 'obvious' attentions are implicated in the sensations of the body. A phone call to an old friend, the noticing of trash on the street, the fear of bad news, a surprise card in the mail—each are rarely experienced without tangibly implicating the soma tier. Our world, that is, our being in the world, is wrapped up in our sentient body.

3.7 Haptic Enviro-Sensing Metronome

> For instance, the most ubiquitous of haptic feedback is created through vibration motors which are generally programmed to turn on and off. They create touchpoints but have difficulty relaying any of the interstitial spaces necessary for human motion understanding. Without the interstitial *yearnings-toward* and *fallings-away-from* the feedback is experienced as a jolt or poke, not as evolving, unfolding motion. The actor receiving the feedback cannot engage/entrain/embody the feedback any easier than they can an unexpected dog bark or clap of thunder. Without forecasting the touchpoint via the interstitials, the actor can only react to the happening, they have no way to engage in time.[38]

Abstract

The Haptic Enviro-Sensing Metronome (HESM) served this thesis as a research probe testing the concept of *nudgability* and the complementary concepts of the *interstitial*, *entrainment*, *ensemble*, and *empathy* (as Lens 3 -*with*). The project proposes to sway the rhythmic cadence of mundane and artistic performance through a dynamic haptic rhythm indicator driven via an enviro-sensing wearable. I am here interested in the limits of nudgability, the role of overt vs. peripheral attention, and the ways that we tacitly understand interstitials as predicting our pending futures. The HESM is an investigation into the power of touch, the human desire for harmony with our surroundings, and the ability of machine learning to anticipate and foster this ideal.

38 quoted from section 2.4 Corporeal Design—Bodies in Design—Body as Input – gestural/haptic/AR/VR

Research Statement

The HESM project is a rich testing ground for the primary themes in my ongoing research. In this project I am exploring interstitial spaces, entrainment, 'nudgability', kinaesthetic knowing, and awareness of the experiencing body.

My research focuses on the physical nature of art, and by extension, any idealized experience, mundane or extraordinary. I am interested in the ways in which our physical presence/bodies are necessary components of any meaningful interaction, much more integrally than the cerebral parts of performing, creating, or appreciating. My bias is that the sound of an orchestra or the two-dimensional visual representation of a painting is not as important as the literal movement[39] that it implies.

The HESM offers a combination of my primary research themes, mixed with opportunities to collaborate with and learn from experts in fields quite different from my own. The HESM tests intuitions founded in musical performance and attempts to extend these ideas to mundane performance. These intuitions, theories, and themes–dealing with interstitial spaces, entrainment, 'nudgability', kinaesthetic knowing, and awareness of the experiencing body—are then made visible through testing with my collaborators in artificial intelligence, public health, and robotics.

39 Here I am defining "movement" as both an actual expression of the body through space (gesture), as well as the sensations such as heaviness or loft that can be physically experienced in stillness or in motion.

The Pitch

What if you had your own personal conductor? People have personal trainers, personal chefs, personal life coaches...what if you had your own music conductor in a tuxedo with a baton in hand who was at your beck-and-call to literally direct you through some of life's tight spots? What tight spots could this individual guide you through? Some conductors are notorious for missing the social cues of polite conversation, but when it comes to navigating the moment-to-moment tempos of life-lived (i.e. to demonstrate how to begin an arc of momentum and see it through to its most perfect closure, or to guide one through the prioritizing of an attention which is required to split between a multitude of stimuli), you cannot find anyone better.

Self-driving cars mark where they are, compared to where they aspire to be, and then process this information as a kinaesthetic—*in time*—operation or challenge. What might we gain as we use technology to look ahead and adjust the flow of our near-future?

As you approach the escalator, how do you know to adjust your gait to the tempo of the moving stairs? As you set the timing of your bench press reps, what do you base the tempo on? As you tap your foot to the beat of the song, why did you choose that specific beat level and not the level that is twice as fast or twice as slow? How might the experience be different if you did tap one of the other beat levels? What might Parkinson's patients gain from the touch of a dynamic haptic indicator on their body?

The Project

The HESM is a piece of wearable hardware that acts as a smart, haptic, and dynamic conductor. Using motion over sound or sight, we are studying how to lead the user through an event with a pulse that will ebb and flow in reaction to the environment by using machine learning and refined human-computer interaction. The HESM is an exploration into both the sensors, data collection, and processing necessary to build awareness of the environment while also testing a series of new haptic interfaces that that strive to inform the user through a more intuitive interface.

This project brings together previously disconnected bodies of expertise across CMU and partner institutions. The HESM project began as a series of conversations between Professor Gus Xia and me in 2015 and is now continuing as a project funded by the Carnegie Mellon College of Fine Arts Berkman Faculty Development Fund and in conjunction with a small team of collaborators.

Whereas traditional metronomes are set at a single tempo that then drives forward without regard for the changing prompts of the environment, the *HESM* possesses the ability to *ebb and flow*, to make micro adjustments leading the user by matching to an external set of variables.

The HESM allows us to ask questions such as:

- What are the advantages and disadvantages of varied haptic interfaces?
- What is *natural* about a digital indicator?
- In what situations do we aspire to entrain to our world?
- What does it mean to entrain *self-to-self, self-to-other, self-to-thing, self-to-environment*?
- In what situations would a new or heightened awareness of the gait or cadence of our micro-performances be of benefit?
- What challenges would need to be overcome to create a *self-driving human* technology?

- How does one prioritize attention over the multitude of stimuli we are presented with every minute of the day?
- How might one re-prioritize with the aid of a smart sensing technology?

The Research

The Berkman Faculty Development Fund will support the HESM project through the next two years of development and testing. It will allow the purchase of prototyping materials, fund a student assistant, and provide for travel to collaborate on site with professionals in the complementary fields of machine learning and public health. The HESM research team is currently refining a working prototype and are preparing to expand the testing to various user communities including music, athletics, physical rehabilitation, and Parkinson's treatment.

Beyond the knowledge generation that is coming from the actual tangible prototype, I am excited to use the project to further investigations into my primary areas of research:

- Corporeal Design
- synergies between the curated-mainstage performance and the mundane micro-performances of daily interactions
- Soma Literacy and the centrality of the sensuous feeling body in experience
- entrainment, interstitials, and the nudgability of the human actor

The HESM, serves not only as an intervention with real-life applications, but also as a testing ground for many of the theories in my research.

HESM Details

Commercially available electronic metronomes are used as proxy for live musical conductors. If the music student had unlimited resources, they could just hire a live musical conductor with a baton-in-hand to reinforce and guide the student through the moments of rehearsal and performance. By using gesture, the conductor fills 100% of the space between the *cruses* (the ictus or "click" moments of a beat) with a natural analogue wave that provides the build-up and decay common to natural happenings. Additionally, the leading gesture of the conductor is dynamic, never remaining exactly the same, but evolving, demonstrating the *ebb-and-flow*, or micro adjustments necessary to match the performance to the environment or needs of the moment.

The modern metronome is neither able to "fill the space" between the *cruses* (revealing the interstitial) nor adjust to the dynamic environment. The HESM project aims to highlight and solve these two deficiencies through the combination of strategic haptics and machine learning.

Strategic Haptics

An analogue squeeze and release is the primary revision to the haptic interface. The HESM requires this analogue (or near-analogue) wave so as to forecast to the user the approaching *crusis* allowing the user to prepare for and rebound from the "click-moment" with rich entrainment.

As the intention is to encourage entrainment of the human body to external forces, the frequencies required are quite low, based on the tempi of slow walking to running gaits (40 bpm/.67 Hz to 180 bpm/3 Hz). This analogue wave can be achieved through a number of different means, including the following:

- through a mechanical cog that would spin, putting stress on a watch band, squeezing then relaxing.
- via pneumatics that create the compression and decompression by inflating and deflating a bag (not unlike a blood pressure cuff) around the wrist.

- Electro-magnets may be utilized to squeeze and release, again building pressure and decay in a cyclical fashion, or a small wheel can roll up and down under a tight sleeve on your arm providing the feeling of a bouncing ball rolling up and down on the body.

The space between the clicks is paramount and in all of these cases the *interstitial* is revealed. This attention to the "between the beat" experience is the first gap in current beat attentions the HESM seeks to overcome.

Machine Learning & Human-Computer Interaction

A second significant intervention that the HESM proposes is the addition of machine learning and human-computer interaction. Through a collaboration with Professor Xia, Assistant Professor in Computer Science, NYU Shanghai, he and I are creating of a large corpus from the user's interactions with the environment, providing the metronome with a computational model that is "aware of the environment". The HESM uses this model to make choices and adjust the performance to the needs of the environment. Within this reality, one is permitted to reconsider the usefulness and purpose of the "metronome." Maelzel's original metronome of 1816 was used as a musical rehearsal device, and that utility has remained unchanged for 200 years. The addition of a dynamic and self-aware technology now opens a space where we can ask new questions of a beat indicator capable of leading:

- In addition to traditional musical performance, what other "pieces" do we "perform" every day?
- What does it mean to "rehearse" these pieces?
- Assuming we had unlimited resources, where else in life could a live conductor (the HESM) be utilized to guide the user through the "performance"?
- Where in lived experience are we attempting to entrain to our surroundings?
- What groups of individuals struggle with issues of mobility, even gait, naturalness of gesture, or group synchronicity?

Hypotheses

The HESM project seeks to test the following hypotheses:

1. Human experience values entrainment. We strive for harmony with our surroundings.
2. We value entrainment to such an extent that if our environment nudges us faster or slower, we will attempt to make adjustments to achieve and maintain harmony.
3. Not all nudging requires cognitive awareness of or concentrated focus on the outside tempo shift.
4. The interstitial haptic information of a continuous, building/decaying/sine wave-type will allow for a more intuitive and efficient transfer of information (as compared to a blinking or clicking style metronome).

Study

With a working prototype, we are exploring the phenomenology of entrainment through a series of interventions. Interventions such as:

Question	**Metronome prompt**	**User prompt**	**Feedback**
Can the user entrain to the HESM?	HESM leads, maintains a simple steady unwavering pulse	User attempts to entrain	HESM measures the ability to stay together at a single tempo. Provides feedback stating margin of error throughout the event and charting significant moments of divergence and convergence. User rehearses to improve accuracy.
Can the user maintain a given tempo?	HESM introduces a simple steady unwavering pulse then allows the user to lead. The *HESM* will continue to provide the haptic support, but entrains to the user allowing the tempo to ebb faster or slower.	User attempts to maintain the initial given tempo	HESM measures the ability to maintain given tempo. Provides feedback stating margin of error from initial given tempo and charting significant moments of divergence. User rehearses to improve accuracy.
Can the HESM nudge the user faster or slower? Can the user follow (maintain entrainment with) the conductor (HESM)?	HESM introduces a steady pulse then fluctuates between leading and following. i.e. the HESM allows the user to lead then offers marginal provocations to the tempo, challenging the user to entrain to an evolving tempo faster/slower.	User attempts to entrain	HESM provides feedback stating margin of error throughout the event and charting significant moments of divergence and convergence. User rehearses to improve accuracy.

These interventions can be applied to musical and extra-musical environments. I see the three interventions above as applicable not only in the rehearsing of a musical selection, but also in a variety of extra-musical domains.

musical: The user wears the HESM and rehearses the interventions while playing a short piece of music.

mundane: The user wears the HESM and rehearses the interventions while carrying out a simple rhythmic task. i.e. walking to the store or performing push-ups.

public health: In consultation with the Graduate School of Public Health, University of Pittsburgh, we have speculated that the haptic pulse may be able to provide Parkinson's patients with a leading indicator, providing the individual with a focused informational prompt allowing the patient to initiate and maintain the forward gait.

Applications

By recognizing that entrainment with our environment is often a safety, community, and/or aesthetic ideal, paired with the notion that we are *nudgable* through this type of intervention, we see possible applications for the technology in any of a number of environments where gait/cadence is required:

- Physical therapy
- Parkinson's disease research
- Sr. citizen balance and fall concerns
- Athletic training, weight training
- Mediation and mindfulness practices
- Military or industry applications where it is critical that two entities (self-self, self-other, self-machine, self-environment) find and maintain synchronicity
- Arts applications such as a smart metronome that can give feedback to the user or in syncing live orchestras to video

The Collaborators

The HESM project is approaching its third year. The small team of collaborators has to date generated five prototypes testing four different versions of the wearable haptic interface with ongoing iterations planned for the coming year. Professor Xia, is serving as Co-PI for the full project and is providing the Machine Learning components, building on his post-doc research. Andrea Weinstein, Ph.D., Graduate School of Public Health, University of Pittsburgh, is ready to join us to investigate the application of the technology to aid Parkinson's patients in initiating and maintaining walking gaits as soon as the prototype achieves this level of fidelity. Curtis Boirum, Engineer at the Robotics Institute has advised undergraduate student teams in designing and building new HESM prototypes. Nicholas Pourazima, is the lead electrical engineer and builder, and has been invaluable in making the hardware come alive.

