

Insights Into the Atlas of Creative Tools
and How It Moves Sustainability Science toward Cognitive Justice, or,

An Interrogation of the Traditional Dissertation

by

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ABSTRACT

Dear reader, I hope you will read this entire dissertation. If you are reluctant because of its length, I invite you to contact me for a conversation instead. Over the past eight years I have been a part of three unfolding histories: colonialism, sustainability science, and the Atlas of Creative Tools (the Atlas). In this dissertation I describe how I am a part of these histories. I advocate for partnering them so that the Atlas is used by people in the field of sustainability science to advance cognitive justice in their work. This advocacy is supported by research conducted using a mixed-methods approach. I combine qualitative methods used to study each of the three histories with the experiential knowledge I gained from being a part of them. Throughout the dissertation I move back and forth between academic research and experiential knowledge. Each informs the other. This back-and-forth movement is itself a method to interrogate the assumptions of dissertation writing. My purposes for doing so are two-fold. I want to honor the dissertation as a form of knowledge production that can promote cognitive justice while also pointing out how it hinders it. Additionally, the back-and-forth interrogation method involves using creative tools from the Atlas in the text itself. This demonstrates how the Atlas can be used to promote cognitive justice while producing knowledge in sustainability science. I structure this dissertation to aid you in four ways. First, I provide a view of sustainability science as a contested space that people can and do use to advance cognitive justice. Second, I write about my research and analysis of the Atlas so that my descriptions can be used right away by other practitioners who are working with the Atlas. Third, my methods for interrogating the dissertation itself are meant to be used, modified, and built on by others. Finally, I hope that the connections I

make between the Atlas and sustainability science are helpful for your work, and that they inspire you to try the Atlas and see how you can use it to promote cognitive justice in your own contexts.

DEDICATION

Undoubtedly.

Dedication is not something I have. It is something I do.

To what ends exactly I cannot say, but I am dedicated to doing
decolonial work for the half-century or so I have left to live.

With any luck, that is. I suppose that whatever times I have, they will be enough.

Enough for what exactly I cannot say, but I am dedicated to doing
decolonial work. Dedication is not something I have.

It is something I do. Doing involves doubt.

But dedication itself?

Undoubtedly.

ACKNOWLEDGMENTS

Most of my acknowledgements are spread throughout the dissertation. I explain why and how I do this in the preface.

I also want to mention a few people and groups here.

I have two families to thank. They are my personal and academic families. This whole research process has happened through relationships. To put it another way, many people have been thought partners, practice partners, warm embraces, mirrors and mentors and sandboxes and quiet voices on my shoulder. You are an eclectic group. I am grateful for the ways you have helped me to change. Some of you changed alongside me. This makes me feel alive. I am also grateful for the ways you have helped me to stay the same. This is a necessary sanity that, as I look around me, I see quickly diminishing.

Silvia and her family. David and Nancy. David, LaDawn and Liz. Jessica and Jonathan. Sechindra and Rebecca. Amira. Neda and Emily. Brian and Erika and Sara and Sarra. Kathy Kyle. Sonja and Rob, Dan and Angela. Mom. Dad, and of course Dave. Arlene. Michael and Lauren. Mac and Sumana and Phil and John and Anna. And here is where I would write the names of people who I would have known if things had been different.

The graduate support and advising team in the School of Sustainability deserves special thanks. Katie, Ivy, Lindsey, Melissa and Lee in particular. Without your kindness, the engine quickly seizes up.

My friends in Norway and in the U.S. are more important than I have let on. My time in the Ph.D. program was as much about learning as it was about unlearning and *not*

learning. You made it easy for me to come home to myself, and to decide what to keep and what to let go of. Kyle and Amelia, Ian and Raymon and Tine, André, Greg and Halley, Giacomo, Brian and Tim and Amy and Eric.

All of you at Senior High Camp, and the spirit of camp itself.

I am very grateful for financial support I received from various groups at Arizona State University and from family during my studies.

Lastly, I thank my childhood selves. You helped us get through a lot. I trust that even though our relationships have changed, you still feel welcome and at home. In this case, I change by loving you, not leaving you behind.

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PREFACE

Hello and welcome to the preface. I am grateful for your attention. I wrote this preface so that we can start together and find each other again if we get separated. As a kid, I went with my dad to the grocery store a lot. Sometimes I would get distracted by something, and when I looked around, he was gone. I can still feel the panic when I revisit these memories. I love my dad. I'm grateful that, from a young age, I learned different ways of checking in and bringing people along with me. I doubt you'll feel abandoned while you read this dissertation. Yet, as it is unconventional at times, I have prepared some ways to start together and check in as we go.

Starting Together

This dissertation is different from most others because I don't take for granted that the document is simply a way to describe a research project and some conclusions. When we do something, the doing consists of both *what* and *how*. Let's say I ride my bicycle here in Tromsø (what) and follow the traffic laws (how). If I stop and let two children cross the road, they learn something about being a pedestrian and being a bicyclist in Tromsø. They learn from the *how*. They don't have enough information to know *why* I stopped for them, but they don't need that to learn from their surroundings. One person's center is another person's peripheral, and it's turtles all the way down. That's a form of interbeing (Thank you Thích Nhất Hạnh for this language).

This document does describe my research project and some of my insights. But the potential for dissertations is so much more. I have seen it. Check out Syrus Marcus Ware's thesis, which included nearly two dozen twelve-foot-tall portraits. A colleague, Neda Movahed, wrote poetic recipes for cooking food that carry you deep into her ancestry and Iranian culture. Dissertations can contain a much fuller range of human expression. I am not saying everyone should buck the traditional structure and use them this way. Completing a Ph.D. is considered a monumental achievement by a lot of people and for many different reasons, and for some, the structure of the dissertation itself won't carry much importance. But when you do follow its conventions, I hope you'll remember two things. First, it is usually a *choice* to do so (more on this below). Second, your consent is a tacit endorsement that the way we produce knowledge through dissertation research and writing is good and worthwhile, or at least not so problematic that it compels interrogation.

About bucking convention being a choice: not everyone has the privilege to take on the risk to openly resist the established norm. On Sylvia Duckworth's *Wheel of Power/Privilege*, I'm firmly inside the inner circle. The only two categories I straddle the line are wealth and housing, but I can hardly say so. My partner owns a flat and we live together. As for money, I have some educational debt, but I now have an advanced degree that comes with the option to access high-paying jobs exclusively for people with a doctorate. Even when I didn't have that, my student income was many times more than what most people on the planet earn. The intersections of my power mean that I experience very little resistance as I live my life. This means I can take on more risk. I

believe I have a responsibility to take on more risk and contribute to others' momentum that changes these power dynamics (Thank you Phil for several insightful conversations about this).

WHEEL OF POWER/PRIVILEGE

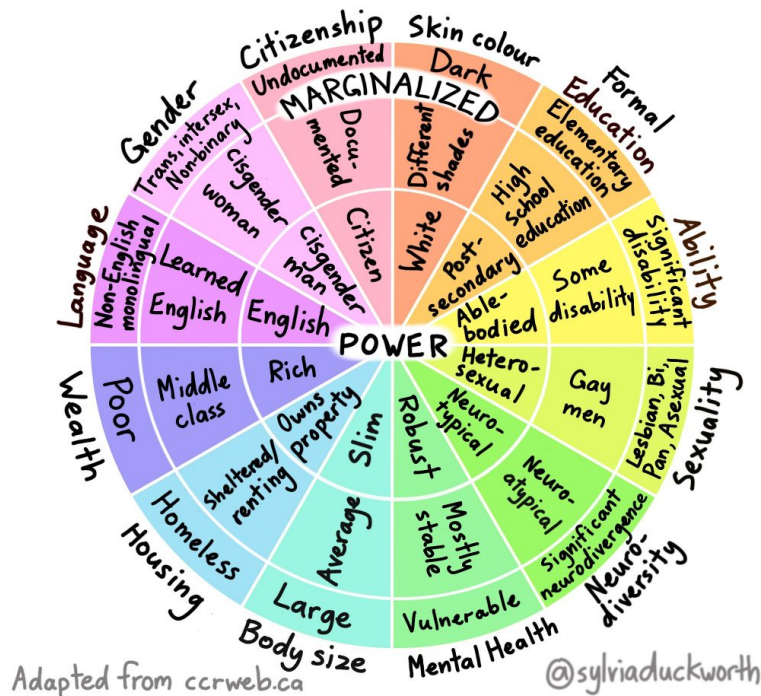


Figure 1. The Wheel of Power/Privilege
Source: Duckworth 2020.

Although this image depicts categories of power/social privilege in ways that can be used to describe individuals, systems of colonialism, patriarchy, and capitalism have created intergenerational inequities for marginalized groups. Despite this, many who are marginalized and discriminated against take on risks every day, despite the increased dangers to themselves and their families. I think that people with many social privileges

should try to use them for some good *while* working to dismantle the structures that create them by partnering with people who have far too much experience resisting oppression (Thank you Shyla Dogan).

Systems of colonialism, patriarchy, and capitalism have also affected knowledge production throughout history. As I learned more about this, I started to question my choice to be in a Ph.D. program. Because I could/can take on risk, so I looked for places I could intervene. Teaching was a great leverage point. Serving on committees and advocating with graduate student groups were less effective. A colleague of mine and I proposed a collaborative dissertation with individual and co-produced deliverables. The idea was that we would demonstrate our ability to conduct independent and collaborative scholarship, along with the reflexive and interpersonal skills so desperately needed in today's increasingly divisive world. I share the story in Chapter 3. Suffice it to say that our idea deviated too much from the norm. In retrospect, I'm not entirely sure we were even understood.

After the collaborative dissertation was sealed away, I returned my attention back to what I *could* do. At this point there was an important collision. For several years I had been working on various projects that supported the Atlas of Creative Tools (more on this in Chapter 2). I had also learned about the difference between methods that extract knowledge from people, and those used to co-produce knowledge by working alongside them. I don't remember the moment when these two things collided. But I realized that thankfully (and I have my family to thank for demonstrating this way of working) I had been doing plenty of nonextractivist work with the Atlas. I just hadn't considered it a

research method. Once I made this connection, my entire committee—LaDawn David, and Liz, each in their own way—encouraged me to find ways of partnering personal and research.

The dissertation became one site for this work. I started from the premise that what others told me about dissertations probably came from tradition and not their opinions. I kept track of how people characterized them. Then I began to ask questions. A lot of questions.

Checking in as We Go

Some of the questions led me to create new structures for dissertation writing. Each structure shows up throughout the dissertation in a consistent way so that you recognize them. Taken together they are structures for increasing inclusivity, dialogue, and transparency. They are for you and for me. Here are the five I think are most important. Each is written using the following format:

How dissertations were categorized. → *A question I interrogated with?* → The structure(s) I created in response to the question. → Descriptions of each structure.

A dissertation summarizes and communicates research findings. → *How can a dissertation share information and be used to practice what's being shared?* → Creative tools periodically shared; reminders for practicing them. → Thinking informs

practice, practice informs thinking, and the exchange makes each more visible, more legible. The Atlas of Creative Tools (the Atlas) contains a lot of ideas and activities that are meant to be used over and over. I begin Chapter 1 by using two creative tools right away. My descriptions and analysis of the Atlas are not until Chapters 4-6. But we don't need to know much about the Atlas before trying some tools. Throughout the dissertation I share several others. I chose the locations and sequence purposefully; the earlier the tool, the more helpful I think it will be for you to partner with the dissertation. When you encounter a tool, I encourage you to try it right away, and then use it periodically as you continue reading. To help you remember to practice, I have indicated in the text moments where each might be useful.

An abstract is a summary of your work, not a conversation with the reader.

→ *If a dissertation is a conversation with the reader, how can I encourage dialogue?* → Greetings; sharing worries, questions, and doubts; invitations to reach out. → Greetings can set the stage for dialogue. If we were together, I would not launch into conversation without a greeting. The ways we come together are important. Chapters and large sections of text begin with different greetings I have learned. Dialogue also involves back-and-forth. Sentences strung together create monologues, and you, the reader, need to create your own moments for pause, reflection, and response. No doubt you will do that while reading this document, because it is mostly comprised of sentences. But I also share my questions, which are invitations for you to stop and consider. If we were together, I would be waiting and listening in these moments. You will find questions

throughout the main text, as well as in the sections titled *Lingering Ideas and Questions* that conclude each chapter. Some of my questions express curiosity, others doubt. Sometimes, rather than asking a question to encourage dialogue, I share a worry or fear that I have. Whatever your response to my concern, these too are moments for us to connect. They are windows into my thoughts and feelings that exist between the lines of text on the page. Windows are mirrors when the lighting is right.

Sometimes I invite you to reach out to me, either in the main text or a footnote. I remind you that my contact information is written in the preface. Here it is:

mattnockphd@icloud.com. This is an open invitation.

The main audiences for your dissertation are academics and experts in your field. → *How can this dissertation be understandable, interesting, and useful to the greatest number of people?* → Ordinary language; defining concepts; changing between ways of understanding. → I have many reasons for making this work accessible and useful. The structures I created as helpmates for this are built into the organization of the entire dissertation. I try to use ordinary language as much as possible. I have Kathy Kyle to thank for helping me practice this way of writing, even in academia. Even so, I do define words and concepts throughout the text. I do this when they are not commonly used, if I want to clarify how I understand them, and for terms that have been created/defined by one of the scholars whose ideas I draw on. This does happen often because part of my research is about describing ways of thinking that are often taken for granted, which in this case means we don't have ordinary language for describing them.

You will find definitions in the footnotes on the page where the word first appears. I repeat some definitions later in the text for terms/concepts that I think are hard to remember.

I also change between ways of understanding to help people with different interests relate to my work and stay engaged. What I mean by ‘ways of understanding’ is how we package and make sense of things. Some examples in this dissertation include theories, storytelling, examples from society and from personal experience, and analysis. I express these in writing, and I worry that people who begin understanding through other mediums—like physical movement, observation, feeling emotions and energy, or contemplative practices—won’t relate as easily.

I try to change between ways of understanding in how I write the main text. In addition, Chapters 2-5 each contain an interlude. Interludes are breaks in some sort of process. I use interludes as a way of sharing the same idea but in a different context, or to help you make sense of the material by thinking about it differently or by exploring it using creative tools.

Dissertations are never co-authored, and you acknowledge others’ contributions by citing the written record of their ideas. → *How can dissertations acknowledge different forms of authorship and peoples’ oral and practical contributions to research?* → First person pronouns; inadvisably long direct quotes; distributing the acknowledgements section; thanking people. → I use first-person wpronouns (we, us) in two ways. They describe things that both you and I do or can do. This is to remind you

that I am here; there is a person behind these words on the page. For example, ‘We can use creative practices to...’. I also use first-person pronouns to describe the collective efforts of Atlas practitioners. They indicate how we work together, often in different ways, to co-create the Atlas. Authorship itself is a complicated topic. For years I took for granted what it means to be an author, to create something, and to have my own ideas and practices. I invite a conversation about the topic of authorship at the beginning of Chapter 5. In that section I describe what I mean by ‘inadvisably long quotes’ and how I use them to describe the Atlas as collective knowledge.

I use three specific structures for acknowledging people’s contributions to me as a person and, through me, to this research. The first is the traditional research writing method of crediting scholarly work through in-text citations and bibliographic references. If you are new to reading research papers, the in-text citations are written like this, (Person’s Name, Year), in the main text, and you can look up the original source in the list of references, which is typically at the end of the document.

The second way I acknowledge people’s contributions is by distributing the acknowledgement section throughout the dissertation. Typically, acknowledgements are found in their own section at the beginning of a work. I like this, but I also want you to know the specific moments when others challenged and supported me. I include these in the main text by naming someone and describing their contribution. The third structure I use for acknowledgement comes from Tema Okun. It is a simple variation on the typical in-text citation, except it is used to thank people for contributions that don’t have a paper

trail. It looks like this (Thank you Tema Okun for sharing this structure). Sometimes I simply thank people without sharing why.

Dissertations are for researchers to tell you about the conclusions they drew by narrowing in on a topic. → *How can a dissertation share a researcher's insights while encouraging readers to find their own connections to their lives and work?* → a variation of CRP; asking questions; emphasizing connections over conclusions.

I strongly believe that you will make your own connections between this research and your situations without my encouragement. People are constantly personalizing information (Thank you Liz). When I describe a theory or share a story, if you pay attention to the pictures forming in your mind you will see one of the ways you do this. Still, we are generally conditioned to being receptacles of other people's knowledge. This happens specifically in dissertations when we let the researcher (exclusively) define what is interesting. Therefore, I use three structures to encourage you to pay attention to what you are noticing, remembering, imagining, and feeling as you read.

Rather than including conventional chapter summaries, I have created a variation of the creative tool *Critical Response Process* (CRP). This tool serves as a medium for summarizing content and asking questions, while teaching the mechanics of CRP itself. I have replaced conventional chapter summaries with CRP because I think summaries tend to corral readers thinking. The fact that they are often the last thing we read exacerbates this. This simple variation of CRP mimics a feedback process we could use if we were together.

Finally, I made so many meaningful connections during my time in the Ph.D. program. I have made a point of sharing these connections alongside conclusions I have drawn. I hope they spark your own curiosity and imagination, and give you the feeling that finding connections and making distinctions are rigorous creative acts that are well worth pursuing.

Chapter 1 – Introducing and Outlining the Dissertation

Hello again, or *takk for sist*, which is a Norwegian greeting that also conveys gratitude and remembrance of the last time two people met. It is one of my favorite Norwegian expressions because when someone says it to me, it's like they are inflating a balloon that expands the present moment and my memories of having been with this person flood in to fill the void. It's a pleasant sensation that brings a smile to my face and helps me notice that they are nearly always smiling, too.

This dissertation is many things. To help me explain what I mean by this and why it is important, I will introduce you to the Atlas of Creative Tools (the Atlas for short) and use a one of the tools from it to unpack the dissertation.

The Atlas is a collection of ideas and tools—for now you can think of tools as processes, methods, or activities—that many people use to get stuff done in very different contexts. It has its origins in dance-making, choreography, and community practice. The original concept of the Atlas, as well as its permeable structure and much of its initial content, was created by Liz Lerman. Part of the permeable structure of the Atlas is that creative tools can become ideas, and ideas can become creative tools. This shift doesn't happen willy-nilly, but through rigorous processes that involve paying attention, naming, doing, iterating—with regular, ongoing practice.

Multiple names for the same thing is a part of the Atlas. It is both an idea and a tool. As an idea, *multiple names for the same thing* refers to the many different

dimensions and interpretations and meanings that someone, someplace, or something holds. Here are some examples:

Someone. I am a younger brother, a mentor, a particular arrangement of DNA, and someone who dances. I occupy many social categories that give me social advantages at the expense of others. I have origins in New York and in Italy, in my parents and grandparents, in immigration, and in reverence to and rebellion against Catholicism. In some ways I am different from how I have been, while in other ways I remain the same. When a person or an institution reduces me to one of these names or the countless others that I have, it usually isn't well-intended and doesn't feel good.

Someplace. Standing Rock Reservation is an Indian reservation recognized by the U.S. Federal Government. It is *ŋyaŋ Woslál Háŋ* in the Lakota language. It is the most recent designation of territory where tribes belonging to the Great Sioux Nation were forcibly relocated many times over the past 150 years. It is adjacent to a portion of the Dakota Access Pipeline. It is a site of significant protests to its construction, of political resistance and spiritual solidarity between members of the Sioux Tribe, U.S. veterans, and other groups. It was named a riot and where many arrests occurred at the direction of the Trump administration. Places have multiple names given to them by the different people and peoples who inhabit, visit, occupy, or simply talk about them from far away.

Something. For this example, let's return to the idea I shared earlier that this dissertation is many things. The dissertation is the thing in question; what are some of the names I can give it?¹

The dissertation is...

... one of many things I have created during the last eight years of my life.

... a requirement for the degree of Doctor of Philosophy.

... an admission of my ignorance and a vehicle for helping me reduce some of it.

... proof to many people that my learning over the past eight years was worthwhile.

... a valuable collection of useful information and writing about the Atlas.

... an additional line of privilege that intersects with my many other privileges.²

... another brick in the wall of knowledge produced by western institutions.

... a form of mindful heresy—albeit a mild form—in western higher education.³

... another demonstration of worship of the written word.⁴

... seen by some as a useless form of knowledge, not practical or worthwhile.

... for others the pinnacle of knowledge and a necessary step to becoming an expert.

... a synthesis of interdisciplinary research, with several theoretical contributions.

¹ This list is in fact created by combining two creative tools: *Multiple Names for the Same Thing* and a writing version of the tool *Perpetual Prompt*. The Atlas often encourages people to combine tools and move between them.

² Thank you Hannah Schwan and others at the Urban Complexity Lab involved in creating the visualization project for intersectionality: <https://uclab.fh-potsdam.de/intervis/>

³ For more on **mindful heresy**, see (de la Garza 2014) and page 228 of this dissertation.

⁴ Thank you Tema Okun: <https://www.whitesupremacyculture.info/worship-of-written-word.html>

... a partnership of knowledge gained through research methods and from experience.

... a partial but important helpmate for some of my own decolonial work.

... the second of two dissertations that were proposed, the first having been rejected.

Multiple names for the same thing is part of a bigger organizing principle of the Atlas called *Multiplicity*. In the Atlas, *Multiplicity* is a commitment to seeking out the multiple layers and dimensions that are always present in ourselves and the wider world. Ideas and tools in the Atlas remind us of this multiplicity and provide ways of working with it. And, just as importantly, the Atlas is designed to help people unpack the ways they already locate and draw on multiplicity in their lives and work. This approach to multiplicity is taking a normative stance that the incredible diversity of people's experiences, ways of making meaning, and forms of expression are valuable, and that the work of encountering multiplicity for oneself and with others is an essential part of human creativity. Everyone has access to this kind of creativity, and when we practice it, a lot of really interesting things can happen.

Throughout this dissertation, I share a few of many the creative tools from the Atlas. I do this by translating them from their original forms into in written versions. It's not the most effective way to use these tools, in my opinion, but I think it is well worth the effort. I want you to see how these tools can make us aware of information that we wouldn't notice was missing and, if we did, would probably consider irrelevant. Surprise is a common outcome of using the Atlas. The tools not only lead to discoveries that defy people's expectations, but also—and this is important—expose what our expectations are.

When we're working together with others, being able to share our expectations is extremely helpful, especially those that we may not realize are present.

One's expectations of what a dissertation is can affect what is considered worthwhile to pay attention to while reading. In my experience, few people ask what a dissertation is beyond the common view. Barbara Lovitts provides a concise description of that view:

The PhD dissertation is the ultimate educational product. It reflects the training of its author and the technical, analytical, and writing skills he or she developed in a doctoral program. Successful completion of the dissertation and the award of the PhD certify that the degree recipient can do independent scholarly work. That much is generally agreed. (2005, 28)

Take a moment to re-read my list of 'The dissertation is...', but this time, read it with this question in mind: Which of these arouse your curiosity and make you want to know more? Make a short list in the margins or on some scrap paper.

Now that you have a list of curiosities, ask yourself: Are these the same ones that can significantly (or perhaps you might say rigorously) contribute to academic research? How do you make this distinction?

Like everything else, dissertation writing takes place in the broader contexts of one's life, the past, and the present. It is because I am a part of these contexts that I can give this dissertation so many names. It has layers of significance and meaning. Each is fertile soil for study and discovery. If I pursued every aspect of what the dissertation is with equal resolve, my efforts would yield an incredibly rich research project that never ends.

In truth, choosing which aspects of the dissertation to focus on has been one of my biggest challenges throughout my Ph.D. process. I am the body which experiences the endings of the sentences that begin with “This dissertation is...” They are both intellectual and visceral. I feel fragmented, or a sense of incompleteness, when I exclude some aspects at the expense of others. Academia excels in creating these sorts of fragmentations.⁵

I have found that thinking and practicing multiplicity is a way to resist fragmentation. The work is exciting and complex and requires constant vigilance. When conducting research, or writing a paper/thesis/dissertation, why might it be important to allow for *multiplicity*, for *multiple names for the same thing*? When can it be problematic? How do we make distinctions once the space has been opened up for multiple histories and interpretations? What informs *how* we go about discerning? When should we choose tradition, and when should we interrupt tradition to include things that we would normally exclude? As my friend and colleague Sumana shared with me, tradition can sometimes be a springboard for creative expression of oneself, and it is possible to have this relationship to tradition even while honoring the parts that deserve our reverence.

Exclusions happen in many ways, and understanding how some forms of exclusion impact sustainability science research and teaching is one of my main focuses. I hope that as you read this dissertation, you keep your ideas about exclusion and

⁵ This feeling of fragmentation is what eventually led me to use a nonextractivist research methodology, which I describe this in Chapter 2.

inclusion—about multiplicity and discernment—on the tip of your tongue. Of course, you can pay attention to how I understand and work with them in my research. But I also encourage you to pay attention to your memories and imagination, and to the connections that you make with your own life and work. Pay attention even when they seem irrelevant. It is well worth the effort. Being surprised and staying with the surprise long enough to better understand it is one way that exclusions can become seen, heard, felt, known.

At the Intersection of Four Histories, or Transdisciplinary Research

Four histories converge, and this dissertation exists at the intersection.

One history is about how colonialism is not over. It persists through both thinking and action. Actions are more visible than thoughts and ways of thinking. This makes colonial actions easier to recognize than the mentalities from which they spring. Fortunately, many have shared their understandings of what colonial mentalities are and how they endure. I am grateful for the many people whose work has informed my thinking. I draw on critical theory—including feminist and decolonial theories—to understand not only how colonialism persists through time, but also how it works in tandem with expressions of patriarchy and capitalism that often reinforce each other. It is because these insights pierce the veil of western modernity that this dissertation is possible.

Another history is about an increasing awareness in many western (or industrialized) countries of the environmental and social consequences of their approach to development. These consequences have local and global expressions. This awareness, which began to gain international awareness in the 1970s and 80s, would eventually lead to the formulation of ‘sustainability science’ around the turn of the 21st century. This approach to scientific knowledge production was rebelling against scientific traditions of exclusivity and social detachment. It was developed to be more inclusive of different ways of knowing in order to bring scientific knowledge alongside others, and to make research and education directly relevant to the social and environmental struggles people face. Today, sustainability science is a young field and continues to evolve in response to the people who contribute to it, which makes this dissertation possible.

A third history is about the Atlas of Creative Tools. The Atlas originated with a choreographer named Liz Lerman, whose rejection of high culture dance-making led to a lifetime of community-based artistic work. Liz pays a great deal of attention to the processes that she and others use to create. Over time, these ways of living and working became a collection of principles and practices, called the Atlas of Creative Tools. Because of its origins in dance, many working outside the humanities are surprised at how relevant and adept the Atlas is at advancing sustainability science. But the permeable structure of the Atlas, devised by Liz, is able to be used by people from many walks of life who have shared their knowledges and practices with the growing community of practitioners. Because of this, and because of the fundamental nature of the creative tools themselves, this dissertation is possible.

The fourth history is my own. It brings the other three together in particular ways. Of the four histories, mine is the one I know the best. It is not separate from the other three histories; I am a small part of each, and each plays a part in shaping who I am and who I may become. My history is possible because of many others. I come from my ancestors, my family and friends, the forests of upstate New York, the foothills of Colorado, the Sonoran Desert in Arizona, and the arctic island of Tromsø. Because of these people and places, this dissertation is possible.

A General Introduction (Without Citations)

Colonialism, patriarchy, and capitalism are incredibly complex. One source of their complexity is that they are interrelated, and often work to reinforce one another. Another source is their ability to change over time. In other words, *expressions* of colonialism, patriarchy, and capitalism, change, but the systems themselves can remain durable and recognizable. Each creates material, physical realities and consequences. These three systems of oppression are also more than their physical expressions. Each has mental, or cognitive dimensions, which is a further source of their complexity. We can call these mental dimensions mindsets, which have their own logics and forms of reasoning that support the existence of colonial, capitalist, and patriarchal systems. Just as the physical expressions of these systems can change over time while the system remains durable, the epistemologies and ontologies that underpin mindsets can persist, even as the logics and grammars used to express them change over time.

Taken together, these three systems of oppression are an important part of what many critical sociologists characterize as ‘western modernity’. In other words, the world today does not make sense unless we consider the historical and contemporary manifestations of colonialism, patriarchy, and capitalism. Of course, the incredible diversity of peoples and cultures around the world is not reducible to these three systems. But because western modernity is the dominant social paradigm, very few people and cultures are untouched by it, even if their ways of living compete or simply co-exist with western modernity.

Even a cursory look at the past and present reveals a pattern of power and wealth in the geographical global North being created at the expense and sometimes destruction of peoples and nature, especially in (but not limited to) the geographical global South. Climate change, for example, is a global crisis that (unequally) affects everyone, but it is caused primarily by the industrialization and run-away capitalist expansion in the geographical global North. Such industrialization and capitalist development in the global North as made possible by historical colonialism, and both interface with histories of patriarchy in ways that tend to value the contributions and interests of men over women.

Many throughout human history have resisted the oppressions of colonialist, patriarchal, and capitalist systems. This work continues today, all over the world. Just as many unique and effective resistances are found throughout the geographical global South, we can find dedicated alternatives to western modernity in the geographical global North. In other words, people can have ways of thinking and living that can resist the

problematic aspects of western modernity, wherever they are. Resistance is not geographically bound, and neither are epistemologies and ontologies that push back against the dominance of western modern thinking.

Western (modern) thinking is broad, to be sure. It includes discourses about democracy, freedom, progress, human rights, economic growth, technology, sustainable development, and many others. Throughout these discourses and in others, one can find the logics and grammars of colonialism, patriarchy, and capitalism. In other words, these systems of oppression have some purchase in the broader social discourses that comprise western thinking. Sometimes they are explicit, and other times inferred.

Western/ized universities are not isolated from western thinking. In fact, many critical theorists describe university decolonization as necessary for them to continue to be sites where people learn knowledges and practices that contribute to socially just and environmentally sustainable ways of living. Sustainability science is largely situated in universities, and evidence suggests that the field is a contested site that both promotes and opposes the conventions of western thinking.

When I first became part of the field of sustainability science, I wasn't aware of these different approaches or the systems and discourses underpinning them. But I soon stopped and paid attention. I learned from critical theorists, and had conversations with people who were describing experiences that were vastly different from my own. I began to reinterpret myself and my surroundings. This is something I think we as humans do all the time. I think it is important to remember that one does not need to adopt or agree with every discovery gleaned from donning a new perspective or trying a new method of

inquiry. There is a creative tool in the Atlas called *Listening Palettes*, which asks us to pay attention to the pictures that are forming in our minds when we hear a story, take in data. Liz cautions that, when you create a listening palette and “pay attention to the pictures, you might lose some of the words. And for some of us, that's hard.”⁶

I have used *Listening Palettes* many times, and I can tell you that she is right: I do lose some of the words when I pay attention to the pictures in my mind. I also lose some of the words when I focus on the way the speaker is gesturing with their body, the energy in the room, or any number of the many things that are happening. But I do not lose the *ability* to pay attention to the words. I also don't lose information, because a huge amount of information is present beyond what someone is saying. Instead, I shift from one source of information—one aspect of the broader context in which a conversation unfolds—to another. One of the things the Atlas helps people practice is to move nimbly between different aspects of an experience or situation, so that some of the undercurrents that might otherwise be ignored can be noticed and perhaps centered. This is something that I think most of us do much of the time. The Atlas simply helps people practice it, so that one has more ways of doing it, and is better able to do it in uncomfortable or challenging situations.

As I was saying, I began looking for expressions of colonialism, patriarchy, and capitalism in my everyday life. I started in the places I spent most of my time and did

⁶ From the instructional video for the tool *Listening Palettes*, created for the interdisciplinary course, *Creative Tools for Saving Biodiversity*, a cross-listed course between Dance and Life Sciences taught in Spring 2021 at Arizona State University.

much of my work. There were two main areas: the School of Sustainability (SOS), and the School of Dance.

SOS is where I was enrolled in my Ph.D. program. During my time as a graduate student, I was doing a lot of teaching and curriculum development, and so sustainability education became a focus of my research. SOS is one of the intellectual homes of sustainability science, and my research scope also involved understanding some of the roots and evolving trajectories of the field. Aside from the literature, I was growing familiar with different approaches to sustainability science taken by the school itself. These were expressed in all kinds of ways: which research was conducted, the classes being offered, the kinds of projects and new positions that received funding, who was sought out for guest lecturers and community partnerships, and so on.

Meanwhile, I was also working with the Atlas of Creative Tools in the School of Dance. This is where I first met Liz Lerman in 2017, and since then I have become part of a community that uses and supports the Atlas. It has become a large part of my personal and professional lives. It is important to note that I encountered the Atlas at a particular moment in its evolution. I was not around for the several decades during which much of its original content was conceived and developed. I was joining at what might be described as a juncture or a new chapter, when Liz decided to join Arizona State University in part to explore how the Atlas of Creative Tools could be built into a digital commons to support the expanding communities of practice.

My own understanding of the Atlas came in many ways. As a student, I took classes and participated in exhibitions and workshops. Eventually I would help teach classes and develop new curriculum. I created several different online platforms in collaborative projects meant to share the Atlas while exploring ways of organizing the Atlas digitally. I also conducted qualitative research through autoethnographic data of my experiences working, and by interviewing other Atlas practitioners.

During this time, there were a handful of us—myself and colleagues—forging connections between modes of creativity in the Atlas and our research and teaching in the School of Sustainability. Meanwhile, I worked with people in fields that interface with sustainability science, such as conservation biology, who were also finding value in partnering with ideas and practices from the Atlas. As my study of creativity and sustainability science deepened, I began to suspect that the Atlas could play an important role in the decolonial, transgressive approaches to transdisciplinary sustainability science that were being discussed in the literature and pursued by some of the faculty in SOS. This suspicion became a curiosity, which led to this research project.⁷

Dissertation Organization and Research Questions

In Chapter 2 I describe the detail the theoretical framework, and how it shapes my research design, methodology, and analysis. I share my statements of problems and

⁷ For those of you beginning your Ph.D. studies, the way this transdisciplinary research project unfolded may be of interest to you. I have omitted much of the process for the sake of brevity, but contact me if you want to hear more.

hopes, which has two threads: 1) sustainability science is a contested field for cognitive justice; and 2) in particular, within the field is little understanding of what forms of creativity support teaching and research for a **post-normal**⁸ sustainability science. The methodology has one idea at its core: to try my best to conduct research using **nonextractivist methods**⁹, which necessitates learning in partnership and as part of a community, rather than from the outside looking in.

In Chapter 3, I consider the contested nature of sustainability science, and the way creativity is treated in relation to the field. The guiding question for this chapter is: To what extent can sustainability science be seen as a contested field able to promote cognitive justice, and what modes of creativity will be appropriate for such approaches? I use a creative tool, *Big Story Little Story*, and two different methods to answer this question. One method is a literature review of the evolution of the field of sustainability science to better understand its roots and choices that have been made in response to criticism. The second method is storytelling, where I share illustrative moments from my own experience as a doctoral student in the School of Sustainability at ASU, including a proposal for a collaborative dissertation. The chapter concludes with an analysis of four modes of creativity that may be appropriate for post-normal sustainability science.

⁸ **Glossary:** Post-normal science is the name of an approach that began in the late 1990s to democratize western science by including more voices in the production and validation of scientific knowledge, with a long-term goal of creating a plurality of knowledges (Ravetz and Funtowicz, 1999).

⁹ **Glossary:** Nonextractivist methods are described by many critical scholars (e.g. Patel 2015; Santos 2018) as bringing the researcher closer to the people and topics being researched so that the different knowledges involved are seen as incomplete and perhaps able to inform one another, and that the knowledge produced through the collaboration is not intellectually “free-floating” but strengthening the resistance against forms of oppression.

Chapter 4 is all about the Atlas of Creative Tools. In this chapter I respond to a set of guiding questions: What are the origins and evolutions of the Atlas? What does it contain? How does it persist through time? The question of how people use the Atlas is treated in more depth in Chapter 5. Chapter 4 does, however, include two thematic analyses. The first involves inductive coding from the Atlas data sets, which results in a rich description of the Atlas of Creative Tools. The second thematic analysis considers the Atlas through the lens of the theoretical framework outlined in Chapter 2.

Chapter 5 describes two stories about how two Atlas practitioners, Xanthia and Ruby, think about and use the Atlas in their respective communities and fields of work. The stories are created from what they shared with me in interviews, and are supported using insights from other Atlas practitioners and projects. Each story is joined by three analyses. The first examines the role that the Atlas plays in the production of knowledges “anchored in the experiences of resistance” to oppression (Santos 2018), in other words, ways of using the Atlas that correspond with epistemologies of the South. This is written into the stories themselves. The second analysis is what we can learn about the Atlas of Creative Tools from how practitioners describe and use it. This is a reflexive analysis aligned with principles of nonextractivist methods and the ethos of the Atlas as a co-produced commons for creative practices that continues to evolve through use. The third analysis is about how each practitioner’s use of the Atlas can contribute to approaches to sustainability science that promote cognitive justice. Rather than making direct suggestions, which I provide in Chapter 6, I use a writing style that encourages the reader

to draw connections between the practitioner’s experiences and their own lives and works.

Chapter 6, the final chapter, is the upshot. It provides practical suggestions for integrating the Atlas of Creative Tools into sustainability science research and teaching. This chapter has two audiences in mind: administrators and educators in sustainability science programs, and students—particularly graduate students—enrolled in such programs. I intend for this chapter to be a helpful starting point for those who are interested or eager to use the Atlas in their own contexts. While it cannot replace experiencing the creative tools by trying them, I hope it is enough to pique your curiosity and connect with an Atlas practitioner to learn more.

An Adaptation of CRP for Chapter 1

As I mentioned in the preface, I want to encourage readers to notice all kinds of things in the dissertation, and draw their own connections and meaning from it. I do not include conventional chapter summaries because they can act as filters for what readers consider important or worth remembering. However, I agree with one of my co-chairs, LaDawn, who reminded me that summaries are also a kindness to the reader, and that we all need to be reminded of things to help them stick.

Therefore, I have adapted one of the tools in the Atlas to serve as a closure for each chapter. The tool is called the *Critical Response Process*, and it is a four-step process usually used to give and receive feedback on works-in-progress. Liz Lerman

created CRP in the 1990s in response to a toxic culture of critique in the performance world. In this sense, it was and continues to be a counter-hegemonic practice for communicating and collaborating. CRP is a very rich tool (or set of tools, as some describe it), and many people and groups have contributed to its development over the years. I describe CRP in more detail at the end of Chapter 4. If you prefer more context about the origins and uses of CRP before proceeding with this adaptation, I suggest you advance to page 169, and then return here when you are ready.

Step One: Statements of Meaning

I appreciated that the Atlas was named and described right from the beginning, because I didn't know what it was and so this gave me something to build my understanding on.

I liked how you described what it *feels* like when you hear that Norwegian greeting,

Takk for sist.

I was glad to see Liz's name associated with the Atlas right from the beginning, because I first found out about the Atlas through Liz.

I'm curious about how something can be both an idea and a creative tool, like how you described *multiplicity*. I'm interested in hearing more about that.

I had an idea of what *multiple names for the same thing* meant when you first described it, and then as I read your examples of yourself, Standing Rock, and this dissertation, I was also able to think about it in a different way.

The footnotes feel like little windows into how you work... and sometimes like personal messages to me as a reader or sometime who helped you along the way.

I found your list of names for the dissertation somehow surprising and intuitive at the same time. They made sense even though I didn't expect to find them.

When you asked me to do that short writing activity after your list of names, I realized that reading this dissertation might be more interactive than what I'm used to.

The way you visualize four histories intersecting made me think of how people sometimes describe their research as being "at the intersection of" so and so, but what's different is how you include yourself at that intersection, too.

I felt a bit relieved when I read the title "A General Introduction (Without Citations)" because I was hoping for an overview that was easy to follow, and sometimes citations make academic writing more difficult to follow.

I appreciated having short, succinct chapter overviews.

Step Two: Questions from the Author

My intention was for this chapter to introduce you to both the *content* of the dissertation, as well as the *processes* I used to create it. Did you notice both content and processes in this chapter?

I mention the tool *Listening Palettes* but don't provide any instructions or a demonstration for how to use it. Did these stand out to you as missing, or did you wish I had included them?

How did you experience reading the general introduction without citations?¹⁰

In the section where I write "I began looking for expressions of colonialism, patriarchy, and capitalism in my everyday life," is it clear that some of the work I was doing was personal and particular to me?

Step Three: Questions from Readers

Step Three of CRP involves asking neutral questions. The spirit of a neutral question in CRP is to seek information or express curiosity with a desire for the person

¹⁰ In CRP Step Two, people are encouraged to respond openly (or honestly), and responses do not need to follow a particular prescription of being critical, complimentary, or anything in between. The main guideline for Step Two is that responders stay on the topic of the question asked of them.

receiving the question “to think about their work in a fresh way, as opposed to telling them how to improve their work or asking them to defend it” (Lerman and Borstel 2008, 17). Sometimes the driving force behind a neutral question is an opinion. But neutral questions are not opinions with question marks at the end. The practice of asking neutral questions involves backing up to a place before the opinion gripped you and finding questions that might help you or someone else learn something. Don’t worry, if you phrase an opinion as a neutral question, you won’t lose the opinion. You can share it later. Having and sharing opinions is an important part of using CRP, and in my view, an important part of life.

I don’t know what questions you would ask of me at this point. Rather than creating some, which I did for statements of meaning, I will instead guide you through what CRP practitioners sometimes describe as a “Neutral Question Workshop”, which helps us practice turning our opinions into neutral questions.

Sometimes people think that the analysis and results are the most important part of research. Because of this I would understand if in this moment you are asking yourself, “Chapter 6 is the upshot, and it’s so far away What’s the purpose of all this stuff before it?”

If you asked something like this, you could notice that this is a question with an opinion (or two) clearly embedded in it. Take a moment and look for the opinion(s). Did you find any?

One opinion I find is that Chapter 6 is so far away, in other words *too* far away from where people usually start reading, which is the beginning. Another opinion is that the upshot is more important than the content leading up to it, or that what precedes the upshot gets in the way of what matters most.

I will try to phrase the original question I imagined above as a neutral question. I do this by considering the opinions I found embedded in the question, and then coming up with a question that seeks more information, or perhaps questions the assumptions that support the opinion. You can do this too. I suggest pausing now and trying on your own before continuing to read.

Example. The upshot is so far away! What's the point of all this stuff before it? → How did you decide on the sequence of your dissertation?; or, How do you think about the relationship between research processes and outcomes?; or, What are some of the insights you want readers to gain from the earlier chapters?

I hope you find this method of forming neutral questions useful. You can try using it if you form strong opinions while reading. I am not advocating that all questions be neutral or that opinions be broken down and investigated in every instance. Nor do I think questions can necessarily be strictly neutral. In fact, practitioners of CRP have recently been problematizing some of the assumptions at the root of the neutrality of questions (Lerman and Borstel 2022). Instead, I shared this tool (or part of a tool) early in the dissertation so that you could have it at your disposal and perhaps refine your use of it

as you read. Finding questions with the aim of understanding can be difficult, and this tool can help.

I am glad—honestly both nervous and glad—to hear your actual statements of meaning, questions, and opinions about this work (Step Four of CRP involves responders sharing their opinions, but I won't demonstrate that in this chapter). I can certainly use the feedback. Even though the dissertation is itself a finished product, that is only one way of looking at it. It is also part of a much larger work-in-progress that I am still engaged with, one that involves both personal and professional research. I encourage you to reach out to me to share feedback, and we can practice and use CRP if you are interested. Remember that my contact information is written in the prologue.

Chapter 2 – Theoretical Frame, Research Design, and Methodology

Welcome to Chapter 2, which is one of the more traditionally academic chapters in this dissertation. This chapter serves several important purposes. It outlines in detail the theoretical framework that contextualizes my research. My choices of research design and methodology are also justified through my theoretical framing. I actually admire theorists and cherish most theories. For me, they are as serious as a coming storm, and utterly practical. While many academic theories can be—and I think often ought to be—complicated, I have attempted to describe the ones I draw on using accessible language. My hope is that your feelings about this chapter are similar to how my dear friend David feels when his family comes to visit him: “I’m happy to see them come, and I’m happy to see them go.”

Three basic premise underly this dissertation. First, people have very different ideas about what constitutes sustainability, and the differences come from the incredible diversity of our ways of thinking and living. Second, a sustainability science that cherishes this diversity will be unable to separate ecological sustainability and social justice, and will work with the cognitive and material dimensions of each. Third, creativity will be an important part of how this work is imagined, performed, and sustained in the midst of powerful forces that resist momentum toward socially just forms of environmental sustainability.

I am not suggesting that sustainability science should embrace and pursue every conception of sustainability that’s out there. To put a finer point on it, some ideas about sustainability are problematic. For example, some take for granted that the dominant

social paradigm of western modernity (more on this below) is the only source of ideas and strategies that can lead to societies that are environmentally sustainable and socially just. Another problematic idea about sustainability presumes that the main features of industrialized, modern society are desired by everyone or, if not desired, an inevitable point along the ‘natural trajectory’ of human evolution.

Conceptions of sustainability couched in either assumption are at best incorrect and at worst highly destructive. Sustainability science needs to tread carefully. Although the field is very young for a scientific approach—only about 20 years old as of this writing—it is growing rapidly. This rapid growth has led to many different interpretations of and approaches to sustainability science research, practice, and education. Some of these, in the spirit with which I believe sustainability science was conceived of—deviate sharply from the two assumptions I described above. Others maintain them. Approaches to sustainability science that support cognitive justice will not perpetuate the root metaphors that, according to Chet Bowers, bring the assumptions that supported problematic ways of thinking from the past into the present and future (2000).

Theoretical Framework

The two assumptions I stated above are among several that I consider in my evaluation of sustainability science as a contested field that is being tugged in many directions. To understand sustainability science as a contested field, we need to understand two of the powerful forces acting to inhibit cognitive justice. The first are

paradigmatic forces, and in particular the paradigm of western modernity. These are covered in this chapter as I outline the theoretical framework used in my research.

A second force acting on sustainability science to inhibit cognitive justice is the legacy of western science. For centuries, western science has viewed itself as the superior system of knowledge production, and the most relevant knowledge for identifying and solving social problems. Sustainability science developed in part as a reaction to the elitism of western science (Staffa, Riechers, and Martín-López 2020). In Chapter 3, I describe the development of sustainability science in relation to the western science it emerged from, and focus on the role that creativity can play in approaches that promote cognitive justice.

Paradigms as Conceptual Tools

Existence is so enormously complex that humans can't possibly conceptualize it in its entirety. One of the conceptual tools we use to make sense of ourselves and the world at this scale is paradigms. In ordinary use, a paradigm describes how things are, or a set of conditions that gives rise to something. I might say "Well, that's the paradigm we live in," or "That's just the way it is." These are references to overarching social paradigms, collective and shared by many people.

Donella Meadows provided a clear description of this type of paradigm: "The shared idea in the minds of society, the great big unstated assumptions— unstated

because unnecessary to state; everyone already knows them— constitute that society’s paradigm, or deepest set of beliefs about how the world works” (Meadows 1999, 17).

As a conceptual tool, paradigms are flexible and can be used to describe different levels of experience. At the level of social experience, as Meadows describes, the minds of society are not only human minds. Taking the metaphor of a mind a little further, society has modes of thinking and storing memory, as well as arrangements that formalize these processes. Institutions big and small produce knowledge and artifacts according to their particular rules, norms, or traditions. These also serve to codify their scope and define their purpose. This is a general description of the processes by which a society may persist through time and tend to reproduce itself. There are many specific perspectives on how these complex processes unfold. One comes from living systems.

Throughout his career, James G. Miller developed a tremendous volume of work about living systems theory. His work influenced others in the fields of network theory, computer science, and complex adaptive systems. He described the features of living systems on multiple levels, from a cell in the body to whole societies (Miller 1975, 343). Society, he thought, follows the pattern of all living systems, a pattern called autopoiesis. This term ‘autopoiesis’ was first introduced to the field of biology by two Chilean researchers, Humberto Maturana and Francisco Varela, in order to develop a theory of cognition (Maturana and Varela 1991). According to them, an autopoietic system is a system that is able to reproduce its own parts, as well as its structures that produce the parts (Luhmann 2012). Miller’s description of societal reproduction fits this model, and has led to several social theories that describe how cultures shape social reproduction as

“ontologically active agents that build the material, conceptual and phenomenological worlds we live in” (Hamilton and Ramcilovic-Suominen 2022). This is in fact one of the main theoretical tenets of the sociological concept of hegemony, which I discuss in more detail in the next section of this chapter.

Another perspective on social reproduction comes from the ways people learn. Western education theory names three broad ‘sites’ of learning. Here, the term ‘sites’ is used to combine locations and ways of learning that can and often do overlap. The three broad sites of learning are formal, non-formal, and informal (La Belle 1982, 163). Formal learning is the mode you are likely to imagine when they think of learning. It is the intentional, sequenced learning that happens through hierarchical education structures inside public and private institutions that give grades, credentials, and often degrees.

Non-formal learning is also organized and systematic but does not take place in degree-granting institutions. This mode of learning happens in public spaces such as museums and cultural centers, and through a wide variety of programs that purposefully offer educational experiences but without formal assessment or accreditation. In both formal and informal modes of learning, content and methods are what drives education and assessment.

Informal learning is essentially all the rest: the learning that takes place outside formal and non-formal modes. It therefore includes broad processes of socialization, and is considered the context in which a vast majority of a person’s learning takes place (Schugurensky 2000, 2). The learning that happens from socialization involves internalizing the values and priorities found throughout society, including media and

political discourse (Sandlin et al. 2011). Even the particular ways that language is socially embedded in informal modes of learning contains root metaphors that bring some of the assumptions from ways of thinking from the past to the present (Bowers 2000). This dimension of language is another mechanism by which the cognitive dimensions of a society or paradigm are reproduced. Cognitive dimensions, or mentalities and ways of thinking, affect not only *how* people think, but also their beliefs and behaviors.

Another perspective on social reproduction comes from Ralph Waldo Emerson in this short excerpt from his speech on War given in Boston in 1838:

Every nation and every man instantly surround themselves with a material apparatus which exactly corresponds to their state of thought. Observe how every truth and every error, each a thought of some man's mind, clothes itself with societies, houses, cities, language, ceremonies, newspapers. Observe the ideas of the present day to see how timber, brick, lime, and stone have flown into convenient shape, obedient to the master idea reigning in the minds of many persons.

Emerson paints pictures with his words. What do you notice about how he describes social reproduction? Some things are explicit, and others I do not think he considered because they were themselves normalized during the time he lived. If you have a moment, reread the excerpt (or the whole speech) with this question in mind: What does Emerson's view take for granted, even as he critiques some of the penchants of his society at the time? Remember, nothing is too small to notice.

When we conceptualize social paradigms, we need to remember that they have both material and cognitive dimensions that are interrelated. Social paradigms include

ways of thinking as well as the physicalities inspired by those mindsets. However, the material and cognitive dimensions of a broad social paradigm do not emerge by scaling up from the ways of thinking and being of any one person, or even a group (or “state of thought,” as Emerson writes). No matter how influential a person or the group, the social paradigms we conceive of are incredibly complex. They contain dominant, subordinate, and subaltern views that compete and coexist on different levels of experience (Santos 2014). And these views are not held by people or groups in monolithic, static ways. Any single person, group, institution, or whatever will contain a wide range of views that may change over time and jostle for influence (with varying degrees of power and influence) in specific contexts.

So far I have been talking about paradigms as a flexible conceptual tool that we can use to conceptualize society, or the level of social experience. The level of social experience is one of three levels of experience that I want to use this concept of paradigm to understand. If we move from the level of society to a particular field of knowledge, like philosophy or western science, paradigms can be used to describe the conceptual structure that gives shape to the thinking and methods contained in a field. In his seminal work, *The Structure of Scientific Revolutions*, Thomas Kuhn illustrated this by showing how paradigms act as a sort of gatekeeper to a field of knowledge by giving it theoretical and methodological boundaries constructed using particular logics and grammars (1962). He described how transitions from one knowledge-paradigm to another happened in part by shifts in these boundaries.

As with in social paradigms, fields of knowledge contain many ways of thinking and methods that coexist and are in conflict. According to Kuhn, there will be dominant forms, and for people working in the field, these will promote or require (or dictate in some fields) certain priorities and processes, while limiting others. This can lead people to categorize certain questions, methods, and knowledges as more interesting and legitimate than others (Kivunja and Kuyini 2017, 26). In research contexts, this is sometimes described using the concept of positionality, which draws connections between how a researcher's characteristics, identities, and the social categories that they occupy affect the ways that data is determined, collected, analyzed, and emphasized (Rose 1997).

Just as fields of knowledge are embedded in social paradigms, people are embedded in fields of knowledge. The methodologists Egon Guba and Yvonna Lincoln describe how, when people are part of a field of knowledge, that becomes part of their personal paradigm operating at the level of individual experience. This personal paradigm, or worldview, includes a person's "ontological, epistemological, and methodological assumptions" (1994, 107). The sources of one's worldview are multiple, and will draw on the broader social paradigm(s) and fields of knowledge they are immersed in. There are also very specific sources that come from the body, one's experiences, and histories situated in particular places and moments in time. However, these are always in the context of processes of socialization, social structures and power dynamics that operate in generalities, categories, stereotypes, representations, roles, and

identities that someone may or may not identify with but are often prescribed from the vantage point of society itself.

At this point, I have described how paradigms can be conceptual tools used to organize three levels of experience: society, fields of knowledge, and the individual (or a person's worldview). The boundaries separating these paradigmatic levels shouldn't lead us to think of them as separate or isolated realms of experience. While analytical distinctions between these levels will yield different insights, they constitute each other. The mental, material, political, and other dimensions of each are held by and transferred between persons, communities, institutions, and societies.

It's also important to note that a paradigm, and its analytical boundaries, aren't any more or less 'real' than other concepts we use to make sense of the world. Remembering this is difficult. Returning to Meadows, remembering means "to keep oneself unattached in the arena of paradigms, to stay flexible, to realize that no paradigm is "true," that every one, including the one that sweetly shapes your own worldview, is a tremendously limited understanding of an immense and amazing universe that is far beyond human comprehension" (Meadows 1999, 19). Perhaps you have found this sentiment in the teachings and practices of your religion or spirituality. Practicing it involves, among many things, a kind of mental nimbleness that isn't supported by many institutions or ways of knowing found throughout western modernity (Lerman 2018, 9). What do I mean by western modernity?

The Paradigm of Western Modernity

Today, western modernity is described as the dominant social paradigm on this planet (Santos 2014). As discussed earlier, it is a broad paradigm that is incredibly complex and contains all kinds of views that coexist and compete with each other. That means that not all beings, environments, people, or societies are organized according to the characteristics of western modernity—although many are—and it is not defined or experienced the same way by those experiencing it.

Because the dominance of western modernity is on a global scale (it is a global paradigm), it is difficult to imagine anyone or anyplace that is not at least indirectly affected by it. Often the characteristics of ‘modern society’ are so normalized that many people would never think to give them a name; they are taken-for-granted as innate features of what it means to have a human society, rather than the current expression of a particular collection of ideas and social systems that are embedded in history and imagined well into the future.

Western modernity is a global paradigm because it is characterized by increasingly global relations of travel, trade, politics, laws, and knowledge. In his analysis of universal narratives, Michel-Rolph Trouillot examines the planetary flows of people over the past four centuries and points to the sixteenth century as the moment when “the world became global” (2002, 839). The mechanisms that produced colonial empires involved movements of people that brought them closer than ever before in both time and space. Importantly, Trouillot does not describe modernity itself as an historical

period, but rather a collection of narratives that are self-serving and perpetuate themselves.

Walter Mignolo also refers to modernity as an idea rather than a time period. He sees modernity as “the abstract companion of two more concrete signifiers: modernization and development” (Mignolo and Walsh 2018, 110). Cast in this light, modernity is a new name for much older social momentums driven by epistemological commitments to linear formulations of time, progress, the individual, and abstract universalisms about what is true or false about these discourses. The ideas of René Descartes in the European enlightenment period contributed greatly to these momentums. The notion “*Cogito ergo sum*” (I think, therefore I am) instigated a significant social shift from God as the source of knowledge to man and rationality as its new foundations. Rationality and logic are the cornerstones of both western philosophy and western science, which along with religion, are chief among the visible debates in western modernity about how to access the truth, or the true nature of things. I say ‘visible debates’ because, as I will describe later, a variety of social science theories describe many other ways of knowing that have been rendered invisible by some of most problematic dimensions of western modernity.

Descartes idea “*Cogito ergo sum*” also constructs a dualism between the mind and the body. This ‘cartesian split’ imagines that a person’s existence is rooted thinking, so that they can imagine themselves as existing outside their body, outside nature and their surrounding contexts, and even outside their societal histories. From this position, a person becomes an objective viewer that views subjects or objects from behind a glass

panel, as external to themselves. Castro-Gómez described this objectification as “point zero”, a point of view that is beyond the scrutiny of any other, including the person doing the objectifying (2021). Consider for contrast the southern African concept of ubuntu. Ubuntu is a view of what means to be part of humanity, ‘I am because we are’, which supports an ontoepistemology¹¹ “of co-being and co-existing” with both people and nature (Santos 2018, 10).

Ramón Grosfoguel illustrates how the logic of “point zero” has remained even while shifting its focus over time:

We went from the sixteenth century characterization of “people without writing” to the eighteenth and nineteenth-century characterization of “people without history,” to the twentieth-century characterization of “people without development” and more recently, to the early twenty-first-century of “people without democracy. (Grosfoguel, 7)

Here, Grosfoguel describes how modernity, as an autopoietic narrative rather than an era or time period, redefines and remakes itself from its own foundations. Its two engines, modernization and development, work in tandem to drive humanity from one horizon to the next. Earlier horizons of modernization were enlightenment, and political and religious missions of civilization. Modern conceptions of development grew from earlier notions of progress, including technological progress (Mignolo and Walsh 2018,

¹¹ **Glossary:** Ontoepistemology is a word that combines the two words ontology and epistemology in recognition that theories and methods of knowing (epistemology) and a theory of being, or worldview (ontology) are interconnected, inform each other, and cannot be realistically separated. Often ontoepistemology also includes an ethics, or how one *should* know and be in a relational world.

111). Today, globalization seems likely to be the new horizon, or the ‘next chapter in the narrative’, that is creating itself by absorbing western modernity.¹²

This “point zero” that derives from cartesian dualism mind/body thinking has been theorized as an organizing principle for an epistemology that perpetuates three broad systems of oppression found in the historical and present-day narratives of western modernity. These three systems are patriarchy, colonialism, and capitalism. Critical theorists from many different fields have described these as systems of domination that are interconnected and often act to reinforce each other in conceptual and material ways.

In the social sciences, patriarchy was first used to describe the unequal distribution of power between men and women, at the detriment of women. This conception of patriarchy has its roots in the family structure, but extended beyond the household to become a social system of domination. However, feminist theories “updated and expanded the understanding of patriarchy” after mainstream social science treated it as a characterization of earlier societies, rather than something that persists in contemporary societies, even if its particular expressions have changed over time (Facio 2013). Feminist theories of patriarchy describe a much more comprehensive understanding of how social institutions continue to create and reinforce unequal power structures and relations that strengthen the domination of a particular kind of masculinity

¹² Caution! Imagining that globalization has a single form is to fall victim to a kind of reductive thinking that excludes the many—albeit marginalized—ways that people connect globally to counter hegemonic globalization. Just as paradigms are contested spaces, movements and groups engaging in counter-hegemonic work have been creating networks and alliances that are seen as emerging forms of globalization that contest the form created by the imposition of liberal democracies and capitalist modes of development (Santos 2007).

over a femininity that is made subordinate (and which may or may not correlate with biological sex) through mental, spiritual, economic, and political means (ibid).

To push back against the harmful idea that women can be treated as a single category, and that all women experience patriarchy in the same ways, Black feminist scholars developed the concept of intersectionality. Intersectionality describes how racism, sexism, and classism create different experiences of oppression for women and other marginalized groups (Crenshaw 2017). This field has added nuances to our understanding of how women who are black, indigenous, and/or are considered immigrants experience discrimination that white women or women in higher social classes and casts often do not.

One concept used in feminist theories (and especially by Black/Afro-feminists) to describe ways that women are excluded is invisibility.¹³ Invisibility describes the ways that women's bodies, work, ideas, and priorities are excluded from public institutions, political discourse, and academia (Arat-Koç 2012; Mowatt, French, and Malebranche 2013). In Marxist feminism, for example, the concept of invisibility can be used to describes how women's labor in the home is unvalued because it is not commodified in the labor market, as well as how wealth is often accumulated by men at the exclusion of women through property ownership (Bryson 2021). This overlaps with theories in political ecology that show how capitalism and patriarchy intersect to create “a totalizing

¹³ In feminist theory, modes of invisibility are often considered alongside modes of hypervisibility. Like invisibility, hypervisibility also creates exclusions. But rather than excluding by absenting women, they are made ‘hypervisible’ by highlighting “sexual subjection or their social disparities” (Mowatt, French, and Malebranche 2013, 645). This hypervisibility is used to reinforce existing stereotypes of and prejudices against women, especially black and/or immigrant women (Arat-Koç 2012, 9).

male gaze which objectifies landscape and women in particular ways” (Escobar 1999, 6), often commodifying both. Using this logic, nature is reduced to natural resources, and women—and especially their social contributions—are reduced to less-than-men or even less-than-human status.

There are parallels in decolonial theory to the feminist concepts of invisibility. Decolonial scholars have elaborated on the ways that indigenous women, especially those who part of social movements in the geographical global south, are often excluded from sociological theorizing about patriarchy and alternatives to it (Santos 2018). These exclusions can be understood as invisibilizations of both people and their ways of thinking. In his analysis of global trends in epistemology, Santos describes the tendency for Euro-centric critical theory and sociology to crowd out contributions from scholars and activists in the global South. Although his analysis often characterizes such exclusions without emphasis on gender, feminists like Vandana Shiva are developing theory from global South perspectives that build on the significance of women’s work, for example, in resisting global capitalist modes of industrial agriculture.

As I pontificate about western modernity, some readers may, at this point, be staring wide-eyed at the elephant in the room with a sign hanging round its neck that reads ‘Hegemony’. Hegemony is an important sociological concept at the core of both Euro-centric critical theory and theories from the epistemological South. It is a great insight from western critical theory that originated in western societies from people critiquing colonialism and capitalism. And it is one of the modes of social reproduction

that I did not discuss explicitly in the previous section about paradigms because it deserves its own treatment.

The basic idea is that a social sphere (like a society or interconnected global societies) is made up of cultural frameworks that are linked together, and these cultural frameworks themselves comprise people, institutions, materials, concepts, ideologies, and so on. These elements of cultural frameworks are diverse, but they are understood and interpreted through specific political, economic, and social logics that limit how things are framed or thought to be in relationship with each other. To reiterate, certain social logics frame *how* elements of cultural frameworks are interpreted, valued, and understood to be in relationship with each other. In this context, hegemony is the dominance of certain limiting frames and relationships that define the ‘horizon of possibility’ within a social sphere (Laclau and Mouffe 2014). One of the results of hegemonic framing is that certain interests that are in fact very particular to a small subset of a society come to be seen as in the interest of the society as a whole.

It’s *a little* like translating every language into one, say English, and then using English exclusively to make sense of the world. This is not a perfect metaphor, but perhaps this gives you a further impression of what I mean by framing and ‘defining the horizon of possibility’.

The dominance of hegemony “is achieved not through the inevitable unfolding of historical dynamics, but rather a contingent, political creation and the result of the operations of power” (Hamilton and Ramcilovic-Suominen 2022). Because a social

sphere is so broad, there is always a diversity of elements of the cultural frameworks that comprise it. But hegemonies expand by co-opting, or assimilating, elements that do not already exist within the horizon of possible logics that frame and interpret.

Importantly, a hegemonic social sphere is not *homogeneous*. In other words, a hegemonic social paradigm remains diverse and complex, with co-existing and competing views as I described earlier. Some elements of the social sphere remain excluded from the hegemonic discourse, and are never assimilated. Sometimes these can survive in the margins, but often are lost, especially when the forms of exclusion are violent (Santos 2014). Settler colonialism provides one of the clearest illustrations of how the hegemonic approach to society-building through empires and colonies attempted at times to assimilate indigenous peoples (think, for example, of the White Man's Burden or of Indian boarding schools in the United States), but often opted to kill and forcibly remove them. While many describe settler colonialism as far less frequent than in the past, colonialism itself has taken on different expressions in post-colonial and 'modern' societies in ways that contribute to hegemonic social reproduction (Mignolo and Walsh 2018).

Hegemonic social spheres expand through a variety of modes of assimilation and exclusion, despite the emergence of new elements over time. For most people, including those who are privileged by hegemonic discourses, the experience of living in society can feel normal, and the hegemony itself becomes invisible. Gramsci described how a small selection of ontologies and epistemologies seem complete, normal, and inevitable through forms of power that operate "less by coercion than by its intellectual and moral

capacity to win the consent of the mass of the population” (Gunn 2006, 707). This involves processes that Dahl, Durkheim, and Nussbaum describe as socialization, or the internalization of society (Lukes 2005, 139). For people and groups ‘outside’ the hegemonic discourses—i.e. those using logics and cultural frameworks beyond the horizon of possibility—the presence of hegemony is far more obvious because it is experienced as physical and cognitive (ontological and epistemic) abuse, exclusion, marginalization, and/or oppression. This awareness of hegemony, which can be theorized in terms of invisibilization (Arat-Koç 2012), two-eyed seeing¹⁴ (Reid et al. 2020), or epistemologies of the South (Santos 2014), is one of the mechanisms that makes counter-hegemonic work possible.

The concepts structure, agency, and power are usually involved in describing the complex interactions within and between the cultural frameworks that comprise a social sphere. In a sociological sense, structure is a relational concept because it refers to the particular organization of society and how it affects the way people think and act (Elliott 1999, 7-8). The forms that social structures take in society are forms of organization. These are orders, positions, processes, and flows of resources and information found throughout society. A social paradigm, even a hegemonic one, includes not only the dominant social structures, but also structures belonging to subordinate and subaltern modes of existence. This diversity is due in part to people’s ability to choose, which makes some social structures contested spaces rather than fixed or determined solely by the hegemonic discourse.

¹⁴ See page 243 for more on two-eyed seeing.

Just as individuals are not living, breathing copies of the paradigms they occupy, neither are they mirror images of the structures they inhabit. In social science, accounts for these differences is a wide-ranging and long-standing tension most visible in theoretical debates between two positions: determinism and free will (Santos 2014). In a general sense, the concept of agency refers to the capacities that people have to make choices, whether supported by or in spite of the particular social structures they are situated in. I tend toward Margaret Archer's view of agency which, as does Lukes, outlines an agent-centric conception of power. It involves describing exchanges between social structures and two interrelated subjective dimensions: reflexivity and consciousness.

Reflexivity is not merely introspection, which according to Archer splits a person into an object that they themselves observe (the logic of the Cartesian split hard at work). Instead, reflexivity is seen as an *internal conversation* from which new ideas, intentions, and meaning emerge (Archer 2003, 90). Here, her use of the word *emerge* is important. She describes reflexivity as a "personal emergent property" (ibid, 9) made possible by human consciousness that is itself an emergent process that can't be reduced to the biochemical dimensions of humanity (Fromm 2005). Archer sees reflexivity of this kind as the causal mechanism for subjective transformation (Archer 2003, 123). Here, subjective transformation happens when a person, through processes of reflexivity and symbolic meaning-making, determines new ways of interpreting, internalizing, and responding to the social structures they are a part of (ibid, 40).

A person's ability to imagine not only the nature of structures but alternatives to them will be limited by the epistemological options one has or does/can open themselves up to. I follow David Manuel-Navarrete's assessment that we as people influence the material dimensions of social structures "not only through our behavior, but also through the stories we tell" (2015, 5). This capacity for creating change from our "inner world of dreams, fantasies, and emotional responses" is also a means of social reproduction (ibid). The difficulty of changing the structures themselves is not overcome solely through subjective distancing or disavowing of those structures, and I am not saying that people can imagine themselves out of poverty, systemic oppression, or the like. Rather, I believe that many of the roots of these injustices and of unsustainable systems depend for their survival—for their social reproduction—on the stories we tell ourselves about them, and on the hegemonic discourses that often narrate these stories, so to speak.

The concept of power also helps us understand how some social structures become more dominant than others, and how some people and groups remain marginalized despite their significant efforts. Steve Lukes formulates power as a relational concept (like structures) that describes degrees of influence, coercion, or force that people have in interactions with others and experience in the context of social structures (2005). His view of power goes further than some of his contemporaries (e.g., Morriss 2002) by describing it as a capacity that can be exercised both consciously and unconsciously, either through action and inaction.

Luke's view that people can exercise and experience exercises of power without knowing it is an important contribution to critical theory. It parallels processes of social

reproduction described by Gramsci's use of hegemony, and Pierre Bourdieu's concept of doxa. Bourdieu's doxa characterizes the experience when subjective principles of organization, like one's thinking and expectations, align with objective or social order. This alignment produces the experience of the social world as natural and self-evident, and ultimately results in its particularities being taken for granted (Bourdieu 1977, 164). The experience of doxa is one of the factors that make institutional cultures difficult to confront and change, because doxa can normalize the experiences of people regardless of their social power in a social field, or situation.

These views of power try to connect thinking and practices at societal and institutional levels with the ordinary experiences of people. As people we are continuously developing an understanding of our inner and outer worlds through our experiences with the people and cultural frameworks we are surrounded by. Even when we engage in Archer's processes of reflexivity to exercise our capacities for choice and change, the choices we make often remain in the context of, and thus conditioned by (in varying degrees) the particular structures and power relations we inhabit.

These contributions from critical theory point toward an important idea: that what does and doesn't occur to us as a choice has something to do with *how we determine* what's real and what's possible (ontology) and distinguish between fact and fiction, truth and belief (epistemology). Santos has characterized western modernity as a paradigm that contains visible, established discourses and arenas for debate (Santos 1995). However, these visible debates are supported by hegemonic discourse that makes other debates invisible by producing them as nonexistent. By nonexistent, I mean that the perspectives

involved in the invisible debates are not only missing from mainstream discourse but are considered irrelevant or unable to participate from the epistemological context of western modernity. To put a finer point on it, certain ways of knowing have been organized out of western modern thinking. Santos describes how, underneath the visible distinction of conflicts, “there is another one, an invisible one, upon which the former is founded” (Santos 2014, 118).

Santos has used historical analysis to describe how this happens. He names the dominant way of thinking in western modernity ‘Northern epistemologies’, and argues that its roots developed alongside colonial and capitalist expansion, largely through patriarchal systems (Santos 2018). The features of Northern epistemologies are a collection of assumptions, methods, logics and grammars that together create distinctions and radicalize them, resulting in epistemic silencing, erasures, exclusions, and ignorance (Santos 2014).¹⁵

He evaluates the role that Northern epistemologies has played in perpetuating western modernity (at the expense of many other ways of knowing) throughout and across societies, including in western/ized universities. According to Santos, “The western understanding of the world is as important as it is partial” (ibid, 164). Any system or field of knowledge will be able to pursue certain questions goals, but not others. He points to this as evidence that a diversity of ways of knowing are needed to achieve social justice, because social justice is not possible without cognitive justice.

¹⁵ For a more detailed analysis of how Northern epistemologies create distinctions and radicalize them, see Appendix E.

Santos contrasts Northern epistemologies with epistemologies of the South (ES). ES are neither the inverse nor derivative of Northern epistemologies (Santos 2014, 134). In the simplest sense, ES are themselves and exist on their own terms, even though they can also be understood by how they are used in contexts of struggles created by western modernity.

ES is used by decolonial researchers as both a concept and a framework. As a concept, ES represent an appreciation of the incredible variety of ways of knowing that have been, are, and may yet become. The basic premise ES as a concept is that “the understanding of the world by far exceeds the West’s understanding of the world” (ibid, 164), and that it will be necessary for many knowledges to come together if we are to solve the problems of western modernity. This coming together can include knowledges that were developed along Northern epistemic lines, such as western science, to the extent that they can be reconstituted in non-western ways that reduce forms of oppression.

As a framework, ES is used in a few ways. One is to provide an explanatory model for understanding how social transformations are happening in societies around the world, even in the face of opposing momentum (Santos 2016, 19). Another is that it gathers together some principles and methods used by individuals and groups in their struggles against whatever specific harms they experience in their particular contexts of colonialism, patriarchy, or capitalism. As Arturo Escobar writes, this collection “provides workable tools for all those of us who no longer want to be complicit with the silencing

of popular knowledges and experiences by Eurocentric knowledge, sometimes performed even in the name of allegedly critical and progressive theory” (2016, 13).

More recently ES has also been used as an analytical framework used by decolonial scholars to question and prod at their particular fields of study and work. These include interdisciplinary studies (Dieleman 2016), peace studies (Catarino 2016), criminology (Goyes 2016), nursing and health (Rodrigues et al. 2016; de Noronha et al. 2019), innovation studies (Jimenez and Roberts 2019), media and communication (de Sousa Carvalho, José Santos, and Houart 2020), occupational therapy (Lussi 2020), international education (R’boul 2022), and creativity (Glăveanu and Sierra 2015).

I have found that when people use ES as a conceptual, comparative, or analytical framework, they usually work with one or a handful of the features and practices, rather than the entire (and extensive) framework Santos describes. In the spirit of ES, one does not need to include and connect every dot in the constellation of known ES principles and practices. Just as C. W. Mills called on social scientists to resist methodological fetishism to advance their sociological imagination, Santos warns us against being epistemologically dogmatic (2018, 126). It is also necessary that a framework committed to epistemic diversity acknowledge its own “location, limits, and potentialities” (Escobar 2016, 13). This is the spirit in which I have considered ES as part of my broader theoretical framework.

Contextualizing the Theoretical Framework in Universities

Universities can be sites of cognitive justice, despite their colonial legacies. The earliest universities were places of learning that also created religious, political, cultural, and scientific elites. This social stratification continues today. What's more, many universities have been built on occupied indigenous lands or with labor from enslaved people (Bhamba 2018). Although western/ized universities across the world tend to perpetuate the epistemic dimensions of western modernity (Gordon 2014), they are also sites of contested efforts to reject, ignore, or reconcile their colonial and capitalist roots and features (Santos 2017).