Gus Xia, Co-PI
PhD in Machine Learning, Carnegie Mellon University
Assistant Professor in Computer Science NYU Shanghai

Curtis Boirum
Engineer II
Robotics Institute Carnegie Mellon University

Andrea Weinstein, Ph.D.
Assistant Professor
Behavioral and Community Health Sciences,
Graduate School of Public Health University of Pittsburgh

Nicholas Pourazima
Master's student in Music Technology, lead builder

Prototype 1—Bone Conduction

Haptic

Sound

Assembly

Surface transducers connected to Class-D amplifier

Method

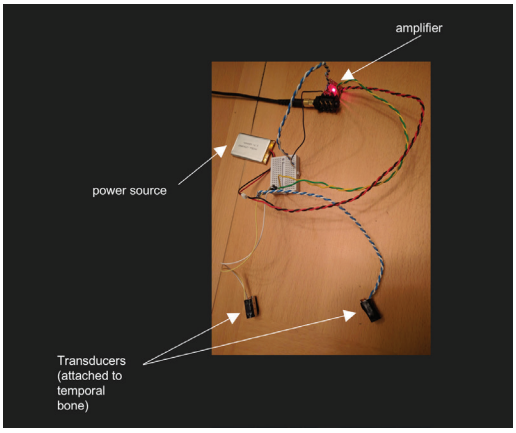
Electric signals converted to mechanical vibrations

Sound transmitted through skull

Bypasses eardrum and goes directly to inner ear

Software

Max patch outputs low frequency sinusoid multiplied by a ramp signal acting as pulse



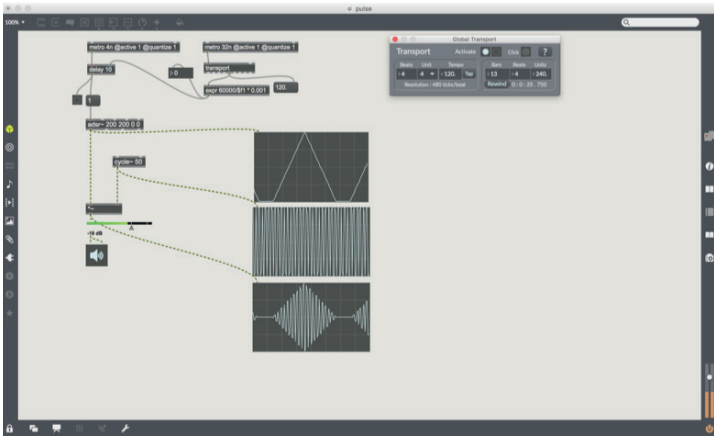


Figure 17. HESM Prototype 1.

Prototype 2—Solenoid Wristband

Haptic

Squeezing

Assembly

Trinket, MOSFET, diode for reverse voltage protection

Method

Actuation pulls and releases taught wristband to an applied PWM signal with increasing duty cycle.

Delay proportional to bpm's

–60 sec/min * 1000ms/sec = 60000 ms/min

–Ex: 80 bpm: 60,000/80 = 750 ms/beat

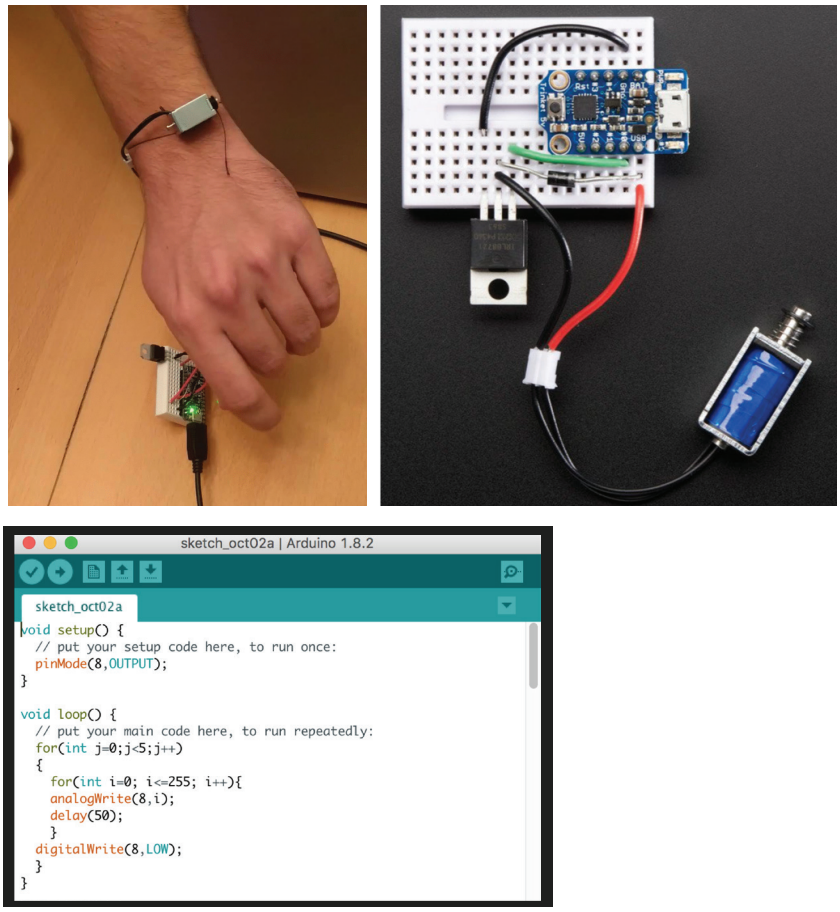


Figure 18. HESM Prototype 2.

Prototype 3—Vibration Pad Array 1

Kush Hemani demonstrating his haptic array from Curtis Boirum's class, 24-354 Gadgetry: Sensors, Actuators, and Processors.

https://www.youtube.com/watch?v=MvDDTuqR8ss&feature=youtu.be&t=1m9

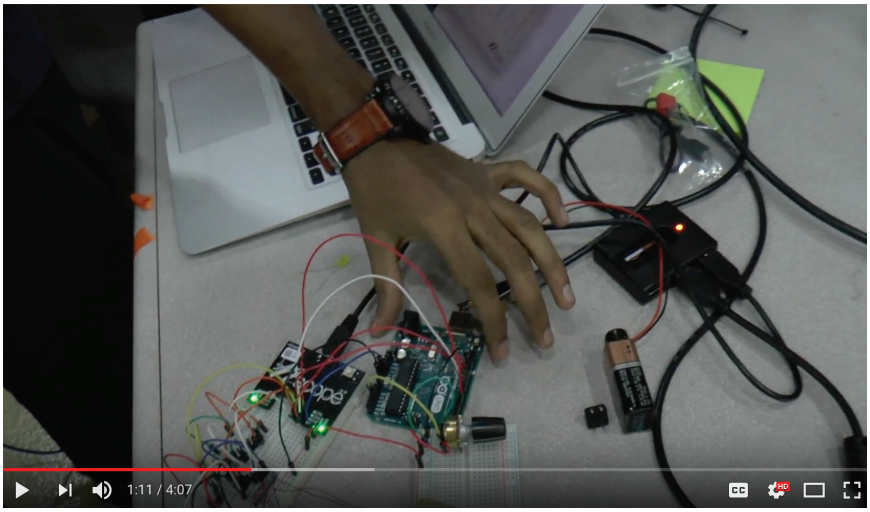


Figure 19. HESM Prototype 3.

Prototype 4—Vibration Pad Array 2

Haptic

Vibration

Assembly

Source signal transmits to microcontroller via BT

MCU triggers output pulse on ERM (eccentric rotating mass) vibration motor array

Method

Delay between each motor is aligned to give a ramp up/down or pendulum sensation.

https://photos.app.goo.gl/qaUR64PI4q9uN2Rf1

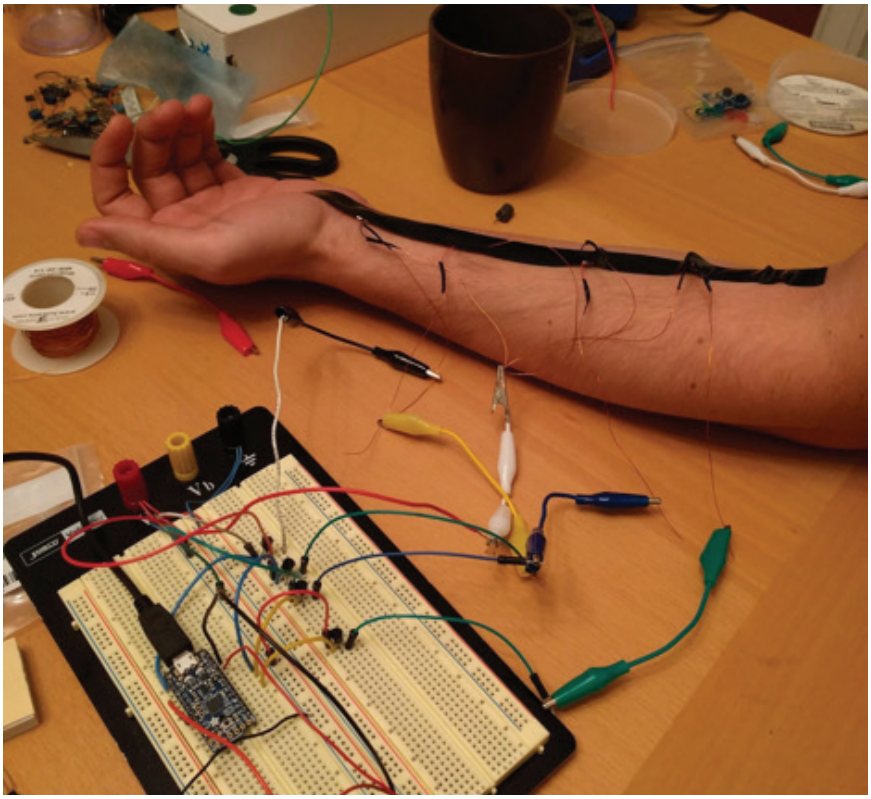


Figure 20. HESM Prototype 4.

Prototype 5—Vibration Pad Array 3

Haptic

Vibration motors moved into a sleeve that is worn on the arm.

Assembly

Source signal transmits to microcontroller via BT

MCU triggers output pulse on ERM (eccentric rotating mass) vibration motor array

Method

Delay between each motor is aligned to give a ramp up/down or pendulum sensation.

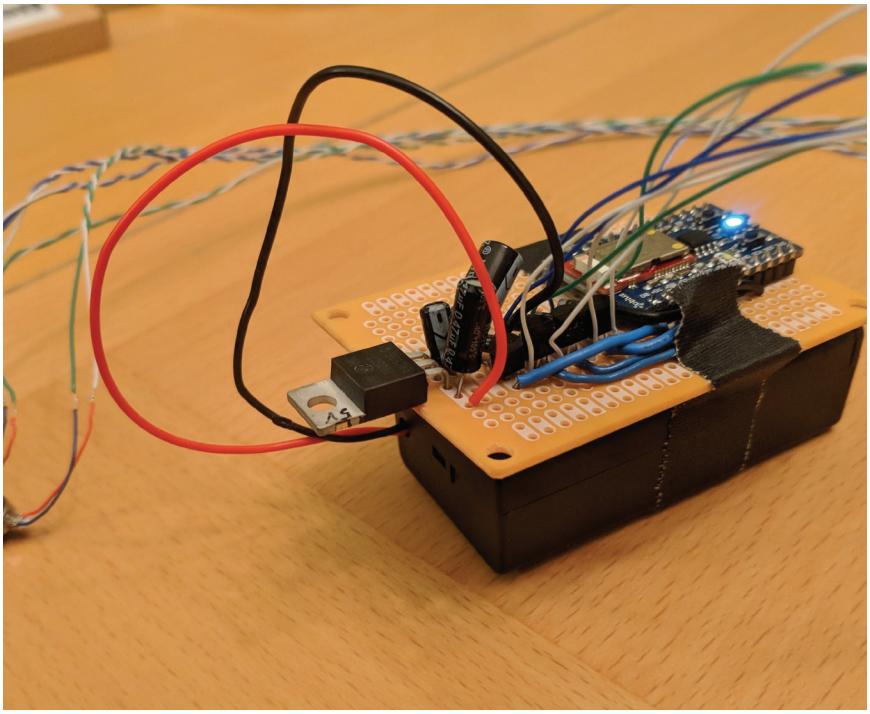


Figure 21. HESM Prototype 5.

Summary of HESM Research to Date

The HESM is a project in process. The greatest hopes for the application of the technologies and insights into areas such as Parkinson's Research are still some years away. However, even the preliminary explorations in the last three years have yielded useful information to the general theories of this thesis.

The HESM offers two basic interventions to a highly prescriptive designed experience.

First is an overt attention to the interstitial. By ensuring that all versions of the haptic interface value the '*betweens*' and see these unfolding moments as inertial and vectorial, we have taken a very strong stance, both on the nature of experience and the gaps in a majority of haptic interfaces. Nicholas Pourazima picked up this particular agenda in his master's thesis at Carnegie Mellon, successfully completed in July 2018, "An evaluation of the interstitial beat across the modalities of touch and sound for the characterization of a meaningful haptic metronome" (Pourazima, 2018). I consulted as Nick's lead thesis advisor. The abstract for his research is copied below and served as the initial investigations into the larger HESM study.

The second intervention to a designed experience is 'nudging' through machine learning. The hypothesis is that as participants in our worlds we so aspire to harmony that we are *nudgable* as a result. Rather than continue avoidable frictions with our environment, we each enact a plethora of micro adjustments throughout the day to come closer to a *beautiful* entrainment with our surroundings. The HESM searches to test this hypothesis by engaging the user in a simple entrainment (not unlike the introductory exercises in the prior mentioned Soma Literacy workshops), and then challenging the user to adjust to minor provocations to the entrained beat tempo. I am curious about the thresholds for conscious vs unconscious and the thresholds for where the haptic is most readily felt (in terms of size, placement, and amplitude on the body).

Through Nick Pourazima's initial research, we have data that supports the interstitial haptic gesture as critical in forecasting a dynamic beat. This has created the opportunity to continue the line of questioning into the 'nudging' proclivities of the human participant. We have observed human nudgability in countless examples in everyday life such as in traffic, pedestrian walkways, ATM interactions, restaurant seating, literal belt loosening, turning the head toward the interaction to hear better, etc. The HESM project is questioning the thresholds for highly encouraged nudges, on par with tactile manipulations through simple surface haptics.

The aspects of the HESM study that are applicable to this thesis in 2019 are the inquiries into the concepts of:

- The interstitial
- Nudging
- Experience as internal vs external
- Entrainment

These four concepts were unnamed in my thesis four years ago. The HESM has provided a vetting ground for the ideas and some amount of hands-on user testing as the project has gained momentum. The HESM is an attempt to demonstrate some of the Soma Literacy concepts and apply them directly to a designed experiential artifact.