In western/ized universities, academics and practitioners in the humanities and critical scholars in natural and social sciences are likely to participate in alliances of intercultural translation, one of the main procedures of ES. Intercultural translation involves the ways that people “collaborate in bringing together different knowledges in full respect of their differences and looking for convergences and articulations” (Santos 2018, 22). In a university context, intercultural translation is work done by academics with those outside the academy. In this way it is similar to transdisciplinary research, except that the purpose of such work is to reduce the suffering caused by the oppressive aspects of western modernity.

Santos describes two main forms of intercultural translation: those between Western and non-Western knowledges and practices, and those between different non-Western knowledges and practices (ibid, 222). However, because ES refers to an

epistemological south, and not a *geographical south*, that means intercultural translations between North/South are not necessarily Western/non-Western translations. For example, artisanal knowledge¹⁶ developed in the west and used in western contexts to resist oppression may be a translation between North/South that is also Western/Western.

This is how I have come to view both the Atlas of Creative Tools and sustainability science over the past few years. The Atlas can be interpreted as a collection of artisanal knowledges that developed in the geographical global North in response to both abyssal and nonabyssal exclusions.¹⁷ I describe the particular circumstances of some of these exclusions in Chapter 5.

Sustainability science, which develops in large part in university contexts, has also been used to promote cognitive justice. These efforts can be seen as a part of broader existing momentums for university decolonization. In particular, sustainability science may be involved in moments toward “polyphonic” universities, or pluralversities, where knowledge is co-produced through the contributions of academics and citizens that bring together ways of knowing and practices “in full respect of their differences, but looking for convergences and articulations” (ibid, 22).

Research Design

¹⁶ **Glossary:** Artisanal knowledges are nonscientific knowledges that are “practical, empirical, popular knowledges, vernacular knowledges that are very diverse” and are always produced alongside other social practices (Santos 2018, 43).

¹⁷ For an in-depth analysis of the distinction between these forms of exclusions, see Appendix E

The theoretical framework I describe in the previous section has guided many of the choices involved in designing my research project as a whole, which is one of the functions of theoretical framing in the social sciences (Sinclair 2007). Choosing a theoretical framework to use in research design requires a deep understanding of some phenomena as well as the roots of existing problems, and the significance of those roots (Grant and Osanloo 2014). Many research projects are designed over time, and my pathway through the doctoral program was full of twists and turns. I was encouraged by my mentors and peers not to converge too early.

I am grateful for this, because it helped me be reflexive in my research. What I learned from how I was teaching, advocating, and working on in applied projects could be actively partnered with the research. I did this partnering in many ways, big and small. Two important choices involved using my theoretical framework to problematize/hope for sustainability science, and to choose and pursue a research methodology.

Statements of Problems and Hopes

Many critical theorists have characterized the problematic dimensions of western modernity in colonial, patriarchal, and capitalist terms. These critiques include both material and cognitive dimensions of these systems. When I began my graduate studies, I wasn't aware of these characterizations of western modernity or their connections to sustainability science. I thought sustainability was essentially about conserving resources,

protecting some land or endangered species, and choosing more efficient ways to produce energy and goods.

I didn't understand how slavery in U.S. history can explain inequities across the social spectrum for black and brown people today, or how that connects to environmental racism and my own privileges. I didn't really know anything about the incredible complexity and diversity of indigenous peoples in North America, on Turtle Island, or of the traumas they experienced and in many instances continue to suffer. When I was growing up in upstate New York, sitting in science class, it never occurred to me to ask how the Mohegans, which are indigenous to that part of the world, would describe their home or their cosmology. In English class, we never talked about sharing knowledge through oral traditions, and I never noticed it was missing from the curriculum. One of my closest friends, my neighbor Danny, was Mohegan, and I never asked him what that meant to him. It didn't occur to me to be curious about that. I still carry some of that shame today.

As I continued my studies in SOS, I met more and more people who described their understandings and experiences of themselves and the world. These were Native Americans from tribes in the Southwest, people from countries in the geographical global South, Americans who were strong activists, and dancers and choreographers who seemed to think and express themselves very differently than I was used to, then I had been taught to. These people shared perspectives that had never crossed my mind.

Up to that point, I had problematized sustainability science because of its lack of critical sociology and educational theory in the socio-ecological frameworks used to

describe complex problems. Slowly I began to realize there were many absences beyond a lack of critical theory, absences that were hard to notice as absent. As I became more familiar with the field of sustainability science and the culture of the school I was a part of, I grew more confident that I could problematize sustainability science in terms of its epistemological and methodological tendencies and exclusions.

In addition to this broad problem statement, I found a more specific gap in the context of sustainability education. I taught a lot throughout my doctoral program, and when I began I was new to teaching in formal educational spaces. I learned from other teachers and researched different approaches to sustainability education in order to improve. Because the sustainability science being used in SOS used a solutions-oriented approach to research and teaching, students were asked to ‘think creatively’ about future scenarios or when working on sustainability problems with community partners.

Creativity is described in the literature as essential for learning processes and outcomes in sustainability education (Sterling 2009). This is also the case for the competency-based approaches to educating sustainability science (Wiek, Withycombe, and Redman 2011).

However, creativity is often treated generically, either presumed to be an intrinsic outcome of university education, or else a byproduct of developing the other competencies or capabilities (Sandri 2013). And even if students learn creative practices, we cannot assume they will help them create in ways and toward ‘outcomes’ that prioritize cognitive justice. ASU prides itself on its innovation, but innovation as an expression of human creativity has resulted in both sustainable and unsustainable practices (ibid, 768). If we are looking for transformative, transgressive pedagogies that

can break open the epistemological space of sustainability education, some conceptions of creativity will be more appropriate than others.

Problem statements can also be statements of hope. *Multiple names for the same thing*. Many have found the field of sustainability science to be helpfully mailable and inclusive. This gives me hope that sustainability science can embrace cognitive justice as an explicit approach that distinguishes it from other scientific inquiry. I hope that, in its own way, my research contributes to these existing momentums.

Methodology

Theoretical frameworks also guide one's choice of methods and methodology. A methodology is not simply a combination of methods used in a particular sequence. It is that, but also an endorsement of certain ideas about what to pay attention to, how to interpret, whether and how to measure and compare, which findings are relevant, and the most appropriate ways to communicate them. "A good methodology is more a critical design attitude to be found always at work throughout a study, rather than confined within a brief chapter called 'Methodology'" (Clough and Nutbrown 2012).

Methods used to conduct research (and indeed to construct theories) are themselves rooted in prior theories and ideological commitments. Consider, for example, Michael Polanyi's mid-twentieth century critique of western science as a **reductionist**¹⁸,

¹⁸ **Glossary:** Reductionist science presumes to understand higher levels of organizational complexity by studying the lower levels, parts, or constituent phenomena (Polanyi 1966).

positivist science¹⁹. It was a poignant critique, but difficult to act on at the time because the reductionist, positivist methods being used in scientific inquiry up to that point were unable to study complex adaptive systems, emergence, and tacit knowledge (1966).

My methodology has two main components: procedures of a sociological and epistemological imagination, and nonextractivist methods. I describe each of these now.

Sociological and Epistemological Imagination

I am indebted to LaDawn Haglund for recommending to me many social theorists, and especially Charles Wright Mills' writing on the sociological imagination. Had it not been for his description of intellectual craftsmanship and insistence on integrating one's work and personal life²⁰, I would have continued to build walls between what I was learning at university and the considerable knowledge I gain outside the academy through processes of socialization and informal learning. One of Mills' critiques of western sociology is that it tends toward methodological fetishism at the expense of being able to use the methods best suited for the question at hand (Mills 1959). The sociological imagination encourages sociologists to develop reflexivity between their lived experiences and their research, and legitimize methods that have practical applications in people's lives.

¹⁹ **Glossary:** Positivist science holds that authentic truths can only be known objectively, ruling out the possibility that subjective knowledge, experience, and meaning can be or lead to real truth (ibid).

²⁰ "Scholarship is a choice of how to live as well as a choice of career" (Mills 1959).

Mills' idea of sociological imagination is similar to suggestions made by decolonial social scientists. One difference is the addition of procedures of *epistemological* imagination. (Santos 2018, 126). Here are four examples of procedures of epistemological imagination. Each is followed by a (further indented) possible application of the procedure in the context of sustainability science.

- Juxtapose ideas and categories that seem mutually exclusive but may yield surprising perspectives when brought together.
 - Bring together scientific and artistic knowledges and practices around a common topic, such as global biodiversity loss, to see how each can inform the other and reveal what ideas and procedures each field takes for granted.
- Explore what forms of unlearning may need to accompany forms of learning.
 - As social progress defined by economic growth is problematized as unsustainable in its current forms, it will need to be unlearned as other more just and sustainable notions of progress are learned and used.
- Flesh out subjectivities when Northern epistemologies presents phenomena as objects.
 - Western conservation biology cannot see the Kichwa people, who are indigenous to the Ecuadorian Amazon, in the trees that populate the forest.

But the Kichwa describe how the spirits of their ancestors inhabit the trees, and so ‘objects’ from a western lens are a form of subjectivity from a biocultural perspective.

- Imagine absent peoples where there are absent knowledges, especially in instances where only one form of knowledge is being used.
 - Conduct an audit of a sustainability science program or classroom curriculum to determine whether, for example, western science and technology studies are crowding out the humanities, critical sociology (especially from marginalized voices), or indigenous sciences.

These and other procedures of epistemological imagination are central to what Santos describes as a “postabyssal social scientist” (ibid, 127). Santos characterizes western thinking as ‘abyssal thinking’, and so postabyssal refers to thinking that leaves behind the problematic dimensions of western thinking. In his work, Santos uses ‘post’ in ‘postabyssal’ quite deliberately. He does not advocate for modifying Northern epistemologies or trying to “teach” them anything (ibid, 296). Instead, he argues that abyssal thinking should be unlearned, and this unlearning will necessarily involve learning from others that have ways of thinking and forms of practice that do not perpetuate the suffering caused by colonialism, patriarchy, and capitalism.

In her autobiography, Angela Davis wrote that “walls turned sideways are bridges.” She employed this powerful image while describing ways that she and others

incarcerated in prisons “can and do repurpose and transform prison space” by using the options made available to them by the prison system (Shabazz 2014), despite the many limitations imposed on inmates. She describes how this work requires, among many things, creativity and ingenuity, and how the prison system does not always or entirely block these innate human capacities. Her view of creativity is similar to Liz Lerman’s, who describes creativity as a birthright that each of us possess in unique ways (Lerman 2018). In her view, this creativity cannot easily be stripped away, even though we are often socialized to devalue it.

I have not been in prison as Angela Davis has. I can relate, however, to her transgressive use of creativity to broach epistemological boundaries. It was in this spirit that I began to follow Mills’ and Santos’ advice regarding sociological and epistemological imagination, creating my own tools that informed my research and teaching with personal knowledge I developed in other parts of my life. I created linkages between my academic research into epistemology, creativity, and sustainability science with knowledge gained outside the academy from dance practices, relationships, social observations, and my struggles against habits with roots that are definitively colonial and capitalist in nature. Habits with chains nearly too light to be felt until they were too heavy to break.²¹ Habits like objectifying women through pornography, irresponsible levels of consumerism, fear of conflict that stifled my ability to protest and support others through activism, and making choices that tend to ride rather than question and redistribute the privileges I have.

²¹ Paraphrased from Maria Edgeworth’s story titled, *Forester*, in *Moral Tales for Young People*, originally published in 1806.

Nonextractivist Research Methods

Decolonial scholars have differentiated between what they call extractivist and nonextractivist methodologies in the social sciences. Extractivist methodologies are based on a separation of the researcher from what's being researched. They tend to turn subjects into objects, knowledge into information, and extract or take that information out of its original context to satisfy the narrower curiosity of the researcher (Smith, Tuck, and Yang 2018). In contrast, nonextractivist methodologies “consist of every process capable of producing trustworthy, reliable knowledge in a nonextractivist way, that is, through cooperation among knowing subjects rather than through subject/object unilateral cognitive interactions” (Santos 2018, 130). They often involve working alongside people and experiencing what's being studied, rather than studying it from the outside ‘looking in’. Nonextractivist methods requires collaboration, which requires trust, which develops over time as people work to understand one another and reciprocate, or give back, so that what's being learned is useful for the different people and groups involved.

I didn't start my dissertation research by saying, “I'm going to use a non-extractivist methodology!” By the time I began to understand some of the thinking around decolonizing and nonextractivist methods, I was already well into the ‘data collection’ stage of my doctorate. I was conducting semi-structured interviews with practitioners of the Atlas, using standard qualitative research methods from western social science. I became worried that I was extracting people's knowledge in order to

construct a particular understanding about the Atlas that could interface with sustainability studies. Sometimes I still have this worry.

But it is also true that I am not only learning *about* the Atlas from the outside in. I have been learning *alongside* other practitioners for several years now and, as of this writing, the work continues. This distinction between *knowing about/knowing with or alongside* is a part of how Santos and others have described nonextractivist methods (e.g., Santos 2018, 143; Patel 2015). For me, this happened because when I first learned about the Atlas, I build relationships with some of the people who were using it. These relationships were important to me, and it felt respectful to honor the origins and complexity of these people and the Atlas itself by learning about it through partnerships.

An Interlude About Difficulties I Encountered Using This Methodology

What I just described is an example of how I did *not* learn from the typical research methods and timeframes used in SOS. Methods from the natural and social sciences were the most supported in my program, and graduating quickly was prioritized over long-term collaborations from socially-embedded research. I was teaching and working in the Atlas community part time, so I wasn't always working on my research project. And yet, I *was* always working on the research, because nonextractivist methods often blend the arts of living and working. I used autoethnography to bridge this gap

between my experiential from working and the knowledge-from-research gleaned using more mainstream qualitative methods.

As I've alluded to, my income in graduate school came from teaching positions. These had responsibilities that I took very seriously, so my time was precious. Deprioritizing publishing my research is a risky choice to make in academia. Publications and their impact values are a standard metric for determining a scholar's influence and productivity. As such, universities weigh a prospective faculty's record of publication heavily in their hiring decisions. I hedged that the risk was worth taking for me, and so I doubled down on my curriculum development in the School of Sustainability and my Atlas teaching and project work. By then I was already becoming a part of the Atlas community of practitioners. Even still, I decided that to really commit to the nonextractivist method of learning alongside, I needed to devote significant time, develop relationships, and take on the risks and responsibilities that came with doing the day-to-day project work.

In many ways, my privileges made these risks easier for me to take on that they might be for others. So many of my social categories and identities—white, cisgender male, heterosexual, able-bodied, with English as my first language and a Judeo-Christian upbringing in a divorced but middle-class family in the United States—grant me essentially frictionless social movement and acceptance in a western university. When I began my studies, I did worry that people would not think I was smart or worthy of being in a PhD program. But that worry came from having a Bachelors in architecture (which

didn't prepare me to conduct research) and no Master's degree. I was never afraid that people wouldn't think I belong because of the color of my skin, my gender, or other social categories.

I do believe that everyone suffers. Importantly, my suffering is circumstantial, not systemic. This is true except for one exception, which is the suffering that Paulo Freire describes in *pedagogy of the oppressed* (2020). He refers to how the oppressor needs to dehumanize others in order to oppress them, and this dehumanizing is itself a form of oppression. I did not ask for the privileges I have, and I would gladly exchange them for social relations based on love and curiosity rather than anger and fear. My internalization of many ideological characteristics of white supremacy²² and western thinking is rooted in socialization, ignorance, and denial. I have worked hard to unlearn and to change, and will continue to do so.

I share this because I can, because I am aware. It wasn't always this way, and I am grateful for the change. I know I have much more to learn. I am also sharing because my awareness of these things came from experiences I had during my Ph.D. program. It came mostly from the tacit, informal learning that happened in conversations and social situations, rather than classrooms. Those experiences are relevant for both my research and my future if I want to continue working in academia. Why? Because it is important for me to be aware that my experience of challenging university norms is likely very different and, in many ways, easier than for others who are marginalized and

²² Thank you Tema Okun and to other contributors of the resources and stories at <https://www.whitesupremacyculture.info>

discriminated against. I have chosen to interpret this as a responsibility to use my privilege to change the systems that create it. Western/ized universities are not the only institutions that need decolonization, but they are among them. And maybe my efforts can contribute to larger momentums to 'exchange' privilege for justice.

In addition to the difficulty of prioritizing socially embedded research and teaching over publication, I encountered two other kinds of difficulties using a nonextractivist methodology in my doctoral program.

The first difficulty has to do with the tendency in academia to draw clear distinctions between processes and outcomes. As I shared in some detail in the preface, dissertations are not just a product—a description of research outcomes—but demonstrations of the ways of thinking and forms of practice that students learn throughout their doctoral programs. In my case, I learned many practical skills—like creative tools and facilitation techniques—which I sample as best I can throughout this document.²³ I hope you have noticed already several instances when I included my own insights and processes that would ordinarily be excluded from a dissertation. This interlude is one way, and there are more ways to come.

The second difficulty I encountered involves helping others understand that knowledge gained through experiences carries its own form of rigor. It is a rigor born from practice, and is involves thoroughness derived from iteration. It is also a rigor defined by 'walking the talk', or in other words, a rigor that seeks out contradictions between theory and practice (including one's own behavior) and works to reconcile them.

²³ Thank you David Manual-Navarrete for continuously encouraging me to find ways to do this.

Experiential knowledge of this kind can be partnered with knowledge gained through conventional western social science methods. This partnership involves a reassessing what constitutes valid data and the function of rigor when conducting social science that abides by the principle of valorizing subjectivities. Valorizing subjectivities is a decolonial principle that necessitates legitimizing the knowledges and practices that, however irrelevant they may seem from the perspective of ‘conventional wisdom’ created by abyssal (or western) thinking, have been or can be used to reduce the suffering caused by the problematic dimensions of western modernity (Santos 2018). The principle of valorizing subjectivities has guided my decisions about what constitutes ‘data’ and the appropriate methods for gathering it (Lester 2005).

Let’s exit the interlude and turn our attention to the data sets and research methods I used in my research.

Ways of Knowing: Data Sets and Methods

As I mentioned earlier, my understandings of the Atlas came in many ways. Here, I distinguish between them in terms of *knowing about* the Atlas (as an object of study) and *knowing with it* (as experiential knowledge that comes from using and developing the Atlas itself). To populate a list, I did several iterations—sometimes using some creative tools²⁴— that involved reviewing course work, project notes, and my daily journaling that

²⁴ See Appendix C for the perpetual prompt created during this process.

tracked my autoethnographic data (more on this later). I made several distinctions and created a Venn diagram to visualize them.

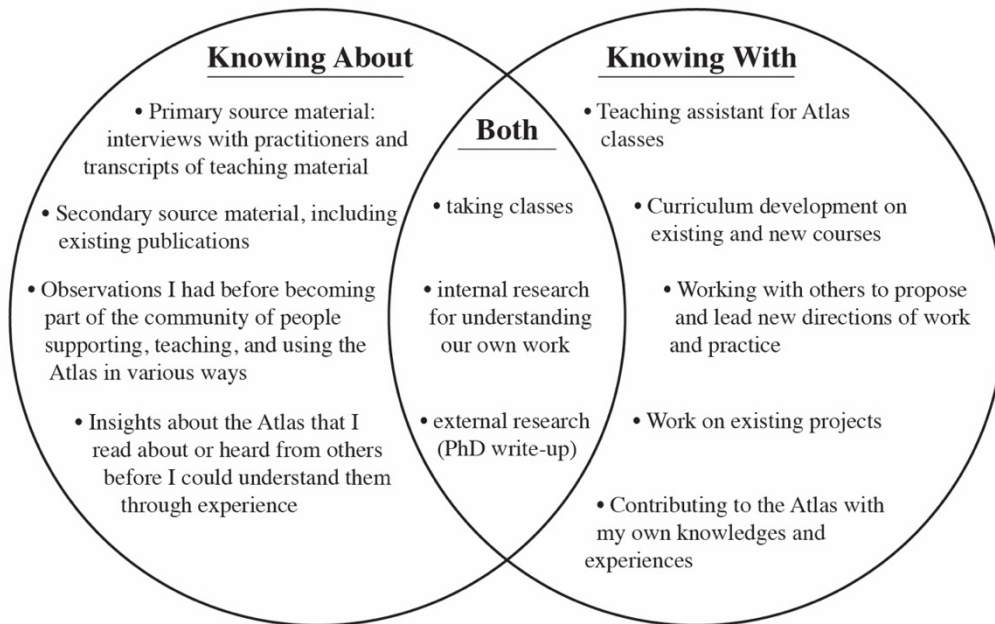


Figure 2. My Ways of Knowing the Atlas of Creative Tools

In the social sciences, primary data describes original data collected by a researcher(s) for the specific research problem at hand (Hox and Boeije 2005, 593). Secondary data is data “originally collected for a different purpose”, often by someone other than the researcher (ibid). Secondary data sources are typically already research outputs that can be reinterpreted by a researcher to answer a new research question. In this case, my semi-structured interviews with Atlas practitioners and transcripts from

Atlas teaching material are primary data. Existing publications, writing, and digital archival records are secondary data.

Experiential knowledge gained through work and practice, and recorded as autoethnographic data, is also considered primary data. I treat it as such, but refer to it as “artisanal knowledge”. Artisanal knowledges are nonscientific knowledges that are “practical, empirical, popular knowledges, vernacular knowledges that are very diverse” and are always produced alongside other social practices (Santos 2018, 43). Much of my work with the Atlas involves the day-to-day work of bringing subjective knowledge to bear in formal spaces, whether they are projects, workshops, classrooms, or something else. This is how I understand it as a form of artisan knowledge.

The tables on pages 66 and 67 lists my primary and secondary data sources and the research methods and forms of analysis used for each.

Table 1. Data Sources

Sources	Methods
Artisanal sources (a sub-set of primary sources):	
- Knowledge gained through formal learning & teaching processes	1, 2, 6
- Knowledge gained through internal work on Atlas projects	1, 2, 6
- Knowledge gained through external projects and partnerships	1, 2, 6
- Knowledge gained through personal practice	2, 6
Primary sources:	
- Semi-structured interviews with Atlas practitioners	1, 3, 4, 5
- Transcriptions of Atlas teaching material, HOL, HIDA, ASU	1, 4, 5
- Transcriptions of Atlas teaching material, A-G YTP, EdPlus, ASU	1, 4, 5
Secondary sources:	
- Published books, articles, and interviews about Atlas	1, 5
- D-Lab Toolkit, Dance Exchange (formerly Liz Lerman Dance Exchange)	1

Table 2. Research Methods and Forms of Analysis

1	Watching, listening, reading, writing (including summarizing and synthesizing)
2	Practice (using the practical mentalities and creative tools regularly and in various contexts, including teaching and facilitation)
3	Semi-structured interviews
4	Transcription of audio/video
5	Thematic coding and analysis (inductive and deductive)
6	Autoethnographic data collection

Thematic Analysis using Deductive and Inductive Coding

Thematic analysis is a method for identifying patterns throughout data using an iterative process of generating codes and themes (Braun and Clarke 2006). There are two kinds of coding: deductive and inductive coding. Deductive coding involves producing a list of codes from established theory and looking for examples of them in the data. This is a “top-down” or “theoretical thematic analysis” that doesn’t provide a rich description of the data set, but rather focuses on a particular aspect of it. Inductive coding, sometimes called “bottom-up” coding, does provide a rich description of the data set by generating the initial and subsequent codes and themes without starting with a theoretical framework. This does not mean inductive coding takes place in an “epistemological

vacuum” (ibid, 84). But it is more likely to identify themes driven by the data itself (Maguire and Delahunt 2017).

I first used inductive coding for the primary and secondary data sets of the Atlas—excluding the semi-structured interviews—to answer the research questions: What are the origins and evolutions of the Atlas? What does it contain? How does it persist through time? I conducted the analysis using the procedures described by Braun and Clarke and outlined in Figure 3:

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic ‘map’ of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Figure 3. Phases of Thematic Analysis
Source: Braun and Clarke 2006, 87.

After this analysis was complete, I summarized it. That summary is contained in Chapter 4. I then used deductive coding to analyze my findings, looking for themes related to both my theoretical framework and modes of creativity appropriate for approaches to sustainability science that can advance cognitive justice. The initial deductive (theoretical) codes used in this analysis were generated from a review of the two literatures and are found in Appendix D.

Semi-structured Interviews

I found helpful guidance for preparing and conducting interviews from the field of human geography. I think that is because, within western social sciences, geographers can be methodologically flexible, using qualitative, quantitative, and mixed methods from a “range of philosophical approaches to knowledge” (Clifford et al. 2016). People have engaged in critical, feminist, and decolonial approaches to geography for at least 30 years, and some of the ways geographers use interview methods have been for nonextractivist research (Naylor et al. 2018, 199).

That said, I do not think that methods like interviews are inherently extractivist or nonextractivist. It depends in part on the intentions of the interviewer, whether the exchange can be mutual, and how what is shared becomes framed, communicated, and used. Conducting interviews and analyzing them using methods that involve coding does not mean the researcher has to generalize or construct a picture of objectivity (Patel 2015).

I conducted interviews for this research for four reasons: 1) to better get to know some of my existing colleagues and others who have been working with the Atlas far longer than I have); 2) to learn about their particular understandings and applications of the Atlas; 3) to see whether their experiences could be understood in terms of my theoretical framework; and 4) to look for examples of the Atlas already being used in ways that may inform approaches to sustainability science that foster cognitive justice.

In July of 2020 I moved to Tromsø Norway to live with my partner Silvia. This was during the peak of many of the restrictions created in response to the coronavirus pandemic, which was at its peak. Had I not moved to Norway during a small window of time, Silvia and I would not have been able to see each other for an unknown amount of time. I had originally planned to conduct most of the interviews in person but was fortunately able to switch to an online videoconferencing platform.

In the Fall of 2020, I reached out via email to fifteen Atlas practitioners or people who were involved in projects featuring the Atlas. Thirteen responded and participated individually in a single, semi-structured interview, except one participant who also participated in a follow-up interview. Semi-structured interviews involve asking questions with “some degree of predetermined order but still ensures flexibility in the way issues are addressed by the informant.” (Dunn 2005). All participants were asked a similar version of the same six questions, although not always in the same order and not with the same emphasis. Variations were due to differences in the practitioners’ degree of exposure to the Atlas and their specific uses of it. For example, several practitioners were familiar with many of the creative tools but had done extensive work with the *Critical Response Process*, and so that became the focus of the interview. I had completed much of my earlier analysis of the Atlas before conducting the interviews because it is recommended for researchers to “brief themselves fully on the topic” in order to “work out a list of themes of questions to ask participants” (Longherst 2003).

I used a purposeful sampling technique because I was not trying to find a representative group in order to generalize something about the Atlas, but rather “to

understand how individual people experience and make sense of their own lives” (Valentine 2013). Instead, participants were selected in three phases. First, I asked colleagues and fellow Atlas practitioners. Second, I reached out to other Atlas practitioners that I had not met but I knew of from archival data about previous collaborations involving the Atlas. Finally, Liz Lerman provided a few additional suggestions of people who had long been involved in Atlas-related work but that I was unlikely to find on my own.

Interviews were conducted on the Zoom videoconferencing platform between September and December of 2020. They ranged between 50 and 90 minutes in length, with most interviews lasting an hour. I recorded both the video and audio of the interview, with an audio backup using a hand-held recorder placed next to the computer speakers. I did not use the video portion of the interview (all videos were discarded) and transcribed the audio by playing it back at 80% speed using the VLC application while typing the transcript using Microsoft Word.

Interviews involved human subjects and so the research protocol was reviewed and approved by ASU’s Institutional Review Board (IRB). The research protocol was granted an exception, which can be found in Appendix A. Appendix B contains a sample consent form.

The interview transcripts were analyzed using two methods. The first was an arts-based research method of narrative inquiry for the purpose of “breathing humanity into the work” (Leavy 2015, 41) and telling a story of the practitioner’s work with the Atlas. I could not always use this method with each interviewee, because some practitioners did

not contextualize their understandings or use of the Atlas in a way that was a story or “was an event—something that happened” (Labov 2006, 38). When practitioners did couch their responses in particular contexts, I was able to describe those as stories before engaging in broader analyses. The two Atlas applications that I elaborate on in Chapter 5 were the two best suited for narrative inquiry based on how the interviewee responded to my questions.

The second method was deductive (theoretical) thematic analysis as I described above. Themes were “theory-driven” (Braun and Clarke 2006, 88) as I coded the data with three specific questions in mind:

- What can we learn about the Atlas of Creative Tools from how practitioners describe and use its principles and practices?
- What roles does the Atlas play in the production of knowledges “anchored in the experiences of resistance” of oppressions perpetuated by western modernity?
- How can understandings and applications of the Atlas by practitioners inform approaches to sustainability science that foster cognitive justice?

The code manual for the first question was generated from my thematic analysis using inductive coding of the Atlas primary and secondary data sets. That is why I describe it as “theory-driven”, even though it came from my own analysis and not existing theory. For the second and third questions, I already described how the code

manuals were developed from my theoretical framework (this chapter) and a literature review of creativity in sustainability science (Chapter 3) respectively.

Although I could have used inductive coding to look for themes in the interviews, it would not have fit for two reasons. First, I was not specifically looking for confirmation or contradictions between my own analysis of the Atlas and what practitioners shared in their interviews, although I did (perhaps inevitably) notice some. Second, inductive coding was too time and labor intensive to undertake a second time.

Autoethnographic data

Autoethnography is both a noun and a verb. As a noun, an autoethnography is a piece of writing. It is sort of a combination of autobiography, a story of oneself, and ethnography, the scientific description of peoples and cultures. Ellis quotes Dumont's earlier description of autoethnography as a noun: "Autoethnography refers to writing about the personal and its relationship to culture. It is an autobiographical genre of writing and research that displays multiple layers of consciousness" (2004, 37).

Autoethnography is also a verb because it is an *approach* to research and writing that systematically analyses (graphy) personal experience (auto) to better understand or make sense of cultural experience (ethno). The researcher **does** autoethnography, and also produces an autoethnography. Therefore "as a method, "autoethnography is both process and product" (ibid, 1).

People hold very mixed opinions about the validity of autoethnography as a research method. It has gained far more acceptance as a credible and rigorous method in sociology and anthropology over the past three decades (Allen-Collinson and Hockey 2008). It is also often critiqued because it fails to satisfy metrics of quality and rigor used in quantitative research (Holt 2003). A friend and colleague of mine had a potential advisor who, despite being a social scientist, thought that “autoethnography is a joke” (Papenfuss 2019, 68).

I am less concerned with defending the legitimacy of autoethnography as valid—both as a research process and product—than I am about how to include my own autoethnographic data in this dissertation. If you would, return to the Venn diagram on page 64. Consider the ‘Knowing With’ sphere. Each point is the name of a category that includes many moments of meeting people, feeling emotions, learning across cultures, and unlearning some of my own habits. Each was filled with the tensions that come with figuring out whether/how to hold on to one’s own knowledge, that of a community of practice, or set both aside when trying to work with and learn from others.

All these things can be described in autoethnography. Some of it can also be considered forms of intercultural translation as the concept is used in ES. For me, the question is not whether the records of my experiences that I have collected during my Ph.D. are relevant, but how to partner them with the theoretical and empirical knowledge of others so that they help the reader see me in the research and the research in me. To answer this question of partnership, I found it helpful to think of my autoethnographic data as a form of artisanal knowledge, as I mentioned before.

Practically speaking, I have categorized ‘Knowing About’ the Atlas as a form of scientific knowledge and ‘Knowing With’ it as a form of artisanal knowledge. The challenge that comes with including both in the dissertation is that academia creates in the researcher the instinct to misrepresent artisanal knowledges as scientific knowledges in order for them to be seen as relevant, legitimate, and rigorous. In other words, researchers are sometimes pressured to redefine artisanal knowledge as scientific knowledge so that others see it as credible.

I join those who worry that some of the forms of autoethnography, such as analytical autoethnography, are capitulations to the logics of scientific knowledge (e.g., Ellis and Bochner 2006). I do not want to critique others’ choice to use them because I don’t know enough about their situations and what gave rise to the methodological choices they made. But I do want to express my own discomfort with using forms of autoethnographic writing that either separates it from the broader research or makes it beholden to it.

Santos describes how in postabyssal research—research that aims for cognitive justice—the line that would typically separate research from practice in the western sciences will become blurred, reimagined, or removed. I have tried to contribute to this blurring by sharing my autoethnographic data in three ways. The first way is to use a first-person voice throughout the dissertation. I hope it helps bring me onto each page so that your experience of reading feels more like a dialogue. The second way is by sharing stories about my process: choices I made, my change over time, and some of my uncertainty in the past and present. The third is to convert into writing some of the

creative tools and facilitation skills that I learned to do in person. They were part of how I conducted research, and so I want for them to be part of how the research is communicated.

An Adaptation of CRP for Chapter 2

In the first chapter, I showcased some possible statements of meaning that readers might have shared, while trying also to remind you of some of the main contents of the chapter. For this chapter, I will do the same. But first, I encourage you to come up with your own statements of meaning.

Statements of meaning are things you noticed, found interesting, provocative or evocative, noteworthy, memorable, powerful, and so on. They may also include things you are curious about, which you could express by saying “This thing made me curious to hear more, or to know about ...”. But there are two filters for Step One: save questions for Step Three, and save opinions for Step Four. Statements of meaning are intended to be observational, positive, or encouraging.

One way CRP practitioners use Step One is to diversity what’s being paid attention to with the work-in-progress. Another way is to highlight their *experiences* and *interpretations* of the work, not necessarily what the creator intended or meant. A further way to use Step One is to build up to future questions and opinions by bringing the topic into the discussion in a neutral or positive way.

Take a few moments to revisit this chapter. You might do this by going back and re-reading what I wrote, re-visiting your notes, or by looking inward at the emotions, memories, or ideas that came up for you. Now, come up with some statements of meaning. Once you've done this, continue on to read mine, which serve the dual purposes of revisiting content and illustrating possible Step One's.

Step One – Statements of Meaning

I noticed that at the beginning of the chapter, you shared two conceptions of sustainability that helped me understand your view of which ideas about sustainability are problematic.

I really appreciated how Meadows describes paradigms as flexible conceptual tools because it makes it easier for me to see them as changing and changeable.

The idea of tacit learning still stands out in my mind. It reminds me of tacit knowledge, the stuff that I know but it's hard to say *how* I know it because its sources are so spread out over space and time.

When you quoted Meadows the second time, I was actually thinking about my Buddhism practice, and then you mentioned religion and spirituality. I found myself glad to see those referenced in a scientific text.

I had thought about modern society as a time period, pretty much from the industrial revolution until now, before you shared how some theorists describe it as an idea that has kind of ‘recreated itself’ over time.

I noticed that you included invisibilization as a way of understanding women’s experiences over time and in modern society.

Hegemony is a concept I sometimes hear people use but find difficult to understand. While I don’t feel I have a firm grasp of it, your summary helped break it down in simpler language.

Hegemony is a very important and complex sociological concept, and an important contribution of critical sociology. I’m glad to see it included in your theoretical framework.

As a new graduate student, I liked how you shared how you identified problems in sustainability science by telling the story of how you began and moved through the program. The interlude was an especially effective writing technique for the storytelling.

The way you describe how you came to use nonextractivist methods makes it seem like they aren’t easy to use, even if you know about them from the very beginning.

I noticed that you listed artisanal knowledges before the other primary sources in your table about data sources, which gave me the impression that they are important to you.

Step Two – Questions from the Author

Of the theoretical perspectives that I included in my theoretical framework, are there any that you think I misrepresented or simplified too much?

Are there any social theories you are familiar with that you think would strengthen my theoretical framework, by making it more comprehensive or in some other way?

For those of you steeped in the hegemony discourse, do you think my simplification of the concept resulted in me mischaracterizing it?

What kinds of people do you think this theoretical framework would offend or put off, and why? (A follow-up question might be about ways of engaging with these people.)

Does my research design make sense based on the theoretical framework? Do you see any contradictions or difficulties that arise from my methodology and methods?

Step Three – Questions from Readers

In Chapter 1, I used CRP Step Three to share the ‘Neutral Question Workshop’ so that you could practice getting from opinions or opinionated questions to neutral questions. In this chapter, I will use Step Three to demonstrate how Statements of Meaning shared in the first step of CRP can lead to questions asked later in the process, and even opinions that are shared after asking questions.

Statement of Meaning:

Hegemony is a very important and complex sociological concept, and an important contribution of critical sociology. I’m glad to see it included in your theoretical framework.

Some Neutral Questions that could come from it:

- How important is it for you that your readers have a nuanced understanding of hegemony?
- Do you want hegemony to be seen by your readers as a foundational concept that underpins the other critical social theory that you include, such as invisibilization or Northern epistemologies?
- What were your thoughts about when to introduce hegemony in your theoretical framework, in other words, about the sequence you chose?

Notice how the statement of meaning can be taken as a single idea, and can also be broken down into several parts. Noticing this is a little act of *multiplicity*. When I broke it down into different parts, I found three, and created a neutral question for each part. In this case, each question is framed as an information-gathering question aimed at learning more about my understandings and intentions as the author/scholar.