An evaluation of the interstitial beat across the modalities of touch and sound for the characterization of a meaningful haptic metronome (Pourazima, 2018)

Nick Pourazima
July 30, 2018
Music and Technology, College of Fine Arts
Carnegie Mellon University, Pittsburgh, PA

Thesis Committee:
Professor Stephen Neely
Professor Thomas Sullivan
Professor Jesse Stiles

Submitted in partial fulfillment of the requirements for the degree of Master's of Science in Music and Technology.

Abstract
[This Master's thesis] is an expansion of sensorimotor synchronization research. It provides an evaluation of the intervening space between the beat as it applies to the modalities of touch and sound. The crux of the experiment is a tap test comparison of continuous and discrete impulses over static (isochronous) and dynamic (non-isochronous) pulse intervals.

Time-based response metrics of a wearable haptic are contrasted to a suite of audible tests. Though vast evidence promotes an auditory advantage in guiding rhythmic accuracy and low asynchrony, this work hypothesizes a haptic benefit when the dynamically changing beat is occupied with a continuous wave across the modality of touch.

The analysis of 16 subjects (8 professionals, 8 amateur and non-musicians) resulted in favorable results for the haptic device during the dynamic test cases as contrasted to the auditory test results. Though the auditory modality yielded the best results for the isochronous test cases, the haptic device won out for non-isochronous or dynamically changing beats with a much cleaner standard deviation. This implies a greater synchronization ability with the haptic device and strongly supports the hypothesis of this work.

The overarching goal is to inform validity and design of a haptic wearable which seeks to supplant the traditional metronome experience in providing a meaningful gestural system. The work holds value towards future entrainment studies in expressive musical performance but can be expanded to include extra-musical applications such as stroke and Parkinson's patient gait rehabilitation practice.

Figure 22. "An evaluation of the interstitial beat across the modalities of touch and sound for the characterization of a meaningful haptic metronome" (Pourazima, 2018).

3.8 Summary of Research Studies

In chapter three I presented six initiatives pointed at revealing both information and knowing concerning lived experience.

Section 3.2 introduces the work of Émile Jaques-Dalcroze and described the biases of my prior education and pre-doctoral research as skewed toward the participatory, the enkinaesthetic, and the visceral, as noted *in time* through aesthetics rather than dialectic.

Section 3.3 describes the ways that my colleague Kakee Scott and I studied the materiality of the body and by extension the *materiality of time*, recognizing that temporality carries an aesthetic. It manipulates bodies.

Section 3.4 describes the *Fundamentals of Experience* course as it was piloted with the third year designers at Carnegie Mellon School of Design in two consecutive years. The course, while continuing to serve as a research space, required me to arrive with concepts ready to delve into, and also required a flexibility and an openness to changing my initial assumptions (both in content and teaching strategies) which proved to push the research agenda along briskly.

Section 3.5 lists the six Soma Literacy Workshops that I conducted between Carnegie Mellon University, Northeastern University, Harvard University, and Schumacher College. Identical to the *Fundamentals of Experience* course, the workshops strove to reveal the *in time* somatic tier of experience. While in each workshop I arrived with a preplanned agenda, I also benefited from a flexibility and an openness to adjust my plans as inspired by the input of the varied stakeholders. Rather than jamming nascent ideas at the groups, it was critical that I recognized the opportunities for academic and personal growth throughout the teaching/exploring/learning hours in order to reveal/nurture/incubate the Soma Literacy concepts.

Section 3.6 contains some of my early autoethnographic studies, scenes of prose attempting to get to the heart of the somatic experience-*ing*.

Hopefully of use to the reader, they accomplished much in forcing me to reach for descriptions and concepts that could, with some amount of fidelity, describe the *in time* interactions of everyday life.

Section 3.7 introduces the reader to the ongoing Haptic Enviro-Sensing Metronome project. It pointed out the usefulness of the project for the continued study and vetting of the concepts of the *interstitial*, *nudgability*, *engagement as internal vs. external*, and *entrainment as a base human aspiration*. I conclude section 3.7 by describing the potentials for the future of this collaborative research in varied communities from the arts, to athletics and medicine.

4.0

SOMA LITERACY

4.1 Soma Literacy

In time knowing Soma Literate meaning

> Thinking more broadly about this issue, I then realized that this unfamiliarity with the world of haptics is not limited to designers but in fact applies to more or less everyone: it seems that we collectively have a very limited capacity to talk about and communicate haptic sensations clearly. While we very clearly recognize different haptic sensations, for instance how particular materials feel when we sweep over them with our hands, we cannot elaborate on the details of this experience in our language. For everyday living and going about our business this is of course not a major problem, but for specifically seeking to design haptic experiences, this lack of vocabulary and shared terminology was itching at me. (Moussette, 2012, p. 103)

> We believe improved somatic empathy (through heightened body consciousness) could improve our ideation not only in movement-based interaction but in any interaction that deeply engages our body. (Lee et al., 2014, p. 1062)

Mihaly Csikszentmihalyi, writing in *The Art of Seeing,* states that most people are not aware of the range and intensity of enjoyable experiences, realizing a majority of that potential requires a literacy (Csikszentmihalyi & Robinson, 1990). Rather than seeing the individual as a leaf being tossed about with the wind, the claim of a literacy in experience assumes that one can aspire to be more like a pilot dipping in and out of the airstreams. While not in control of the temperature, the precipitation, or the cycles of daytime/nighttime, the skilled pilot can anticipate the pending future, can choose to ride with or against the current, and can analyze their performance using a wide range of knowledge earned through the first-hand, *in time* participation.

The experience-*ing* of experience can be fostered as a skill. While we all feel tossed and turned by the events of our days, there are opportunities

to pilot ourselves through many of these events and there are ways of analyzing our experiential histories that recall our first-hand, *in time* knowings.

In time knowing

The first assumption of Soma Literacy is that it is a literacy of *in time* knowing. The usage of the term soma recalls Shusterman's (2008) sentient perceiving body-mind, a unified whole that is the active participant in an unfolding reality. Rather than a body that is tall or short, now or then, beautiful or grotesque, this literacy starts by acknowledging the body as the soma, an attention to the feeling, evolving, dynamic, living body. This kind of knowing is always a becoming, where the threshold for knowing resounds in the sentient body.

We come to know our worlds through a variety of registers of attention or tiers of experience. These are attentions to the visual, aural, logical, and somatic. The Cartesian mind/body split has been challenged for more than a century. Rather than separate parts, the second Soma Literacy assumption is the embodiment of the actor, where one's thoughts, actions, and attentions are all implicated, one affecting the other and even determining the other. The challenge of the aforementioned attentions is in juggling one beside the other. Ontologically, we are embodied beings. Practically however, we develop habits and coping mechanisms that often skew and limit the potentials of the experiencing body. The western biases toward seeing, hearing, or thinking can run so rampant as to override the root discerning of experience, the resounding feeling in the sentient body. Rather than seeing these four tiers as mutually exclusive modalities, the ideal is to reintegrate the embodied actor such that I develop an understanding and vocabulary for what I experience, what I see/hear/feel and then how I come to logically reflect on that embodied knowing.

Of the attentions noted, the somatic is the least rehearsed or embraced by the academy. Throughout my twenty-five years of teaching at the university using body-based methods, I have found that the somatic is such a distant attention, that students often report "the complete 180", the way in which noticing the soma has completely reoriented the way they process their own experience. While visual literacy has enjoyed a proper discourse since the 1960s, philosophy (the literacy of logical thought) theorized and taught since the dawn of western civilization, and aural literacy (such as music theory) scrutinized since antiquity, the formal, accepted acknowledgment of the sentient body in experience has remained only the attention of varied disparate specialists. This lack of attention has left much of Western society, and design practice in particular, without an understanding, a language, a vocabulary, or a skill set with which to play-in and grow. In design today, with the advent of overtly participatory artifacts, these attentions are critical. If the practice is to discuss and design with efficiency, impact, and authenticity, an understanding, "sensory and cerebral, . . . characterized by an inward responsiveness to an outward stimulation," (Bari, 2018, para. 2) is necessary.

Soma Literate meaning

Lim, Stolterman, Jung, & Donaldson, wrote a short paper in 2007 titled, "Interaction gestalt and the design of aesthetic interactions." In this paper they lay out a basic case for Soma Literacy in design.

> [T]he challenge here is to create a language that helps a designer understand which attributes are to be considered in order to create a certain gestalt that in turn will result in desired user experiences. . . . This language includes: (1) a good sense of what it is that is designed—i.e. a design target—in our case the interaction itself which we call interaction gestalt, (2) a good sense of what is possible for a designer to manipulate when designing the design target—in our case, the attributes of the interaction gestalt, and (3) a good sense of how to manipulate these attributes in order to shape a specific design—the interaction gestalt. We will discuss how those attributes of the interaction gestalt can actually be used in designing aesthetic interactions. (Lim et al., 2007, p. 240)

However brief and nascent, the paper gets a third assumption of Soma Literacy exactly correct. Soma Literacy is an exploration and skilling in the *shapes of interactions*, not the emotional reflections that these interactions spur in the individual actor.

> An important character of these attributes is that they are *not* experience qualities. They are simply descriptions of the *shape* of the interaction, and not emerging experience qualities. Experience qualities are . . . connected to personal judgment such as fun, engaging, comfortable, pleasant, excited, and etc., which do not describe the interaction shapes, but describe overall qualities of user experience. (Lim et al., 2007, p. 249)

There are two kinds of *meaning* that one might discuss when considering the results of an interaction. The most common is the "experience quality" or *emotional narrative* that one tells when trying to decide in what ways the interaction comments on their past history. These are the descriptions of happy/sad, exciting/upsetting, etc. Soma Literacy notes a second kind of *meaning* which is the raw aesthetic of the experience. The aesthetic, the active feeling created in the embodying of an event, occurs pre-reflectively. It therefore contains qualities that can be described separately from the emotional narrative. The first perspective assumes that all experience is personal, so personal as to render it impossible to design or share with another individual. This disposition values the reflective narrative and is driven by individual context and history. The second perspective, the Soma Literacy agenda, also personal in that it touches the feeling-self, looks at the *shapes of interactions*, and notes that the base concepts of experience are universal: tension/release, dynamic ebb/flow in an organic model, awkward/beautiful, *yearning-toward/away-from*—all shifts of weight.

Soma Literate *meaning* is just this, the understanding of the bodied implications of an interaction. These implications can be described as the *shape of an interaction*, or the design of an interaction, a design that designs with a palette of variables specific to the somatic tier of experience. In its most reductive definition, Soma Literate meaning revolves around *shifts of weight*. The body needs motion to feel. In order for the motion to carry meaning it must possess trajectory. Without the

experienced *shift* from nothing to something, from here to there, the interaction will not register as a happening, it will carry no meaning (in either definition of the term). When the trajectory is realized in the core of the body *soma-deep*, either as being literally tossed about or as in a "gut reaction" or "weight on my chest" etc., we recognize the interaction as transcending the mundane, creating an opening for significance.

In section 2.3 I parsed out three attentions of embodied experience that highlighted the ways in which we might notice the shapes of interactions. The first lens of attention clarifies how one can assess an experience by noting if it literally feels in the body or not. Some interactions miss the body and some barely touch it, while others are deeply felt. The second lens assesses an experience based on the literally felt motion in the interaction. Where some experiences are defined by their *yearning-toward* vectorial trajectories, other aspired-to experiences fall flat as static, unable to engage. The third lens of experience analyzes the interaction based on the impact to the actor. The third lens is the threshold for empathy-*with*, the noting that embodied is never a solitary, isolated being; rather it is a union-*ing-with* the Other. The third lens considers these embodied moments on a scale, from the quotidian to the profound. How much is the current interaction common to your normal routines, and how much does the empathetic act force you to be significantly more (or less) than your common version of you? These three attentions are all discerned, not in a post-event reflection, but in the *in time*, unfolding experience.

Currently the fields of IxD have a very shallow understanding of interstitial spaces, performative entrainment, and awareness of the experiencing body. As has been shown through the literature review, there is no agreed-upon understanding of *experience* or *embodiment* as would be relevant to design, and there is no common listing of terms, concepts, or recognized palette of temporal variables. **Literacy reveals what is hidden to the illiterate.** Without an overt conversation of Soma Literacy, the design fields cannot see what is felt (here I now include HCI, IxD, etc., as well as music, dance, drama, cinema, painting, and architecture). The reading of a shopping list, service design blueprint, journey map, musical score, Laban notation, or hiking trail map are

doomed to only be seen as a series of touchpoints, isolated cruses until the engaged, body-in-action is thrust to the front of the attention. At this juncture a *180* is possible, where the previously understood design can be known through the somatic, a tier of living experience always present and ripe for knowing.

Soma Literacy is both (1) a way to analyze my experience (analyze why a moment was or was not impactful) and (2) a way to create or foster an experience by willfully participating (or not) in the heavy/light that surrounds us or by designing an experience with these soma variables in mind. Soma Literacy gives one a specific and significant lens to see through and participate in the world. It reveals tiers of experience that are hidden to many. Surfers, yogis, athletes, and many performing artists have found such an attention to experience through their varied modalities. This thesis brings the varied soma attentions under a single heading, and expresses both the validity and the opportunities for the design fields in gaining such an understanding.

4.2 Soma Literacy concepts

Universal Principles of Temporal Design

The fields of design have undergone an absolute transformation in the past twenty years. While communication design and product design have long histories, modern foci such as Interaction Design, Service Design, Experience Design, and Transition Design have pushed the collective attention into completely new conversations compared to past generations. What most of these new design foci contain is an awareness of time. In this modern era, even the fields of communication design, industrial design, and architecture are keenly aware of their performativity. Rather than static posters, toasters, and monoliths, we recognize that the value of these artifacts is not demonstrated in remote, static, disconnected images . . . rather, in all cases, the value is experienced *in time*, and that experience requires investment by participating bodies. Without participation, *in time*, the artifact speaks to no one.

What is *in time*? How does one access this space and what variables can one manipulate in this palette? What is the equivalent of kerning or line weight or perspective in the temporal canvas? Once one starts asking these questions, the tools and palettes immediately expand to include participating performative bodies.

When planning the Fundamentals of Experience unit of study, I consulted Lidwell, Holden, and Butler's *Universal Principles of Design* (2010) which presents 125 different principles of design edited into a concise survey of concepts. Of the 125 principles, I noted how very few touched on the temporal, and of those that did, even fewer understood the role of the body in discerning experience. Continuing the strategy of Lidwell, Holden, and Butler, I then set to investigate, reveal, name, build, and play with an ever-evolving list of temporal concepts. I compiled these into the Soma Literacy concepts below. Prior to this, there was not such a collection of these temporal concepts amassed for the design professional.

In the following pages I lay out an incomplete succession of temporal design concepts, ideals, and variables focused on the performative applications of modern design arenas. Contained here are many time-based somatically experienced variables that the fields are ever more dependent on. The ideas and theories are drawn from a number of sources, primary among them my 25 years teaching as an instructor of Eurhythmics based on the work of Émile Jaques-Dalcroze.[40] The concepts presented are not intended to serve as the exhaustive list of soma tier temporal variables. As the reader works through the varied titles, the hope is to build a framing or a lens with which to analyze experience, both designed and mundane. I encourage the future adding, subtracting, refining and debating of any of the presented entries.

As the design community builds such a vocabulary and a practice around the somatic, I hope that the resulting designs will be appreciated more for their ability to engage the actor than for other concerns. Without engagement, the participating, the unfolding, the driving forward, the *yearning-toward*, the gait, the cadence, the interaction . . . without the experience-*ing*, there is no experience. And this is what we design. Regardless of the specialty . . . we propose artifacts that engage the actor *in time*.

40 Émile Jaques-Dalcroze (1865-1950) recognized that there was something to the body-in-motion as a primary revealer of an often-overlooked tier of experience. He recognized that the motion-filled, *forward-yearning*, arcing lines of gesture can serve as an aid in recognizing this less obvious tier that is central to our feeling experiencing body, the soma. Throughout his life, Jaques-Dalcroze developed an attention to the tier of experience revealed through the body-in-motion. His work culminated in Eurhythmics, a course of study presented in an open classroom without tables and chairs, traditionally bare-foot, and focusing on kinaesthetic (individual) and enkinaesthetic (social) experiences designed to direct the student's attention to the somatic tier of participation. Through the redirection of attention, the actor/designer is able to know an event through a new or different lens. Rather than just seeing the façade of the design, the student is primed to recognize multiple other literal connections in the experience, connections registered in the sensuous-physical-bodied soma tier.

These Soma Literacy concepts presented as Universal Principles of Temporal Design are listed in alphabetical order to eliminate any value hierarchy.

45 concepts of Soma Literacy

Accent
Agogics
Alignment
Anacrusis–Crusis–Metacrusis
An Experience
Anthropomorphic Form
Attentional Hierarchy
Beat
Cadence
Coherence/Interactional Gestalt
Contour Bias
Depth of Processing
Empathy
Entrainment
Eurhythmic/Arrhythmic
Figure–Ground Relationship
Flow
Fluency
Gait
The Golden Gesture
The Grand Pause
Hierarchy
Hierarchy of Needs
In Time
Inertia
The Interstitial
Kinaesthesia and Enkinaesthesia
Meter
Nudging/nudges/nudgable
Phrase
Poise
Range–Vision
Rhythm
Shift of Weight
Soma Literacy
Syncopation
Tempo
Temporal Fit
Temporal Relativity
Tension and Release
Tiers of experience
Time–Space–Effort
Vectorial Trajectories/ Yearning-Forward
Weakest Link
Willful Performance

Universal Principles of Temporal Design

Accent

n. the distinct emphasis given to a moment in time.

Accent is the term used to mark the impact of a given moment or beat. Accents are experienced as heaviness or lightness and add novelty relative to the surrounding moments. Most accents are experienced as augmentation; they add weight to the anticipated moment *in time*, although accents of diminution are also possible. A moment of surprise or shock will create a weightiness that is more than was expected. It defies expectation by addition. A moment of disappointment or betrayal may leave the actor feeling empty or breathless, defying expectation by subtraction.

Accents can be agogic, dynamic, timbre, harmonic, rhetorical, somatic, etc. or in any combination of the above.

see Agogics

Agogics

n. the study of duration.

The rule of agogics states that longer equals heavier. Actors gravitate to heavy moments in time and one can design heaviness through duration. It is a common technique found in all performative experience. In rhetoric, we experience it as the lengthening of significant words.

Read the following quote from Dr. King:

> *I have a dream that one day this nation will rise up and live out the true meaning of its creed: 'We hold these truths to be self-evident: that all men are created equal.' (King Jr., 1929-1968, n.d.)*

As we hear Dr. King speaking, we feel the heaviness, the emphasis on some words over others. Some of this emphasis is accomplished by either lengthening specific words or lengthening the silent space surrounding significant words. Notice how insignificant words regularly have the least duration.

It should be noted that agogics are only relevant as these long-and-short moments are compared to surrounding moments. Agogics are found in moments heard, seen, or felt, through words, beats, beeps, pauses, etc.

Alignment

n. an arrangement of variables in appropriate relation to one another.

Communication Design speaks of alignments such as left justified and tab usage. What is the temporal version of left justified? Meter is a good example. Both alignment and meter deal with predictability. Left justified text allows the eye to anticipate the new line before focusing on it. Meter is an alignment of time that is used to allow the actor to anticipate pending weight shifts. Temporal alignment is any cue that permits the actor to anticipate the pending moment.

see Meter

Anacrusis–Crusis–Metacrusis

n. the progression of the parts of any action.

Anacrusis (Émile Jaques-Dalcroze & Rothwell, 1930) is the *gesture-* or *yearning- toward*. It is everything that is both preparatory and in motion toward a resolution.

It is the first two syllables in the word Mississippi.
It is the years of courting that builds to an engagement ring or break-up.
It is the proliferation of nuclear arms and the mounting heated rhetoric yearning for the dropping of the bomb.
It is the ringing of the doorbell, the wind-up, the inhale.
The anacrusis *yearns-forward* for its crusis.

Crusis is the point of arrival. It is the specific instant in every beat/event/yearning where the actual arriving is marked. Cruses take up no space or time. They are instances *in time* to which one is always *driving-toward* or *away-from*.

The crusis is the ball hitting the bat.
It is the instant of recognition for a job well done.
It is the body's actual striking the ground when falling off of a skateboard.
It is the moment of greatest heaviness at the bottom of a swing.

Metacrusis is the follow-through. It is the fall-away. The metacrusis is the trajectory created from the anacrusic gesture meeting its crusis. The metacrusis yearns for equilibrium.

In cyclical motion like pendulums, swimming strokes, or tides, it is often not clear where the metacrusis ends and the following anacrusis begins.

Crusis is every city on your travel agenda and is also the items you list when reporting on your day. Each city on the report or title on the list is most often a crusis. It is not the experienced beat or event. The anacrusis and metacrusis take up time and drive toward or away-from the crust instant. One spends a lifetime in constant *yearnings-toward* juxtaposed with *fallings-away*. One can *list* the crusic moments but can only *experience* the build-*toward* and the retreating-decay.

The crusic gesture (anacrusis–crusis–metacrusis) aspires to progress through all three parts to equilibrium. The full gesture requires motion that is always driving-*toward* or falling-away. The crusic gesture cannot be static, or wait, or pause.

> I have emphasized the fact that every integral experience moves toward a close, an ending, since it ceases only when the energies active in it have done their proper work. This closure of a circuit of energy is the opposite of arrest, of stasis. Maturation and fixation are polar opposites. Struggle and conflict may be themselves enjoyed, although they are painful, when they are experienced as means of developing an experience; members in that they carry it forward, not just because they are there. (Dewey, 1934, p. 42)

An Experience

n. the significant experience.

John Dewey, the American pragmatist philosopher put a fine point on the general term of experience. Rather than an all-encompassing, experience-at-large, Dewey separated those experiences of significance. There are the forgettable observations and participations of daily living, and then there are moments of impact that cause a stir in the soma. These events constitute *an experience* (Dewey, 1934).

In Dewey's model, any experience that lacks cohesion through vague temporal connections, or rigid automatisms is characterized as an anti-experience, *anaesthetic* (Núñez-Pacheco, 2018). In his model, an interaction does not amount to *an experience* until the participant perceives the action and the action is believed to have intention.

It should be noted that (1) even a well-perceived succession of individual points in time does not guarantee experience with intention (trajectory), and (2) the proof of *an experience* lies *in the actor* (who may or may not be the designer). Cohesive experience requires the actor be in communion with the sounds, words, moving images, thoughts, or gestures and participate in the presentation as motion unfolding.

> Experience is the result, the sign, and the reward of that interaction of organism and environment, which, when it is carried to the full, is a transformation of interaction into participation and communication. (Dewey, 1934, p. 22)

see Inertia, Soma Literacy

Anthropomorphic Form

n. possessing human shape or characteristics.

The anthropomorphic form bias states that humanlike static forms are more appealing to actors than foreign shapes. The temporal equivalent is found in gesture. Motion with *an affinity to the human body (Todes, 2001)*, or rather, "natural" will be more appealing compared to an *implied* gesture (think mechanical or digital) that is seen as foreign or manufactured.

See also Contour Bias, Golden Gesture

Attentional Hierarchy

n. the selective consciousness resulting from a narrowing and ranking of experiential variables.

A Soma Literate attention notes that hierarchy in any temporal design is proven in the arrangement of attentional variables in the performative moment. Where the concept deserving attention is often assumed to be fixed, as though one just sees or perceives the obvious content in front of them, in reality, our hierarchy of attention is regularly both a default disposition and exceedingly malleable with appropriate skill and priming.

For a discussion of default disposition see *Temporal Relativity and Willful Performance*.
For priming see *Range–Vision*.

see Figure–Ground Relationship, Range–Vision, Temporal Relativity

Beat

n. one swing of the pendulum.

The beat of an interaction is the cyclical pulse that marks the successive moments of the happening. Beats are predictable, measured, and relative. They can speed-up, slow-down, present as pulses like a heartbeat or the buzz of a bee wing or the cycles of the sun.

Beats are felt as *shifts of weight;* moments of heaviness separated by moments of lightness. The beat of an interaction is relative to the actor (their literal size, their disposition, their past experiences), the environment, and the culture. It is possible that different actors may participate in the same event but experience different beat levels relative to themselves.

see Anacrusis–Crusis–Metacrusis, Attentional Hierarchy, In Time, Temporal Relativity, Shifts of Weight

Cadence

n. the coming together of experiential variables that result in the sensation of resolution.

The Soma Literate reading of cadence describes a specific set of beats searching for and achieving closure. A cadence is formed as a succession of beats completes the trajectory they were *yearning-toward*. This completion may be profound, like the last words of Shakespeare's *The Tempest*, "As you from crimes would pardoned be, Let your indulgence set me free," or a cadence can also be significantly lighter, like the close of a common sentence or arrival at the corner bus stop to await your morning ride.

see Beats, Phrase

Coherence/interactional gestalt

n. the integration of temporal elements into a completed whole.

Soma Literacy recognizes that a mere ordering of temporal variables cannot constitute a coherent experience or what Lim et al. (2007) describe as an *interaction gestalt*. Coherent experience requires an embodiment of vectorial motion, not the simple hitting of ordered touchpoints, but a participatory engagement *in time* with momentum. Without an attention to momentums, there can be no temporal coherence.

Contour Bias

n. the prejudice toward natural gestures.

The common understandings of *contour biases* regularly miss the interactive opportunities. In three dimensional designs we are biased to prefer natural *shapes*, as in the design of a rounded soap dispenser or curvy car. In the temporal canvas we are drawn to natural *gestures*. Whether it be through UX designers or conductors of orchestras, rounded natural motions offer readability over the mechanical or static by permitting the actor a model capable of entrainment and empathy.

See Empathy, Entrainment, Golden Gesture

Depth of Processing

n. "A phenomenon of memory in which information that is analyzed deeply is better recalled than information that is analyzed superficially." (Lidwell et al., 2010, p.72)

Soma Literacy notes that deep analysis in the temporal realm first requires movement/participation *in time*. Reflection after the moment is not part of the Soma Literacy agenda. Analyzing deeply *in time* requires *feeling deeply*. This is attention to the soma tier of experience.

see Soma Literacy, In Time

Empathy

n. the ability to share in the 'feeling-with' the Other.

Somatic *empathy* to/through the world amounts to a specific kind of knowing, a literacy unto itself. This felt/participatory *pathein* quality of *empathy* involves shifting things (happenings, phenomena, events, opportunities) on the outside, separate from me, into a felt experience; felt as part of myself. This is an entirely different way of knowing compared to a scientific knowing where one names and categorizes in a sterile and distant way. Rather than remaining isolated or separate, *objectively* appraising an event as an impartial observer, experience, in its idealized form *pathein*, is messy, implicated, and participatory. In this manner, Soma Literacy assumes that there is no *objective knowing* of experience. One must *subjectively* participate in the event. One must shift the sterile potentiality on the outside into a messy and implicated happening of outside/inside combined and felt.

> . . . sensory and cerebral, . . . characterized by an inward responsiveness to an outward stimulation. (Bari, 2018, para. 2)

Entrainment

n. the synchronizing of one moving thing or being to another.

To entrain is to arrange the unfolding cyclical moments of heavy/light in one performer so as to coincide with the cyclical moments of heavy/light in another performer. Not only a coinciding of crusic *hits*, Soma Literate entrainment recognizes a syncing of the building and decaying momentums/inertias/trajectories *yearning-toward* the crusic moments.

Walking in lock-step, passing the baton in the relay race, and adjusting to a new time zone are all examples of entrainment. Easy conversation where both parties share a seamless pacing and an effortless back and forth is a form of entrainment. As one approaches an escalator, they must entrain their walking gait to synchronize to the moving stairs before stepping on.