In academia, people often consider deeply certain concepts and the details that distinguish them from others. When someone has a deep understanding of something, it can make it very difficult to ask neutral questions about it to other scholars that may be less familiar with the topic/concept, or perhaps treat it with less depth because the focus of their research is elsewhere. One of the purposes of CRP is to understand the *understandings* and *motivations* of the creator. There are all kinds of reasons for doing this. It is important to remember that one can suspend their own knowledge about something in order to ask someone a neutral question about it. At a minimum, this usually results in the other person, the subject of your curiosity, feeling heard and valued. What they say may also surprise you. But is difficult to for someone to add something new to your cup when it is already overflowing.

Fortunately for us, suspending knowledge (or, depending on your disposition, suspending judgement *and* knowledge) can be a temporary act. In other words, you won't lose the knowledge just because you set it aside in order to be curious or center someone else in relation to something you know a lot about, or have a lot of experience with. In academia, this is sometimes referred to as intellectual humility. This is one of the ways

that CRP can help you practice, and formulating neutral questions in particular is a helpmate in this work. CRP not only helps you practice suspending knowledge, but also helps you make distinctions between questions and opinions so that, after you do seek information and the perspective of the creator, you can still resume your ways of knowing and re-center your knowledge to offer an opinion that may, in some cases, be more informed than it was when it initially formed.

Step Four – Permissioned Opinions from Readers

CRP is designed to center the priorities and work of the creator, and so when responders offer opinions, the creator is first given the option of whether they want to hear it or not. This dimension of CRP has particular origins and motivations, and CRP as a protocol for feedback is one of many, and won't always be the appropriate choice. See Chapter 4 for more about the idea of 'permissioned opinions'.

Here is an example of an opinion that might be offered by a reader to the author. It is related to the questions that were asked, and the statements of meaning they built on. Of course, we don't have the author's responses to the reader's questions, which would ideally inform any opinions they chose to (or not to) share.

Reader: I have an opinion about the level of detail with which you describe hegemony. Do you want to hear it?

Author: Okay.

Reader: The complexity of hegemony and hegemonic discourses is what gives the concept sociological rigor. I understand that it's one of many concepts you bring into your theoretical framework, but it's an important one. I liked how you introduced it, but I think your readers will benefit from a more thorough analysis because it will help them understand the rest of your critique of western modernity and western science better, especially their epistemic dimensions.

This opinion motivates me. It didn't come out of nowhere, and I saw the reader work to understand my intentions from the questions they asked me. It is phrased in a way that acknowledges my work as the author but also shares the opinion of the reader. I am not saying that all opinions need to be shared this way. But it is well worth thinking about why you're sharing an opinion in the first place, to determine whether some ways of expressing it might be more effective than others.

Chapter 3 – Sustainability Science

Big Story, Little Story is one of the tools in the Atlas that helps you work/play with scale and emphasis. Is the history of humanity the big story, and your life the little story? Or do you make your life the big story and humankind the backdrop? When do you choose one or the other? Sometimes, and for some people, George Floyd the person is big story. At other times, and for other people, George Floyd is the little story inside the broader narrative we in the United States call institutional racism. Why do you decide which story is the big one, and which the little? When do you move between the two, and how are you able to do it? What does that movement entail? Is there something gained through the movement, something left behind?

Recently I was talking with someone who said to me, “Slavery probably isn’t as awful as we’ve been told.” Even though I know this person well, and could almost expect this kind of comment, when I heard it my body completely tensed. My mind lashed out. His comment filled my whole being, and ballooned into the big story, the only story. The context of the conversation and our relationship shrank away, then vanished. I wanted to shout at him that he doesn’t know what he’s talking about. I wanted to point to this and that, to make him understand how incredibly wrong he was.

I sometimes find it helpful in these moments to use *Big Story Little Story*. The tool itself can be an expression of multiplicity, which I introduced in Chapter 1. When I use *Big Story Little Story*, I am usually able to deflate the balloon a little bit. Not so much that I don’t address the harm, but enough for multiple stories to coexist, so that the trust

we'd developed over the past five years that enabled this conversation could be the big story and his comment (which was intended to push my buttons) the little story. I can allow for both the relationship and the comment, and switch between the two.²⁵ That is, I can allow for both the general context and the specific detail, and in this case, keeping the context helps us address the detail in a way that doesn't end in screaming or sweeping it under the rug.

Switching from context to detail is a shift in emphasis, or a shift in scale. It can be difficult to shift emphasis and move between scales. This is especially true when a relevant scale, the scale that *really* matters, is so well established. This chapter is about sustainability science. I wrote the chapter to advocate for a view of sustainability science as a contested space that can promote cognitive justice. Recall the levels of experience I described in Chapter 2: social experience, fields of knowledge, subjective experience. The normal expectation of the relevant scale for knowing sustainability science is as a field of knowledge. I can acquire this knowledge by reviewing the academic literature tracking the evolution of the field and sharing it with you. In academia, this would be an appropriate way to understand the field.

If, on the other hand, I described sustainability science at the level of subjective experience, it would likely be viewed as a less credible form of knowledge in academia. One of the critiques of Northern epistemologies is that they operate at scales of universal

²⁵ Most people don't use the tool *Big Story Little Story* in this way. I do because I experimented with it in relationships, and as a writing method. When I found it to be effective in certain ways, I adapted it to those contexts. This process of adapting creative tools from the Atlas for one's own use is encouraged, and part of how we structure the Atlas as a digital commons.

and global, and these scales are privileged compared to the scales of subjective and local (Santos 2014). If I study sustainability science through my experience at one of the schools where it is being developed, and share my findings in an academic journal, my account would probably be considered anecdotal. This makes it, by definition, narrow relative to the range of approaches to sustainability science that exist. That is okay. The problem is that, from the perspective of western thought, anecdotes and the subjective experiences that inform them tend to be devalued compared with knowledge that can generalize, or can scale up in terms of scope or impact. The detail only makes sense in terms of its context; the part can only be understood in reference to the whole.

When I began studying sustainability in 2015, I couldn't have provided any insights about sustainability science from my own experience. It was still an idea, an approach to researching and practicing sustainability that I was barely immersed in. But over the years, I became more involved in the School of Sustainability. I supported the graduate student community in different capacities, served on committees, developed curriculum and pedagogical approaches to teaching sustainability science, was mentored by many people, and became a mentor for other graduate students in teaching roles. I read emails, saw flyers, learned about what other people thought sustainability was and could be, and watched how the school evolved. I began to see patterns and tendencies across all these things. I noticed what was present and, with the help of others, what was absent. Over time, I accumulated a lot of personal experiences of sustainability science.

It can be difficult to shift emphasis and move between scales, especially when the relevant scale, the scale that *really* matters, is so well established. This chapter is about sustainability science. (*Oui, Déjà vu.*) I now have two perspectives on sustainability science: as a broad field of knowledge and practice, and from my own experiential knowledge as a graduate student in the School of Sustainability at ASU. In other words, I have two distinct perspectives on the field: ‘knowing about it’ and ‘knowing alongside’.

Convention may say that the general knowledge about sustainability science informs my specific knowledge of it. Mills’ sociological imagination, Bourdieu’s theory of practice, and autoethnographic methods each say, in their own way, that knowledge from my experiences about sustainability science is worthwhile on its own, and can also tell me—tell us—something valuable about its broader nature. *Big Story Little Story* is a creative tool that helps me locate each story inside the other by shifting the emphasis, by centering some part of it and then really investigating it. There is rigor in all of this: the rigor of finding and connecting ideas in the literature, the rigor of evaluating the details of one’s experiences, and the rigor that is intrinsic to continuously practicing centering and recentering different things.

The guiding question for this chapter is: Do examples from the different approaches to sustainability science suggest any underlying epistemological features of Northern or Southern epistemologies? I respond by sharing a broad view (one of many possible) of the field of sustainability science and a specific view from my experience (again, one of many stories I could have shared). Each is considered in light of the theoretical framework outlined in Chapter 2.

Sustainability Science: A Little Story

Many European cities are still organized around ancient Roman roads. Some things continue to shape society long after the names of their creators are forgotten. This is just as true for concepts as it is for pavers. Consider *truth* and *progress*, which can be read between the lines of every law and are at the heart of the simplest inventions in western societies. Each marches steadily forward to a drumbeat whose rhythm is determined by a conception of time that twists the natural cycles into a line as straight as the Appian Way.²⁶ Concepts like *truth* and *progress* have staying power. They are the inevitable conclusions that one can draw while looking for the conceptual patterns that permeate western society.

Despite records of its western formulations date back thousands of years, sustainability has not been a concept with staying power in the west. In some nonwestern societies, especially among indigenous peoples, sustainability has old roots describing people's relationship to the land, and remains part of their cosmologies, ontologies, epistemologies (Grober and Cunningham 2012). Today there are many expressions of sustainability conceived of in both the global North and South. However, the western view that reemerged in the second half of the twentieth century is the dominant conception of sustainability.

²⁶ The Appian Way was originally built as a relatively direct road to conduct roman troops southward from Rome to colonize the Italian peninsula. Old sections of it remain in use today.

Originally, this view was used to modify the discourse around development that followed World War II and the post-war reconstruction programs, described, for example, by President Truman in his 1949 inaugural address,²⁷ in what later became known as the Four Points Speech (Rist 2014, 71). Environmental (and to a lesser extent social) concerns that grew out of the wake enormous investments in infrastructure projects led to the idea of ‘sustainable development’, first published in the *World Conservation Strategy* report published in 1980. By the time it was brought into the Eurocentric mainstream by the Brundtland Commission’s report, *Our Common Future*, in 1987, the European debates around what constituted sustainability and whom it was for were beginning to emerge.

International politics was an early arena for such debates because the United Nations is the parent organization of the World Bank, which funded many of the development projects whose impacts were being criticized by advocates of sustainable development. Various UN agencies began organizing research toward the conceptualization and implementation of sustainable development, with UNESCO in particular playing a large role. Education was seen as a powerful intervention point for this work, and in 1992, the first educational program to support sustainable development (ESD) was outlined in Chapter 36 of Agenda 21 at the Earth Summit in Rio de Janeiro in 1992 (Hopkins and McKeown 2002).

Since the Earth Summit, the conceptual framework for ESD has been shaped by several major UN conferences. Initially, the foci of these conferences were seen as

²⁷ You can view the full address here: https://www.youtube.com/watch?v=gytbJo_bmxA

irrelevant or merely tangential to ESD. Over time, they became more central to ESD with the growing academic consensus that the causes of environmental and social problems were often inseparable. The World Conference on Human Rights (1993), the World Summit for Social Development (1994), and the Fourth World Conference on Women (1995) expanded the original outline of ESD to emphasize social and human development and empowering of women through education (ibid, 14).

As with any international project, attempts to create broad and inclusive programs for ESD led to significant disagreement about interpretations, priorities, and responsibilities. Today ESD is in its fourth decade. Although it has benefited from a plurality of voices that I hope acted in good faith, many significant absences have led to critiques. One critique is that, from its inception, ESD has relied on Eurocentric conceptions of sustainability, development, and education, and that it lacks the epistemological breadth that would come with more perspectives from the global South (Selby 2006, 355). The argument is that because of these epistemic exclusions, ESD generally reproduces the knowledge systems that dominate western modernity, particularly positivist and reductionist science (Sauvé 1999, 11). Non-scientific knowledge systems that essentialize context and valorize subjectivities, and which contribute to local conceptions of and strategies toward environmental and social sustainability, are largely absent from programs for ESD, even as ESD calls for their inclusion in principle (Clugston and Calder 2014, 216). In broad strokes, I find this argument persuasive.

A second critique shifts the focus from ESD itself to the institutions responsible for conceptualizing and pursuing it. Here, the argument is that, in the context of western/ized universities that already generate marketable knowledge according to capitalist logics, ESD cannot help but perpetuate the dominant paradigm of economic growth based on an increasingly globalized capitalist mode of expansion (Worster 1995, 124). This happens through unspoken commitments to growth-based development, an instrumentalist conception of nature, skills-based training for job preparation, and western conceptions happiness and wellbeing (Selby 2006, 355).

Some who criticized ESD along these lines proposed an approach to science that would encourage “transformative, transgressive pedagogies” able to pursue knowledge and strategies outside the imagination of western modernity (Lotz-Sisitka et al. 2015, 73). That approach had its roots in the idea of post-normal science (PNS), which near the end of the twentieth century was being developed as a western science attempting to reconcile with its inherently historical and political nature (Ravetz and Funtowicz 1999). At the time, PNS was part of a larger movement to establish a “genuine and effective democratic element in the life of science” (ibid, 641). The main procedure for doing this was to extend the existing peer community of scientific researchers in order to build a plurality of knowledges with scientific understandings of the world.

Many researchers (and increasingly educators) dissatisfied with ESD found a new home in the principles of PNS. A conceptual framework for a post-normal “science for sustainability” began to take shape around the same time that PNS was gaining recognition (O’Connor et al. 1996). Since then, programs that support research and

teaching in sustainability science have grown. Although the scopes of these programs differ considerably from university to university, reviews of sustainability science literature find that the central features of PNS are indeed present in many approaches to sustainability science, at least in their theoretical conception (Spangenberg 2011, 281).

Unsurprisingly, the most popular conception of sustainability science developed from collaborations between scholars working for universities in the United States and Europe. Although sustainability science had similarities to the problematized ESD, it articulated a clear commitment to a plurality of perspectives that would:

[Bring] together scholarship and practice, global and local perspectives from north and south, and disciplines across the natural and social sciences, engineering, and medicine. Its scope of core questions, criteria for quality control, and membership are consequently in substantial flux and may be expected to remain so for some time. (Clark and Dickson, 8060)

As I write this, twenty years have passed since Clark and Dickson's vision of sustainability science began to influence research, curriculum, and organization and priorities of degree-granting programs in western/ized universities. I think its evolution describes an epistemologically contested space. Some people continue to experience sustainability science as a field in flux. For example, many indigenous scholars have found space in both the discourse and as well as academic programs to integrate indigenous sciences (e.g., Glasson et al. 2009; Whyte, Brewer, and Johnson 2015), methods (e.g., Johnson et al. 2015), and transdisciplinary practices (e.g., Chilisa 2017).

However, there are also indications that sustainability science continues to comprehend through abyssal thinking. Some reviews describe a field that has narrowed its focus considerably, citing how “many scientists position sustainability science as serving universal values related to sustainability and providing knowledge that is crucial to societal decision-making” largely along western lines of thinking (Miller et al. 2013, 279) This illustrates how the field often relies on the horizon of possibility prescribed by hegemonic discourse, even as it works in other ways to locate the limits of its understanding.

Others contributing to the development of sustainability science as a field have concluded that the future of sustainability transitions will necessarily take place in the context of global free markets (Leiserowitz, Kates, and Parris 2006), one of the original critiques of ESD. This thinking fails to imagine beyond the capitalist logic of productivity²⁸, a mainstay of western thinking. The degree to which sustainability science researchers uses interdisciplinary methods and work with communities outside the academy (using transdisciplinary methods) has also been questioned (Schoolman et al. 2011).

The epistemic diversity of the field of sustainability science can also be seen in how the concepts resilience and sustainability are defined and related. That is because resilience theory and sustainability science are often considered complimentary approaches, and sometimes used synonymously (Redman 2014). Resilience theory

²⁸ **Glossary:** The monoculture of the capitalist logic of productivity accounts for how capitalist economic growth is treated as an unquestionably rational objective in western thought (Santos 2014, 174).

describes how ecological systems self-organize in response to disruptions, either caused by human activity or other natural phenomena.

On the one hand, resiliency is often portrayed as a desirable quality of social-ecological systems (SES), but the resilience of social structures of oppression has raised issues about efforts to increase the use of resiliency of SES (Olsson et al. 2015). One reason resiliency theory is unable to grapple with structural oppression is because it lacks theoretical analysis of agency and power (Davidson et al. 2016), even as some work to integrate critical social theory (Galaz 2009).

On the other hand, resiliency theory is sometimes critiqued by using logics of abyssal (western) thinking. If such critiques take hold, the field could move further away from supporting cognitive justice in sustainability science research, rather than supporting it. For example, Christophe Béné has critiqued the use of resilience theory by policy makers seeking to reduce poverty in the context of development (2014). As he does so, he perpetuates (I think inadvertently) the idea that that modern science is the primary criterion for truth that operates at a universal scale, one of the features of abyssal thinking (Santos 2014, 172). Consider Béné's critique:

In the field different organisations or communities of practice have tried to develop resilience frameworks in order to analyse existing programmes. Based on the definitions offered by different disciplines, they come up with lists of resilience characteristics, which help evaluate the resilience-building potential of existing interventions. One could argue, however, that because no clear definition or ways to measure resilience exist, the list of characteristics that are presented as resilience characteristics cannot be tested rigorously (accepted or rejected) and therefore will always remain untested hypotheses (Béné, 609).

In contrast to this, other resiliency scholars provide us with in postabyssal understandings of resiliency theory in SES. In general, resilience theory describes material changes in SES at the biophysical level of organizational complexity. These include those resulting from biophysical emergent processes (Fromm 2005). However, human subjectivity, reflexive agency, and symbolic meaning-making at the level of human consciousness have not been developed as part of mainstream resiliency theory in terms of SES (Manuel-Navarrete 2015). This view argues that it is not only material, but cognitive dimensions of SES that provide powerful leverage points for change. It maintains that mainstream ideas about resiliency and SES frameworks have mischaracterized how human creative processes that emerge through consciousness affects social-ecological systems.

This postabyssal conceptualization of SES draws on the Santiago theory of cognition. The Santiago theory of cognition is an interdisciplinary theory developed primarily by two Chilean scientists, Humberto Maturana and Francisco Varela. They brought together research from biology, cybernetics, philosophy, and neuroscience to try to understand what constituted a living system and account for a wide range of organism/environment interactions. The theory states that “living as a process is a process of cognition”, and that:

“...cognition is not a representation of an independent, pregiven world, but rather a bringing forth of a world. What is brought forth by a particular organism in the process of living is not the world but a world, one that is always dependent upon the organism's structure. Since individual organisms within a species have more or less the same structure, they bring forth similar worlds. We humans, moreover,

share an abstract world of language and thought through which we bring forth our world together.” (Maturana and Valera).

Their theory contradicted the prevailing view of an objective world that exists separate from the one observing it, which was the cartesian view that influenced the trajectory of western science from early in its development as a way of knowing. Cartesian thinking, as I mentioned earlier, claimed that an object of our understanding was “independent of the human observer and the process of knowing” (Capra 1997, 40). This view is gradually being replaced with an understanding perhaps best summarized by Werner Heisenberg: “What we observe is not nature itself, but nature exposed to our method of questioning” (Heisenberg and MacLachlan 1958).

In Maturana and Valera’s description of an organism, they talk about its structure. The word structure here means something different from the way I used it in a sociological sense in Chapter 2. In the Santiago Theory of Cognition, structure refers to an organism’s particular physical constitution. A living system (which might be a cell, an organ, a tree, an animal, a human being, or the Earth itself) interacts with its environment through “structural coupling, that is, through recurrent interactions, each of which triggers structural changes in the system. For example, a cell membrane continually incorporates substances from its environment into the cell's metabolic processes.” (ibid, 219). The relationship between a cell and its environment is reciprocal; each living system is in fact produced through the process of structural coupling, of being in relationship with the other.

Importantly, the structural coupling described by the Santiago theory accounts for both material and symbolic coupling. So although an organism's structure is how it is constituted physically, how an organism "couples structurally" with its environment include and go beyond the material level. Material couplings constitute the non-subjective dimensions of interaction, typically because the living system is unconsciously engaging in coupling, as in Capra's example of the cell above. With regard to human consciousness, the Santiago theory holds that symbolic structural couplings are continuously woven through languaging (Maturana Valera 1991, 234).

Language gives humans the ability to ascribe meaning to the patterns and relationships experienced through coupling. In contrast to Descartes' "*cogito, ergo sum*" (I think, therefore I am), Maturana understood both self-awareness and human consciousness as "*con-scire*", or knowing together. This is similar to the southern African concept of ubuntu, meaning humanity, or "I am because we are", which supports an ontology "of co-being and co-existing" (Santos 2018, 10). Self-awareness is thus intertwined with processes of meaning making made possible through symbolic coupling that takes place in the social contexts where language is shared, created, and embedded. "The world everyone sees is not *the* world but *a* world, which we bring forth with others [italics added]" (Maturana Varela 1991). Here, the social and subjective dimensions of structural coupling are made clear: "This human world centrally includes our inner world of abstract thought, concepts, symbols, mental representations, and self awareness. To be human is to be endowed with reflective consciousness" (ibid, 290).

When humans are involved, there will always be a double coupling of the material and the symbolic. Both are important, as they often partner to help us understand our motivations and the implications of our actions. However, compared to the material aspects which are often observable or measurable, the symbolic and subjective dimensions of such coupling can sometimes be difficult to see.

Consider, for example, the increased levels of lead detected in thousands of children living in Flint, Michigan after the 2014 public health crisis caused by lead contamination in the drinking water. The toxicology studies eventually revealed higher levels of lead in the water and in people who drank it, and the material coupling that took place within human bodies can be understood in terms of human physiology interacting with an internal environment now characterized by unsafe lead levels. Many of the developmental and social consequences of childhood lead exposure are known (Carroll 2016). But the symbolic dimensions of this structural coupling raise questions unanswerable by toxicology studies. No such tests can, on their own, reveal the patterns of systemic racism that the Michigan Civil Rights Commission, among other groups, identified by putting the crisis and government response in cultural and historical context, informed by interviews with the majority-black population of Flint (Levy 2017).

We can use the example of the Flint water crisis to connect the Santiago Theory of Cognition and double coupling with sustainability science. One connection is the characterization of the crisis as an example of environmental racism, which is a theoretical lens often used to study how black people and racial minorities are often disproportionately exposed to environmental toxins. Another is the likelihood of

increasing water-related transitions as reliable access to safe drinking water becomes scarcer due to environmental shifts caused by global climate change (Mukheibir 2010). Conflicts over access to water, whether physical or political, will likely necessitate shifting infrastructure and prioritizing certain populations or sectors over others. These choices will inevitably be affected by the historical and contemporary influences of colonialism, patriarchy, and an increasingly globalized capitalism.

David Manuel-Navarrete has suggested that the double-coupling (material and symbolic) between social and ecological systems is not symmetrical. What he means is that the socio-cultural dimensions that give rise to the possibility of symbolic coupling are relatively separate from (and not heavily influenced by) the lower-level complexity of material coupling (2015). He writes that human beings and the cultures they create are:

...driven by symbolic processes that change more rapidly, with higher freedom to rearrange, recombine, and create new components. Even though biological and ecological functions determine some human cognitive capacities, socio-cultural organization emerges from symbolic dynamics barely influenced by biophysical processes. Human consciousness forms from the course of making our way through the world as individual subjects. Subjective individual freedom is a manifestation of our consciousness, reflexivity, and ability to maintain internal conversations about ourselves, as well as about the structures present and trajectories taking place at the objective level. (Manuel-Navarrete)

His view of sustainability science is one that takes seriously the power that comes from symbolic coupling and processes of meaning-making. He suggests that rather than sustainable transitions driven solely by changes to the material dimensions of socio-ecological interaction, they must also be initiated by and align with “meaningful personal trajectories” if they are to be contextual and valorize the subjectivities of the people

involved in such transitions. In other words, successful transitions are also socially just transitions, which include cultural, socio-economic, and cognitive dimensions.

Consider the example of Flint. Through a lens of environmental racism, the problem cannot only be solved (or avoided in the future) through material changes, such as sustainable and reliable infrastructure for safe drinking water. As important and essential as material changes are, they do not address racist mentalities—at the individual and institutional levels—that were determined to have contributed to the Flint water crisis. A marriage of ecological sustainability and social justice requires us to find connections between the material and cognitive dimensions of SES and to work on both, even when that work involves using very different methods. This is part of the *breadth* of postabyssal approaches to sustainability science.

Sustainability Science: A Big Story

As of this writing, the graduate students in the School of Sustainability (SOS) at Arizona State University (ASU) have a big group chat on WhatsApp. We use it to build community, share information, and ask questions. In September of 2021, I saw a message from another student who asked whether SOS had any founding texts or articles on its scientific philosophy. Their question found me at the right time because I was writing my first draft of this chapter. I used the opportunity to clarify my thinking and reframe my research using the student's question. The result was a seven-page response that

combined my understandings of the school's philosophical commitments from research and personal experience.

I have modified passages from that writing to tell a story about how my own journey through SOS was riddled with possibilities and dead ends that illustrated some of the contours of the broader tension between abyssal and postabyssal sustainability science.

The story takes place during a particular period of the school's history. It is about when a colleague of mine and I proposed conducting a collaborative dissertation, where at the end we would each receive a PhD for our contributions to a shared research project. Our aspirations ran up against one of ASU's institutional limits to innovation. This limit has two roots, one obvious and the other less so. The obvious root is one of the oldest traditions of knowledge production in western/ized universities: that thesis and dissertations are always individually authored, and degrees individually awarded. The less obvious root is the epistemological foundation of this tradition, which is a logic of western thinking that elevates possessive individualism of creation and authorship above alternative, co-created modes.²⁹

SOS was founded in 2006, nine years before I enrolled. It replaced the Center of Environmental Studies. Some of the faculty from the Center joined the new school. That is one of the reasons why SOS has many natural scientists, geographers, and

²⁹ **Glossary:** Possessive individualism of creation and authorship refers to the privileging of “self-reliance, independence, and individual creations, possessions, and contributions” (Santos 2018: 54). Research is academic innovation (at ASU, “Innovation is a product of creativity” ([ASU President Michael Crow](#)), creativity is equated with originality, and originality is often attributed to autonomy and individual contribution, even when it is made possible through collaboration.

environmental economists, but comparatively fewer sociologists, educators, indigenous scholars, or faculty from the arts and humanities. However, by the time the school was established, ASU was already transitioning away from the disciplinary organization of colleges to ‘centers’ and ‘institutes’ that made it easier to conduct multi and interdisciplinary research. Horizontal collaborations across the university were being encouraged as one of the drivers of innovation. This meant that students in SOS were (and continue to be) able to take classes from and conduct research with faculty not rostered in the school itself.

I began my studies in the Ph.D. program. At the time, the school offered four graduate programs—MA, MS, MSUS, and Ph.D.—that all encouraged interdisciplinary research topics (Miller 2013; Miller et al. 2014). The MSUS program, which stands for ‘Masters of Sustainability Solutions’, requires students to conduct applied projects (often described as transdisciplinary research) with groups outside academia (Wiek et al. 2011). SOS supports a systems-theory approach across all of these programs. In my cohort, social-ecological-technical systems (SETs) courses and readings were required. There is a complex adaptive systems science concentration within the Ph.D. program. The Center for Behavior, Institutions, and the Environment³⁰ has also played a large role in the school’s research trajectories.

I was offered a teaching position my first semester and would continue teaching for the next five years. During that time, I became familiar with much of the undergraduate curriculum. The guiding pedagogical approach for undergraduate studies

³⁰ <https://complexity.asu.edu/cbic/>

(as well as the graduate curriculum, but to a far lesser extent) used a competency-based approach to sustainability education. The competency-based education in SOS grew from a desire to synthesize the many approaches being developed in nascent sustainability programs across Europe and North America (Adomßent et al. 2014). It outlines several interdependent competencies for research and problem-solving, and provides recommendations for modifying existing educational programs or developing new ones.

It was clear from the onset that sustainability science was an undercurrent of the school. It is one of the foundations for competency-based approaches to sustainability education. Undergraduate and graduate students alike are hard-pressed not to read Kates or Clark's descriptions of sustainability science as it emerged.³¹ Some faculty at SOS contribute directly to the development of sustainability science as a field (Heinrichs et al. 2016). In SOS, one of the main advocacies of sustainability science was that research should be "defined by the problems it addresses rather than by the disciplines it employs" (Clark 2007). My peers and I were encouraged to address sustainability **wicked problems**³² in our research and practical solutions.

I was admitted to the Ph.D. program without a master's degree, which is unusual. I think that was an early sign that the school values having students from a variety of educational backgrounds. I didn't have any prior research experience because my bachelor's program in architecture and environmental design was mostly applied work.

³¹ See, for example, (Kates et al. 2001; Clark and Dickson 2003; Kates 2011; Jerneck et al. 2011; Kates 2012).

³² **Glossary:** Wicked problems are problems that cannot be understood without a knowledge of their context(s), nor can they be fully understood before looking for 'solutions', which will invariably cause more developments of the problem itself (Rittel and Webber 1973).

At first, this lack of experience made me feel unworthy and like an imposter at a research institution like ASU. In retrospect, I am glad I was not predisposed to the traditional ideas of what constitutes valid research processes and outcomes.

Because I did not have a Masters, I needed to take 30 additional course credits. This allowed me to explore the different perspectives offered within SOS, and eventually, several beyond the school. Over time I was able to identify at least three major themes of SOS's philosophy of science: 1) sustainability science as a commitment to post-normal scientific philosophy supporting inter/transdisciplinary research (Funtowicz and Ravetz 1993; Scholz and Steiner 2015a, 2015b); 2) living systems theory and complexity science, including institutional arrangements (Capra 1997; Ostrom, Janssen, and Anderies 2007; and 3) competency-based educational theory in order to integrate these scientific discourses with a formal educational approach (Theoni 2017).

As I wrapped up my coursework, I continued to teach. I took my teaching responsibilities very seriously. Over the years I grew to love it. I learned a tremendous amount from my students. As one might expect, the educational approaches to sustainability science became one of my research interests. I would have loved to join a lab or get an RA to support my work in SOS. But at that point, SOS did not have any faculty who focused on sustainability education. I found guidance from faculty in other colleges, including Mary Lou Fulton Teacher's College and the School of Dance.

Around 2017, SOS was given funding to hire a tenure-track faculty in sustainability education. I served as the student member on the search committee. By that time I was starting to learn about decolonizing universities and what that might look like

in sustainability science. People with a wide range of perspectives applied for the faculty position. Throughout the search process, faculty and administrators shared their candid views about what each applicant might bring to the school, and to the field of sustainability science more broadly. How likely were they to succeed in getting tenure in SOS? Whose work would have the broadest relevance for our current students? I gained many deep insights into the kind of sustainability science the school thought it was worth investing in.

Ultimately, we picked a European ESD educational researcher, but that person declined the offer. The following year, SOS hired a different European ESD educational researcher. Certainly the new faculty filled the school's gap in educational theory and practice, and I liked them as a person. But I remember feeling disappointed by the school's timidity to include people that were very different from its current makeup.

This timidity has been justified by some in the school because of its 'big-tent' approach to sustainability. The big tent is constructed through cooperation across the university and with communities outside academia. To use language from one of the creative tools in the Atlas, SOS often "frames things larger" so that more people can fit under the tent and learn from each other (Lerman 2018c). I think there are some advantages to this approach.

On the one hand, I was continuously surprised and impressed by what my peers were able to constitute as sustainability research and practice. There have been pedagogical approaches to decolonization in sustainability science programs (Papenfuss 2019; Movahed 2020), including the inner dimensions of sustainability through spiritual

practice (Berejnoi 2020), and co-producing knowledge with indigenous communities (Buzinde, Manuel-Navarrete, and Swanson 2020). Right before I left Arizona for Norway in 2020, SOS hired Melissa Nelson, a professor of indigenous sustainability who is a scholar-activist committed to community-based work and the cooperation of context-specific, multiple sciences.

On the other hand, I had many conversations faculty who described the tent as originally much smaller. These were faculty that I met when I began taking classes outside SOS. They had watched the school emerge from the Center for Environmental Studies and evolve over the years. Some told me about early collaborations that left them feeling like they had overstayed their welcome. Others described how the knowledge and practices they wanted to contribute weren't always seen as relevant or rigorous for the trajectory that sustainability science was heading in. A few were never invited in the first place, or at least never saw themselves, or "people like them", in the new school. Over the years, I also spoke with several faculty from within SOS about how they experienced the 'big tent' approach as a double-edged sword. Research topics and methods that deviated from the norm weren't exactly stifled, but they rarely had programmatic or institutional support.

An Interlude About Creating a Collaborative Dissertation

In 2018, a colleague of mine proposed that we team up to design and pursue a collaborative dissertation. What is a collaborative dissertation? We described it as a

single dissertation, authored by the two of us, that would involve a combination of our individual and collaborative efforts. We would each receive a Ph.D. for the co-produced work. This is not the same as collaborative supervision of Ph.D. students, nor collaborative Ph.D. cohorts, nor the inclusion of co-authored papers in three-chapter dissertation formats. So far as I can tell, collaborative dissertations as we envisioned them do not exist. If you know of any, please reach out to me.

The main argument supporting our proposal for a collaborative dissertation was that assessment within sustainability graduate programs should model the kind of inter/transdisciplinary work they were already doing and would be expected to continue once they finish. We used the ASU tenure guidelines as metrics, translating them into a structure of skills, milestones, deliverables, and assessment appropriate for Ph.D. students. We made the case that sustainability faculty are hired and fired based on a wide range of capacities beyond their impact rating and grant writing. Faculty must demonstrate their ability to work on teams and joint projects that co-produce knowledge. They need to know how to work with others to integrate knowledges. Throughout these processes, faculty create a variety of deliverables beyond publications, like curriculum, program reviews, community-based projects, and forms of communicating with broader audiences. They need strong interpersonal skills to support their colleagues, mentor students, and (ostensibly) to teach.

We proposed that because these are all valuable pieces for determining whether a faculty achieves tenure, they should each have weight in the formal assessment of future faculty: Ph.D. students. This conclusion seemed straight forward to us. However, it

diverts sharply from standard doctoral formula: individual [coursework + comprehensive exam + research proposal + dissertation] = Ph.D.

We proposed that our deliverables and defenses would have both individual and shared components, and described how we would be assessed not only by our tangible deliverables but also by our interpersonal and collaborative capabilities. We advocated that Ph.D. students ought to demonstrate the intangible aspects of research—the so-called ‘soft skills’—like processes, relationships, and embodied facilitation and communication skills.

When I say “we proposed”, I am referring to a year-long process that began with the birth of the idea and reading the existing SOS and Graduate College requirements for independent research, and ended with a written, formal research prospectus proposal. During that time, we met with school’s graduate director and our own committees, separately and together. We prioritized transparency throughout this process, which involved several conversations with our co-chairs and school administration about how we interpreted the existing rules in relation to our proposal. Once we had the support of our committees, we created a model of what a collaborative dissertation could look like, and designed a research project with IRB approval. We began meeting with our collaborator/participants just as we submitted the written research proposal.

Looking back at email correspondence and my notes from our in-person meetings, I still can’t tell when the misunderstandings began. Once we submitted the research proposal and attempted to schedule the prospectus defense, we were asked to pause. The school needed clarification about how two students could schedule a defense at the same

time and in the same room. A few days passed, with me and my collaborator steeped in conversation and folks in the school's administration separately doing the same. We began to grow nervous.

We soon received correspondence describing how the school did not support our proposal for a collaborative dissertation. We were reminded of the value of individual deliverables and demonstration of our knowledge. We were asked to understand the academic culture in which we had chosen to study, and to appreciate all the freedoms the school allowed us in determining our own research trajectories. The shared nature of certain deliverables, and expanded metrics of assessment, deviated too far from the norm. We were reminded that our design did not fit with the graduate college guidelines, and that the school must adhere to those guidelines. Here is an excerpt from the message we received, with names redacted:

“I’m personally sympathetic to anyone who questions why certain rules and formalities exist in the doctoral process. Your responsibility, when you ask that question, is to give thoughtful consideration to the answer. [REDACTED], [REDACTED], and I have already been through the PhD process and [REDACTED] and [REDACTED] have mentored many additional students through it. [REDACTED] and [REDACTED]’s decision involved discussion and consideration [...], not just adherence to established rules and norms. After that discussion, they determined that it would be in both of your best interests to hold separate prospectus defenses.”

“When you send your new prospectus announcements, please make sure they include an abstract as requested on the form. Knowing how to write an abstract is an important part of publication and sharing your research, so it’s important to demonstrate that skill as part of the prospectus defense. Using the first person is fine, but an abstract is a summary of your work, not a conversation with the reader.” (Personal communication, name withheld)

I don't hold any grudges or blame anyone personally. I am sharing this one piece of communication because it helpfully illustrates the presence of western thinking in the school's decision. I do empathize with how reasonable this perspective can seem. In this case, it is not only a view codified in rules and institutional norms, but is also how most people make sense of the dissertation creation process.

While we were allowed to include nonwestern research methods and deliverables, such as poetry, performance, and storytelling, they needed first to be stripped of the co-produced dimensions of their creation and expression. Likewise, co-authorship of written parts of the research proposal and dissertation were excluded on the grounds of possessive individualism, which is steeped in the idea that creativity equals originality which one achieves through autonomy. It also perpetuates the broader view of individualism that one is disconnected or not reliant on others to exist and thrive (Santos 2018, 54).

The facilitation skills my collaborator and I had developed through our practice of the Atlas of Creative Tools could not be part of our formal assessment because they violated the dichotomy that separates the knower from what is known. This dichotomy, which hides the hierarchy that positions 'what is known' above the 'knower', excludes the possibility that embodied knowledge about subjectivities involving relational 'soft skills' could be relevant in the assessment of scientific knowledge. In other words, the person knowing can't also be the knowledge itself.