Entrainment is not exactly optional. We desire harmony with our environment and the persons and things around us. It is such a strong desire to be-*with* that the the actor is notably *nudgable*. From the view of the actor, entrainment presents as *self* to *self*, *self* to *other*, *self* to *thing*, *self* to *environment*. The temporally minded designer will do well to recognize the cycles of heavy/light that are present in a given situation and search for ways to ease the transition from stand-alone actor to entrained actor.

> . . . we entrain with the world while having an aesthetic experience, we *let the world act upon us* as we are trying to identify, understand or interpret the current action, i.e. as we are trying to form a clear representation. This contrasts with an instrumental relationship, where we attempt to bent the world to our desires (in aesthetic conduct we adjust our mental representations to the world). We are being receptive to the world. (Lesage, 2015, para. 48 emphasis added)

see *In Time, Flow, Gait, Nudgable*

Eurhythmic/Arrhythmic[41]

adj. Eurhythmic is simply 'with good flow' whereas Arrhythmic is an absence of good flow.

> Users find it hard to engage deeply with artefacts where there is no growth no change, no narrative and only predictability. However change alone alienates users through a lack of coherence. Therefore, *a smooth and seamless shift* must be present in order to evoke sensations of mutual growth. (Chapman, 2015, p. 76 emphasis added)

Figure–Ground Relationship

n. The association and dependency of one object or being compared to another.

In two dimensional designs, the figure–ground composition can be stabilized through thoughtful attention to the layout. In designs that are experienced through motion, temporal attention assumes an *unfolding* of figures and grounds. The relationships between these competing variables present as another example of hierarchy in attention. The actor can choose what to give attention to. An actor cannot be forced to see or notice. A designer can nudge the actor in a given direction, but the final experience is in the body of the beholder (via default or choice).

see Attentional Hierarchy, Range–Vision, Willful Performance

Flow

n. "Optimal experience in work and leisure" (Csikszentmihalyi & LeFevre, 1989, p. 815).

In 1989, Mihaly Csikszentmihalyi and Judith LeFevre published "Optimal experience in work and leisure." In it they lay out a description of optimal experience, a specific type of interaction or mindset that we now know as *flow*.

41 Attributed to Jaques-Dalcroze (1921; 1920).

Flow theory postulates three conditions that have to be met to achieve a flow state (Nakamura & Csikszentmihalyi, 2009):

1. One must be involved in an activity with a clear set of goals and progress.
2. The task at hand must have clear and immediate feedback.
3. One must have a good balance between the perceived challenges of the task at hand and their own perceived skills.

The flow state is defined by the following six factors:

1. Intense and focused concentration on the present moment
2. Merging of action and awareness
3. A loss of reflective self-consciousness
4. A sense of personal control or agency over the situation or activity
5. A distortion of temporal experience where one's subjective experience of time is altered
6. Experience of the activity as intrinsically rewarding

Flow is the holy grail of designed experience.

> For Heidegger, the 'nadir of inauthentic temporality' is time as a sequence of instants . . . which is opposed to the lived time of *Dasein*, and whatever gives it meaning. (McGilchrist, 2009, p. 143)

Fluency

n. With ease and gracefulness in unfolding time.

Gait

n. gait is beat bodied.

If the *beat* is embodied, it can be said to have a gait. The most common example of gait is in the walking gesture, but the click-clack of a train on the tracks can be described as a gait to the extent that the observer *feels* the rise and fall of the predictably progressing beat.

See Beat

The Golden Gesture

n. an ideal ratio in unfolding time.

The Golden Ratio is an idea that suggests there is an ideal arrangement or ratio of lines and spaces in the visual realm. It proposes that designs that adhere to the ratio tap into an innate attention in the actor, an attention for the the beautiful, the well-placed—rendering the image more readily understood or easily embraced.

Similarly, the Golden Gesture, originating in the Soma Literacy research, occurs in the realm of motion and is only expressed *in time*. The Golden Gesture is exemplified in the swing of the pendulum. It is a fundamental and ubiquitous motion, recognized as a basic truth of physics on this earth. The Golden Gesture proposes that temporal designs that adhere to this ratio tap into an innate attention in the actor, an attention for the eurhythmic—the right, the beautiful, the well-placed—rendering the image more easily embraced or empathisised-*with*.

Things fall. The falling motion has an exact formula of acceleration when starting at rest and suddenly rushing to full velocity. It is most easily described on the playground swing. If pulled out to the highest point and then released, the child on the swing starts from no motion and slowly gains speed into the bottom of the swing only to be turned around and tossed up again on the other side. The acceleration into the bottom (anacrusis) passes through the moment of greatest speed (crusis) and decelerates as it moves away from the crusic point (metacrusis). The acceleration and deceleration happen in exactly specific unfolding formulas.

Riding the playground swing reveals another dimension in the experienced gesture. In addition to the acceleration and deceleration present in every swing, there is also a sensation of gaining and shedding weight while in motion. To be in stillness, one feels the pull of gravity in a manner that we recognize as normal; *I feel like me*. Once in motion, the swing takes the static sensation of being still and turns it into the most perfect example of *the dynamic*. At the outside edges of the swing the child is tossed upward and passes through a moment of absolute weightlessness, only to be released into a free-fall that both gains speed

and also the sensation of weight. As the child drives toward the bottom of the swing, they gain so much weight that for an instant they weigh more than their at-rest weight. The moment is transcendent as they become amplified and their experience is rich rather than mundane.

The Golden Gesture is not random or creative. It is both an exact and perfect gesture; it is the definition of *natural* movement. It is exploited for its rich interaction on playground swings and rollercoasters. It is also inherent in every step we take and every ball we toss. It is not only found in physical gesture but in all of temporal experience. It is in the cadence of your natural speaking and in the way one perceives an array of road signs while driving down the street (we feel the anacrusis–crusis–metacrusis of each). The short definition reads, "The Golden Gesture is experienced as the *shift of weight*." One cannot shift weight from one place to another without tapping into this specific progression of heavy/light.

Similar to the Golden Ratio, built interactions that acknowledge the Golden Gesture ideal, result in smoother transitions and more seamless readability. They engender trust and permit an engagement in the beauty of the world.

see Anacrusis–Crusis–Metacrusis, In Time, Inertia

The Grand Pause

n. an exaggeration of a suspended moment of silence.

The Grand Pause is a term borrowed from music that names an exploitation of anticipation. It is the "pregnant silence." The grand pause is not to be confused with stillness. This absence of sound is robust with yearning. It is absolutely active. The grand pause is the holding of one's breath that we know will have to release eventually. If the attempted grand pause has no sense of urgency and imminence, if it accomplishes no bodied motion, then it is a failed silence. If it feels like an anacrusis leaning ever toward a crusis, then the extended silence can be quite breathtaking, pulling attention and relaying an exceptional type of power.

see Anacrusis–Crusis–Metacrusis

Hierarchy

n. the willful ranking of variables.

Lidwell, Holden, and Butler present a version of hierarchy for design that only considers the information organizing perspective. Hierarchy in Corporeal Design is far more ubiquitous and powerful than just the choice to utilize menus in a web page. Hierarchy is the basis of free will. The empowered citizen can arrange their priorities to their values. The intentional actor can design their own unique interaction where the lemming actor is forced to follow mindlessly. Hierarchy preexists experience. One can choose personal levels of attention in advance, or if not, a designer may choose these for them.

See *Willful Performance*

Hierarchy of Needs

n. the ranking of 'in time' variables as explain human motivation.

Maslow's Hierarchy of Needs attempted to explain human motivation. Lidwell, Holden, and Butler's Hierarchy of Needs lay out a ranking of design goals. A temporal Hierarchy of Needs points the reader to the *in time* ranking of experiential ideals.

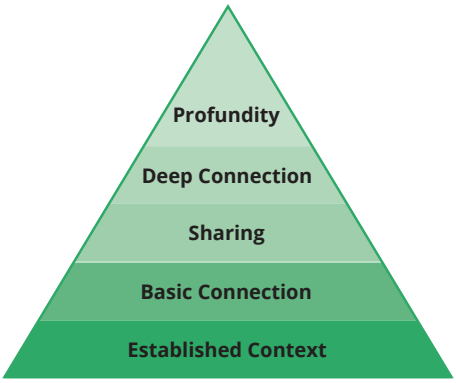


Figure 23. Temporal Hierarchy of needs.

1. Established Context (I am in a painting gallery.)
2. Basic Connection (I recognize this in the painting)
   I see a dog.
3. Sharing (I recognize this in the painting that relates to myself)
   I see a dog. I used to have a dog.
4. Deep Connection (I recognize myself in the interaction in some manner. I empathize in a self-*with* Other manner.)
   I see a dog and I miss my old friend.
5. Profundity (I am transformed in my interaction) Catharsis, transcendence, flow all occur at this level.
   I think of my life differently now that I have been led to process this scene in this way.

A Temporal Hierarchy of Needs reveals that there is not just *do* or just *experience*. Participation occurs on a spectrum[42] from shallow to deep, from cutaneous (as superficial as the lightest brush by a finger) to soma-deep (the sensation of organs sloshing about while riding a swing, or the feeling of dread in your gut) (Neely, 2018).

See An Experience

In Time

n. the experience as it is happening, separate from the reflective experience.

In time is the first assumption of Soma Literacy. Everything happens *in time*. This is not the "just in time" of catching your bus, but rather, the "Step *In Time*" that Bert sings about in Mary Poppins.

The concept of *in time* highlights the aspiration to entrain to our surroundings and that that entrainment happens only when a compromise is made between oneself and the other force. Further, the compromise must be made at the opportune moment (*kairos*). Once missed, the entrainment is impossible and *in time* is broken.

In time is the experience as it is happening, separate from the reflective experience. Zen practice speaks of *being present*. This is the essence of *in time*. It is "in the moment" and should be treated as a unique, fleeting, and the most authentic mode of interaction. Memories warp, evolve, define and redefine past events. The sensuous experience, as it happens *in time*, is the authentic performance that only happens once.

Inertia

n. is the yearning-forward, uninterrupted feeling of progression through the periods of anacrusis–crusis–metacrusis.

The living being is always in motion. One is not truly static until death. Our heartbeats, respiration, even the vibrations of electrical impulses to specific muscles are measurable at every moment of life. To be alive is to be in motion. To *feel* alive is to notice this motion. Inertia is neither

42 see section 2.3 Experiential Lens

forced or reserved. It is not random or creative. Somatic *inertia* is the *yearning-toward*, natural, free flowing, and uninterrupted feeling of progression through the periods of anacrusis–crusis–metacrusis.

The Interstitial

n. is the space between.

One of the profound takeaways from the *Fundamentals of Experience* study was the realization that our vocabulary and tools to represent happenings as unfolding events is amazingly shallow. To truly note the unfolding, one needs to see the spaces between the cruses as active, inertial, and vibrant. All of the action happens in the in-betweens.

We are quite good at listing the events of the day and treating the list as if it is the honest representation of the day, yet it is none of the experience. 100% of our experiencing exists *between* the moments described on our lists. Attention to the interstitial is not merely a recognition of generic motion in experience; it is the understanding that all significant movement is either *yearning-toward* or *-away-from* the moment of happening. The crusis is not the experience. This moment is just a point in time that is lost as quickly as it arrives. One cannot experience the instant of note (crusis). We experience only the *drive-toward* and *away-from*.

> We give names to things, but not to the spaces between them.
> (Steenson, 2017, p. 55)

Kinaesthesia and Enkinaesthesia

n. awareness of movement, personal and collective.

Kinaesthesia is the awareness of the movement of one's own body. It is an attention to the base motion, trajectory, and the sensuous reality created as a result of the body in motion.

Enkinaesthesia (Radman, 2013) is the awareness of the movement of one's own body among and with other social bodies. It is an attention to the social motion, trajectory, and the sensuous reality created as a result of the body in motion in concert with other bodies in motion.

Meter

n. beat patterned.

Meter describes the hierarchical patterns into which beats fall. In music, the meter may be described as being "in 4" or "in 5" etc., meaning that the beats fall into regular groupings of 4 or 5 beats per set respectively. In somatic experience, the term is more general, pointing to any regular groupings of the experienced beats in an event permitting the forcasting of future beats.

See Syncopation

Nudging/nudges/nudgable

adj. the inclination to go with the flow.

A foundational assumption of Soma Literacy is that *we yearn for harmony with our world*. We aspire to entrain to our surroundings: *self to self, self to others, self to things, self to environment*. This yearning for harmony or entrainment begets *nudging*. Here I mean nudging not in a patriarchal behavioral economics reference (Thaler & Sunstein, 2008), but rather, in the literal bumping of a body to be here not there. The desire to be in harmony with our world is so powerful that we, the performing individuals, self-nudge constantly to keep our personal in-the-moment trajectories in sync with our surroundings. Once recognized, this self-moderation, self-nudging becomes a powerful insight into the performativity of daily interactions. There are choices I make because I have had time to logic them out and can verbalize the intention, and there are thousands of others that I make below the level of conscious thought, decisions I make solely because they feel. I am in a constant bodied dialogue with my environment and am nudging myself into harmony or entrainment hundreds or thousands of times every day.

> Another conceptualization of the artifact is that it is a work of persuasion [24] or rhetoric [15]. For [24], technology can be used in persuasive ways (which suggests that some technologies are not persuasive). . . . For both, persuasion/rhetoric is not merely transitive from the intentions of the designer to its effects on the user; in some sense, persuasion is projected by the interface itself. . .

> . . . [The] persuasive/rhetorical artifact argument suggests that an inanimate object—a design—is conditioning everyday, practical living. This claim has obvious ethical implications, which both [24] and [15] explicitly consider. Note that ethics is all but irrelevant if a design is just a tool, because ethical agency is situated squarely in the user. But if designs persuade people, or reshape everyday life, they can in that limited sense be understood to exercise agency and have an ethical dimension. (Bardzell, 2009, p. 2364)

Phrase

n. a completed crusic gesture.