A few other logics of abyssal (western) thinking can be read between the lines of the school's decision. One can find an explicit attitude of paternalism. Also present is the idea that the school can rely on precedence to insist that the present unfold based on logics from the past—even though they contradict the spirit of a post-normal sustainability science—and that the future of sustainability science is known, and thus cannot develop using this postabyssal approach. Collaborative dissertations are not part of the present or future of sustainability science research. The school does not act to change the problematic aspects of western knowledge production because it views history—and the Graduate College and the university's endorsement of that history through its policies—as separate from itself. In other words, the school perpetuates individualism and universalism by failing to see its culpability vis-à-vis excluding alternatives, or failing to advocate alongside students for those alternatives.

Our use of certain principles and tools from the Atlas in our particular contexts, such as with the research community and at the defenses, do not scale up in the broad and generalizable sense. Instead, they scale according to a different logic that depends on diversity and relationality. In this case, we advocated for the knowledge that grew from relationality between particular people and in particular contexts be used to determine the appropriate standards of assessment and rigor, rather than the universal standards for dissertation-making. The relational, local standards we proposed came from us as particular people, working together in the contexts of our research community, SOS in Tempe, and the evolution of the field of sustainability science at a particular moment in history.

Sadness and reflection followed our exclusion. Eventually we declined the school's offer to accommodate only a portion of our proposal. Looking back, I don't know if I would make the same choice again. I think we might have been able to push the limits of the school so that other students could build on that momentum. But it was a shared decision, and neither of us could make the push without the other. We cut short the research project and thanked everyone who had participated up to that point. We each wrote separate research proposals and dissertations. I feel both sad and grateful for this. This project—the one you are reading now—has valuable insights and was personally important to me. It would not exist had we continued our work together. Yet I am sad that the ripples from our collaborative model for doctoral work are not out there in the world in the ways they could have been.

I hope this interlude has provided you with a glimpse into some of fine strokes that are present in the broader strokes of how 'the field of sustainability science is developing'. I am very grateful to SOS and the many experiences afforded to me during my time in the doctoral program. This lives alongside my disappointments and motivates me to continue working for change. Now, let's exit the interlude and continue to the final section of this chapter, which proposes four modes of creativity appropriate for sustainability science that promotes cognitive justice.

Sustainability Science and Creativity

Creativity is seen as an important part of the learning that happens in sustainability education (Sterling and Huckle 2014). This is true for the competency-based approaches to educating in sustainability science (e.g., Wiek et al. 2011) and education for sustainable development (e.g., Adomßent and Hoffman 2013; Cebrián and Junyent 2015). However, creativity is often treated generically. It is either presumed to be an intrinsic outcome of university education, or else a byproduct of developing the other competencies or capabilities (Sandri 2013, 765).

If sustainability science aims to promote students' creativity, there should be purposeful efforts to include creative practices rather than assuming creativity develops on its own. But what kinds of creative practices are needed? Sustainability science is a normative field, both in terms of research and practice (Miller et al. 2014, 241). Creativity in-and-of-itself does not inherently yield sustainable processes or outcomes. Innovation as an expression of human creativity has resulted in both sustainable and unsustainable practices (Sandri 2013, 768). If sustainability science is to pursue postabyssal approaches to education, such as transformative or transgressive pedagogies, some conceptions of creativity are going to be more appropriate than others.

Consider, for example, a common conception of creativity from western creativity theory that describes it as “an imaginative process with outcomes that are original and of value” (Robinson 2001, 118). This is a common way of thinking about creativity, and it involves some abyssal thinking. It describes creativity as primarily an imaginative

process uses the dichotomy mind/body. The mind/body dichotomy, in this case, masks a hierarchy that puts the mind above the body in terms of how to be creative. The idea that knowledge and creativity can be embodied “remains unintelligible to the Western notion that only the mind knows, and only reason can provide access to truth, creative processes, or expression (Santos 2018, 165).

Additionally, equating originality with creativity is problematic for several reasons. It perpetuates individualism and the emphasis on individual creations and contributions. It also relies on Western conceptions of linear time that continually constructs the past as obsolete, privileging “new, creative ideas” *because* they differ from the past and existing forms of knowledge (Santos 2014, 168). This view of originality makes it difficult to see knowledges and ways of being that already exist as highly creative and relevant for defining and addressing sustainability challenges. What’s more, originality in the context of western society usually means discovery, which is linked directly to ownership. Ownership in a market-based economy usually leads to discoveries being commodified, which can make them more exclusive and less accessible.

Which modes of creativity will be part of sustainability science that promotes cognitive justice? First, creativity that challenges Newtonian and Cartesian mental models and the mind/body dichotomy will help to identify the assumptions that underly reductionist theories and methodologies (Lozano 2011). Creative practices that partner the mind and the body and are rooted in embodiment practices will foster “feeling-thinking”, which is a pathway for decolonizing the senses (Santos 2018, 170).

Second, modes of creativity that are rooted in particular contexts encourage people to take their knowledge-through-experience seriously. People are active participants in their creative processes because the process of reflexivity is not merely introspection, which fragments the individual into an object and observe, but rather an ‘internal conversation’ from which new ideas, intentions, and meaning emerge (Archer 2003, 90). Creative processes that valorize subjectivities are an aspect of transformational learning, and sustainability science can provide an ethical context for such learning in university contexts (Moore 2005, 88).

Third, modes of creativity that recoup wasted experiences can contribute to **ecologies of knowledges**.³³ Wasted experiences are those experiences which are produced as nonexistent by abyssal thinking when we “refuse to see, let alone valorize, the experience around us only because it is outside the reason that allows us to identify and valorize it” (Santos 2014, 170). Creative practices can help us make explicit our normative stances and the underlying assumptions that support our choices. Here, we need modes of creativity that are able to work inside particular contexts and make visible the hierarchies that often inhabit them.

Finally, modes of creativity that are actionable are well suited for the solutions-oriented research agenda of sustainability science. In other words, creative practices for sustainability science move “beyond creativity theory” (Kozbelt, Beghetto, and Ronco 2010) and into a “shared learning environment in which knowledge is created rather than

³³ **Glossary:** Ecologies of knowledges are “composed of different critical knowledges and practices: South-centric and North-centric, popular and scientific, religious and secular, male and female, urban and rural, and so forth”, that come together in order to “engender social transformations that reduce the suffering created by colonialism, capitalism, and patriarchy” (Santos 2014).

taught” (Sandri 2013, 773). We will need modes of creativity that are able to thrive in collaborative spaces and toward uncertain outcomes. This will likely involve procedures of intercultural translation, which I described in Chapter 2.

In sum, at least four considerations may be helpful guidelines for identifying modes of creativity that are well suited for approaches to sustainability science that advocate for cognitive justice: 1) those that integrate the mind and body; 2) those that draw on personal experiences by valorizing contexts and subjectivities; 3) those that recoup wasted experiences and contribute to ecologies of knowledges; and 4) those that are actionable or are procedures of intercultural translation. As you will see in the next chapter, the Atlas of Creative Tools can be understood in terms of these four modes of creativity. It was this association that first clued me in to its relevance for a post-normal and postabyssal sustainability science.

An Adaptation of CRP for Chapter 3

In the previous chapters, I shared some statements of meaning to demonstrate the first step of CRP and provide a review of the material. In this chapter, I instead ask you to formulate your own statements of meaning.

Step One: Statements of Meaning

What did you notice, what stood out to you? Your statements of meaning can come from what you remember now after having read. They can also come from notes you jotted down. Did you find anything especially evocative or distinct? Are there details you want to call attention to? What was your experience like while reading the chapter or reflecting on it afterward? When coming up with your statements of meaning, nothing is too small to notice. Your observation is valuable in its own right, because it is an indication of what from what I shared matters to you. And you never know how the creator—in this case the author—may be able to draw on what you share to understand their own work better, or to improve upon it.

Take some time to come up with your statements of meaning.

Step Two: Questions from the Author

I have several questions. You can consider and respond to these questions; if we were together, I would be asking them of you because I value your insights. Each question represents an important thread in my work. Some are concerns that I have. Others address sticking points or aspects where I am not sure how to proceed. Paying attention to someone else's questions is a good way to understand their priorities. Questions can also indicate someone's willingness to change what they're doing, which

means they are invitations for a kind of collaboration between the questioner and the responder(s).

In my historical account of the development of sustainability science, do you know of any important moments or social momentums that I left out but, had I included them, would give readers a better (more nuanced, more accurate, more complete, etcetera.) understanding of the field?

I chose to include the Flint water crisis to illustrate how the social-ecological systems studied using sustainability science have material and cognitive dimensions, and should not be reduced to either. Did you find this to be an effective example, why or why not?

Have you encountered any proposals or actual projects for dissertation or thesis-creation like the collaborative dissertation model I described?

What opportunities do you see for our collaborative dissertation model? Are there certain fields or research programs better suited for this kind of approach to knowledge generation and accreditation?

What drawbacks or problems do you think could come from a collaborative model for granting degrees?

Did my story about how I experience sustainability science in SOS affect how you make sense of the field more broadly?

Are you using any versions of the four modes of creativity I outlined at the end of the chapter in your own life and/or work? How do you use them, and for what purposes?

Are you familiar with any modes of creativity—particularly non-western perspectives and approaches—that you suspect would be relevant for the kind of sustainability science I am advocating for?

Steps 3 and 4

What questions do you have for me? When using CRP, responders are encouraged to ask questions that build on their statements of meaning. You can return to the list you made in Step 1 and formulate some questions that come from your observations. Not all your questions need to derive from statements of meaning. When they do, your initial participation in Step 1 also functions as a signal to the author the direction of your future questions and opinions.

If you do have any opinions, you can practice checking to see whether there are any neutral questions you would want to ask me first. These are questions that help you build up to your opinion. They can lead you to reinforce your opinion, adjust it, or decide not to share it after all. One final thought about opinions: you may notice that your

responses to my Step 2 questions are also your opinions. Even your statements of meaning can be understood as what, *in your opinion*, is worthy of your attention or emphasis. In CRP, not all opinions are relegated to Step 4. Instead, Step 4 is meant to serve as a container for certain kinds of opinions. These are opinions that matter to the responders to such a degree that they actively build towards them in steps 1 and 3. Regardless of whether the creator consents to hearing them (more on this in Chapter 4), you as a responder still get to maintain your opinion. It's not lost simply because it isn't shared in this particular moment of feedback.

Chapter 4 – The Atlas of Creative Tools

Welcome to this chapter, which is entirely dedicated to the Atlas of Creative Tools. I'm glad you are reading this, and I especially hope it is of use to you. There's a lot in here. That this chapter even exists is, for me, quite exciting. That is because the Atlas is, by and large, a collection of practices that are spread out across space and time, in many people's bodies and minds. As of this writing, little is written about the structure of the Atlas, its origins, or content. I would have loved to read a chapter like this when I was first introduced to the Atlas by Liz Lerman in 2017. I am honored to be part of the community of practitioners that contribute to its evolution, and especially grateful for the opportunity to chronicle it.

What Is the Atlas?

Anonymous: “Atlas has different forms, it's been taught in classes, explained in books, papers and a museum exhibition, and many artists use its tools to create Art. To me, it is part of my lifestyle, my way of staying intimate with life and bonding with the gift of existence. It is my sixth sense that transforms mundane into enticing.”

From the outset, it is important to say that Liz Lerman conceived of the Atlas and its particular structure, including many of the foundations-as-principles at its core. She devised much of its initial content, including the Critical Response Process. This work was exciting and challenging and lonely and communal. For Liz, it involved a

tremendous amount of personal investment and dedication, even amid highly collaborative environments with others who have, over the years, contributed to its development and many different applications.

Because the Atlas has many people engaging with it, there are also many interpretations of it. This is by design. At the beginning of Chapter 1, I shared the idea/tool *multiplicity*, or *multiple names for the same thing*, which encourages you to look for and allow multiple perspectives to coexist. People notice and give meaning to things differently. As more and more people encounter the Atlas and use the creative tools, their understanding of the Atlas is shaped by who they are. This is encouraged. Together we build our ways of using the Atlas into the apparatus that supports it, and over time its principles and tools expand so that the multiple perspectives of practitioners inspire and inform each other. This is a part of the permeable structure of the Atlas that Liz set out to create.

That this work is happening *together* is critical. People developing the Atlas are supporting those who share (when they choose to share) their own understandings and tools. The Atlas does not expand the way capitalism expands by extracting, stealing, co-opting, and for the most part commodifying. Consent, partnership, representation, attribution, and compensation are part of the ongoing processes of growing the community of Atlas practitioners and defining its scope and trajectory.

~~What is the Atlas of Creative Tools?~~ This is my most recent interpretation of the Atlas of Creative Tools. It comes from the different ways I have interfaced with it, which I described in the methodology section of Chapter 2. I hope it helps others to visualize

and perhaps even experience the Atlas, which can feel a bit amorphous because it is to some extent a shifting collection of knowledges and practices.

In my description, I will use language like, 'the Atlas is', 'it contains', and 'these are related to those because'. This is language that easily gives the impression of something fixed or singular. An objective reality. When I use this language, the risk is that my perspective is not conveyed as my perspective at all, but instead a description of what the Atlas truly is. Yet, I have chosen to run this risk and write using this language for two reasons.

First, I haven't yet found or created a better alternative. If you know of any, or these ideas have suggested something to you, please reach out to me.

Second, following language conventions makes it simpler to write and easier to be understood. Many languages describe things in definite, singular terms. Some people have created alternatives, like Thích Nhất Hạnh, who replaces the verb *to be* with *interbe*. I am; I interare. I love this, and I also do not want to create confusion by using too many unconventional words. And I don't want to double the length of this chapter by repeatedly writing "one interpretation of the Atlas is..." or "one way of thinking about...".

Maybe this idea about language doesn't trouble you, but if it does, I'll offer a little practice that I often use to help myself as I read. I remind myself that I can hold two ideas in my mind at the same time, even about the same thing. I remember that there will be multiple interpretations of the Atlas, and one does not need to negate or reduce others. My perspective is as important as it is partial (Thank you Santos for this language).

Instead, I can make distinctions between understandings, and “distinction do not have to be about right or wrong” (Lerman 2011, xvi). They could be, mind you! Right/wrong thinking is sometimes very useful. Very appropriate. But when we use that logic at the beginning, we can converge too early, and sometimes when we do that, we exclude others ideas and experiences.

My Interpretation of the Atlas of Creative Tools in 7 Paragraphs

The Atlas is an attempt to catalogue and share a collection of beliefs, behaviors, and practices that Liz Lerman developed in relationship with many others for most of her life. In its most comprehensive form, it’s like a mini culture containing origins, traditions, values, mindsets, practices that interact with its surroundings, and feedback loops that contribute to its own growth. This complexity is impossible to know without some degree of immersion, and without practice. There are also simpler, partial ‘collections’ of the Atlas that are easier to make sense of. University courses or workshops contain a limited number of the tools and ideas in the Atlas. They are created for particular needs, and often in the context of ongoing partnerships. But these are products of the Atlas, and not the Atlas itself. People’s tendency to underestimate the processes that yield these sorts of products is the leading cause for oversimplifying and mischaracterizing the Atlas.

Broadly speaking, the Atlas contains specific principles and activities, called ‘creative tools’, that people use to understand/expand their creativity and get stuff done. The oldest principles can be traced back to Liz’s youth. Recently, practitioners have used

the tools to reframe/reimagine existing principles like consent and inclusivity. Many of the tools originated in dance, and thus begin with moving one's body. Other tools start more conceptually. Most tools ask us to partner the body and the mind in deliberate ways. All the tools were developed and refined through the arts of living and working. This happened in communities and synagogues, universities and hospitals, retirement homes and in concert halls. They are used in the desert and in people's homes. Among the people who use them are artists, teachers, mothers, scientists, administrators, and facilitators.

The Atlas contains many, many creative tools. I am familiar with about 25, but in conversations with others new ones are frequently shared with me. I know there are many, many more. But determining what is a tool is complicated. Some practitioners describe what I call the 'principles and values' as tools. Others describe as tools what I designated as 'mentalities'. It is easy to name 50 tools if one considers that each tool is usually made up of aspects I call 'ingredients', but others call tools. Some of the tools that Liz brought to the Atlas are well-known in the dance world and either preceded her or were developed by her contemporaries. Liz honors the work of others, and often has her own versions of these tools that range from quite similar to very unique. Other tools in the Atlas were created in communities where Liz collaborated with others. In this way, many tools became a part of the Atlas through people who encountered it and have since shared them with the broader community. There is one tool in particular that I will name here. It is the Critical Response Process, which was made by Liz in the early 1990s. It has

since developed through her own persistence and in close partnership with many communities and individuals, including John Borstel.

When people engage with the principles and tools in the Atlas, they often describe how they change. One dimension of this change is their creativity: where it comes from, how they recognize and create conditions for it, how and where they apply it, and in general an expansion of their creative capacities. This happens most comprehensively when people have a “Toolbox Mentality”, which involves a kind of mental nimbleness that enables one to do all kinds of things: to learn ideas and practices from others; to discover/develop their own; to move swiftly between process and product and reflection and action; to translate between disciplines and across cultural boundaries; and to center/recenter various elements of a situation in order to “discover the enormous potential for application that lies in the essential” (Lerman 2011, xvii).

People use the Atlas to get stuff done. The stuff that gets done might be for work or fun, to improve communication or while doing activism. Sometimes the Atlas is used (and indeed created) in the context of struggles. The Atlas has been used to valorize the dance form breaking, to create recipes of peoples’ identities, to learn and remember things, to develop anti-racist cultures and practices, to get bodies moving, and to produce a stage performance that centers women and their knowledges *witch* have historically been erased, vilified, and criminalized. People use the Atlas in brief moments and throughout long processes to advance something, make some progress, keep going, and survive when they find themselves thrown into the deep end. They use it to notice, problematize, explore, generate, try, test, edit, refine, teach, learn, facilitate, support, get

out of their comfort zone, and as a protocol for communication. In Chapter 5 I detail a few examples of how people have used the Atlas in these ways.

Finally, there have been several projects meant to collect and publicly share certain principles, tools, and applications of the Atlas. The earliest were visible in the embodied (verbal and actioned) practices of Liz's early-career work in New York City, Washington D.C., and at the Dance Exchange, the dance company she founded in 1976 in the D.C. area. Later the Dance Exchange moved to Takoma Park, Maryland. The D|Lab Toolbox at the Dance Exchange was one of the first large efforts to digitize, curate, and share creative tools in a digital commons. This Toolbox was informed by the work being done within the Dance Exchange and in relationship with communities. The D|Lab Toolbox was/is not the Atlas, but it is part of the origin story of the Atlas. Liz's conception of the Atlas of Creative Tools, which was created after the D|Lab Toolbox, maintains two traditions from the first digital commons: it involves digital descriptions and demonstrations of principles and tools, and it is informed by practitioners in different communities. Recently, the Atlas has been organized into courses (both online and in-person), on traditional websites and other digital spaces, and in physical, interactive spaces such as in research facilities and in art galleries. As of this writing, most recent online versions of the Atlas were constructed in the context of partnerships at Arizona State University and for an exhibition at the Yerba Buena Center for the Arts in San Francisco.

As of 2023, some of us working directly with the development of the Atlas are trying to create an apparatus that supports the growing community of practitioners. We are exploring big dreams and small details. One consideration is dedicated physical spaces beyond the multitude of informal physical spaces already used. Another is an interactive digital database containing decades of knowledge. We are thinking about regular workshops that help people their tools and explore the implications of using them in different contexts. These workshops could be part of a larger effort to support mentoring, teaching, and facilitating using the Atlas. Some have talked about the potential for the Atlas to be used as a helpmate in transitioning away from problematic forms of university knowledge production toward some other, unknown modalities. These ideas are perhaps the stage on which the next chapter of the Atlas will be danced as it continues to question itself and grow in response to current events and through an increasingly diverse community of practitioners.

Ways of Categorizing Content and Relationships in the Atlas

One way to understand the Atlas is to break it down into smaller parts, look for relationships between them, and think in terms of categories. It is a reductionist method that, if done on its own, could never reveal the deeper understanding described above, which was informed in part through experience. Defining and categorizing can of course be a useful exercise. In this case, we can see how conceptions of the Atlas has changed over time vis-à-vis its origins, and how it has been categorized in different moments.

The D|Lab Toolbox

The Toolbox at the Dance Exchange was launched in 2004 as a part of the D|Lab webpage. In the D|Lab Toolbox, there are seven categories: tools, applications, variations, foundations, practices, principles, and stories about tools in action.

Tools are “concrete, take-action techniques, often consisting of multiple steps, for structuring art, generating artistic content, and engaging people in learning and collaboration”.³⁴ The D|Lab toolbox contains twelve tools. Each has a description and lists different ways of using it, which are called applications and often describe variations of the tool. The tools are distinguished from ‘foundations’, which are “brief descriptions of practices for effective teaching, leading, crafting and collaboration” that themselves contain ways of practicing them and are rooted in certain underlying principles.

The foundations are often part of how to go about using a tool. For example, the foundation “nothing is too small to notice” is a constant companion in many of the tools, such as Step 1 of *Critical Response, Annotation, Detail, and Spontaneous Gesture*, and *Essence*. Whether you are facilitating a tool with/for others or using it by yourself, there are several moments when it is important to remind/remember that nothing is too small to notice. In this way, foundations sometimes describe conditions or steps in a tool. They can be part of the activity itself, or the conditions that exist or are encouraged/created for the tool to be used in.

Here are the foundations found in the D|Lab Atlas:

³⁴ <http://www.d-lab.org/toolbox>

Table 3. Foundations from the D|Lab Toolbox

Tell people what to do, as opposed to what not to do.	Nothing is too small to notice.
Form a circle.	Engage discomfort.
Let meaning be discovered.	Start where people are at home.
Don't wait to be introduced.	Just keep dancing.
Stop. Reflect. Continue.	Resistance is information.
Turn discomfort into inquiry.	Practice active belonging.
Turn defensiveness into learning.	

The foundations are formulated in general terms. What I mean by ‘in general terms’ is that, when read on their own, each foundation lacks contexts: contexts of who, where, when, how, and why. This generality does mean that there are many ways to ‘do’ a foundation, and a creative tool can be seen as a particular configuration of one or more foundation. It also means that in the absence of certain contexts, foundations can be interpreted and used to justify all kinds of behavior, problematic or otherwise. “Let meaning be discovered”, for example, could be the foundation for any number of extractivist methodologies.

One of the distinctions between the D|Lab Toolbox and the Atlas of Creative Tools is that, in the Atlas, the foundations become normative stances for a particular view of creativity. At its heart, the Atlas embraces Liz’s view of creativity as a birthright. It is

something that people and groups have simply through their unique expressions and cultural traditions. Creativity is also something that can be used to appreciate this diversity. And creativity can be practiced, so that people and groups embrace their ways of understanding and forms of expression.

Consider the principles for the foundation “Form a circle”:

- Establishes less hierarchical, less authoritarian structure.
- Facilitates interaction by positioning people at a relative distance and within easy view of each other.
- Facilitates listening and observing.
- Conveys this idea: “We are going to share an experience from which we all will learn,” rather than, “I’m the teacher and you’re going to learn from me.”

The practices associated with each foundation reveal how these foundations were articulated over many uses. We can see this because the practices themselves sometimes describe the situations they grew out of by linking to stories that describe people’s experiences using the Toolbox. This is also something you can get to know by working with and practicing the Atlas.

The Atlas of Creative Tools at ASU

When I first encountered the Atlas in 2017, it was undergoing its first formulation with the name and structure “Atlas of Creative Tools”. In a sense, it was another “virtual commons for choreography and collaboration” similar to the D|Lab. But Liz’s vision of the Atlas, and the structure she was creating for it, was also different from the D|Lab Toolbox.

The D|Lab Toolbox was the container that held everything. Take a moment to imagine a toolbox. Examine the picture in your mind. What does it look like, what does it do? For me, I picture a toolbox with my woodworking tools, filled with all kinds of compartments that organize and separate things. The second picture I see is my sister’s toolbox in her new home, which the last time I saw it was more like a bag where anything related to home improvement was ushered into without a thought to retrieval. In her bag, anything could be touching anything else, and you might find anything on the top. Simply glancing in there could inspire me to approach a project in a different way.

In a recent collaboration with the United Arab Emirates Abdulla Al Ghurair Foundation for Education, Liz described the Atlas this way:

The Atlas of Creative Tools has three big words in it. Atlas, which for me means a journey with multiple possibilities, multiple ways of going. And you’ll see the way we’re organized that you can structure this in many ways to follow your own path. It has the word creative in it. I think creativity is a birthright. I think each one of us is born with such innate capacity for many of us that gets beaten out of us. But I hope these tools help remind you how to get it back. And maybe you never lost it, really. And then there’s this word tool. I think a lot of people think of a tool like a hammer and then they say, you know, you can only use the hammer.

And I mean tools differently. I actually mean a tool is something that you can repurpose in multiple ways. Sometimes all you have to do is turn it a little bit and you realize, oh, yeah, there's another side to it. Let me try it that way. (Lerman 2020)

This describes a shift away from linear relationships among toolbox contents and toward nonlinear ways of working through the Atlas. One of the first ways we organized the Atlas was to create a university course. One of the reasons Liz joined ASU was to further develop the Atlas, and a course was the structure that the university agreed to support. The first course was created in collaboration with the Herberger Institute for Design and the Arts (HIDA). It was ironic that the first version of the Atlas was a university course, because this structure made it difficult to organize it in nonlinear ways. The difficulties came from the constraints of the online learning platform, and from the pedagogical norms built into most university curriculum. The course needed to be created with according to several considerations: timeframes for learning and practicing tools, the sequence for introducing them, activities that could be done in-person and online, and the frequency and formats for feedback and assessment.

With each semester we made changes within these structures based on our own learning as a teaching team that came largely from students' feedback. These iterations have resulted in at least five 'subversions' of the course. Beyond these broad pedagogical structures, the course was used to promote existing programs at HIDA, for example the dance education students' applied work in schools. Additionally, the course was generally cross-listed to create interdisciplinary student groups. Students across the university explored the Atlas in their academic contexts, which was one of the impetuses

for creating the course in the first place. Another justification for using the course structure was that, while courses were only accessible to registered students, those students provided much more guidance, practice, and feedback than someone interacting with content on a website.

Although many subversions of the Atlas-as-academic-course exist, they have maintained the same categories of content. These differ from the D|Lab Toolbox. There are five main categories in the course version of the Atlas: creative tools, lectures, creativity theory, tool applications, and reflection/self-assessment. I don't detail them at length because my analysis of the Atlas is broader than its course version. But I do want to call attention to a few aspects. One is how creative tools are described. Here is a comparison:

Table 4. A Comparison of Definitions of Creative Tools

D Lab Toolbox	Atlas Course in HIDA
<p>Tools are “concrete, take-action techniques, often consisting of multiple steps, for structuring art, generating artistic content, and engaging people in learning and collaboration.”</p>	<p>Tools are “a way of practicing something over and over again, enough so that you understand what it is, how it works, and what it will cause to happen.”</p>
<p>Liz wanted to “discover questions and structures that would help inventive people find physical answers and stories inside themselves” in relationship to dancemaking, and these questions and structures were among the earliest tools.</p>	<p>A tool might be a whole set of processes, or steps, or it could be “just the small thing, the small ingredient or piece of information” that we choose to work on.</p>

Notice a shift in how the tools are framed as useful beyond artistic contexts. The D|Lab formulation of creative tools was developed at a time when most people using the tools were artists. In contrast, one of the intentions of the Atlas was to use creative tools to bridge the gaps between disciplines and communities of practice. The tools developed for the Science Choreography program at Wesleyan University are a good example of this shift.³⁵ This educational program combined creative tools with science classroom

³⁵ See: <http://sciencechoreography.wesleyan.edu>

content to enhance students' learning. While tool use in the Science Choreography program continued the D|Lab tradition of "engaging people in learning and collaboration", it also shifted the emphasis to kinesthetic, embodied learning about science concepts and some of the ethical dimensions of scientific inquiry.

Another shift is how, in the Atlas, the tools are framed as forms of practice. The online D|Lab formulation of tools give the impression that they are fixed techniques with particular structures and steps. While conversations that I have had with folks at the Dance Exchange don't lead me to think that's the only way the tools were used, one can also get that sense as they explore the full tool pages. The shift from tools-as-structures to tools as a way of practicing something repeatedly grew in part from an awareness among practitioners that, when they used the same tools in different contexts, one of two things usually happened.

The first is that when someone used a tool without modifying it, either the context changed to fit the tool, or some of the underlying assumptions that structure that context (e.g., Bourdieu's experience of doxa, existing power relations) were revealed. In other words, taking a procedure developed in an artistic context and dropping it into a culturally-different context would usually cause disruptions, or reveal something about the tool or the new context.

Another possibility came from modifying the tool before using it in a different context. If someone changed a tool (for various reasons) and paid close attention to what happened, they could learn something new about the tool itself. When one does this over time and in multiple contexts, it becomes a rigorous and iterative process that involves

paying attention, asking questions, naming, repetition, and practice that leads not only to more flexible tools, but a more flexible way of thinking. This way of thinking would eventually be called the “Toolbox Mentality”. It is one of two mentalities (the other being a horizontal mentality) that marked a shift in how practitioners approached using creative tools and making new ones, and is central to my categorization of the Atlas.

My Categorization of the Atlas

My categorization of the Atlas comes from having considered a wide range of material and experience. These include the histories of particular people, the Dance Exchange and D|Lab Toolbox, earlier collaborations such as Science Choreography with Wesleyan University and Guildhall School of Music and Drama’s use of CRP, more recent versions of the Atlas developed in cooperation with ASU through various projects, various publications and writing about the tools and especially CRP, and my own experiences from having worked with the Atlas in a variety of capacities as I described in Chapter 2.

The categorization resulted from an inductive thematic analysis of primary and secondary sources, the bulk of which are transcriptions from Atlas material developed for a number of course versions between 2016-2022. Additional sources include existing publications and archival sources, like the online D|Lab Toolbox. This resulted in a broad description of the Atlas, which I compared with my notes, memories, and experiences of working with the Atlas, as well as how other practitioners describe it. In other words, one

factor determining the trustworthiness of the results of the research method is whether they make sense based on my and others' first-hand experiences. This is a kind of validity that, in terms of research, is rooted in the idea that the specific and the general can both contribute to our how we understand something. Each tells an important part of the story, and can be refined (or distorted or disproved) by the other. This is why, in Chapter 3, I shared two of my perspectives on sustainability science: the first from a literature review, and the second from my experience as a student.

I name five categories that make up the Atlas: practical mentalities, foundations as principles, creative tools and their ingredients, procedures, and applications/using the Atlas in particular contexts. Generally speaking, the contents of these categories are recognizable as such but could be recategorized by different practitioners depending on how they understand and use the Atlas. For example, I categorize *horizontal thinking* as a practical mentality, but many students have described it as a tool that they used. In fact, it was these perspectives that led me to modify the category name from 'mentalities' to 'practical mentalities'.

Here is a brief analogy that shows how I think about a practical mentality. I am an amateur carpenter. I've been doing woodworking and finish carpentry projects on and off for many years. As of this writing, my carpentry tools are in a toolbox in a storage unit in Tempe, Arizona. If I gave you the key and you visited the unit and opened the toolbox, you would find a variety of hand tools: chisels and files, hand saws and planers, screw drivers and awls, clamps, and sanding blocks. But you would also find some power tools: electric table and miter saws, a router, and drills with bit for drilling holes and fastening.

Already this combination of traditional and electric tools might give you some indication about the woodworking mentality I hold, even if you don't know much about woodworking.

These physical objects and their arrangement in my toolbox do indeed reveal some of my thinking around wood and craft. But you would gain far more insight into my woodworking mentality by working alongside me, or even by inspecting my hands. That is because the ways I work are manifestations of how I think about the craft, and my thinking changes in response to how I am able to work in particular situations. If we partnered on a project, you might see me try to use local or reclaimed materials, or I might buy them new. You would find that sometimes I restore old ones, but sometimes buy new ones. I measure twice so that I can cut once, and make certain choices based on the species, grain, and moisture of the wood. Sometimes I wait during phases of a project when waiting is necessary. Other times I use techniques that allow me to cut corners or skip steps.

These and a thousand other behaviors are like little windows into my mind. I have no doubt that after working together for a month or so, you could summarize fairly accurately my woodworking mentality, together with some insights about my broader worldview. This is what I mean by a practical mentality: the thinking informs of the practice and the practice informs the thinking, so that the exchange makes each more visible, legible. Contradictions float to the surface, because when we're working together, they can't hide behind my words. Practical mentalities understood this way cannot stray

far from the specific contexts they are used in without some deliberate ignorance or cognitive dissonance.

Two Practical Mentalities that Breathe the Atlas

The Atlas contains two practical mentalities: *horizontal thinking* and the *toolbox mentality*. Each shapes how people use existing creative tools and make their own. I am able to describe them separately because they have distinct origins and qualities, although in practice we encourage people to use them in tandem.

Horizontal Thinking

“To me, the Atlas is a lot about Liz. Herself.”- Farzaneh

If the Atlas had grown from a single seed, I think horizontal thinking would be that seed. It is a mentality that Liz Lerman developed her own version of early in her life, and so it guided many of the choices she made about her professional work. In the earliest stages of the Atlas, before it was even named, horizontal thinking was already a guiding force against the logic of the monoculture of knowledge that contends that high art/culture are the “sole criteria for aesthetic quality” (Santos 2014, 172) and that those who create artistically using means or for purposes outside the cannon lack culture and are excluded on that basis.

I illustrate the roots and significance of horizontal thinking for the Atlas by sharing a few moments from Liz's earlier life. One cannot respectfully separate the Atlas from Liz, just as one cannot respectfully separate someone from their ancestral land. This is perhaps the strongest case against seeing the Atlas as collective knowledges. But I insist that it is. The Atlas does not *belong*³⁶ to Liz simply because she has, for most of her life, nurtured and stewarded and shared it with others. The same is true for many indigenous people who do not subscribe to such an impoverished relationship between them and the land they nurture, steward, and share.

In western modernity, people are seldom asked to heed origins. Someone can, of course, use tools from the Atlas without acknowledging where it came from and how it evolved over time. For Farzaneh, an Atlas practitioner who takes origins very seriously, there is a highly complex version of the Atlas made visible by witnessing Liz move fluidly amongst its intricacies.

Moments in Time: Freedom School. Liz began dancing at a young age. She was encouraged by her parents in very different ways. Her father's egalitarian view was that all and any dance was worth learning about, worthy of appreciation. "His most important legacy to me as a choreographer was his complete lack of high-art/low-art thinking. He made me watch everything." (Lerman 2011, 27). Her mother's view of dance had some

³⁶ Recently a lot of work has been done (particularly by Candice Williams) to clarify the intellectual property rights of Atlas material. I will not write about this in the dissertation, because such writing could be used against us in the future. While copyrights ascribe ownership and limit access, a core capitalist logic, particular situations are complicated. You can reach out to me if you want to talk more about this and, although I cannot make a promise, we may be able to discuss it.

interesting nuances. She admired the structure and technique of classical dance, and also wanted Liz to find her own voice within that structure. Liz noticed both views and the tension they created.

This early exposure to these contrasting perspectives on dance gave Liz some early insights into horizontal thinking. She trained first in classical ballet, and those years of training were literally formative for her body and her initial thinking about dance based on ballet aesthetics. A part of Liz did find comfort in the technicality and physicality of ballet, and she would throughout her life seek refuge in its familiarity. During her early training, the classical tradition dictated how ballet was to be learned and performed. It did not change with the particular people dancing or current events.

As she grew older, Liz became increasingly troubled by the complete separation between the dance she was learning and the social struggles she was witnessing during the American civil rights movement. Her father was an activist throughout his life, and her family's protesting of school segregation in Milwaukee involved Liz going to a Freedom School. Freedom Schools were temporary schools established throughout the United States to advance the social and political equality of Black Americans. Liz wanted for the subject matter of her dance to reflect the relevance and urgency of the stories that she heard from students and teachers at the Freedom School (ibid, xx). There was no room in the cannon for the dance and the stage to be mediums for challenging racism or valorizing dance form outside classical traditions.

“Why do you want to build an aesthetic that says, the most mysterious a thing is, the weirder a thing is—why do you want to build an aesthetic that has zero support for

community values? I don't understand why that's a good thing. Why is that a good thing?" (Liz Lerman, personal communication)

Horizontal thinking became a way for Liz to reconcile the contradictions she saw between dance and western dance aesthetics. It is the subject of a full-length book, *Hiking the Horizontal*, written by Liz and first published in 2014.³⁷ Among other things, the book traces the impact that horizontal thinking has had on Liz's life and work. Her conception of horizontal thinking bears similiarity to what Robert Johansen has called full spectrum thinking, "the ability to seek patterns and clarity across gradients of possibility while resisting false certainty" (2020). Liz developed this attitude at a young age, which helped her to move between her parents' contrasting views of dance. It helped her move between the ballet studio and the freedom school while staying curious about the social relevance she knew that dance had beyond the stage.

Horizontal thinking is not without discerning and judgement. In fact, it requires both these things. Thinking along a spectrum does not mean one opens the field for all ideas and behaviors to coexist equally, separately, without comparison or preference. In practice, horizontal thinking requires one to make distinctions constantly. But they are not the radical distinctions of abyssal thinking. Instead, rather than making distinctions—often unconsciously—in order to fit things into socially determined categories, they are made as a deliberate "a creative act worth doing in order to understand the nuances of our efforts" (Lerman 2011, xvi).

³⁷ The full title of the book is *Hiking the Horizontal: Field Notes from a Choreographer*. In 2021, Liz narrated an audio version.

Horizontal thinking challenges us to notice when the distinctions we are making slide into typical categories of right/wrong, better/worse, either/or, relevant/irrelevant. These dichotomies often reveal the presence of metonymic reasoning. Or to be more precise, when dichotomies hide hierarchies, such as when ballet/breaking hides *cultured*/*peasant*, metonymic reasoning does not exert itself to look for other criteria for aesthetics beyond western traditions. Just as people add and subtract meaning through processes of symbolic meaning-making, we can also suspend and apply judgement. Horizontal thinking asks us to notice the presence of dichotomies, for example, and ask when they may be useful or not. We can apply judgement later.

Moments in Time: The Roosevelt for Senior Citizens. Liz did not want to choose between dancing and participating in social struggles. Instead, she put the two on a spectrum and began to look for relationships between them. She began to apply her classical training in unconventional ways and spaces. Sometimes her reasons were quite ordinary and relatable, like needing money. Once she saw an embroidered blouse of Eastern European design on display in a shop window in New York City. She fell in love with it but could not afford it, which led her to ask her friends and take on a job as a go-go dancer at bars in New Jersey. By then, Liz was already paying attention to how she could bring skills from one area of her life to another and save herself when she was floundering (toolbox mentality).

It would have been easy for her classical dance training to prevent her from thinking of a bar as a stage or her body as the subject of the performance. But she was

already looking for ways that the dance could be relevant, which includes both social and subjective relevancies, and so she was able to develop a whole new set of tools and perspectives on performance dance. And she was able to buy the blouse.



Image 1. The Blouse

Source: Photograph courtesy of Liz Lerman, 2023.

In 1975, her mother died at a young age from cancer. Liz wanted to make a dance about her family's experience of her mother's death. She wanted for older people to be part of the piece, but performance dance was (and mostly still is) danced by bodies whose ability was defined by their strength and technique. Dance was for the youthful. At this time in the US, there was not much thought given to healthy aging, and older citizens were often relegated to senior citizens centers without many opportunities for physical

movement. In western societies, the social exclusion of older people has its root in capitalist productivity³⁸ and in a disregard of ancestral knowledge held by elders that is useless from the western perspective of linear time.³⁹

In her search for older people to be part of the dance honoring her mother, Liz approached the Roosevelt for Senior Citizens in Washington D.C. and proposed to give dance performances for the residents. The staff at the Roosevelt was initially skeptical, but Liz persuaded them and carved out a job for herself. What started as performances became dance classes that brought young and old people together in surprising and challenging ways. It rapidly grew into a rich space for Liz and the undergraduate dance students she was working with to develop new tools for movement and teaching. Over time, the older residents at the Roosevelt began to change their movement habits. Many of them found physical comfort in the touching and movement, and described how their mobility increased outside the dance classes. The students' growth was perhaps less physically demanding but required mental backflips as they found ways to accept and support older bodies, Ways they did not—could not—learn from traditional dance training.

Liz's own learning from the residents and dance students continued to drive her understanding of horizontal thinking. In 1975, six seniors from the Roosevelt joined the cast of professional dancers to create the dance about her mother, called *Woman of the*

³⁸ **Glossary:** The logic of capitalist productivity applies to both natural and human labor. In the case of human labor, nonproductive and slow forms of labor are excluded, along with the labor involved in “the flourishing of personal, family, and community” (Santos 2014, 173).

³⁹ **Glossary:** One of the logics of linear time is that there is one true history and future, not multiple histories and futures. (Santos 2014, 173). Using this logic, oral and ancestral knowledges, as well as knowledges possessed by elders and the elderly, are seen as irrelevant and produced as nonexistent.

Clear Vision. In 1976, Liz founded the Dance Exchange in the D.C. area, where she continued her work bringing young and old people together in dance and choreographic works for 30 years.

Liz had many different names for her commitment to horizontal thinking. Her use of the term “horizontal” did not come until later in her career. When it did, it first came in the form of a physical gesture. It was a response to people who praised her work on stage but diminish her time spent dancing with seniors or with people in communities. Or people would commend her community work while questioning why she still bothered with stage productions. Liz wanted to continue to move between these two worlds and let each inform the other. She described this movement as ‘hiking the horizontal’. Hiking the horizontal begins with a commitment to allow for multiple perspectives and is maintained, in part, through another practical mentality found in the Atlas: a Toolbox Mentality.

Toolbox Mentality

A toolbox mentality is rooted in a simple, powerful idea: you can notice how you are able to manage difficult situations so that those methods can be repeated, refined, and tested in other contexts. When you do this, you are developing your toolbox mentality, and the particular things you did—your ways of living and working in actual situations—become your own collection of tools. “Whether you’re working intuitively, with recipes, or with processes that someone has taught you, you can be paying attention to the things

that work, the way you interchange them, and come to find that it is actually interesting to make your own toolbox, your own set of ways of working.” (Lerman 2018d). In this sense, the toolbox mentality can seem like a description for how many people live their lives.

Xanthia: “The language of creative tools didn't come to me through Liz. I think that's a pretty common like sort of phrasing of thinking about an artist's toolbox. And so I feel like that language has been with me for a long time, just thinking about anything that you could put in your toolbox that is from your embodied artistic practice. And then, how you utilize those different tools—if you're pointing them towards a goal or a conversation or a question and exploration. I feel like I use that language of creative tools a lot. And sometimes that's in the context of Liz's work and sometimes it's totally separate, in a separate context.”

Sumana: “The way that I came to my Master’s degree program was that I needed a toolbox. I didn't have that vocabulary, though. I just needed a new way of creating, something that meant something to me in a different way. I mean I had used the traditional way of creating in Bharatanatyam dance. It was taking pieces from older choreographies and trying to fit them in, or taking a full choreography about some mythological or historical event and then seeing how it relates to my existence right now. And you know, that only lasts so long because all I'm really doing is reproducing. I'm not

creating. I'm creating connections, sure. But I'm not creating something that actually means something to people now, including myself.”

Different practitioners of the Atlas describe tools and toolbox mentality in different ways. This has helped us see how the toolbox mentality serves several purposes. It encourages noticing and giving names to what you're doing, or not doing, so that they become easier to recall and move in and out of. Many people breath deeply to calm their bodies and minds. Maybe they learned how through a spiritual practice, in therapy, or by some other way. If we practice deep breathing over and over, it becomes embodied. Of course, it was already embodied. It's breathing. What I mean is that it becomes easier to recall and do it outside the context it was learned in. We can breath deeply in other situations, even in situations where it is seen as weird and we are pressured not to do it. This is using a toolbox mentality to practice taking a method or activity you are familiar with and bring it from one context to another to see what it causes to happen.

Anonymous: “Why Atlas? There is a network of possibilities between expression, experience, and apprehension, rather than one-sided roads. Let's say using eye glasses is a tool to expand the visual umwelt of weak eyes, and both microscope and telescope are tools to expand visual umwelt of healthy eyes. One of my strongest hypotheses about Atlas tools is that they expand human's movement umwelt beyond just physical movement. Atlas made all of my efforts to escape from how the world is already defined and dictated, systematic. It empowered my critical experiencing, not just critical

thinking. Creating could be objective or subjective. Familiarity with the toolbox mentality helps one to be aware of subjective creativity, and turn it into objective processes that could be built into one’s personality. More easy said than done.”

Foundations-as-Principles

As I conducted the inductive thematic analysis, some codes were primarily found in certain data sets. For example, *reflection* and *learning* were coded for throughout the teaching material, but rarely came up in the interviews with practitioners or in existing publications. However, there were some codes that were represented across all the data sets. In the first round of coding, these were:

Table 5. Initial Inductive Codes, Filtered Across All Data Sets (Round 1)

keep trying	many different	knowing from experience
keep going	multiple	paying attention
stuck	switch	noticing
discomfort	try another	process(es)
resistance	practice/rehearsal	way of [...]
question	testing	embodiment
inquire/inquiry	not using/suspending	with the body
judgement (of others, self)		

In developing themes in the second round of coding, these initial codes were combined into 10 emerging themes:

Table 6. Coding Themes from Codes Represented across All Data Sets (Round 2)

keep going	multiplicity	embodied knowledge
discomfort/resistance	move between different	noticing details
asking questions	practice	judgement
suspending		

These themes were found throughout the data, and so I grouped them into a ‘parent theme’ called foundations. Some of them had been part of the descriptions of earlier foundations from the first D|Lab Toolbox, but they were often not used in the same ways. When I noticed this, I revisited each initial code in its context to better understand the spirit in which it had been used by its author. I made lists of the contexts under each of the themes that emerged from reorganizing and combining the codes. Around of recombining yielded seven themes. I expanded these into one-sentence ‘rich descriptions’ of the foundations by couching each in information from their combined contexts.⁴⁰

⁴⁰ The descriptions are in my own language except two, for which I adopted Liz’s language after considering which was clearer. “Living is practice, practice is rehearsal, and rehearsal means making mistakes” came from Liz and replaced my original “Living is a form of practice, and practice inherently involves failures that we can learn from”. Liz’s “Nothing is too small to notice” replaced my “Even the smallest details can be relevant or made to be relevant”.

Table 7. Rich Descriptions of Themes Organized Under the Foundations Parent Theme

When you pay attention to your body and imagination—and especially when you partner them—they provide you with a tremendous amount of information that you can use.
You can turn moments of resistance or discomfort into inquiry so that you don't get stuck, converge too early, or shut down the possibilities that come from asking questions.
Both knowledge and judgement can be suspended and applied, making distinctions can be acts of connection <i>and</i> of separation, and one can discern with respect even while being critical.
Living is practice, practice is rehearsal, and rehearsal means making mistakes.
Allow for multiplicity and seek it out.
We can move quickly and skillfully (nimbly) among different ways of thinking and doing, and our ability to do so is itself something we can practice and improve on.
Nothing is too small to notice.

In my categorization of the Atlas, I describe the seven foundations as foundations-as-principles. The one or two-word themes under the parent theme 'Foundations' are interpretable and may seem neutral. In their original contexts they are value-laden. I wrote the seven rich descriptions of foundations to illustrate their normativity.

I see several relationships between the normative stance of epistemologies of the South and the Atlas's foundations-as-principles. I sketch a few here to give you my impressions and encourage you to imagine. When people use the Atlas, they practice the foundations-as-principles when they use existing tools or create their own. One of my main ideas is that when they do this in relation to a particular a particular

question/project/process/moment, they are doing at least two things. First, they take practical steps, whatever they may be, in that context. Second, when they use the Atlas regularly—daily, hourly, with increasing frequency—they become more nimble.

Anonymous: “Why do I find it essential to be nimble? Being from Iran, I carry an eternal graveyard in my soul. There is so much missing, loss, intergenerational trauma, and blood enough to sink every second of my life. I need to wash my own sight and moments constantly. Atlas has made this healing effort systematic and tangible. Having tools to feel the nuances of my immediate environment keeps me alert, keeps me alive.

Atlas is a safe space to experience different and even opposing forms of knowledge and fluctuate between them. It is transcendence in practice, where I get to be nimble and still, far and close, yin and yang, inside and outside of the box, restricted and free, and flowing towards the center or corners, at the same time.

Atlas is an invitation to notice what is not captured by constant habits of life. Slow stretch of a shadow on the walls of my office, the wrinkles of waves on the ocean's body, the unique sound of each key turning in a lock, and much more is noticeable to me after living Atlas for 7 years.

When I say Atlas, most of the time I mean the toolbox mentality, the ability to concretize the most abstract dimension of human life such as curiosity, courage, non-

judgemental thinking, artistic inspirations, and more. These are some of the desires and values that shape each of the creative tools and that's why the need for these tools keeps recurring, because of the value and desire that they contain. I keep practicing a tool until the deciding line between if I'm reacting to a situation or using a tool becomes very thin.

This might take years to accomplish.”

Atlas Foundations-as-Principles and ES Ecologies. Previously I have described various logics that produce monocultures found in Northern epistemologies. ES instead creates ecologies, which is meant in this sense to be a normative concept. These are ecologies that advocate for interdependency and the diversity that it creates, and acknowledge that respecting diversity involves inclusive, intercultural processes of seeing, understanding, seeing, and deciding.⁴¹ I consider the foundations-as-principles in relation to three ecologies below: temporalities, recognition, and knowledges.

The ecology of temporalities confronts the logic of the monoculture of linear time. One dimension of this monoculture is its conception of the relationship between the past and the present. The past is relegated to the past, the present the present, people live in present time. The idea that “a given person [...] is a temporal palimpsest” comprised of many different forms of time is excluded from the monoculture of linear time (Santos 2014, 176). Our memories are bridges between modes of time. When I remember moments in my childhood and imagine how they persist today, I reveal the presence of a cyclical time. The cycle may consist of actions or forms of thinking. In either case, their

⁴¹ See (Santos 2014: 175) for a more detailed description of the normativity of the ecologies against the waste of experience (that is, against the logics of monocultures).

evolution over time does not necessarily indicate any significant change, even if they appear different. It may be a shift in form, for example from physical to symbolic along the lines that Bourdieu described in terms of how modes of domination operate and persist through time (1994, 186).

This form of cyclical time is not the same as the cyclical time of seasons or natural rhythms. But I see it as a form of cyclical time that serves at least two functions. First, it can disrupt one's impression that the present and future are both inevitable and predetermined by bringing the past into the present and use it to act in surprising ways. These ways may be to reduce one's own abyssal thinking or to promote practices that resist it. Second, for the person who thinks in terms of linear time, the introduction of a new conception of time is a movement from singular to plural. It allows for multiplicity. When this person notices two conceptions of time, they can practice putting them on a horizontal spectrum and ask questions and make distinctions. This is about what they discovered (a particular conception of cyclical time), but also helps them practice acknowledging diversity and the limits of their own knowledge. It can be a form of practice that supports a larger process of seeking out the temporalities of other cultures (ibid, 177).

Horizontal thinking also supports the ecology of recognition, which confronts the logic of social classification. Horizontal thinking involves making distinctions without using the logics of dichotomies and hierarchies. When horizontal thinking becomes a practice, it helps us see that there are many ways to make distinctions. For example, someone can make distinctions between their identities and social categories to better

understand the role their intersectionality plays in particular abyssal and nonabyssal exclusions. This can help individuals and groups decide where to put their efforts in resisting oppression. Using the same example, someone can distinguish between their identities and social categories to understand how they yield privileges so that they can use them to dismantle the sociabilities that create them. Either of these procedures involve suspending judgement long enough to be able to do the work—the judgement that comes from having internalized the logic of the oppressor.

The ecology of knowledges can become populated only when we see our own knowledge as a system of understandings and ignorances. Recognizing the limits of one's knowledge is a recognition of ignorance and could lead one to seek dialogue with people and cultures with other knowledges. But when knowledge is not seen as a system of known and unknown, knowable and unknowable, it becomes a monoculture of knowledge. When that happens, admitting ignorance does not lead one to consider forgetting, unlearning, or ignoring the knowledge they have (ibid, 188). Instead, it contributes to the search for perfectionism in white supremacy culture, either by coopting or consuming other knowledges or by ignoring/producing as nonexistent the problems that defined the limits in the first place. A view of life-as-practice and practice-as-imperfect can encourage us to see ordinary moments as testable and editable without seeking perfectionism or even comprehensiveness. This is more likely to happen when we have named our knowledge systems and practice suspending them in order to ask what the other ways of understanding are.

One final note about a dimension of ES that cuts across these three ecologies: valorizing subjectivities. Procedures that valorize subjectivities are those legitimizing the knowledges and practices that, however irrelevant they may seem from the perspective of ‘conventional wisdom’ created by abyssal thinking, have been or can be used to reduce the suffering caused by the problematic dimensions of western modernity. Each of the foundations-as-principles can be an expression of valorization along these lines. In particular, as we partner mind and body, body and imagination, imagination and memory, we center subjective knowledge-through-experience in our practices. This happens, as Farzaneh described, when we become “aware of subjective creativity, and turn it into objective processes that could be built into one’s personality.”

Creative Tools

Elizabeth: “We're creating all the time, so I think that part of part of what creative tools is, is being aware of the process and what we're doing to do what we do. You might have heard Liz talk about how intuition is just really fast work. Right. And so sometimes in order to figure out our tools, we just need to slow down our intuitive choices to be able to see them. And I think in that process, we then allow ourselves choice, we allow ourselves choice and to be choosing more often.”

The Atlas of Creative tools contains... creative tools! Creative tools are ways of working. They are processes. Each has a structure that can be tried as it is. **Sumana:** “Coming to the Atlas, that seemed to give me more structure. It was very explicitly a

method. Each tool has a method. And so it was easy, or easier, to follow that and see where it takes me.”

People modify the creative tools all the time. This is encouraged. It is one of the many ways new tools are created. We also encourage people to first try tools in the way that someone teaches them. That is because we sometimes want to modify a tool to help us in a particular way or fit a certain context. But sometimes we change a tool to avoid the resistance or discomfort that arises when we are asked to think or act differently than we usually do. **Sumana:** “In teaching the tools, I think that the most difficult thing was telling people there is a definite method. Let's follow that first, and that's how we will know how we want to use it or change it or whatever. But I felt like knowing the fundamentals, knowing the fundamental method of the tool was also important. Before you start making your adjustments.”

Even when we use someone else's tool without changing it, and it seems like we are repeating what we learned, the tool becomes personalized. **Elizabeth:** “Sometimes there's a real pleasure in that, right? Give me the 5-6-7-8. Tell me those steps. I just want to do exactly what I'm told and that my job in this moment is to just do that. And you know what? There's a there's a beauty in that. But even when I'm doing 5-6-7-8 and I'm doing *your* thing, if I'm aware of my experience in that, there's choice in that. Because even if I'm doing the 5-6-7-8, in the way that you are bringing it, I'm still bringing my body. I'm still bringing all of my experiences. No two people can experience the 5-6-7-8 the same way, right? I am having to make choices about the execution of it. So, I am in dialog all the time, whether it's internal or external.”

We do not always experience or express the mind and body as one. The creative tools deliberately partner the mind and body because their roots are in dance and choreographic thinking. Their branches extend in order to translate those knowledges across physical and epistemic boundaries. **Liz:** “I am interested in what dancers have to learn from people who have been in motion for over sixty years; in how much dancers know and how little we share it with the rest of the world; in how much dancers know and how little the rest of the world knows we know it.”⁴²

When we use creative tools guided by the horizontal and toolbox mentalities, the process always involves doing and reflecting. Doing is not limited to the body, nor reflecting in the mind. Both contribute to each. **Elizabeth:** “It's so simple. It's not changing the world, but it's noticing our experience to be able to find the tools that allow that to be possible, to then be able to make choices around it. I believe it's so grounded in the body. It's so grounded in our physicality, in the knowledge that our body gives us. I don't feel like, in our constructs of our world, we take the time to notice. And we I feel like everything is grounded in our bodies—on a molecular cellular level—it's all our bodies.”

If we do not notice the knowledge that our body gives us, why? It may be because of the ways masculinity is constructed in western modernity. **Brian:** I was struggling in the class with letting myself go, especially with movement tools like *movement metaphor* and *equivalence*. There is this added element of insecurity. And for me, growing up in a very masculine culture and household, I definitely hit some barriers with the movement

⁴² Excerpt from the Artist's statement used in Dance Exchange Press kit in the early 1990s

because it felt very feminine or just abnormal, it felt weird. And there was part of me that wanted to push against that. This is dumb. This is stupid.”

Sometimes we *do* know that our bodies are homes to knowledge—especially cultural knowledge—but we have to fight so that they can be part of the institutions, the societies, we are a part of. **Ruby:** “I wanted to challenge from the beginning, I wanted to challenge what it meant to learn dance. I want to challenge what it meant in America and our way, our colonized ways of thinking, of making stuff, and how it is that we become proficient in something.”

And sometimes. Sometimes the patriarchal, colonial histories that complicate embodied cultural knowledge make them problematic. **Sumana:** “There's nothing in Bharatanatyam text that says you cannot lift your leg up like that. It's something that's been passed down maybe over the last 500 years. Maybe it was a man who made up that rule because he couldn't control himself when he saw a woman's leg up—I don't know! But that's not there in our texts. That is going back to the fundamentals and discovering what really was said. And then even as Indians, we're reading the translations that were done by European Indologists, and subsequently by Indians who are trained by European education systems.”

Sometimes we want to keep whole traditions, or parts of them. Sometimes we do not. In any case, when one trains for years to internalize tradition, it is difficult to make room for alternatives. The creative tools are not intended to replace what we have. They can be used that way if we choose. At their core, the tools help us to better know ourselves and our roots. **Sumana:** “We are very big on rhythm. We're very big on

melody. We could do just rhythm or we could do just melody, but we had to have something, or we had to have some meaning that we're pursuing. And a lot of the creative tools were like, no, you don't need rhythm, just create something in 30 seconds. And I was like, that's just not something we do. Sorry. It was really difficult for me because I had to let go of some of the tenets of my dance. If I have a seven-beat rhythm, I can do so many different things with my arms and my feet. But now I'm being told, no, we don't use rhythm or music. So now I have a different structure, like *beginning, middle and end*, or thinking how the word 'cat' feels in your body. Or maybe it's the letter C and the letter A and the letter T. I was learning that there are other structures that might work for me. I guess it was just changing my mentality about what structure is. But the idea of tools being inherently decolonial, that's how I took it.”

Some of the creative tools that begin with embodiment practices are *ask a question, annotation, action grids, coping and resilience, delayed mirror, detail, equivalents, essence, movement metaphor, mutual coaching, postcards, read the wall, scripting an emotion, scripting gestures, spontaneous gesture, and walk and talk.*

Other tools ask us to center the ways we think, pay attention, and make meaning. **Melissa:** “Creative tools are ways to open up the space, think more divergently about things. They are ways to create new ideas, new meaning, new ways of thinking about things: new representations of things that open up the ‘problem-solution’ space.” These tools can be disruptors. **Brian:** “I just get stuck in this loop in my head. How do I get myself out of this type of thinking? I think the tools are a way to stop. And instead of relying on my brain or my mind to sort of think my way out of this situation, it was like I

have these other ways of switching my brain to a different side, or of using my body, that really helped.”

Some of the creative tools that emphasize noticing with our different senses and investigate how we think and attribute meaning include *abstract/literal*, *big story little story*, *bottle as structure*, *the critical response process*, *framing big and small*, *image scramble*, *listening palettes*, *observing with and without reason*, *perpetual prompt*, *pits and paths* scripting an image, *theme and variation*, *thinking grids*, *worry thought question*, and *5-4-3-2-1*.

These are the tools that I encountered and that have been recorded in various places. There are many others that people shared with me but were unnamed, or whose names I have forgotten. There are still others that people have mentioned in passing but that I have never used. And I know there are countless tools created by people who have encountered the many branches of the Atlas throughout its history, some forgotten and some still used today.

A written dissertation is not conducive to sharing these creative tools. Still, I have endeavored to use a few in order to illustrate their capacity to adapt and my capacity to translate them. There are some digital spaces you can visit to learn and try some of the tools.⁴³ As of this writing, we are in the process of building something more comprehensive. Because the Atlas is collective knowledge, it will take time and care, and no one can predict its configuration or how it will evolve.

⁴³ For example, <https://www.atlasofcreativetools.com>; please contact me if you would like to explore further.

Ingredients and Procedures

For me, one of the more interesting discoveries of this research came from developing two themes: ingredients and procedures of creative tools. What I find interesting is how thematic analysis was simultaneously useful and inadequate for understanding them. On one hand, was useful in that a number of common themes and subthemes emerged across many descriptions of different kinds of activities. This helped me organize what has often felt like a tremendously complex web. When these activities are rooted in dance and movement, ingredients and procedures can be seen as part of the foundation of choreographic thinking tools (e.g., DeLahunta, Clarke, and Barnard 2012). On the other hand, ingredients, procedures, or even some tools cannot be strictly designated as such. The relationships between them are also not fixed.

Although I am using the word ‘ingredients’ to describe this collection, it could have other names, for example: components, elements, features, qualities, characteristics, processes, interactions, modes. These first five (components, elements, etc.) designate an ingredient as a part of a whole. For example, the tool (whole) *essence* involves the ingredient essentializing (part). The last three (from processes onward) designate the essential nature of ingredients as themselves separate from a whole. Switching is a part how one uses the tool *Big Story Little Story*, but switching also can be done without any reference to the tool. In that case, it can simply be used on its own, or it may itself become a tool (a whole) comprised of other ingredients. Tools themselves can be thought

of as wholes, but they too can be (and nearly always are) part of larger processes that take place over time. Ingredients are listed alphabetically in Table 8.

Table 8. Ingredients (of Creative Tools) in the Atlas

abstracting	disrupting	juxtaposing	repetition
adopting	distinguishing	literal	rigidity
annotating	emphasizing	making permeable	sequence
arranging	essentializing	metaphor	shape
ascribing	exaggerating	momentum	suspending
asking	excluding	moving	switching
assembling	filtering	naming	thinking
break things down	flexibility	orienting	timing
centering	imagining	peripheralizing	unmoving
choosing	including	rearranging	waiting
circumscribing	interpreting	reflecting	
detail	interrupting	remembering	

Procedures are the ‘activity-contexts’, or modes, in which tools are used. For example, <exploring/discovering> is a procedure, and when I use the tool *Walk and Talk* with this procedure, I engage in **divergent thinking**⁴⁴ to populate, explore what comes

⁴⁴ **Glossary:** Divergent thinking involves generating or creating ideas expansively, perhaps in non-linear ways.

up, and look for connections to the questions or topics I am working with. Alternatively, I can use *Walk and Talk* in a <editing/refining> procedural way to **converge**⁴⁵ on one idea among many. Procedures are not the same thing as settings, which is the particular time-place and context in which someone uses a tool. Work is a setting. Monday evening after dinner, standing in the kitchen with my arms crossed talking with my partner while trying to formulate a question in a more neutral way is a setting. Procedures are listed alphabetically in Table 9.

Table 9. Procedures (of Creative Tools) in the Atlas

assessing/taking stock of	generating/producing
blending/mixing/combining	harmonizing/synergizing
bridging/translating	interrupting/disrupting
comparing/contrasting	maintaining/providing consistency
developing/evolving	reflecting/introspecting
editing/refining	responding/reacting
exploring/discovering	separating/disconnecting
fixing/repairing/restoring	testing/trying

A few more notes about procedures. There are slashes between words because of the difficulty of combining/synthesizing codes, and to guard against dogmatically

⁴⁵ **Glossary:** Convergent thinking involves focusing on, limiting one's options through processes like choosing or editing.

interpreting single words in one way. Additionally, my categorization of these as ‘procedures’ reflects the ways that people would describe how they used creative tools in general terms. Melissa’s work as a teacher educator shows an example of this: “I actually did a gesture interview with the teachers about what it means to them to be a teacher. It was just really interesting to see what that brought out that I wouldn't have gotten if I just asked them a question. I was just exploring with them and highlighting just to see overall what it means to be a teacher.” This is different from the specific settings in which she used *Scripting Gestures*, which involved interviews with a group of four teachers.

Finally, procedures can also be thought about as the spirit in which someone uses a tool. This includes using tools in value-laden ways. For example, the procedure <interrupting/disrupting> can shape how a particular tool is used to identify and work with problematic colonial legacies. Xanthia describes this at Rising Youth Theatre: “CRP is a tool that we frequently point towards making sure there's a space where we get to name things and be in dialogue. We do a lot of CRPs about organizational, white supremacist culture.” When procedures are understood in this way, they can be moral guides for how we use tools given broader social contexts.

Earlier I mentioned that what I describe as ingredients, procedures, and tools cannot be strictly defined by these categories, and that the relationships between them vary. Here’s one way of thinking about it. A horizontal mentality is an ethical stance that values multiple perspectives, naming one’s own position along a spectrum, and thinking in details rather than dichotomies. A toolbox mentality a practical way of hiking the horizontal, in other words, doing horizontal thinking. What makes the toolbox mentality

practical is the presence of many tools, which through regular practice become more familiar. Familiarity leads to a more nuanced understanding of a tool.

You can use that nuanced understanding in many ways. One way is to be able to enter and exit tools more smoothly, and to switch between them. You can switch between them when you notice that something stopped working or that something else might be more appropriate. Many of the Atlas practitioners I know use their nuanced understanding of tools in this way, similar to seamlessly shifting between gears using the clutch in a manual-transmission car. A few extraordinary practitioners have such a depth of practice that they shift without the clutch, their bodies attuned to feel the particular vibration the car makes at precisely the RPM needed for the gears to mesh smoothly.

Another way you can use a nuanced understanding of the Atlas is to see more and more of the ingredients/elements/processes/etcetera involved in using a tool. As each becomes visible, it is as if a new dimension of the tool is revealed. Now that dimension can be emphasized, which might lead you to create a variation. The variation might make the tool better suited for a situation, or more respectful of a context. This might come about because an ingredient of a tool is problematized, which can happen by sharing it with others who point out its underlying assumptions. A good example of this is the work that many CRP practitioners are doing to address the problematic assumptions built into some aspects of CRP, such as whether questions can be neutral, whether the process prepares participants—especially women—to withhold consent, and the idea that people have enough self-worth and self-confidence to put forward their works-in-progress as artists or share their perspectives as responders.

Yet another way to use your practice → familiarity → nuanced understanding is to recategorize and then reconfigure aspects of the Atlas. Here is an example from my own practice. I described <Exploring/discovering> as a procedure. It's a mode of using a tool. What if instead I categorize it as an ingredient? When I do this, I can ask myself, what regular, familiar ways of working/being (tools) do I do that involve the ingredient exploration? I actually asked myself this question at a time when I was reading some decolonial perspectives that problematized exploration as one of the root metaphors of western modernity. I created a *Thinking Grid* to bring together aspects of exploration with moments in my daily life. Along one axis I broke down exploration into several parts, including traveling, observing, mapping, discovering, and the unknown. Along the other axis I wrote a sequence of a typical working day for me: waking up, stretching, making coffee, meditation, walking/bussing to work, working, eating, dancing with Silvia, and so on.

I populated the grid squares and then filtered them for problematic exploration. Up to that point I hadn't thought of objectifying someone sexually as an unconsented exploration of their body. I hadn't realized how much I had learned about Norwegian culture through the contrasts I saw when I first moved to Tromsø, and how I had forgotten much of it as it became normal for me. These awareness eventually led to some of my own tools for decolonization centered around exploration: *Carry In, Carry Out, Leave Out, Leave In; Limits to Going; Being a Tourist in your own Culture; and Body Maps*.⁴⁶

⁴⁶ Contact me if you want to explore these tools further.

Throughout this process, exploration went from being a <procedure>, to an ingredient of other tools, to how I structured my own tools and organized them thematically within a broader a neighborhood of decolonial tools. This work involved theories and ideas of others, but applied in my own contexts and particular struggles. Now I have translated that process into academic scholarship, hopefully contributing to postabyssal social science. All this was possible because of practice, which yielded nuanced understanding and a nimbleness that is both a “helpmate to hiking the horizontal, and also an outcome from moving along it” (Lerman 2011, xvi).

The Critical Response Process

Rather than concluding this chapter with an adaptation of CRP as in Chapters 1-3, I instead provide some details about its origins and uses.

Of all the tools in the Atlas, CRP is perhaps the most visible. Its visibility comes from at least two sources. First, it has had a similar structure for more than 30 years (Borstel 2017a). In its most formal mode, CRP has certain values/principles, particular roles for participants, steps with deliberate instructions, and a sequence for doing them. This is what I mean by structure. The second source of its visibility comes from how widely it has been used during those 30 years. By widely I mean both geographically and in a variety of contexts. Here is a small sample to give you an impression:

- With Alternate ROOTS, an artist organization in the American South working toward social and economic justice, which was one of the original pilot sites of CRP and has influenced its evolution through more than 30 years of sustained practice. (Borstel 2017b)
- At Rising Youth Theatre, a Phoenix-based non-profit committed to “youth-driven, multigenerational collaboration on justice-centered artistic process and performance”⁴⁷ using CRP as an organization-wide protocol for communication geared toward creating horizontal power structures
- At the Guild Hall School of Music & Drama in London, England used CRP in a strategic initiative to improve double-loop learning and “empower students to explore their own creative and professional voice”⁴⁸
- In formal assessment, for example at New York City Department of Education as part of a collaboration with University of Albany Professor Heidi Andrade where CRP was adopted for formative assessment in arts classrooms. Also see Lekelia Jenkins adaption of CRP in STEM education for formative assessment in seminar courses (Jenkins 2020)
- At Marymount University, where Carroll Hauptle has adopted CRP for use in first-year college writing classes to enhance peer-review (Hauptle 2006)

⁴⁷ See <https://risingyouththeatre.org/mission-and-core-values> and Chapter 5.

⁴⁸ See <https://www.advance-he.ac.uk/knowledge-hub/guildhall-school-music-drama-empowering-artists-future-through-transformational>

- In Leeds in the UK, CRP was used as the underlying structure for an online platform meant to democratize artistic engagement with audiences (Walmsley 2016)
- At Bowdoin College in Maine, where Director of Writing and Rhetoric Meredith McCarroll used CRP as a basis for improving the writer/tutor relationship in the writing center (McCarroll 2019)
- At Griffith University in Queensland, Australia, where CRP has been used as a method for preparing music teachers with lifelong learning abilities (Carrey and Coutts 2019)
- In the University Design Initiative at Arizona State University, where Phil Stoesz uses CRP as one of his core facilitation methods in his capacity as Design Expert and Facilitator⁴⁹

CRP has been described as a tool (Lerman 2014), a method (Lerman and Borstel 2008), and more broadly as a protocol for communication. A basic and common description of CRP is that it is a way of giving and receiving feedback about a work-in-progress that values personal perspectives and experiences throughout the process. The structure of CRP is what shifts the focus between the perspectives of the different people involved. At its roots are several values/principles, including multiplicity, asking questions, being practical, and consent. **Phil:** “I’ve chosen four things that CRP does that

⁴⁹ <https://udi.asu.edu>

are the most important for me. And I've repeated them for a long time. They are curiosity, specificity, rigor, and care.”

All of us are constantly giving and receiving feedback. It happens casually, through a nod and a smile or a comment that expresses a judgement or opinion. There are also formal processes for giving and receiving feedback, like performance evaluations, academic assessments, rites of assentation, critiques, program reviews, parole boards, and the opinion column in the newspaper. **Phil:** “No matter where you work, no matter where you are, no matter your community, you have a culture of feedback. There is a culture. It could be one that's unintentional. It could be one that is very faint. It could be one that is overtly destructive. It could be one that is utterly destructive. It could be one that is beautifully generative. It could be based on personal relationships rather than power level. It could be raised totally on power and nothing about personal connection. But when CRP enters into spaces, it's entering into a culture of feedback that's already been developed. It's always doing that.”

Sometimes we are prepared for the feedback we receive. This can happen when we seek it out by asking a question, or when we willingly participate in some formal critique process familiar to us. I think that much of time we are surprised or unprepared for the feedback we receive. Unsolicited feedback is common, and even in formal processes, people behave in ways that are outside the norms. Sometimes it is the culture of feedback itself that is designed to create discomfort or intimidate.

Liz Lerman invented CRP in the early 1990s. At that time, it was a structural response to the uneasiness and intimidation Liz felt during critiques in the art-making

circles she was a part of. Sometimes she found herself on the receiving end of feedback sessions that were “brutal and frequently unhelpful” (Lerman 1993). Other times she was asked to provide feedback in residencies about dancers’ work without knowing anything about the actual people creating the dances—their ideas, motivations, cultural backgrounds, or lived experiences. It was as though the artform itself was the sole object of critique, with the subjectivity of the person creating it at best an impediment to some external standard, and at worst a replaceable body that merely delivers the artform.

CRP was initially created because of a toxic culture of feedback in choreography and performance art. But you do not need to be familiar with these fields to recognize the decentering of human beings that is at the center of many cultures of feedback. One of the greatest things Marty Anderies ever said to me was, “Most institutions make it difficult to be human.” CRP is a way of giving and receiving constructive feedback that centers human experience and, through its structure, helps people cross the barriers that typically separate systems of knowledge. The evolution of CRP over the past 30 years has been along these lines.

I mentioned that the formal mode of CRP has had a durable, recognizable structure. CRP originally had three roles and six steps when Liz began developing it at the Dance Exchange and piloting it at the Colorado Dance Festival and Alternate ROOTS. The three roles have remained relatively unchanged. There is a facilitator (or sometimes co-facilitators) who is tasked with, among other things, explaining, maintaining, and moving people through the process. There is an artist(s), or creator(s), whose work is the subject of feedback. One of the preconditions of this work is that it is a

work-in-progress, and that they are “prepared to question the work in a dialogue with other people” (Lerman and Borstel 2008). The third role is that of the observers/responders. The spirit of being a responder is committed to “supporting the artist's intent to make excellent work” (ibid). This does not mean avoiding conflict or filtering out opinions. When we have deeply held judgements about the work (or perhaps even the artist), the notion of supporting another person’s excellence “is not always achievable, but worth working towards” (Lerman 1993).