A phrase is the successful crusic gesture (anacrusis–crusis–metacrusis). It proceeds with momentum, *yearning-toward* equilibrium. It is what Dewey describes as a "circuit of energy" that "moves toward a close" (Dewey, 1934, p. 42).

Poise

n. the ability to adjust one's bearing to meet forthcoming demands.

Poise is the entrainment of *self with self.* It requires an idealized vision/anticipation of the near future and a skillfulness to self-nudge the performative body into the preferred state.

> The person who cannot coordinate his actions, and is awkward, spends most of his movements in fighting himself.[43] He cannot turn his attention to "foreign affairs" and to "defense" because he is the ruler of a hopelessly anarchic domestic society that does not carry out his orders. To deal effectively with objects around us, we must be able to anticipate them before we reach them, or they us, so that we can then be prepared at the actual moment of meeting to respond effectively. If we can act only with parts but not with the whole of our body, then the sets or anticipations of parts of our body are very likely to be blocked at the crucial moment of meeting by the unpreparedness of the rest of our body. (Todes, 2001, p. 46)

See *Empathy*

43 This is engagement of self with self. See the four bodies of embodiment, section 2.4.

Range–Vision

n. the conceivable list of options available expressed as breadth and depth respectively.

Range speaks to the vocabulary the actor possesses. It is not necessarily a list of words, but rather the known or believed current options of an unfolding situation. If you are asked to "stretch" physically, the average Joe will know that they have a different range of motion than their neighbor who is a gymnast. If you ask a peer to solve a problem, they will look to their bag of imaginable solutions. This is their range. In that moment, they are not able to stretch any further to see alternate possible options.

Vision is the individual's prediction, or self-awareness of future range. The gymnastics coach might think, "I can see you will be able to do the back-handspring some day in the future if you follow this training routine." Teachers, coaches, and leaders of all types are called upon to demonstrate vision. Designers and actors alike possess range and vision. Design education is deeply focused on expanding both range and vision. Design practice benefits when this focus is turned toward the experiencing actor.

> Service design operates in the realm of emergent and dynamic relationships – among people, between people and things, and between those differently situated. Relationships in service design are also created by imaginations of what things, spaces, places, and people could or should do in the future, and how access to those futures are framed. (Agid & Akama, 2018, p. 800)

> A service designer can "visualise, express and choreograph what other people can't see, envisage solutions that do not yet exist, observe and interpret needs and behaviours and transform them into possible service futures, and express and evaluate, in the language of experiences, the quality of design" (Service Design Network, 2005). (Holmlid & Hertz, 2007, p. 2)

Rhythm

n. a succession of moments of varying lengths.

In music, there is a succession of notes, and rhythm is created when some of them are long and some are short. The rhythm can be predictable, falling into patterns, or quite random. Beat is foundational. Meter is structural. Rhythm is layered over and is relative to the beat and meter.

For example:

> *And I do love thee: therefore, go with me;*
> *I'll give thee fairies to attend on thee,*
> *And they shall fetch thee jewels from the deep,*
> *And sing while thou on pressed flowers dost sleep;*
> *(Shakespeare 1564-1616, A Midsummer Night's Dream)*

The hierarchy is as follows:

> Beat is the base pulse. (the patter of the syllables.)
>
> Meter reveals groupings of the beats. (the iambic pentameter)
>
> Rhythms are the longs and shorts that provide novelty to the experience. (the specific choice of these words, some long some short, some heavy, some light)

Shift of Weight

n. the base action and proof of any embodied gesture manifest as felt motion and requiring a lifting and transferring of weight from one point to another.

The embodied actor comes to know an event has happened through the *shift of weight* experienced in the sentient body. This can be in an overtly physical, gross body tossing, such as on a rollercoaster, or in a mundane bodily action, such as taking a step while walking, or in an implicit happening such as the feeling of mounting change while making a decision. The Soma Literate individual will recognize that the thought action, when part of a complete gesture, will create the *shift of weight* in conjunction with the cadence of the thought.

> [Considering a] writer trying to come up with the precise word for her verse, the implicit and wholistic sense of *knowing-without-explicitly-knowing* can be considered as a felt-sense of the situation: the writer knows what she wants to say, despite the fact it remains in a non-conceptual form until discovered. When the correct word shows itself *a felt shift* is generated, and the writer can carry forward with her process (Figure 4). (Núñez-Pacheco, 2018, p. 34)

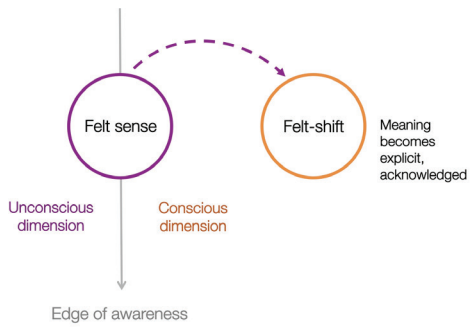


Figure. 24. Where the felt-sense and the felt-shift are situated (Núñez-Pacheco, 2018, p. 34).

see The Golden Gesture

Soma Literacy

n. An awareness of the bodied content present in experience.

The Soma Literate individual is skilled to analyze, interpret, reveal, and make meaning through the bodied content present in experience. The literate individual is able to note the soma tier of experience as distinct from other tiers (visual, aural, logical, etc.) and analyze happenings through this specific lens of the fundamental sentient body-in-motion. Soma-experiences can be mapped on a spectrum from cutaneous to soma-deep (the inwardly understood sensation of kinaesthesia) and understood by asking questions pertaining to meaning, significance, and function recognized in both individual (kinaesthetic) and social (enkinaesthetic) contexts.

see kinaesthesia and enkinaesthesia

Syncopation

n. the experience of weight (or emphasis) where it is unexpected.

Syncopation requires a predictive, metered event, where there are groupings and expectations of moments to come. Syncopation is the defiance of these expectations. Comedians, storytellers, and rollercoaster engineers all utilize this technique to create novelty *in time*.

see In Time, Meter, Beat

Tempo

n. the speed of interaction.

Tempo is noteworthy because the term is regularly treated as a single truth, when in actuality it is highly relative to the participant and easily malleable. Tempo requires a standard to compare to. Does the waterfall pour 1 gallon per second or 4 quarts per second? The volume of water is the same, but the tempo of the attention is truly different.

Tempo is manipulated or reframed when someone coaches, "Don't sweat the small stuff" (quit counting quarts and focus on the gallons).

see Temporal Relativity

Temporal Fit

n. the appropriateness of temporal variables to the participating actor.

"Good design is the absence of bad fit" (Steenson, 2017, p. 28). This is a significant statement in temporal designs as much as it is in 2-D or 3-D designs. In the temporal realm we desire a cohesive gestalt experience and this experience will fit the participant (that is, it will permit an entrainment, an empathy) via the manipulation of temporal variables such as the tempos, accents, agogics, gait, and cadence.

Temporal Relativity

n. The association of our personal temporality (literal and cultural) to the world we inhabit.

Our current reality is relative to our past experience, our culture, and our actual physicality. Our personal history and individual disposition create relevances and dissonances that encourage hierarchical attention to our environments. Your world is the world that is relative to you. The world you know is actually just a micro-version of the infinite full world. We each rank the multitude of possible attentions settling on a world that entrains to our history and our body.

When listening to a new tune on the radio, why do you tap your toe to *that* beat? Why not the beat twice as fast or twice as slow? You choose the tempo that is closest to *the tempo of you*. Your heartbeat, your respiration, your walking gait all fit into a range. This range informs the lens you see the world through, it informs the way you rank and participate in your surroundings.

What beat level would you tap if you could see the world as a mosquito? Or that of a blue whale?

See Tempo

Tension and Release

n. the bodied phenomena of anticipation and follow-through.

Tension and release is a supporting concept to *Anacrusis–Crusis–Metacrusis* and the *Golden Gesture*. Analog motion requires a *shift of weight*. This action is full of potential energy (tension) converting into kinetic energy (release) and back again. To the living sentient being, "stillness" (which is never truly still) mounts as potential energy (tension) and eventually requires a motion, kinetic energy (release). These cycles of stillness/motion, potential/kinetic, heavy/light all follow the *Golden Gesture*. One cannot control every moment of the day, eventually you have to let go. Living is defined by constant, overlapping cycles of *tension and release*.

see Anacrusis–Crusis–Metacrusis, *Golden Gesture*

Tiers of experience

n. analytical registers of attention.

The tiers of experience are the visual, aural, logical, gustatory (taste), olfactory, and somatic. They are each implicated in one another. In actual *in time* unfolding experience, it is not possible to negate the soma in turn for another, rather, the Soma Literacy agenda strives for a skilling that permits the noted integration of the soma with the other varied attentions. The Soma Literate individual is skilled to recognize the somatic tier in conjunction with the other possible attentions.

Time–Space–Effort

n. the expression of an archetypal codependent relationship.

Temporal attention is never about time singularly. To work with time is to implicate space and effort. The three are codependent. If redesigning a given happening, any change to one of these concepts will have to involve a change to at least one of the others.

> *i.e. tossing a ball.*
>
> *If you toss the ball over more space in the same time,*
> *it requires more effort.*
>
> *If you toss the ball over same space in the more time*
> *it requires less effort.*
>
> *If you toss the ball in the same space with more effort,*
> *it requires less time.*
>
> *If you toss the ball in the same space with less effort,*
> *it requires more time.*

Vectorial Trajectories/Yearning-Forward

n. the threshold whereby a motion becomes a gesture.

The bodied experience is defined by the *in time interstitial* yearnings. The experience-*ing* of the experience is in the *yearning-toward* and *-away-from* the crusis. This *yearning-toward* is both moving forward with inertia and momentum (trajectory) and is driving *toward* or *away-from* a specific crusis (vectorial).

> *I lift a foot and expect a floor under it as it free falls back to the earth. I know where I intend to walk for lunch. The path is anticipated. The pendulum swings toward the bottom and rises in the predictable arc. The body is attuned to the cadence and rhythms of the world.*

We aspire to make the IxD as intuitive, as able to be anticipated as gravity pulling my foot. The anticipation of how a UX behaves is felt in the interstitials of the *in time* performative body more deeply than it is considered in the mind.

Weakest Link

n. in attentional hierarchy, the attentional variable that is willfully dismissed.

In automobile design, the designer/engineer chooses which part of the car to make weak as a safety feature. The decision is made by the designer in advance of the actor experience. In the temporal environment, one must recognize that the actor shares in the role of designer. There is a designer who makes plans in advance, but there is also an actor/designer who can, in the moment, decide to prioritize and re-prioritize the many levels of experience in the moment, choosing to make one level the weakest link over another. Like the crumple zone of an automobile, the skilled actor can render some attentions expendable, allowing them to crumple in exchange for other attentions deemed more valuable. While the novice actor will default to weakest links in predictable patterns of attention, an advanced actor knows their *range–vision*, has more flexibility within the interaction, and can direct the engagement to transformative ends.

See Attentional Hierarchy, Range–Vision, Willful performance

Willful Performance

n. the skillful ability to rearrange one's Attentional Hierarchy.

Willful Performance is an advanced concept of Soma Literacy. In novice interactions (which include a majority of mundane acts) we are all tossed about, nudged, and manipulated by our active environments. Because the body yearns for harmony with our worlds, we are in a near constant game of reacting to the provocations coming at us. However, the skillful performer is accomplished in noting the ways that our environments and our default dispositions are manipulating our bodies-in-action. This actor can possess greater range and vision and make choices *in time* that exert an individual willfulness over the world. It is possible in many cases to *willfully choose what I see, what I hear, what I think,* or *how I feel.*

A visually literate actor can choose what to see in the painting or the nature walk. The aurally literate actor may note the pitch and timbre and analyze the event through the multiple sounded variables. Aural literacy is also demonstrated in the skill needed to separate out one talking voice from all of the cacophony in a loud crowd. The soma literate actor not only recognizes the bodied cadences experienced *in time*, entrained to the actor's world, but can also choose which of the constant overlapping cadences they would prefer to entrain to, by resetting their attentional hierarchy.

4.3 Summary

> [I experience beauty as a] somatic-sensory response, a body plugged into a mind, awake to the world and responsive to its suggestions. For me, the beautiful is a kind of prickling around my shoulders, a tightening in my chest, sometimes a welling in my eyes, a feeling of pain as well as pleasure. Sometimes, it is the sense of something precarious, a particular organisation of colour or sound that can be gathered together permanently but nonetheless bears a certain frailty as though both it and the coherence of my attention might fall apart at any moment. At other times, the beautiful can feel expansive, like air inhaled, filling my lungs endlessly. The beautiful demands repetition – reviewing, rewinding, revisiting – as though whatever it might intend to say could never be said enough or too much. (Bari, 2018, para. 20)

There was a point in the late 1990s when Kodak pulled a bit of interaction sleight of hand. In order to lessen the annoyance of waiting for a just-taken picture to load on the DC 210 viewfinder, they first posted a quick low resolution thumbnail of the picture, while in the background the early CPU compiled the data necessary to present the high-resolution photo on the viewfinder (Moggridge & Atkinson, 2007). This seems to be a visual solution to a visual problem, but upon closer analysis I contend that the problem of the slow loading image is not visual as much as it is somatic. We *yearn-toward*. Experience, action, aspiration *yearns-toward* the idealized resolution. The static blank screen version of waiting is anaesthetic. It encourages the chronic tick-toc *chronos* kind of experience rather than the *kairos* feeling of *moving-toward*. Placing the low-resolution thumbnail in the viewfinder, then bit by bit evolving that image into a high-resolution photo provided the actor an interstitial gesture to entrain to, to ride, to participate in.

Soma Literacy is simply a lens for noticing the world, a way of seeing a base reality. While a soma literate attention will aid in ideation (in that it opens-up a palette of new variables), it first needs to be understood as a literacy in noticing a mode of being, interwoven in every moment of the day, whether conscious or not. This mode of being is revealed

through the exploration and skilling in the *shapes of interactions* (as opposed to the emotional reflections that these interactions spur in the individual actor). The Soma Literacy project introduces an awareness of felt motion (weight shifts) into IxD. Where kinaesthesia is simply the feeling of motion, Soma Literacy proposes a rich context, discourse, named concepts, and strategies for analysis.