Over time, the six steps consolidated into four.⁵⁰ With the exception of some nuances, the first four steps have remained largely unchanged. In brief, they are: Step 1) Statements of Meaning; Step 2) Artist(s) ask Questions; Step 3) Responder(s) ask Questions; Step 4) Permissioned Opinions.⁵¹ Steps 5 and 6, originally named ‘The Subject Matter’ and ‘Working on the Work’, were often grouped together into an amorphous group of “more steps” that were either implied or not always prioritized compared with the first four (Williams 2002, 96). By 2003, CRP had undergone some refinement through workshops and conversations, and a comprehensive and fully illustrated 62-page guide was published by the Dance Exchange.

CRP can also be broken down into smaller parts—especially the principles and steps—which can each be used on their own. People have created many informal variations of CRP along these lines. **Helena:** “It is Liz’s generosity in saying, just try. Just try. Just do it. Don’t feel worried, give it a try. She’s not precious about it, and I

⁵⁰ An early formulation of the six steps can be found in (Lerman 1993).

⁵¹ For detailed descriptions of each step, see (Lerman and Borstel 2003).

think that is important.” Because so many people have used CRP in so many contexts and with different variations and emphasis, there is a lot of writing and video describing the work. For a recent and nuanced view of CRP from the perspective of many practitioners, I recommend *Critique is Creative* (Lerman and Borstel 2022).

Onward⁵²

I believe that, through our actions and inaction—merely by virtue of our existence—we are always creating, impacting, affecting. With every breath and footfall, with each beat of our hearts or our wings, through our instincts and intentions and also without knowing, we leave our trace and thereby adjust the future balance of probabilities ever so slightly according to our particularities. This is vibrant subjectivity. It is Thích Nhất Hạnh’s *interbeing*. We are always creating. The Atlas encourages us to go about this purposefully and through partnerships. It asks us to develop practices so that we can know, as deeply and in as many ways as we can, the how and what and why we create, and to determine from within and alongside others whether we should. To determine, as best we can, if it is alright for us and for them.

One finding of this research about the Atlas is that many of its roots and uses are in the context of struggles. Its earliest principles and practices emerged from at three distinct struggles in the United States: the civil rights movement, agism in dance-making, and the toxic feedback culture in the arts. As the community of people using the Atlas

⁵² This language is an homage to one of the simple ways Liz expresses her ongoing commitment to the work.

grows more culturally diverse, the creative tools are being used in the context of different struggles.

Here are some current or recent applications of the Atlas: to create horizontal power structures in a multi-generational, anti-racist non-profit theatre organization; by Bharatanatyam dancers working with survivors of sexual abuse to help tell their stories; by sustainability educators to create decolonial and indigenous learning experiences; to bring somatic practices together with qualitative research methods for a better understanding of teachers' identities; to create process-driven choreography that draws on Mexican Cumbia to challenge canonized notions of acceptable teachers and dance forms in the United States; to provide a more inclusive culture of feedback for visual arts students in formal education; and to conduct interdisciplinary research about global biodiversity loss among artists and scientists.

At the end of Chapter 3, I proposed four modes of creativity well suited for post-normal sustainability science that advances cognitive justice. They are: 1) those that integrate the mind and body; 2) those that draw on personal experiences by valorizing contexts and subjectivities; 3) those that recoup wasted experiences; and 4) those that are actionable, and can contribute to procedures of intercultural translation. I hope that throughout this chapter I have demonstrated the Atlas's relationship to the first two. In the next chapter, I will emphasize the last two by sharing the stories of how two people, Xanthia and Ruby, use the Atlas in their lives and work.

Chapter 5 – Two Applications of the Atlas

This chapter contains two stories about how two Atlas practitioners, Xanthia and Ruby, think about and use the Atlas in their respective communities and fields of work. I wrote the stories based on what practitioners shared with me in interviews. Each story is joined by three analyses. The first analysis examines the role that the Atlas plays in the production of knowledges used to resist the oppressive aspects of western modernity. This is written in the story itself. The second is a reflexive analysis for the Atlas, and answers the question: What can we learn about the Atlas from how practitioners describe and use its principles and practices? The third analysis is about how the different stories can inform post-normal approaches to sustainability science that support cognitive justice.

How to Use This Chapter

I have written this chapter in a way that encourages you to make connections between the practitioner's experiences and your own life and work. My goal is for you to explore and be surprised. I also want you to find this chapter useful. It is likely that if you are reading this, your work involves some combination of sustainability science, epistemic justice, or using the Atlas of Creative Tools and/or CRP. As you read, I want you to imagine how the knowledges shared through the stories of the practitioners can translate into your own contexts. This kind of imagining is something that I think people

do all the time and without conscious effort. In the Atlas, some of us call this ‘personalizing data’.

Here is one way you can actually see *how* you personalize data. I’ll tell you a short story, and all you have to do is pay attention to the pictures that form in your mind as you read it (thank you Liz for this effective approach, and for my mom and the farmers who made this story so memorable). I grew up in a little village, and every autumn my mom would bring me to a farm. We would walk down the gravel path from the small parking lot, past the horses in their pasture and toward the pumpkin patch. Together we picked out pumpkins for baking and for carving, along with some colorful gourds for decorating the sukkah after Yom Kippur. When I was little, I carried the gourds and pie pumpkins, but as I grew older my mom and I switched, and I carried the large carving pumpkins.

Take a moment to revisit your pictures. Who was in them? Were there cars in the parking lot? What did the farm look like, the pumpkin patch? What color were the horses? You didn’t see the Siever’s Farm along Goldfoot Road on the outskirts of the little village of Round Lake in Upstate New York. You saw some other farm and pumpkin patch, some other horses. You saw your own sukkah, not mine, which was nestled on the porch between the house and a large oak tree in the back yard. The farm pictures in your mind came from memories of your own experience on a farm. Maybe they came from something you read or heard. If you have never been to a farm, or don’t know what a sukkah is, you might have simply made something up. Even that imagination comes from your experiences. This is one of the ways we personalize

data/stories/information. We do it without conscious effort. But we can also be more deliberate about it. Many of the tools in the Atlas are well-suited for this sort of work.

If I was with you right now, I would recommend using the tools *Postcards* and *Thinking Grids* as you read this chapter. They are creative tools that can help you notice details in the pictures that form in your mind as you hear/read someone else's story. If I thought movement practices might get in your way of trying the tool, I would suggest *Thinking Grids*, which I would facilitate more actively to help you create axes for your thinking grid that orient it toward personalizing the story. If you were comfortable of curious about using movement, *Postcards* would be a more direct way to get at this. Conveniently, both of these tools are (at least at the time of this writing) available for you to learn so that you can use them as you read this chapter.⁵³ Try them out for yourself before you begin. If you do want some tips or guidance, you can reach out to me using the contact information I included in the preface.

You may find that some of the Atlas practitioners' stories or my analyses do not apply to your contexts or would be inappropriate to integrate. I still encourage paying attention to how you personalize them. This leaves open the possibility that you will be surprised. Beyond this, I do not insist that what is shared in this chapter will be helpful or relevant for you. If you find that to be the case, I hope you do not take it as proof that the broader knowledges and practices contained in the Atlas are equally irrelevant. There are many applications of the Atlas that I do not share in this dissertation.

⁵³ See the cards at <https://www.atlasofcreativetools.com>, which is a small digital installation of the Atlas that I created in 2022 for an exhibition of Liz Lerman and Brett Cook's work at the Yerba Buena Center for the Arts in San Francisco: <https://ybca.org/event/brett-cook-liz-lerman-reflection-and-action/>

Atlas Application 1: CRP as a ‘Way of Being’ in Rising Youth Theatre

Many stories about Rising Youth can be told. This story is about how Critical Response Process (CRP), which is part of the Atlas, interfaces with Rising Youth. Although formal CRP is designed for sharing feedback on works-in-progress, Rising Youth has also adapted it as a tool for power sharing across the organization. Centering youth in leadership and decision-making positions requires ways of working that “de-centers Whiteness and Eurocentric leadership practices”.⁵⁴ The principles and structure of CRP enabled it to be used toward these ends, but it was Rising Youth’s integration of CRP into their organizational culture that made it a part of how they collaborate on a daily basis. I am able to share this story thanks to Xanthia Walker having shared her perspective as a long-time collaborator (a co-founder in fact) with Rising Youth.

Rising Youth Theatre (Rising Youth) is a non-profit “youth leadership organization working at the intersection of art and social justice” in Phoenix, Arizona.⁵⁵ It is a multigenerational ensemble that for twelve years has engaged in community spaces throughout the valley. Making theatre is a central focus of Rising Youth. They create productions in parks and on stages, with juvenile corrections and at schools. One of their longest programs is Light Rail Plays, which take place on platforms and the trains that crisscross the metro area. In addition to their theatre work, they run children’s summer camps filled with play, creativity, and acting. They offer classes for dance, film, and

⁵⁴ From Rising Youth Theatre’s Statement of Justice, Equity, & Inclusivity: <https://risingyouththeatre.org/equity-statement>

⁵⁵ Thank you to the authors of the text on various pages of their website: <https://risingyouththeatre.org>

theatre classes to children and adults. They also collaborate with schools through a residency program based on social-emotional learning and with workshops designed to strengthen student-teacher relationships with the hope of reducing **pushout**⁵⁶ rates.

Within the organization itself, “artists of all ages work in a shared learning, creative youth development model” to develop rigorously researched and produced plays about topics that members care about and are socially relevant. Some of the repeating threads are race, the US-Mexico border, mental health, and student success. Young people work in a variety of roles across Rising Youth, including as staff members and on the board.

Xanthia Walker and Sarah Sullivan are co-founders of Rising Youth. They met in the final years of their MFA (Master of Fine Arts) at Arizona State University. Each had their own experiences as community-engaged artists working with young people. Together they held some shared values: centering youth leadership, theatre based in communities, multigenerational collaboration, and a commitment to horizontal power structures so that the work could be youth driven. They created Rising Youth with the hope of institutionalizing those values to provide sustained opportunities for youth.

Most institutions employ hierarchies based on seniority or expertise. This makes them a difficult setting for distributing power, decision-making, and access to opportunities offered by the organization. Xanthia and Sarah faced challenges from the very beginning. One of the earliest came from writing the first version of their mission

⁵⁶ **Glossary:** The term ‘pushout rates’ is used rather than ‘dropout rates’ to emphasize the institutional, structural reasons that students often drop out, rather than attributing them to some deficiency of the student and then labeling them as a ‘dropout’.

statement, which was: “To create youth driven theatre that is riveting and relevant, challenging audiences to hear new stories, start conversations and participate in their communities”⁵⁷

Reflecting back on that choice, Xanthia recognizes the hypocrisy involved in “two adults creating an institutional container into which youth would be invited to lead”. Youth were not part of the process of creating the initial norms for the institution intended to give them agency. Although many of the sentiments from that original mission statement are still part of Rising Youth, Xanthia *describes the way the statement was created* as a “harm”. It is one of many she has recognized in her ongoing work of finding within herself aspects of white supremacy in order to unlearn them. Paternalism is one of the characteristics of white supremacy (thank you Tema Okun). As a social arrangement, institutions inherently hold paternalistic qualities, sometimes despite the intentions of their creators. They are designed to produce knowledge and practices according to their rules, norms, and traditions. That typically gives the people who establish an institution (and the initial structure of the institution itself) more power than those who join after its creation. This is akin to the power to set the agenda (Lukes 2005). When we spoke, Xanthia described the contradiction she saw in writing a mission statement that prescribed the ways youth could drive their youth-driven theatre.

Xanthia and Sarah were looking for these kinds of contradictions. They knew that creating methods and structures for power-sharing within an institution, even a non-profit, would be difficult. They have tried several strategies. One structural choice was to

⁵⁷ April 2012, <https://web.archive.org/web/20120413132128/http://risingyouththeatre.org/>

set aside traditional titles in favor of “Collaborators” that have different focuses and responsibilities.⁵⁸ While decision allowed for many more voices to be part of decision-making processes, it also highlighted the importance that communication would play in their work. Xanthia often refers to the work happening at Rising Youth as worked that is “rooted in dialogue”. In order projects to be driven by what youth found important at the time, Rising Youth needed protocols for communicating that could make the organization more inclusive, flexible, and responsive to what was happening socially.

Some of the earlier members of Rising Youth were already familiar with the Critical Response Process, having encountered it in practice or through the published workbook. At first, CRP was not known by everyone in the organization, and its use was more intermittent than systemic. When Liz Lerman accepted a position at ASU and moved to Tempe in 2016, CRP became more accessible because additional opportunities for learning and practice were created. Liz and John Borstel offered a formal course offered through ASU, and a growing community of facilitators in the Phoenix area held workshops and trainings. In 2018, nearly everyone on the staff enrolled in the CRP course offered through ASU. This point in time also happened to overlap with a new, year-long Certification Program for CRP. Two members of Rising Youth have been part of the certification program so far. in workshops and the certification program.

Through the CRP course, Rising Youth learned how to use CRP in a variety of ways. They learned how to use the formal four-step process as a method for giving and receiving feedback on particular works-in-progress. As an organization, Rising Youth has

⁵⁸ See the description on their staff page: <https://risingyouththeatre.org/staff>

written statements outlining their mission, principles, values, and explicit stances on social issues. They have overarching documents that describe their organizational structure, their roles and responsibilities, and how they make decisions. They also create many documents that grease the wheels of everyday work, like budgets, project proposals and descriptions, communications with communities and the website. Rising Youth would increasingly use the formal CRP process to review existing statements and documents and to create new ones. This can be seen as a form of power sharing that further democratizes of how the institution operates and expresses itself.

The CRP course also provided Rising Youth with nuanced variations of the process. CRP can be disaggregated so that the structure and spirit of each step can be used in settings where a formal circle (which is a shorthand name for the full process) is too clunky or time-consuming. Members of Rising Youth learned “variations for coaching, collaboration, personal reflection, and teaching/learning” the process.⁵⁹ This included ways of using informal CRP more spontaneously, while still being recognizable as versions of the processes they had learned together. They also explored what is sometimes referred to as ‘*step five*’, which is not frequently part of the formal process but can be used to shift the focus from the work-in-progress to, as Xanthia describes them, the “unspoken dynamics that people are experiencing” in a given situation.

How people interpret and experience a situation is influenced by many, many factors. If someone feels afraid, belittled, or excluded, those feelings may arise because of something benign, like a misunderstanding or a bad mood. But they can also come

⁵⁹ From the Fall 2020 course syllabus, Generative Critique: The Critical Response Process, class number 93112 in the Herberger Institute for Design and the Arts at Arizona State University.

from structural privilege and oppression that create benefits, harms, discrimination, and disadvantages depending on the circumstance. Step five in CRP is a way of normalizing that these structural dynamics and power relations are present. It can be used by anyone, in formal and informal modes of CRP, to deliberately shift the focus to from the topic/subject/content being worked on to people's context/process/experience of working on it.

As more members of Rising Youth learned CRP, they saw its capacity for helping the organization become more inclusive of and responsive to its members. Xanthia has shared how she thinks the relatively small size of Rising Youth helps aids this. It is not necessarily that fewer people leads to more agreement, although the people at Rising Youth do share its values in a general sense. Instead, Rising Youth operates using an idea of scale that expands not by emphasizing growth through physical size and numbers, but by including more of the subjectivities of the people involved. It scales in depth of experience, through relationships. The strength of people's relationships is one of the factors that helps people to continue showing up and supporting each other even when there is discomfort and disagreement.

Once nearly everyone on the staff had learned CRP together and in-depth, they decided to adopt it as a protocol for communication throughout the organization. This continues today. They have integrated CRP into as many of their ways of working as possible, including formal situations like board meetings, project meetings and rehearsals. They also use variations of CRP in the informal and ordinary moments that make up the majority of the time people share together at Rising Youth. Even with this

kind of integration of CRP, Xanthia describes how difficult the ongoing work of power-sharing and eliminating white supremacy culture is. It is not that CRP fixes these problems per se, but is a tool that enables people to work in the midst of/toward these goals with curiosity, specificity, rigor, and care.

A few things made their organizational-level integration of CRP possible. One was the decision to make learning and practicing CRP accessible not just to the leadership, but as many people involved with Rising Youth as possible. This helped the group be more aware of when the momentum from how organizations are typically arranged was outweighing their power sharing work. The details are particular to Rising Youth, but you will recognize their shapes: moments when people try to fix rather than listen, when efficiency is prioritized over inclusivity, when the strength of an opinion pushes away curiosity.

Integrating CRP was especially possible because of their common knowledge of the process. This gave the group a shared language to identify particular steps or principles of CRP that might be useful in difficult moments. The way they learned CRP was through regular practice with each other. The fact that the people were a common denominator likely made it easier to transition CRP from the context in which it was learned (a workshop-style university class) to the particularities of Rising Youth. Finally, many people have an in-depth knowledge of CRP. That means anyone can teach CRP to new people who join Rising Youth, and teaching CRP is itself a way to deepen one's understanding and practice of it.

Xanthia describes how, in both formal and informal modes of CRP, people practice “listening, noticing, and naming the depth of context that is people’s lived experiences and informs their opinions.” They practice “non-defensiveness, asking neutral questions to harvest more information, and dialogue”. Each time someone practices CRP, they get better at the skills involved not just in the context of whatever they are using it for (to create a budget or craft their Black Lives Matter statement, for example) but more generally as a person.

Xanthia describes how, over time, the principles of CRP are becoming part of the organizational culture at Rising Youth. At this point, Xanthia describes CRP as “more of a way of being” than a tool that you use and put down when you’re finished with it. The work is still challenging, to be sure. CRP helps Rising Youth to collectively articulate its core values and maintain them over time by building them into its artifacts (like statements, documents, and performances), procedures and protocols. This did not happen in predictable ways. It could not, because the processes of co-creation were determined by the ongoing work of collaboration with new youth and different community partners. Reflecting back on the original vision of Rising Youth, Xanthia described how “there is such a difference between what I thought that meant ten years ago and what it means now.”

How Rising Youth Informs the Atlas

One of the ways Rising Youth's use of CRP can inform the Atlas is for understanding bridge tools. Bridge tools are tools used in a processes of connection. They might be used to bring knowledge from one context to another, or to help two knowledges come together. Bridge tools also translate between modes of understanding or expression, such as from movement to writing, or from feelings to ideas or movement. Bridge tools can be tools developed with these procedures in mind, or it is a way of re-categorizing tools that can be used in these ways.

CRP is a set of knowledge and practices that was created and refined in the context of struggles. Its principles and procedures are marginalized in western modernity, even while they are being problematized by current practitioners using decolonial and patriarchal lenses. CRP practitioners do not see the process as final or unchangeable. As more people use it in contexts with different ways of thinking/being than those used to create CRP, tensions/contradictions are revealed. CRP exists in tension, but it is a tension that gives it stability because, rather than being rejected, they are held by that community of practitioners.

Rising Youth seems to have brought CRP into their organizational culture by using its tensions as anchors for practice. One the one hand, CRP is intrinsically well-suited for power sharing because its principles and structure promote it. It also scrutinizes the roles that consent plays while in dialogue and making decisions as a group. These

dimensions of CRP helped Rising Youth find footholds for using the process in their work, as I described above.

On the other hand, CRP developed primarily in art-making spaces where the focus was on making the feedback process as useful for the artist/creator as possible. It was not designed to be used as a tool for creating organizational structures for sharing power and decision-making between youth and adults. That meant that the particular ways that CRP interfaced with issues of power and consent at Rising Youth led either to variations of CRP or problematizing the process itself. Its principles (can) remain but take on new meaning, multiple meanings, that inform how people use it. By allowing CRP to contain contradictions and be in tension, and approaching those tensions with curiosity rather than dismissal, Rising Youth can maintain the spirit of CRP's origins-from-struggle while changing how they use it to fit their context.

Rising Youth integrates CRP with their culture in part by actively working with the tensions it contains. Because CRP is a protocol for communication, and dialogue is a foundation of Rising Youth's work, they used CRP itself to help integrate it into their organizational culture. In this case, CRP sometimes took on multiple roles. CRP-as-disrupter brought to the surface aspects of white supremacy culture built into assumptions and behaviors at Rising Youth. CRP-as-bridge tool created a container for dialogue during and after these moments. In both these cases, CRP shows its capacity for productive ambiguity, which can be described as "the ability to transform tensions that disrupt our current understandings into opportunities for personal growth" (Shipe 2019). This suggests that one of the things that makes an effective bridge tool is not only its

ability to disrupt normal patterns, but also structures the moments of disruption so that it is harder to fall back on the dominant ways of knowing/being. CRP is a complex tool with deep histories. It can also be understood as a particular combination of a number of other tools. Bridge tools (besides CRP) that are younger or have more specific scopes may benefit from partnering with other tools.

CRP was not the only bridge tool used by Rising Youth to integrate it into their organizational culture. I wonder about the moments when someone wanted to use CRP, formally or informally, but encountered resistance. It may have been resistance within themselves, the person/people they were with, or something created by the organizational structure or culture. What did this person do in that moment to be able to use CRP, or to decide that CRP was not appropriate for the situation? These are questions I did not ask Xanthia, but plan to follow up on if they are of interest to her. I suspect they are questions that should be answered from working alongside Rising Youth.

Beyond bridge tools, the way that Rising Youth learned CRP as a cohort can also inform the Atlas. One of the difficulties we face as we share the Atlas is that the skills involved in being able to use creative tools are not the same as being able to teach them to others. Content knowledge does not imply the ability to teach it. It is true that the creative tools are activities, and so being able to do them inherently involves some degree of demonstration and facilitation. But there are far more Atlas practitioners who use creative tools than have expressed confidence in their ability to teach them. Indeed, one of the difficulties experienced by some dance education students in the Atlas course is that, while they can effectively use and facilitate tools with their students, they have less

practice teaching students to develop their own tools using the horizontal and toolbox mentalities.

Both the dance education students and the Rising Youth cohort learn tools as a group. But in the context of Rising Youth's horizontal power structures and the elimination of traditional hierarchical roles, there seems to be more shared responsibility for continuously learning CRP and teaching it to new members of the organization. Folks engaged in pedagogical work with the Atlas may find that structuring workshops and classes for learning creative tools using power sharing principles from Rising Youth involves more student-driven learning, so that teaching skills become part of the way tools are learned and practiced.

Connections to Sustainability Science

Rising Youth's integration of CRP raises at least four questions for the postabyssal researcher: 1) What are the cultures of feedback in your university contexts? 2) How do I choose which areas of your work to use the Atlas; 3) How much integration is possible; and 4) What contexts influence the shape and momentum of your efforts?

I don't think one can respond to these questions without first trying CRP and the Atlas more broadly. Some folks at Rising Youth were already familiar with CRP before learning it as a group. They learned CRP together over five months before deciding to integrate it more fully into the organization. But you don't have to explore the Atlas for five months before using it in your contexts.

An Interlude About Trying the Atlas!

If you haven't used any creative tools in the Atlas, I suggest trying a few before you continue. If I have done a good job so far, you should already have some understanding of the practical mentalities and the foundations-as-principles. You can look for the ways you already express them; these might be your own tools or the beginnings of tools! You can try the Atlas by exploring some resources from the Atlas on your own, or by partnering with people already using the Atlas. Here are some tips for trying the Atlas for the first time.

First, if you choose to explore the Atlas on your own, there are some differences between the digital resources available for trying the creative tools. The digital toolbox associated with the Dance Exchange has a relatively small collection of tools, along with instructions for trying them and ideas for settings to use them in.⁶⁰ All information and instructions are in written English. Alternatively, the Atlas exhibition created for YBCA contains even fewer tools (six in total), but each has more depth in terms of guided learning and connecting it to associated Atlas principles and projects.⁶¹ Tools are presented using video with special variations so that you can follow along and try the tools as they are being shared.

⁶⁰ <http://www.d-lab.org/toolbox>

⁶¹ <http://atlasofcreativetools.com>

If you want to learn CRP in particular, the first book, *Liz Lerman's Critical Response Process* (2003), is a short, straight-forward guide for learning the roles and steps. It is enough to start using CRP right away. The recently published *Critique is Creative* (2022) is less of a manual but gives you a much deeper dive into the principles of CRP through reflections about the process over many years, as well as stories from practitioners about how they use it in different contexts. There are also several helpful video resources on the internet about CRP that you can find using a search engine.

Second, keep in mind that neither digital collection of tools is extensive. Even the Atlas course offered through ASU includes only a selection of tools. There is no real-time facilitation, nor systems for being in dialogue about your work or being able to share your tools and applications with the broader Atlas community. Additionally, we have heard that it can be more challenging to practice the practical mentalities of the Atlas (horizontal thinking and the toolbox mentality) on your own. These are the primary differences between learning on your own compared to working with someone or a group. As for CRP, it contains many nuances, especially for the role of facilitator, that can't be learned from the manual but do come with practice, especially with experienced practitioners.

Third, if you want to explore the Atlas by partnering with a practitioner, now is a good time for that. As of this writing, a growing number of practitioners are working with people who reach out. As I mentioned in Chapter 5, we are in the process of creating some systems that support this work. For now, you can reach out to Liz⁶² or myself.

⁶² <https://lizlerman.com>

There are several other people I could name here, but I have not asked whether they want to be included in this dissertation as points of contact. As I am unable to edit the document once it is uploaded to ASU's thesis and dissertation repository, I will err on the side of caution.

Finally, you can be looking for connections between the Atlas and how you imagine it interfacing with your cognitive justice work even as you explore it for the first time. For instance, most tools are structured so that you use them in relationship with some questions or topics relevant to you. People often source these questions/topics from things they care about and are working on. That means that even when you are first learning a tool, you can already be experimenting with it in relation to some dimension of your work or a particular social issue you are engaging with. For tools that involve asking questions, I suggest using some of Santos' procedures of epistemological imagination to guide your inquiry.

The First Question

Now, back to how Rising Youth can inform approaches to sustainability science that support cognitive justice. What are the cultures of feedback in your university contexts? How can you learn more about them? There are lots of ways to do this. If you ask the question and pay attention to your memories and the pictures in your mind, you have a lot of information already. You can start to notice how you feel in different situations where dialogue and feedback is prevalent. You can compare your feedback

cultures with methods used for structuring dialogue, such as CRP, non-violent communication, or story circles (e.g., Davis 2019).

The Middle Two Questions

The second and third questions (How do I choose which areas of your work to use the Atlas, and how much integration is possible?) ask us to take stock of our circles of influence, first in scope and then in how they are connected. Some areas of one's university work likely include: teaching, developing curriculum and associating curriculum with disciplines of knowledge, the character of inter/transdisciplinary research and practices, prospective graduate student selection, hiring committees for faculty, faculty meetings, mentoring existing students, and other roles or responsibilities involved in 'institution-building' or that interface with the decision-making and governance processes of one's department/unit/college/institute.

What others do you have? What others *don't* you have because they do not exist at your university or your culture more broadly? Why mightn't they exist? Areas of your work—areas to do your work—can include both presences and absences. Who is it already easy to partner with? Who would it be difficult to work with, and why? Who *can't* you work with because they are gone, removed, silenced, or absent from society? From the academy? Who aren't your colleagues, but could be, could have been? Inquire into your work and the people involved using procedures of epistemological imagination.

Matt: “Aldo Leopold could look at Escudilla Mountain and see bears, Native Americans, and Spaniards. He lived during the great grizzly, saw its tracks, and heard the story of its demise. He met people who evidenced the Spanish and reminded him about the absence of native peoples. He reflected that, even in 1949, when one looks upon Escudilla, they no longer think of bears, natives, or settlers, unless by some remote chance and the thinnest of threads they are connected to those events. Events that with each passing sunrise move further away in time and memory. How do we remember what was? How can we imagine what is absent in the present in order mourn, to honor, to work in relationship with it? Leopold is sharing at least a few ways.”

CRP is a tool for structuring dialogue, whether formally or informally. In formal CRP, the structure is outwardly visible. When people use CRP informally, it takes on more of an inner structure to help one notice different things, be curious, and pay attention to the momentum of another person (the artist/creator). Rising Youth chose to integrate CRP into as many situations involving dialogue and decision-making as possible. This was a group decision. It was possible to decide as a group in part because of their small size, and also because they are an organization with an explicit goal of power-sharing. Universities are large, with hierarchies for making decisions based on roles (student, adjunct faculty and lecturers, tenured faculty, administration, university leadership) and seniority. Where in your work, when in your day, can you use CRP either formally or informally? If there are times/places in your work with feedback cultures that align with CRP values, there may already be ways of using it formally.

In January 2020, a professor in SOS reached out to me because some MA/MS students in a “Sustainability Synthesis” class had asked if I would provide a CRP workshop for the group. The course syllabus had time for guest lecturers built into the schedule that were intended to “bring new ideas and methods for how data can be synthesized across topics and disciplines”. The guest lecturers were not determined in advance, and the current cohort of students were involved in choosing who to invite. This class structure opened up space and choice for CRP to be brought into the classroom without needing to be designated as formal curriculum in advance.

We held CRP workshops in 2020 and 2021. In each case, we began by using CRP in a usual way with two students’ works-in-progress. At some point we discussed how the group could imagine CRP being used other than as a way of giving and receiving feedback from peers about their thesis drafts and for poster presentations. Interestingly, students in both cohorts said that they wished CRP could be part of how they were in dialogue with their faculty advisor/mentor. They suggested modes of CRP for in-line feedback on their work and for in-person conversations. I remember at one point someone said something to the effect of, “Imagine how different peer review of manuscripts for journals would feel if it involved CRP.” Even though the workshops were only 90 minutes, by the end, many of the students were excited about the potentials for CRP.

Their ideas and excitement did not translate into sustained practice. When we look at the differences between this synthesis course and Rising Youth, we can guess

why. Although the MA/MS students and the professor learned as a cohort similar to Rising Youth, the learning was limited to a single, short workshop. I shared resources and offered for students to follow up with me afterward, but without dedicated practice, the pressure in academia to do more in less time likely prevented it. Neither the professor nor the students had enough practice with CRP to be able to continue learning from and teaching each other. Too much knowledge was concentrated in me, the guest. I did have overlapping relationships with many of the students (I was invited because they knew me and my work) but was not part of the cohort. I did not see them every week and develop working relationships with them.

I had also just moved to Norway six months prior (I facilitated the CRP workshops over a video conference). Rising Youth has a collective knowledge of CRP. In other instances, we have seen how in the absence of this, cultural shifts in academia rely too heavily on one or two people. At the Guildhall School of Music and Drama, Helena described how large groups of musicians learned CRP in some in-depth workshops over many years. But the culture of practice in music education prioritizes individual skill and methods unique to each role in music production and performance. This prevented CRP from becoming “hard-wired into the organizational and program structures or real paradigm shifts.” CRP did become part of how individuals worked, but it was largely sustained at the institutional level by people in leadership roles. When these people left,

Helena reflected on how she may have “underestimated the role that leaders play in cultural shifts”.⁶³

In both SOS and Guildhall, space was made for CRP. Even when this happens, the many threads that make CRP (and the Atlas more broadly) collective knowledge are strained as they pass into university cultures that tend to reject them *prima facie*. They can require fervent advocates to ask when they are appropriate and how they can be used. If the practices remain too concentrated in the minds and bodies of a few, the labor that maintains them against strong institutional currents becomes unsustainable. How can we sustain? One way is to forge connections within and beyond the academy. “Decolonizing the university is a task to be conceived of as articulated with other processes of decolonizing social and cultural relations prevailing in society” (Santos 2018, 270). What other groups doing similar work are you a part of, or, if you are not part of them, could you ask to partner with?

The Last Question

The last question raised by Rising Youth’s integration of CRP is: What contexts influence the shape and momentum of our efforts as postabyssal researchers? Here I am thinking in broad terms. Colonialism, capitalism, and patriarchy are always in articulation (ibid). We need to be careful that our efforts to intervene in one do not exacerbate

⁶³ Recently there has been renewed interest for CRP at Guildhall. The Atlas involves principles and practices that are often at odds with university cultures. We should remember that deep cultural changes can be unpredictable and usually take time.

another. But we also cannot be paralyzed into inaction by the complexity or strength of their articulation.

Rising Youth is a non-profit that produces exhibitions and plays in non-traditional theatre spaces. The topics and formats involved in their work are not marketable forms of knowledge. The leadership training that youth participate in at Rising Youth uses counter-hegemonic-culture methods like CRP. Because of this, the organization focuses its efforts on colonialism (intervening in white supremacy culture) and patriarchy (intervening in paternalistic organizational hierarchies). Each is still intertwined with capitalist logics, but the particular contexts Rising Youth operates in help them determine now to prioritize and navigate them.

Consider ASU. It has very different articulations than Rising Youth. In many ways it exemplifies the new trend toward university capitalism through its neoliberal commitment to marketable knowledge production. ASU develops programs so that other universities can evolve along similar lines.⁶⁴ Because ASU is an enormous institution and I know some of the human beings working there, I don't reduce it to an engine of university capitalism. As far as people go, is a mixed epistemological bag. As an institution, I continue to see it as an epistemologically contested space, despite the dominant logics of global universal scale, technological development as progress, and capitalist productivity being clearly visible. The **monoculture of the naturalization of**

⁶⁴ See, for example, UDI: <https://udi.asu.edu>

difference⁶⁵ is perhaps the aspect of abyssal thinking that ASU challenges the most through efforts to increase access for and broaden the diversity of students and faculty.

It is not impossible to be a postabyssal researcher at ASU. I do think it is difficult. I know several people who have left ASU after years of defeats and being taken advantage of. It is especially difficult for the postabyssal researcher at ASU to produce “market-free knowledge” rather than the free-market knowledge created by university capitalism (Santos 2017). Three examples of this that I was involved with at ASU were the decolonial autoethnographic writing methods class that was offered in the Hugh Downs School of Communication, the Embodied Activism and Leadership class in the School of Dance, and research involving the Andes and Amazon Field School with people from across and outside ASU. I discuss this last example, which has distinct ties to sustainability science that supports cognitive justice, in the next Atlas application.

Atlas Application 2: Creativity through Reciprocity

Ruby Morales is an artist-activist whose work thrives in the in-between. The in-between is not a void crammed between two wholes. It is not better than what it is adjacent to ($\frac{in-between}{either\ side}$), nor is it worse ($\frac{either\ side}{in-between}$). Ruby makes dance, and so the in-between is where movement-in-bodies and bodies-in-movement come together despite the forces that seek to separate them. In the in-between, cultures inform the methods for

⁶⁵ **Glossary:** This logic imagines that natural hierarchies exist, based especially on race and gender, and we can categorize people based on them and distribute and segregate populations accordingly. This segregation happens “not only spatially, but also in terms of their access to what they need to live healthy, meaningful lives” (Santos 2014: 173).

teaching dance, and dance become the grammar that dismantles exclusions and assembles different criteria for dancemaking: hybridity, creativity, reciprocity, integration. Dance making in the in-between becomes a **destabilizing subjectivity**⁶⁶. In the in-between, Ruby honors her connections to community, ancestral knowledge, and land. Through this, the in-between can be located in dance cultures: cumbia, hip-hop, breaking. It can be located spaces: Tempe, Tucson, New York City, Douglas, Agua Prieta. It can be located in its own terms, which means it can continue to be an in-between, or it can be

_____.

This is how I describe Ruby and her work. You can find out about her in her own words.⁶⁷

Ruby first met Liz and encountered the Atlas during the senior year of her BFA. She began the year having already met the program requirements, which freed her up to take all kinds of electives. She enrolled in classes for creating fashion and sculpture, and the Atlas of Creative Tools. BFA students have senior projects, and one of the driving questions for her project was, “How does Ruby make stuff? Where do I pull from? How do I think of myself as a maker?”

It was a “sweet spot” for Ruby to be in those different art and artisanal classes, in part because they provided a lot of ways to reflect on these questions. At some point she realized that, despite feeling deeply connected to her familial and cultural traditions, she

⁶⁶ **Glossary:** Destabilizing subjectivities experiment with eccentric or marginal forms of sociability or subjectivity in modernity (Santos 2014, 98). They deviate from the past without rejecting it, but also without reproducing it as it was.

⁶⁷ See <https://rubymorales.com>

wasn't pulling from that knowledge to inform her artmaking. Among these were her Mexican-influenced cumbia and the methods her family used for learning and teaching it. It didn't seem obvious or even possible. "The fact that there were no women of color that were teaching dance... when I went into college, there was nothing that was telling me, 'You know you can do this, right? You know this is possible.'"

As Ruby worked with Liz and the Atlas during her senior year, she didn't explore these questions directly. It took some time. "It was more of a journey than having happened in that moment." Some of her first experimentations with the Atlas involved her work with hip-hop and breaking dance forms. The same year, Ruby met the choreographer Yvonne Montoya.⁶⁸ Yvonne's approach to process-based and culturally relevant dance making inspired Ruby. She began making connections between the Atlas and her work with Yvonne, which sometimes overlapped as Liz and Yvonne shared some dance-making programs. Reflecting back, one of the insights she gained from working with them both was that "everything I wanted to include was valid. Cumbia is valid. My family being there is valid."