Soma Literacy is built on the following grounding premises:

1. The body is the first instrument (E. Jaques-Dalcroze, 1921).
2. The body feels. We come to know our world through the immediate tangible interactions with our environment (primary and then derivative) (Lakoff & Johnson, 1999).
3. Feeling (experience) is only revealed through motion *in time*.
4. We yearn for entrainment (harmony) with our world and are therefore nudgable.

Soma Literacy provides a way to recognize the gaits of experience, the felt heavy and light *shifts of weight* experienced in the body while listening to a speech or seeing the architecture hall. It is both a way to analyze experience (analyze why a moment was or was not impactful) and a way to create or foster an experience (by willfully participating or not) in the heavy/light that surrounds us or by designing an experience with these variables in mind). Soma Literacy gives one a new lens to see and participate through in the world. It reveals moments of experience that are often hidden and can make the mundane aesthetic through willful participation.

5.0

A CORPOREAL TRANSITION DESIGN

5.0 A Corporeal Transition Design

The 2019 Transition Design syllabus at Carnegie Mellon University lists twelve strategies that together help to frame the Transition Design agenda. Transition Design is a transdisciplinary field that seeks to guide and enact systems-level change to foster more sustainable futures. It focuses on long horizons of time and notes the concept of worldview as critical when wrestling with the twelve defined strategies. The following seven Transition Design strategies share content in common with the Corporeal Design and Soma Literacy attentions.

TRANSITION DESIGN (Irwin & Kossoff, 2019):

- Brings together two global memes:
  1) the recognition that whole societies and their infrastructures must transition toward more sustainable states;
  2) that these transitions will require systems-level change and a deep understanding of systems dynamics.
- Uses living systems theory as both an approach to understanding wicked problems and designing solutions to address them.
- Develops design solutions that protect and restore both social and natural ecosystems through the creation of mutually beneficial relationships between people, the things they make and do, and the natural environment.

- Sees everyday life and lifestyles as the most important and fundamental context for design.
- Designs solutions for short, medium and long horizons of time, at all levels of scale of everyday life (the household, the neighborhood, the city, the region).
- Sees the designer's own mindset and posture as an essential component of transition designing.
- Calls for the reintegration and re-contextualization of diverse transdisciplinary knowledge.

Transition Design espouses "four mutually reinforcing and co-evolving areas of knowledge, action, and self-reflection" (Irwin & Kossoff, 2019). These areas are 1) Vision; 2) Theories of Change; 3) Mindset & Posture; 4) New Ways of Designing.

Of the four, *Mindset and Posture* shares a number of values with the Corporeal Design agenda. The Soma Literacy workshop held at the Transition Design short course summer of 2018 delved into these overlaps and explored some of the more abstract concepts, offering clarity through participatory enacted study. In the following pages I will describe the ways that Corporeal Design not only comes near to requirements of sustainable transition but can be viewed as a model disposition for fostering a mindset and posture advantageous to sustainable futures.

In time Knowing

> [D]esigners tend to still get their aesthetic education from the contemplation of museumed objects, silhouetted out from their background everyday life, and recast in the ethereal neutrality of the photographic studio. When all sense of *aesthesis* as the experience of things is lost beneath the hegemony of vision, then designers are ill-equipped to design . . . beauty-in-use. (Tonkinwise, 2003, p. 2)

The Corporeal Design and Soma Literacy agendas are convenient allies in that they are well positioned to highlight much of the knowing that Transition Design values. Of first note is the Soma Literacy emphasis on *in time* knowing.

The concept of *in time* recognizes that there is knowing that can only be recognized while in process. This knowing is to be contrasted with the reflective, after the fact, backward-looking analysis. While both are valid means of learning, the *in time* disposition reinforces the Transition Design attention to *living systems* as dynamic, symbiotic, networked and to the gestalt attentions of long time horizons, mutually implicated momentums, and the realities of disequilibrium vs. equilibrium in a living (dynamic) experience.

> Never static, ecological systems are flux-spaces that adapt and morph in response to shifts in environmental condition. (Chapman, 2015, p. 5)

Jonathan Chapman, writing in *Emotionally Durable Design*, notes the dynamics of living systems with some key descriptors. The term *dynamic* is generally understood by an educated audience, as are Chapman's words *static*, *flux*, *morph*, and *shift*. Yet without some semblance of these concepts in the experiencing body, without some amount of somatic literacy, the knowing is vastly incomplete. The Transition Design *Mindset and Posture* area of focus requires not a simple dialectic understanding of ideas such as *static*, *dynamic*, *flux*, *morph*, and *shift* but rather, a bodily-felt *posturing* toward these concepts. The *Mindset and Posture* area is rightly concerned first with a *transition* in the learning designer so as to rightly position themself to the overall agenda of transitions to more sustainable futures.

The philosophy behind the *Mindset and Posture* stance encourages the actor to orient to a more holistic disposition. *Mindset and Posture* is not about memorizing a litany of ecological "do-gooder" facts; rather it is about posturing the body in such a way as to capably wrestle with the deep and complex tasks of sustainable transitions. Irwin, Kossoff, and Tonkinwise have taken the insightful stance that traditional left brain reasoning alone will not accomplish the goals. In order to understand a problem that is *fluxing, morphing, shifting—living* problems in a living earth will benefit from some living *in time* attention and knowing.

Soma Literate Empathy

> Landfills around the world swell with fully functioning appliances—freezers that still freeze and toasters that still toast—their only crime being a failure to sustain empathy with their users. (Chapman, 2015, p. 24)

Listed among the various Transition Design values are multiple mentions of parts vs. wholes. Rather than seeing the world as a storehouse of separate resources waiting to be gathered, we are encouraged to recognize the earth as a living organism where the multitude of resources are implicated, overlapping, and supporting of large vectorial trajectories. Rather than believing that the human is the only sentient being separate from and superior to all else on the earth, the agenda recognizes the human as a part of a living system, inside a living system, implicated with other living systems. Communities vs. individuals, whole systems rather than individual parts, this mindset is one of perspective and humility, recognizing our role in a relationship with other humans, other living systems, and the earth.

Corporeal Design recognizes *four bodies of embodiment*. These are the various ways that the individual actor transcends their siloed, isolated self and can empathize with the Other through embodiment. These embodiments of self-*with*-self, self-*with*-other, self-*with*-thing, self-*with*-environment provide both a context and a series of practical activities where the mindset of self-*with*-neighbor, self-*with*-refugee, or self-*with*-Earth might be made tangible.

Empathy is about making the foreign intimate. It is the ability to make the outside personal. It is the act of making the not-me me and being able to see myself as part of the whole. *Mindset and Posture* is not the part of the agenda that strives to fill the actor with facts about a decaying earth, it strives to encourage a knowing that recognizes the earth as part of me, and me as part of the living earth. By accomplishing a somatic empathy with the Other, I would no sooner dump plastics in the ocean than I would ingest poison in my own body.

> The context for this argument is that there is no such thing as a sustainable product or built environment, only more sustainable *uses* of products and built environments. **Unsustainability derives from the way we relate—or more accurately, fail to relate—to the things we use everyday.** This is why a design awarded for its sustainability can be used in utterly unsustainable ways. (Tonkinwise, 2003, p. 2 emphasis added)

By directing attention to the often-overlooked/assumed/ignored soma tier of experience, I am claiming that we open a window to a fundamental aspect of human experience. Empathy for the Other (human and non-human), discovered through and understood at this most base level of the pushed and pulled, tossed and turned, enkinaesthetic (social) body-in-motion, is potentially the most intimate interaction that can be designed. The soma experience is so universal and so base that it holds the potential to cross racial, gender, age, and socioeconomic divides, divides that must be confronted if meaningful cultural/social transition is to be accomplished.

Values, Ethics, and the Designed World

> But gradually I came to see how [somatic practice] enabled me to take a holistic stance on some of the horrible plagues we battle right now—misogyny, racism, privilege, and denial of climate change. Although somaesthetic design *will* not remedy those issues—they are far too complex for that—it offers me, as a design researcher, a path toward a form of activism. (K Höök et al., 2018, p. 178)

> Attention is a moral act. (McGilchrist, 2009, p. 133)

The modern project, with its increasing reliance on technology, built on the long reigning premise of mind as separate (and superior) from the body, continues to offer diminishing opportunities for a corporeally experienced life. This is noted in many facets of modern life, notably in the separation of rituals, social connections, and beliefs. Where earlier eras relied on practices of physical investment within a community (harvesting seasons, religious practices), the modern era has permitted and even encouraged a separation of corporeal practice from belief and community (Shilling, 2008). Corporeality has also become associated with lower socioeconomic status, particularly in first-world societies. In these societies, those who work with their bodies are seen as lower in status than those whose occupations do not require significant physical effort.

Chris Shilling, writing in *Changing Bodies: Habit–Crisis–Creativity (2008)*, speaks of the corporeally impoverished experience that technological culture encourages. Through the prevalence of modern technologies, the individual is permitted, and in some cases pushed, to be ever more "individualised and compartmentalised" (2008, p. 160). Our ubiquitous computing has primed modern man to stand ready for the "demands of productivity" (2008, p. 160), ready at a moment to scan the web, be available for every conference call, or ready to analyze our personal biomedical data. Rather than noting and encouraging the *connected* and *empathetic*, we are ever more disconnected from the overarching and connecting values once ingrained in the work, and inattentive to the global implications of our *work* or the experience of the bodies we harness for the effort.

> As numerous studies suggest, there appear to be a growing number of individuals who feel that the pressures of work, the pace of change and the emphasis placed on material success, has led to an emptying of values from their lives (e.g. Zizek, 2001; Anway, 1995; Bell, 2006; McGinty, 2006). While it may remain theoretically possible as an individual to maintain psychological belief in a set of values, it is difficult to maintain these as deeply meaningful when they can no longer be attached to social relations and practical actions in the workaday world of daily life. (2008, p. 152)

Shilling's description does not deny the great social advantages that modern technology has brought to us; he merely notes the disembodied nature of many of these interactions. Where in earlier eras it was impossible to carry on an intimate conversation with a friend in a remote country, modern telecommunications now make it effortless to not only talk but to see and share complex information at the push of a digital button. What these technologies do not afford however is the shared physical participation of earlier times. The rituals and physically shared practices, requirements for survival in simpler times, are less and less common and rarely necessary for communal survival, even to the extent of appearing irrelevant (Fogel, 2013).

Shilling sees communities of practice and experiences that overlap belief, ritual, and community as nurturing the "types of lived experience that invest individuals with a sense of meaning" (Shilling, 2008, p. 161). And this sense of meaning is not a mere flight of fancy. It is the difference between an "impoverished experience" and an actualized, and purpose-filled life (2008, p. 161). Many prior systems that supported an interconnectedness of belief, ritual, and community have become supplanted by a technical culture that encourages materiality over all else. The acquiring of things over relations and embodied experiences has created what Shilling refers to as a "[Design-led] emptying of values" (2008, p. 152). **The removal of the body from our daily practices amounts to the removal of meaning from these activities**.

Modern technologies of travel, communication, and our interactions with things have all trended toward *physical isolation, binding,* and a

minimalist interaction that disengage rather than engage us with our global community in corporeal practice. These trends continue to manifest ignoring or diminishing the body as a necessary or valued component of interactions. Whereas in earlier eras and societies participation in any of these types of interactions required a present body, our modern western society permits and even encourages a different, and often minimal, corporeality.

Consider three short examples:

As a participant of social media, electronically connected to high school friends thousands of miles away, how does one weigh this emotional connection against the *physical isolation* it encourages? Where in earlier eras one had to physically commit to making a trip to see old friends, it is now possible to connect without sharing the same literal space. What is gained and what is lost in these new norms?

As a participant in a modern society with ubiquitous computing becoming the norm, I am permitted and even encouraged to interact with my environment in an ever-minimalist manner. What once required full-body pick and hoe to accomplish, is now on a path to complete physical disengagement (Hebert, Thorpe, & Stentz, 2012). For example, robotic agriculture promises rewards unfathomable to our great-great-grandparents. One can now sow and harvest from the comfort of an armchair (Tobe, 2017), and while this permits productivity at a scale unimaginable 100 years ago, it also profoundly changes the experience of the farmer. If considering the experience of the specific farmer, what is gained and what is lost in these new norms of physically *minimalist interaction*?

A prisoner in a cell is *bound* in that their physical interactions with their surroundings are forcibly diminished, and as a result of these diminished interactions, they live in a diminished world. Is it possible, through designed interactions, to diminish our interactions to such an extent that we bind the actors of our world? I hypothesize that the exclusion of actualized-body amounts to the same aesthetic of a prisoner in a cell, imprisoning ourselves by diminishing our interactions with

our world. If interactions with the environment were limited to only *fingers on glass,* what would be gained and what would be lost? How much more would one need to diminish the actuated experience before resulting in the bound aesthetic of a prisoner in a cell?

> The concern here lies in the possibility that the move toward devices may progressively place the opportunity for expression of values beyond reach. As the "burdens" of social and bodily engagement are removed, so too are possible opportunities to act on particular commitments, cares, responsibilities, preferences, and so forth (i.e., values). (Tatum, 1994, p. 74)

This modern stance which diminishes the shared experience, removes the interactional gestalt, and encourages a disembodied culture with such a narrow and insular world view that it should be no surprise that there is an epidemic of loneliness, xenophobia, a rise in ultra-right wing politics and a continued raping of the earth for resources. One cannot truly consider or change one's mindset and posture without valuing the body as critically implicated. The mindset and posture necessary to recognize the current state of affairs must be an open, implicated, shared, empathetic body in ensemble with the world (human and non-human).

Designs are not merely isolated artifacts, siloed on podiums in museums. They are performative and perform-*with bodies, in time*. These performances amplify or diminish values. A soma literate actor will better recognize how a series of design moves encourage or discourage their ability to express their values. The Corporeal Design agenda, supported by the Soma Literacy knowing permits Transition Designers (1) a palette of manipulable variables to consider when making design moves, (2) a language and practical applications for embodied knowing, critical for an *in time* discourse such as sustainability of a living earth, and (3) an enhanced mindset that recognizes the ethical implications of literally nudging bodies to and fro via interaction/experience designs. In short, a soma literate understanding of these issues allows the actor a personal visceral knowing, far more intimate than any logical repeating of learned facts.

The Transition Design Short Course Workshop

The Soma Literacy workshop at the Transition Design Short Course, June 2018, permitted me an opportunity to apply the *in time, bodied* attentions of Soma Literacy to the Transition Design discourse. We found that ideas around *shifts of weight, free falling, kairos and chronos, trust, potential energy, cycles, attentions,* and *temporal relativity/world views* were just the tip of the iceberg. We filled the 90 minutes effortlessly and recognized the advantage of embodying many of the abstract concepts presented in the short course.

Holistic thinking recognizes that all things are connected and connected in a living—unfolding—inertial progression. In the living system nothing can be held still. It is evolving, unfolding *in time*. The Soma Literacy concept of *anacrusis–crusis–metacrusis* paired with the embodied motion-filled strategies of the workshop provided a model for this understanding. The workshop setting was the ideal place to contrast a reflective dialectic understanding with an intimate visceral knowing.

Summary

Soma Literacy and the Corporeal Design agendas attempt to present a holistic mindset and posture useful to the designer of experience. Transition Design requires a complementary mindset and posture pointed at the design of experiences over massive horizons of time that strive to tackle wicked problems in unbounded complexities. This dissertation seeks to develop, critique, and inquire into current and future practices that engage and re-engage the corporeal dimensions of experience in order to aid the building of experiences that carry meaning. The potentialities of design-global carry heavier burdens and rewards than is regularly acknowledged in design rhetoric. Transition to a more sustainable future is a profound agenda and begins with a reorienting of mindset and posture, an attention that must acknowledge the embodiedness of any participation in this world.

If the interaction designer, considering how to offer a more pleasing aesthetic on the front of an appliance, thinks only of appearances, efficiencies, and functions, and misses the inherent self-actualization ideals of human experience, they not only miss the opportunity for a deeper more impactful interaction, they are actively diminishing the lived experience (not unlike the cell for the prisoner). If the designer of more sustainable futures looks only to the dialectic and misses opportunities to engage in the corporeality of the systems and processes under investigation, they too run the risk of amplifying the unsustainable practices and diminishing the empathetic engagement with our world. In the current dissertation I have sought to show how one might design meaning back into our interactions by turning the designerly attention back to our primary instrument, the center of experience, our bodies. Corporeal Design is not only concerned with the narrow interactions of bodies and our things, rather it is an agenda striving to encourage a more meaningful and knowing interaction with all of our lived experiences: embodied engagements of self-*with*-things, but also self-*with*-self, self-*with*-others, and self-*with*-environments which in the Transition Design agenda is now more significant than ever.

6.0

CONCLUSION

6.0 Conclusion

This thesis started with an attention to experience and the recognition of a specific inattention in design practices to the *embodied engagement* in any experience. I was concerned with the designerly attentions and inattentions to the bodied components in any interaction, be they virtual, physical, digital, analogue, isolated, or communal. By asking questions about the range of corporeal participation, surveying the designerly tools we use to understand engagement as a bodied phenomenon, and searching for the bodied participation in all interactions (not only the obvious platforms of 3D virtual realities or athletics), I recognized that these questions amounted to a literacy. It was not possible to ask the questions, to conduct the surveys, or design the experiments without first recognizing the *in time* performative body. This single shift of posture was very possibly the most significant learning I gained through the five-year process. Once I understood how my noticing through an *in time* body-knowing was different from an after-the-fact, reflective dialectic knowing, I was then positioned to see the world of the embodied *in time* actor: active, act-*ing*, involved, implicated in the experience-*ing* of their world.

Contributions to Knowledge

The investigations of this thesis revealed and offered a context and vocabulary of concepts for an attention to the living, moving, sentient body. I synthesized attentions and techniques from the performing arts and specifically the Eurhythmics study of Jaques-Dalcroze with the goals of temporal design practices. This research contributes both theoretical principles to design studies and pedagogical principles to design education. By naming the soma tier of experience and building a taxonomy of Soma Literacy principles, values, ideals, and variables, I am offering an amplified level of fidelity to a critical area of design attention, and by collecting these insights under the single heading of the Corporeal Design agenda, I am adding knowledge to the design fields by prioritizing the sentient body as the fundamental constant in participatory experience.

These attentions reveal a number of insights concerning lived experience:

- Experience must be felt to register as a happening.
- All feeling (lived aesthetics) requires motion which can manifest at the cutaneous (haptic), subcutaneous, or soma-deep level.
- Soma Literacy is a skill. Like any literacy, it is possible to proceed through life unskilled in the given field, and therefore unable to comment, analyze, or design within it.
- The Soma Literate designer is skilled to recognize and value the interstitials of experience over the cruses.
- The Soma Literate designer recognizes the interactional gestalt over the often-disconnected touchpoints.
- The Soma Literate designer notes the extreme difference between the *in time* knowing of the dynamic body, and the reflective dialectic knowing of a logical mind.
- The Soma Literate designer notes that only those designs with an affinity to the feeling body can be felt as eurhythmic. Any interaction without such an attention can only be realized as arrhythmic, resulting in awkward, narrowed, or dulled life-experience.

- The Soma Literate designer recognizes that it is possible to "skill-up" within the mundane acts of the day, striving for virtuosic performance and reaping more profound aesthetic from everyday mundane interactions.
- The Soma Literate designer can recognize the somatic tier of experience from the visual, the auditory, or the logical.

Through the Universal Principles of Temporal Design, I have provided the first comprehensive description and taxonomy of Soma Literacy concepts and have tied the relevance of these to design practice.

I have presented the body-in-action (the living body) as both a medium for design and the proving ground for all of experience. Rather than merely stating that the body matters, and the body feels, I have offered specific insight and a conceptual framework applicable to design practice and design education.

I have offered research and insights from the embodied classroom, noting the kinds of knowing that such an environment makes possible. Furthermore, the kinaesthetic and enkinaesthetic strategies revealed more design-implicated concepts than had previously been collected. It was only in these hands-on, *in time* explorations where many of the Principles of Temporal Design were noted, named, tested, and vetted. These participatory settings yielded additional concepts that I had not planned on, most of which are outside of the traditional design education, yet potentially critical for the modern designer who is working evermore in explicitly temporal realms.

Future Research

It is my hope that the initial 45 Universal Principles of Temporal Design will prove a useful starting point for any design academic or design educator interested in delving deeper into the performativity of experience. By noting the varied tiers of experience and finding the literacy to separate out the somatic from the visual, aural, or logical, the concepts provide a context for deeper and more efficient analysis of interaction, experience, aesthetics, frictions, and flow. Through the compiling of such a list I hope to continue the research, expanding the listings, definitions, and examples, and to collaborate with other design academics, pedagogues, and professionals interested in these frames.

The ideas contained in this dissertation are pulled largely from my autoethnographic accounts of interactions with a variety of students from many fields over 25 years of hands-on, shoes-off, participatory kinaesthetic and enkinaesthetic exploration. I value the Jaques-Dalcroze sensibilities and strategies as filling a wide berth in the prior research. The attention to the enkinaesthetic and ever in time attentions as well as the engaging, participatory teaching strategies are unparalleled in prior studies. I hope to have the opportunity to continue this research into the coming years with varied extra-musical audiences, to home in on the applications of Soma Literacy to specific audiences in service, architecture, visual art, and Transition. Pulling from the Fundamentals of Experience and Soma Literacy Workshops, I hope to create practical guidelines or a new teaching method for designers and to see experiences redesigned based around the concepts contained here. I look forward to the complementary contributions of my worldwide colleagues as they serve to embrace or challenge the claims made here.

Summary

This body of research was started by asking, *in what ways is life like music?*

In attempting to answer the question I had to grapple with the concept of *living*, the *experience* of life, with *music* and the idealized reality that it strives to accomplish. I explored the ways that we come *to know* anything, and the various thresholds and modalities of knowing. I investigated experience as a personal intimate event, and empathy through an opening of the self to engage and even embody the Other. I wrestled with the difference between reflective and *in time* knowing and in the differences between what I think, I do, and what I feel. Aesthetics and the bodied proof of any aesthetic became a central attention of the explorations. The role of the designer, the agency that the creator of experiences possesses, and the extents to which an individual can nudge and be nudged revealed not only the power of Corporeal Design, but also the moral responsibilities of manipulating bodies-in-action. Lastly, the relevance of these investigations to IxD and HCI, as well as design for service, social innovation, and Transition, each revealed what a large and global set of ideas this dissertation sought to collect.

While the specific terms *Corporeal Design* and *Soma Literacy* may or may not take hold, I hope that this thesis will be seen as a small contribution to a very large agenda, the reintegration of the body into the consciously designed world. For it is here, in the acknowledged, empowered, skillful soma, that agency and freedom lies.

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Card Deck Image Key—p. 204-207

A	B	C
D	E	F
G	H	I

J	K	L
M	N	O
P	Q	R

S	T
U	V
W	X
Y	Z

AA	AB
AC	AD
AE	AF
AG	AH

A	https://500px.com/photo/24566945/-by-yana-sirenko
B	https://cdn.hk01.com/di/media/images/549735/org/6a162f9daf8108441a65dd423670dca2.jpg/qoV98-LGu2e91Ws-g_e-ti7pSGZuiyas8rSmnVq0pp1Y?v=w1280
C	https://i.pinimg.com/originals/ff/c3/4f/ffc34f11f3834d29dc27c349ad5a7361.jpg
D	https://balletthebestphotographs.files.wordpress.com/2013/11/maurya-kerr-3.jpg
E	https://incaseumissed.blogspot.com/2017_03_13_archive.html
F	https://www.benoitdebuisser.com/wp-content/uploads/2015/12/tumblr_n7xj0r4neH1qzt40qo1_1280.jpg
G	http://earthporm.com/wp-content/uploads/2015/03/tattooed-elderly-people-3__605.jpg
H	https://i.pinimg.com/564x/ed/f9/c3/edf9c3857a7bf1273a5bdec57fa33527.jpg
I	https://www.moma.org/interactives/exhibitions/2011/talktome/assets/TTM_258-large.jpg?_ga=2.162558972.1399661351.1553034610-1735399913.1553034610
J	https://i.pinimg.com/originals/71/25/85/71258562e611c7a1ad5467939c5fb456.jpg
K	https://www.abc.net.au/news/image/3810274-3x4-700x933.jpg
L	https://www.okchicas.com/wp-content/uploads/2016/07/15-situaciones-que-viven-las-chicas-que-tienen-cara-de-beb%C3%A9-2.png
M	https://www.littlelakecounty.com/wp-content/uploads/2015/08/17037_1060kurios_quebec-9546_MediumResolution.png
N	http://www.wendytrainor.ca/wp-content/uploads/2010/11/EMDR-circles2.gif
O	https://www.workingmother.com/g00/3_c-6bbb.btwpnslrtymjw.htr_/c-6RTWJUMJZX68x24myyux78x3ax2fx2fbbb.btwpnslrtymjw.htrx2fx78nyjx78x2fbtwpnslrtymjw.htrx2fknqjx78x2fx78ydqjx78x2f870_6c_x2fuzgqnhx2fnrfljx78x2f7561x2f58x2ffrd_hziid.oulx3fnytpx3dNUs6BSx78ux26khx3d05x2c05x26n65h.rfwpx3dnrflj_$/$/$/$/$/$/$/$/$
P	https://www.flickr.com/photos/nikolinelr/3560452130/
Q	https://nspt4kids.com/wp-content/uploads/2012/11/child-getting-clothes-on.jpg
R	http://www.fubiz.net/2013/04/17/the-kama-sutra-alphabet/malika-favre-kamasutra1/
S	https://youtu.be/GqzTHsWrniQ
T	https://youtu.be/qoixKJx95I4
U	https://ayeshatjie.files.wordpress.com/2015/11/hik1p5blo1ankoxxhpzveihgqag_gnai2ze8hxdsysijbms6lxesv-ipmq7qjx_vf-wmezlww2nlqnv796vj5jhmdh_cqx1mcqmazg2w-9ryayermsaa30wkvnix8dusxhsjyyqaad1d6vyzxhgw500-h220-nc.gif
V	https://www.fatosdesconhecidos.com.br/wp-content/uploads/2015/04/fotos.jpg
W	https://oaclubs.files.wordpress.com/2010/11/woman-pilates-demo2.jpg?w=598&h=398
X	https://d2rormqr1qwzpz.cloudfront.net/photos/2012/03/16/55-23202-aug_military.jpg
Y	http://bodypiercingmag.com/wp-content/uploads/2015/10/Corset-Piercing-Pictures.jpg
Z	https://i.telegraph.co.uk/multimedia/archive/02239/wave_2239904b.jpg
AA	http://2.bp.blogspot.com/_TAMrMeUbGqg/TM_lmJSZ_0I/AAAAAAAAAR4/nh49BKwgX5I/s320/P1030886.JPG
AB	https://youtu.be/zL4HSk4MUUw
AC	https://www.flickr.com/photos/10110263@N03/3688371965/
AD	https://www.maistecnologia.com/wp-content/uploads/2016/08/Surf.jpg
AE	https://greece.greekreporter.com/files/Immigrants1-1024x576.jpg
AF	https://i.pinimg.com/originals/f9/ff/a3/f9ffa35287d59b087b89704f6dae1494.png
AG	https://youtu.be/elho2S0Zahl
AH	https://i0.wp.com/en.kunming.cn/index/image/attachement/jpg/site162/20120530/00215a70cda4112fc00801.jpg