After graduating, Ruby decided to bring Mexican cumbia into her dance making in the U.S. She applied for a grant to support her work. Part of the project was to have dancers take classes in cumbia, and for the classes to be taught with "as much cultural relevance as possible". In Mexico, cumbia is often taught informally in people's homes. Ruby learned how to dance cumbia at family parties. She didn't learn it inside the western dance structures for learning dance, with studios and weekly classes from

⁶⁸ See <https://www.yvonnemontoya.co/choreography>

teachers that break the dance down into steps or movements. Ruby wanted the dancers in her cumbia classes to learn from her parents. And she wanted her parents to teach the dance in terms of how they knew it, which was ordinary, embodied, and not very conceptual.

This was difficult for Ruby. Initially, her western choreographic training imposed itself on her ideas of how cumbia could be taught. When she used some practices from the Atlas, like suspending knowledge—in this case the knowledge from western cannon of dancemaking—it created a void in her understanding of how to teach cumbia to dancers who are used to a very structured way of learning. It brought up what she named “internal, learned resistance”. “I definitely feel like it’s learned. You have it through being colonized. We feel an internalized resistance: ‘this isn’t going to be validated, this isn’t going to be right. This isn’t the right way.’ I still feel it as a challenge, trying to stop myself from stopping myself.”

Ruby had to consciously remind herself that she could be a process-based dance maker. One of the ways she did this is by using tools and principles from the Atlas in a lot of interesting ways. A big idea in the Atlas is *Breaking Things Down*. Many tools and the toolbox mentality involve this. But we don’t always want to break things down. Reductionist science has shown us that much. For cumbia to be taught by her parents in the way they knew how to teach it, Ruby realized breaking things down wouldn’t be a helpful structure for creating choreography. “I didn’t need to fully understand it to apply it.”

This can be seen as an example of horizontal thinking. It is not that we never want to think in either/or terms. Rather, we want to see either/or thinking as a *kind* of thinking that can be useful or not useful, appropriate or inappropriate. In this case, *Breaking Things Down* wasn't useful and would have been a culturally inappropriate way for Ruby and her parents to teach cumbia. Instead, what emerged from the earlier dance classes was used to actually inform and guide what was about to happen, the next step. It became a form of process-based choreography rooted not only in Mexican cumbia but also in the particular way Ruby learned to dance with her family.

Ruby had many reasons for wanting to bring her cultural and familial knowledge into her artmaking. One of her motivations was “to challenge what it meant to learn dance in America and our colonized ways of making stuff and how it is that we become proficient in something”. She continued to explore this through different projects that supported her dancemaking, including Dance of the Desert, founded by Yvonna Montoya, and with Urban Bush Women with Jawole Willa Zo Zollar. As her motivations clarified, she began applying them not only to dance making but also to her activism. She described how *Multiplicity* was one of her sources for this move. The ‘What else is it?’ embedded in *Multiplicity* is a corollary to the improvisational structure ‘Yes, and...’ that helped Ruby “see the potential in everything, to be able to connect things through my thoughts, imagination, my memory. No matter how distant the connections seem, they are valid.”

Ruby worked to bring this practice of making connections into her activism. Recently she was involved in increasing voter turnout. She was noticing that the group

had a distinct culture of “thing being done the way they have always been done.” Ruby used some Atlas tools, like *Ask a Question, Multiplicity*, and one of her own, which she described as “sharing nonsense, any ideas even if they might be rejected”. She had a structure to her tool, which involved staying with questions long enough to see what happens, and suspending judgement about the relevance of her ideas. Eventually she found that some of them gained traction, despite the tendency of the organization to fall back on **arrogant reason**.⁶⁹

Another of the ‘distant connections’ that Ruby brought to voter turnout was relationship building. She noticed a contradiction in her organizing work: on the one hand, she found that developing relationships was one of the central parts of the job; on the other hand, it wasn’t quantifiable like most other aspects of the work. “That’s not part of my job, that’s not going to help. It tricks you into thinking that you’re not doing your job.” For Ruby, politics is about people and relationships. “In four hundred years, I imagine us to be in really great relationship with one another, each other's communities and beliefs and cultural practices, and we have all the resources we need in such a way that we don't need the gatekeeping of a government anymore, right? It’s such beautiful relationship with one another that it is unnecessary.”

Understood through the lens of the **sociology of emergences**⁷⁰, Ruby expands the present and contracts the future that is defined by predictable, linear time in order to

⁶⁹ **Glossary:** Arrogant reason is “a kind of reason that feels no need to exert itself because it imagines itself as unconditionally free and therefore free from the need to prove its own freedom.” (Santos 2014). For example: ‘I don’t need to try or consider that. I have chosen what I do and think, so I don’t need to go beyond that.’

⁷⁰ **Glossary:** The sociology of emergences is an inquiry into “a future of plural and concrete possibilities” made possible by what is being done in the present (Santos 2014, 182).

make room for what she is doing now to populate the future. The organizing structure she was a part of didn't make time or prioritize developing relationships. It operated using a form of dominant time scales: political cycles and the urgency they engender. Ruby expands the present by bringing her vision of the future into her voter registration work. Politics is about people and beautiful relationships can render government unnecessary. She concretizes the practice in the present (rather than a fantasy that ends in a thought experiment) to make them part of future possibilities.

At this point, the reciprocity of building relationships had become a big part of her creative practices. Relationships might be with another person, the land, a particular site. When she is working with others, her creative process is changing in response to the people and places she connects with. "I learn from you and you learn from me. I give you space, you give me space. I let you mourn if you need to mourn, and you let me mourn." This is akin to the place-responsive choreography described by Karen Barbour (2016). For Ruby, changing through her relationships with people and place is a form of reciprocity that "allows there to be room for creativity to feel free and valid. It's in the air."

How Ruby Morales Informs the Atlas

I am grateful to Ruby for sharing her 400-year vision of the future. At the time, all I could say was “Oh, wow.” She was so matter-of-fact about it. It reminded me of so many critical theorists that moan about how difficult it is to imagine a world beyond capitalism. It’s not like I know any more than they do. What does post-capitalism look like? People stop imagining before they ever get started, finding all kinds of *reasons* that alternatives will fail. **Ruby:** “I didn’t not need to fully understand it to apply it.” Ruby’s clear vision and practical ways of going about creating it have inspired me on more than one occasion.

One way Ruby informs the Atlas is with her understanding of “internal, learned resistance”. I don’t know whether she considers this a tool, or if she has developed some tools with this in mind. It is a recurrent theme in the Atlas, but in other words and procedures such as ‘Stay with a question long enough to...’ and “What’s your fourth, fifth, sixth response?” If I were to introduce it to my categorization of the Atlas, I might consider adding it as a procedure: <socialized/learned resistance>. Learned resistance can also be an orientation for using other tools, especially *Recipe* for understanding identity or in combination with *Equivalentents* or *Movement Metaphor* as a way of unpacking the source of habits and absences in the physical body. I’m curious to hear whether Ruby has continued working with her thinking about learned resistance.

Another way she informs the Atlas is how she has used tools for intercultural translation. She is bringing nonwestern knowledge into spaces and people often informed by western expectations and techniques for artmaking. Cumbia and breaking dance forms are marginalized by a logic of metonymic reason (the monoculture of knowledge) that

holds that they do not have aesthetic quality, and those creating artistically using means outside the cannon lack culture (Santos 2014, 172). Her role in this process is something akin to a cultural mediator as Ishizawa describes them. He sees them as people who are firmly planted in their own culture but can understand the deep nature of two different cultures (Ishizawa 2004, 60).

But I think that through her creative practices, Ruby goes a step further than Ishizawa's cultural mediator. He relegates the in-between to "a kind of no man's land." In doing so, he misses out on the decolonial potential of hybridities and the destabilizing subjectivities they can create.

Certainly Ruby has her own tools for doing the work of intercultural translation and cultural mediation. But I suspect she also has a deep knowledge—perhaps unnamed as of yet—for how many other Atlas tools can be used in these ways. It is a particular kind of bridge tool that, rather than crossing over the boarder walls that separate cultures, tuns walls into stages and dances across them to a beat that reverberates through bodies and the hard desert sand.

Connections to Sustainability Science

There are at least three ways that Ruby's work can inform sustainability science that supports cognitive justice. The first is about bringing oneself into the work. The second is about prioritizing relationships, particularly those in the spirit of reciprocity. The third is Ruby's use of tools as boundary objects in in-between spaces.

Bringing oneself. One of the throughlines of epistemologies of the South is valorizing subjectivities. This involves bringing, trusting, using knowledge and practices that can reduce the suffering caused by problematic dimensions of western modernity.

Epistemologies of the South will invariably be collective knowledges, but the way they are used by particular people in certain moments situates the personal in the collective.

Some folks working in sustainability science have been advancing the inner work required for social transformations to be possible and durable (eg, Ives et al. 2020). From an educational perspective, inner work is often framed by how contemplative practices and spirituality can take place in the contexts of western/ized universities. They are described as necessary parts of a broader set of approaches that also involve intellectual and interpersonal capacities (Berejnoi et al. 2019). One theme they share is bringing one's whole self into university settings of teaching, learning, and research that tend to construct categories of personal and professional lives and creates a division between them (Mills 1959). It is the conventional wisdom created by abyssal thinking that creates this division and makes integrating the two seem irrelevant/incomprehensible.

The postabyssal researcher can orient practices of bringing oneself to investigate colonial, capitalist, and patriarchal patterns of thinking and the sociabilities they create. This work may involve sharing experiences from this side of the line or the other side of the line. Sharing experiences on the other side of the line could be of exclusions and forms of struggle and resistance against them. Experiences on this side of the line will likely contribute to the sociology of absences by identifying not only the problematic

dimensions of taken-for-granted practices, but also the wasted experiences that could not or have yet to become practices in western universities. Sharing about experiences on either side of the line may involve identifying contradictions and some forms of complicity in the construction or internalization of abyssal lines.

Before Ruby could bring her cultural and familial knowledge to bear, she needed to know it well. There will be many different processes for knowing knowledge and its epistemological dimensions. In sustainability science there are some examples of pedagogical approaches to practicing postabyssal research by investigating oneself in relation to culture. One involved a colonialism exhibition, where students were asked to find evidence of colonialism in their everyday lives, especially in their bodies, objects, and cultural artifacts (Movahed 2020). The exhibition was part of a series of semester-long activities that used creative tools from the Atlas and the horizontal mentality as a design principle for creating, facilitating, and assessing student/teacher experiences.

There were several lays of integrating oneself at different levels of the university structure that made this kind of teaching, learning, and research possible. One layer was that the professor formally responsible for the course could hire a teaching assistant, and the teaching assistant was permitted to create curriculum and activities expanded the original scope of the class by investigating colonialism not as a historical period but a current phenomenon experienced daily. The professor himself was (and continues to be) engaged in his own decolonial practices, which contributed to his choice to trust in his teaching assistant, share power in the classroom, and investigate colonialism directly. His trust is an important factor for understanding how this version of the class was possible.

He was not himself familiar with the Atlas, and sometimes he expressed discomfort with facilitating creative tools involving embodiment practices. But he like Ruby, did not need to fully understand the creative tools in order to apply them. He could rely on his teaching assistant, who had by then been using the tools for two years. His intellectual understanding and experiences of colonialism complimented his teaching assistant's creative, embodied practices.

A second layer of integrating oneself was that the teaching assistant had been using the Atlas to understand herself in relationship with her ancestral, cultural, and familial knowledge. An entire chapter of her dissertation is a narrative ethnographic study of womanhood from her immediate and distant lineage in Iranian and U.S. cultural contexts (ibid). She had also been using the Atlas, along with decolonial writing methods, to explore her relationship with coloniality. This integration prepared her to be able to develop curriculum and facilitate experiences with students using the Atlas in this way.

A third layer of integration was done by the students themselves. It involved for many of them locating colonialism in the world as well as in their minds (ibid, 194). Sometimes those stories were stories of perpetuating abyssal thinking and creating abyssal lines. Sometimes they were stories of exclusions from the other side of the line. Students did this by bringing their cultural, familial, and personal knowledges into practices that used the Atlas to investigate them in terms of contributing to oppression or struggles against oppression. Many students describe this work as both difficult and meaningful. Most highlighted how unconventional the teaching and learning was compared to what they were used to from their other experiences in western/ized

universities. For these students, the arts-based research methods, especially creating writing, movement, and gesture work, allowed them to more easily bring their whole selves to the study of colonialism.

Another example of pedagogical approaches to postabyssal teaching and research in sustainability science is the “Decolonizing the Unstable Mind” co-taught by a colleague of mine in the School of Sustainability (Papenfuss 2019). This example illustrates how abyssal thinking can make it difficult to create postabyssal teaching experiences. The co-teacher took on a role with power (teacher in a classroom) and facilitated dialogue and activities around decolonization. He used a conceptual model of decolonization that he had found helpful but was not created with the group he was working with. I was a student in the class, and I remember that one of the recurring themes throughout the semester was that race and racism were not being talked about or worked with enough. The co-teacher reflected on how he didn’t realize how his approach to decolonization used some of the same logics of abyssal thinking that perpetuate it.

His reflections are written in his dissertation through analytic autoethnography. This provides some of his behind-the-scenes thinking and a layer of transparency to how he integrated himself with the research. It is also at the same time his writing is also suggestive. As I read it, I find other examples of abyssal thinking in the way he makes sense of his experiences and phrases his observations. I suspect many of you reading this text will find the same in my own writing. This is one of the ways abyssal thinking complicates doing postabyssal research. For those who are unlearning abyssal thinking, the process will be messy. Pedagogical approaches, such as this class about decolonizing

the mind, will help some make progress toward unlearning while unknowingly using abyssal thinking in ways that harm and exclude others.

I do not think this likelihood should stop us before we start. Rather, there are ways one can prepare themselves in advance that can help them approach a situation and respond once they're in it. Ruby's clarification of her motivations and the practices she learned from being in community with Yvonna Montoya and Liz Lerman helped her maintain them during the work. In the previous example, the teaching assistant expanded her view of decoloniality and her own relationship to it alongside many others, which prepared her to be able to take on a facilitation role in the classroom. Both Ruby and the teaching assistant had practiced the horizontal and toolbox mentalities, which gave them tools for getting through uncomfortable moments like the one the co-teacher describes ("There was anger in her voice; I was so rattled that I stumbled to verbalize a response") (ibid, 76).

Prioritizing relationships. Ruby described how relationships can't be excluded from her work with communities and the land. They are both a method doing work and a metric for understanding the quality of it. Relationships foster trust. When they are developed among people from different cultures, they necessarily involve understanding those cultures. For Ruby, relationships rooted in reciprocity mean there are connections between herself and others that are there to be discovered if she is motivated to look for them. She found that, in the presence of these relationships, she was able to bring more of

herself into her creative practices, and that those practices changed in response to the people and places around her.

In sustainability science, relationships are an important part of what makes research that centers cognitive justice possible. Extractivist methodologies often used in natural and social science research treat knowledge as an object that can be harvested from people, the land, and culture. Methods for co-producing knowledge using horizontal, rather than hierarchical, models will require a commitment to developing relationships in the spirit of Ruby's, even (and especially) when the work that goes into relationship building is not valued, prioritized, or assessed.

A recent example of this in sustainability science can be seen in an ongoing collaboration between a small number of professors at ASU and indigenous communities in the Ecuadorian Amazon. The collaboration centers around the main station of the Andes and Amazonian Field School, which is based at Iyarina (pronounced ee-yah-ree-nah). Iyarina is located along the Rio Napo in the 'province de napo' as designated by the Ecuadorian government. The word *Iyarina* is a Quichua word that means "thinking about the future by remembering the past".

The Andes and Amazonian Field School was founded by an Ecuadorian-Kichwa family in 1999. It employs mostly Kichwa people from the nearby community that "foster collaborations while teaching Indigenous languages and biocultures to Western researchers and students" (Manuel-Navarrete, Buzinde, and Swanson 2021). Many of the collaborations involve different projects oriented toward horizontal co-production of knowledge. The ones I am familiar with include learning and promoting Quichua

language during the United Nation’s 2019 ‘Year of Indigenous Languages’, an annual study abroad program with students from ASU, and research assessing the methods used by other researchers at the field school—biologists in particular—who are conducting fieldwork with an around indigenous communities.

I was part of a workshop class that supported the first two projects. As one of the co-facilitators of the class said, “human beings are at the center of these projects.” We had been invited into these projects by members of the Kichua community, which included a professor at ASU, who knew the class co-facilitators through previous visits to the field school. Both projects were framed as ways of co-producing knowledge rooted in relationships and explicitly excluding extractivist methods.

The UN was hosting a series of webinars for indigenous peoples around the world to share about their histories and languages, often accompanied by people who would translate into English or Spanish. The Kichua people we knew from the community who spoke Quichua often also spoke Spanish. Several students in the class spoke Spanish, which enabled us to work together to organize the webinar. In this case, working with members of the Kichua community was part of how we were expected to create the webinar, and the quality of those relationships was part of our formal assessment in the class. It the cases where formal assessment of curriculum required—frequently the case in universities—this is an example of a model for formalizing knowledge produced through relationality.

I also worked with a group tasked with creating activities that would prepare future study abroad students to visit Iyarina. Our challenge was to help students be ready

to learn from the indigenous communities in (as much as possible) their own terms, rather than making sense of what they experienced exclusively through their most familiar knowledge systems. This involved activating that would investigate the colonial—and more recently capitalist—roots of their scientific training. The goal of the preparation was not to stop using knowledge and methods of western science entirely. Instead, it was to position western science as one of many ways of knowing, and to create epistemological space for other ways of knowing by being in relationship with the Kichwa people and that particular part of the Amazon rainforest.

Our group combined creative tools from the Atlas with some place-based learning activities developed by ecologists. We started with themes from the ecological activities, such as finding connections and interdependencies between plant species and animals. We gave them new structures using Atlas tools, so that the activities included movement and paying attention to how people were personalizing, through their imaginations and memory, the environment. We also used tools for creating stories to prepare students for how many of the Kichwa understand and are in relationship with the forest. These activities were structured into a schedule of pre and post-travel classes for preparation and reflection. However, the first year of the study abroad program was cancelled due to the Covid-19 pandemic. Despite my early involvement in the project, I did not remain involved after moving to Norway in 2020, and I do not know whether these pedagogical applications of the Atlas were used in subsequent years.

However, study abroad and other research has since resumed at Iyarina. The third project underscoring the importance of relationships in postabyssal sustainability science

involved a study with biologists conducting field around Iyarina. I am not personally familiar with this study but have worked with some of the people involved. The aim of the study was to better understand the factors that affected the biologists' tendency to engage in horizontal knowledge co-production with indigenous people. The research identified three structural factors that affected biologists' disposition toward co-production: "(1) disciplinary predispositions acquired through formal education, (2) lack of decolonial approaches in academic curricula, and (3) pressures in academia to do more in less time" (ibid).

Each structural factor is connected to the ways that relationships are absented in western/ized universities. First, the premises of disciplinary knowledge production is that understanding can be better achieved through depth rather than breadth, which is a relic of reductionist methods that were incapable of investigating interconnectivity. Forming relationships with people, knowledge, and knowledge systems beyond one's discipline has been considered either an irrelevant or inefficient use of time and resources.

The second structural factor, the lack of decolonial approaches in curriculum, absences relationships by emphasizing the traditions of individual learning and assessment. Although collaboration certainly exists, the relationships themselves are seldom seen as an important focus of the educational process. This is rooted in western ideas of individualism. Consider the story I shared in Chapter 4 about our proposal for a collaborative dissertation. Efforts to decolonize universities, or else transform them into some other institutions, will invariably include intercultural translation rooted in relationships (Santos 2017).

In third structural factor, pressures to do more in less time, relationships run up against the capitalist logic of productivity. Relationships and the interpersonal skills (tellingly referred to as ‘soft skills’) needed to develop them are neither a marketable commodity nor an explicit goal of education. With an increasing shift toward university capitalism, the time and energy that goes into building relationships will continue to be considered nonproductive labor. We can also understand this in terms of the logic of the dominant scale, which at universities expresses itself as the production of knowledge that can ‘scale up’ with global effects. Interpersonal relationships operate in different scales, for example, of depth of connection or interdependency.

The study describes how that biologists who felt less social pressure against co-producing knowledge with indigenous peoples may also have had more connections with them and their cultures. The researchers also found that field workers with less experience felt more social pressure against knowledge co-production. This suggests that postabyssal approaches to sustainability science should normalize the expectation that relationships that foster mutual intelligibility among different knowledges are at the center of both learning and research (Santos 2018, 276). I have described several ways that the Atlas has been used along these lines by people within and outside sustainability science. In the final example below, I share how this work has involved the concept of boundary objects.

Creative Tools as Boundary Objects

In 2020 I worked with Liz Lerman and Beckett Sterner to help develop a version of the Atlas of Creative Tools class that would bring artists and scientists together to investigate biodiversity loss. The class launched in Spring of 2021 with a mixture of students from the life sciences and the Herberger Institute for Design and the Arts. Throughout the semester, artists and scientists partnered in groups and combined creative tools with concepts from transdisciplinary research to research biodiversity loss in conceptual and embodied ways. Students likewise used tools and methods from their disciplinary training to co-create exhibition pieces that combined writing, dance, and artifacts from their research.

One of the transdisciplinary concepts used in the class was boundary objects. These are abstract or physical objects that “have different meanings in different social worlds, but their structure is common enough to more than one world to make them recognizable, a means of translation” (Star and Griesemer 1989, 393). The idea of boundary objects came from observations about how different people involved in interdisciplinary projects were able to work together. As Beckett put it in the Atlas class, “How do we get things done together when we differ in really fundamental ways?”

One of the impetuses behind creating Atlas/biodiversity class was that when Beckett was first introduced to the creative tools, he thought of them as boundary objects. Consider the three components to boundary objects described by Star and Griesemer (2010):

Table 10. The Three Components to Boundary Objects (Star 2010, 604-5)

The object (remember, to read this as a set of work arrangements that are at once material and processual) resides between social worlds (or communities of practice) where it is ill structured.
When necessary, the object is worked on by local groups who maintain its vaguer identity as a common object, while making it more specific, more tailored to local use within a social world, and therefore useful for work that is NOT interdisciplinary.
Groups that are cooperating without consensus tack back-and-forth between both forms of the object.

Ruby's use of creative tools can be understood in terms of boundary objects. Although she often stays in the 'interdisciplinary' space (in her case, explorations combining different dance forms), she uses the creative tools in more specific ways while teaching cumbia or investigating breaking.

Beyond Ruby's practice, creative tools are regularly used as boundary objects. In the Atlas/biodiversity class, tools (which have both physical and procedural aspects) were positioned in between the artists and the scientists. They maintained their 'vague identity' in the more basic/original forms used for teaching them, but were interpreted and used in different and specific ways by the artists and scientists. When these students worked together in groups using the same creative tools, they were able to continue using

the tools despite their different understandings and applications of them. There other are examples of Atlas tools being used this way in arts/science settings, such as the science choreography program at Wesleyan University.⁷¹

In sustainability science, boundary objects are becoming more important for work that bridges traditional knowledge gaps. (Fischer and Riechers 2019, 118). Groups that center the use of boundary objects for intercultural translation are sometimes described as boundary organizations. For example, the field school at Iyarina, which I discussed earlier, has been described as a boundary organization (Buzinde et al. 2020). The practical mentalities and creative tools in the Atlas are well-suited for working within and between social worlds. They have been used as boundary objects themselves, and can support the work happening in boundary organizations.

Others' Stories

Although I conducted 13 interviews with Atlas practitioners, I chose to share only two in this chapter using storytelling and rich descriptions. I hope you found their stories compelling, and that you were able to make some connections between how they apply the Atlas to your own life and work. Many of the insights shared by other practitioners, whose stories I do not elaborate on here, are woven into Chapter 4. They also shaped my recommendations for integrating the Atlas into sustainability science, which is the focus of the sixth and final chapter of this dissertation.

⁷¹ <http://sciencechoreography.wesleyan.edu>

Chapter 6 – The Upshot

Let's get right to it. If you are working in the field of sustainability science, this chapter is meant to help you think of ways that you can integrate the Atlas of Creative Tools into your spheres of influence. Students, staff, faculty, and administrators can all be advocates for cognitive justice.

People should not be excluded from the work of decolonization. I agree with Nikki Sanchez that while indigenization may not be everyone, decolonization is for everyone (Sanchez 2019). We cannot do the work of decolonizing by resorting to methods of colonialism. Consider the example of territory/land acknowledgements that are becoming more and more common in university contexts. People share them as they open and close meetings. They are on college websites and in email signatures. I have come across many over the past eight years.

Some of them seem shallow, or on the surface. They do not demonstrate the “first steps” that Sanchez offers for people who want to decolonize. Other times I have heard territory/land acknowledgements that make me *feel* the rigor of learning, self-reflexivity, and sometimes an awareness of complicity that went into creating them. Recently I was on a call with about 25 CRP practitioners, and we were each asked to share a territory/land acknowledgement as we introduced ourselves. Everyone did this except for me. Each person seemed to be able to do this because it was alive in them. I could not, because I have not prioritized building these relationships or this learning since I moved from the U.S. to Tromsø. I have had very few conversations with Sámi peoples. I have

read very few histories of this region in English, and do not yet know enough Norwegian and Sámi languages to read their histories in their languages.

For as long as I have known myself, it has taken me a long time to do things when I involve my whole self. The same is true for decolonizing. It can be a slow, steady process. This is the main reason it took me eight years to complete a Ph.D. I suspect that if I had used typical research methods and excluded myself from the work, I could have finished in three of four. But it takes time to make barriers more porous, to make the walls between distinctions more permeable. One by one, little holes were poked in the barriers intended to keep my subjectivity from affecting the university structure. Sometimes it was others who poked these holes, with care or with force (thank you to the many people who stuck with me over the years). Sometimes holes formed by chance. And sometimes I poked them myself. This was most effective when I used the Atlas as a helpmate.

Aliyah Hasinah said of decolonization, “It is valuing multiple ideas, multiple perspectives, multiple people and humanizing everyone. Instead of having absolute truths, or sciences based on peoples of other people. It’s also about questioning. How do we question where we currently are today? How do we ask what’s missing? How do we put those things that we’re thinking into action? And how do we start reimagining?” (Hasinah 2019). Decolonization is a way of living, a lifelong commitment. People should not be excluded from the work of decolonization just because they make mistakes, or it takes a long time. If you can relate to any of the stories I shared in this dissertation, do not exclude yourself from the work of decolonization.

I have agreed with others that western modernity and universities are contested spaces. I propose that sustainability science is as well. I also think people are contested spaces. People are literally the site of physical and epistemological contests in ordinary and extraordinary moments. Given the ongoing presence of internal conflicts and contradictions whose forms change over time, it is important not reduce people to their most visible commitments by disregarding their tensions.

When we commit to decolonial work, we will be building sustainability science that promotes cognitive justice. Our approaches will necessarily be context specific. Just as CRP practitioners always bring the practice into existing cultures of feedback, postabyssal researchers in western/ized universities are operating in existing cultures of colonialism, patriarchy, and capitalism. The specific ways each of these modes of domination exhibits itself will help to inform (although not dictate) the interventions that we can safely or strategically pursue.

Decolonial work at the personal level involves a lot of reflection that translates into action. This reflection/action is an iterative process, which we can all reflexivity. The specific ways that we understand and experience modes of domination help us determine what kind of reflexivity to engage in as we do the work. Those working to unlearn abyssal thinking “must be focused on the idea and value of diversity, the recognition of different ways of knowing and of being” (Santos 2018, 296). For those who have already done a lot of decolonial work, but continue to be excluded from changing university culture, reflexivity can be about “how to represent the world as one’s own and how to transform it according to one’s own priorities” (ibid). Practically speaking, people will

need to act within their spheres of influence, which may involve expanding or contracting those spheres at different moments, depending on the kind of reflexivity they are doing.

Expansion and contraction. Contractions can create room in one's mind for other knowledge systems and, in institutions, for people, roles, and priorities that are absent. Expansions can be to recover 'wasted experiences' and to imagine futures that have been made difficult to imagine. **Ruby:** "Decolonizing, and being in a good relationship with the land and with one another and reciprocity have been in my mind and in how I am. Recently I applied for this fellowship that asks you to imagine four years, forty years, and four hundred years from now. In four hundred years, I imagine us to be in really great relationship with one another, each other's communities and beliefs and cultural practices, and we have all the resources we need in such a way that we don't need the gatekeeping of a government anymore, right? It's such beautiful relationship with one another that it is unnecessary."

In western/ized university settings, we must therefore be able to engage in forms of both of these forms of reflexivity for learning and unlearning. To this I would add a third form of reflexivity that the postabyssal researcher needs: a reflexivity for *not learning*. I mentioned earlier that my training in architecture did not prepare me to think and use methods for producing academic research. As it turns out, this was a boon. It greatly aided my capacity to not learn certain ways of thinking and working. Both of my parents were teachers, and many of the people I admired at university gained my admiration because of how they taught and mentored me. Because of this, I never buried

teaching below research, even as that hierarchy had clear expressions in the institutional culture in SOS and ASU more broadly.

Not learning is part of the tension that supports my **mindful heresy**⁷² in the university. Universities can be the sites of learning, unlearning, and not learning. The combination is what contributes to ecologies of knowledges, and universities can be the fertile soil for these ecologies to thrive, even when the institutions themselves need to change for this to happen. This is the value of education that I revere, and this reverence has helped me discern between the ideas and traditions of universities that I can support, and those that I cannot.

Suggestions for Integrating the Atlas into Sustainability Science

In Chapter 3, I outlined four modes of creativity that are largely absent from mainstream approaches to sustainability science but are appropriate for supporting cognitive justice. The four modes are:

1. Those that that integrate the mind and body and foster feeling-thinking.
2. Those that draw on personal experiences by valorizing or honoring people's contexts.
3. Those that recoup invisibilized and wasted experiences.

⁷² **Glossary:** Mindful heresy is a term used by Amira de la Garza to describe “a person who consciously and intentionally violates the normative beliefs, behaviors, and/or expectations of a group or association she deeply reveres in order to *maintain* reverence for its value” (2014, 220).

4. And those that are actionable and available so that they contribute to procedures that people use while working together so that different knowledges can co-exist.

In Chapter 4, I described some of the modes of practice that are supported by the practical mentalities and foundations-as-principles and made practicable by the creative tools. These included:

1. Partnering the mind and body, and drawing on your imagination.
2. Legitimizing your own experiential knowledge and bringing it to bear in the present situation.
3. Working with others so that different ways of knowing and being can co-exist.
4. And getting unstuck when the work is hard.

In Chapter 5, I shared the stories of two Atlas practitioners, Xanthia and Ruby, and some ways they interpret and use these practices to support versions of social and cognitive justice in their respective fields.

To transition from the dissertation to your work in sustainability science, I will use the four modes of creativity outlined above to structure my suggestions for how the Atlas can be integrated into the field. Rather than serving as concluding remarks, I intend for my suggestions to be a starting point. I provide ideas and examples for each of the four modes that are relevant for two audiences: staff, faculty, and administrators in

sustainability science programs, and students enrolled in such programs. I highlight some of the value that the Atlas can add to sustainability science, and why it's worth the effort to undertake this rigorous form of creativity.

Body Mind Integration

Sustainability science is increasingly asking us to compliment intellectual knowledge with social-emotional learning and embodied knowledge. That is because relationships are at the heart of sustainability science research, teaching, and practice. Every transdisciplinary research project involves building and maintaining relationships. To teach and mentor in ways that encourages students to bring their worries, hopes, priorities, and traditions into classrooms and research projects requires trust, which develops over time as people work to understand one another. The same is true for recruiting and supporting an interdisciplinary team of faculty and staff.

Many of the creative tools in the Atlas are embodiment practices that come from dance and choreographic expression. But you don't have to be a dancer to use the Atlas to draw on embodied knowledge. Consider gesture work. Several tools in the Atlas help us practice recognizing and working with gestures. When I practiced these tools, especially *spontaneous gesture*, *scripting gesture*, *annotation*, I became much more adept at not only paying attention to how people communicate with their bodies, but to use the *specific shapes* people were making to improve students' experiences in the classroom.

Once I taught a class that included a first-generation student of color. He self-identified as black, and was the only black student in the class. One thing I noticed about this student was that, when he would ask me questions, he would often cross his arms, right over left. I noticed this because of my work with *spontaneous gesture*, but I didn't think much about it. One day, a group of students was leading an activity, so I could focus my attention—visual, mental, and my emotional field—on the entire class without needing to teach at the same time. With my increased bandwidth, I saw that this student would ask his peers questions with his arms moving about, gesturing all the while. They weren't crossed or fixed to his body, and I was intrigued.

This moment of intrigue is important. It signaled something that I found interesting, even though it would be easy to ignore. And I would certainly have ignored it had I not practiced ways of linking the way he shapes his body with the context using questions that help us explore relationships between the two. I didn't presume to know what it all meant, and I didn't expect that he would necessarily be aware of his arm-crossing. In this moment of intrigue, the point was not to discover some truth. It was to partner my intuition that this small detail *could* matter with some practical methods for discovering meaning.

One day after class I shared some statements of meaning about his role as a student in the class (CRP Step 1's are often an inviting way to begin dialogue), and then shared my intrigue. I asked if he wanted to do some gesture work (*annotation*), and he agreed. One question I asked was about the relationship between crossing his arms and curiosity. Another was about the right arm over the left arm. He was brilliant at

suspending judgement, even though I think this form of mind/body inquiry was unusual for him. By the end of the conversation, he shared two things that changed how I approached teaching for the rest of the semester.

The first was that he criticized himself for asking adults questions but was comfortable asking his peers. He traced the origins of this back to how he was treated by his teachers in primary and secondary school because of the color of his skin. The second thing he shared, about the right-over-left arm gesture, was that he thinks he is more naturally a right-brain thinker than a left-brain thinker, and that he feels self-conscious about that in science classrooms. When he shared that with me, it didn't matter that neuroscientists have questioned the validity of the left-brain logic right-brain creativity hypothesis (Nielsen et al. 2013). This interaction was about relationship-building through embodiment work and using what I learn to make my sustainability science teaching more inclusive. Our conversation was one of the momentums that helped me build the creative tools more explicitly into the curriculum.

You don't need to be familiar with the Atlas to notice body language. What the Atlas helps us do is pay attention to it in unexpected moments, and gives us practical ways of *work with it*, interrogate it to find out what information it contains. You don't need to be a dancer to ask your body questions and see what stories it holds. The student was bringing into the present, through his body, his past experiences of being dismissed in classrooms when he didn't understand something, a dismissal he attributed to how teachers treated him because of the color of his skin. It didn't matter that I wasn't treating him that way (a point he stressed to me). As Bessel Van der Kolk wrote, the body keeps

the score. The student's story bridges from past to present, and the creative tools help the student find the story.

This is one of many examples I can share about integrating embodiment practices into sustainability science pedagogy. In our large sustainability science survey class for undergraduate students, we have used movement mnemonics improve students' learning and remembering concepts, and movement activities to connect with different learning styles and help students stay engaged. I have also used embodiment practices, and gesture work in particular, to aid students' development of empathy with one another while role-playing in sustainable futures scenarios. Dancers have already shown how creative tools in the Atlas can be used to promote empathy and "understanding across cultural divides" (Johnson 2013). This earlier research was the impetus for including creative tools in pre- and post-study abroad classroom activities for students traveling to the Iyarina Field School, which I described in Chapter 5.

If you are teaching sustainability science, these creative tools are ways to operationalize the often ambiguous 'interpersonal competency' or soft skills (a telling name) advocated for in the sustainability education literature. Their structures allow them to be practiced on their own and used in different educational contexts. They are excellent helpmates in interdisciplinary classes, where students from different backgrounds are working together on shared projects (see my description in Chapter 5 of the *Creative Tools for Saving Biodiversity* class). Students can be assessed not only on their use of the tools themselves, but also on their ability to translate them from one

context to another or use them as bridges between knowledges. In other words, assessment for creative tools can be content-driven, skill-driven, or use-driven.

If you are developing a sustainability science program or conducting a program review, look for the ways you already support embodiment practices and experiential knowledge. How does your curriculum encourage students to learn from their senses and place-based experiences? Where can you add these dimensions of learning and capacity building? What kind of knowledge and support would you need to do this? Who has it, do you know them, can you get to know them? Are they willing to collaborate? What knowledge traditions hold embodiment practices that are most relevant for the context of your sustainability science program? Dancers are one of many groups for whom movement is a learning lens, a canvas, a medium for understanding and exploration, connection and communication.

Administrators and faculty tasked with program-level support can advance this work by making cross-disciplinary partnerships easier to begin and maintain. Do undergraduate students know about classes that teach movement or somatics? Are graduate students able to work with faculty from other disciplines? Is it possible for student funding, for example research and teaching positions, to come from multiple sources? What incentives do sustainability science faculty have to work with their colleagues in other disciplines? Sometimes the humanities and social sciences where embodiment and experiential knowledge practices live are underfunded. Can your sustainability science program support partnerships that include financial contributions for shared work? If your sustainability science program is seen by your college or

university as more socially (or intellectually) relevant, can you use that leverage to demonstrate the importance of these other fields and ways of knowing.

When you pay attention to your body and mind, to your imagination, they provide you with a tremendous amount of information that you can use. How you use it in your sustainability science programs is a question that depends on your context. Now is an advantageous time to give structure to the role that creativity plays in this work, because we are currently building out the Atlas as a digital commons that more people can access and use.

Experiential Knowledge that Valorizes Context

The Atlas helps people practice taking their histories, traditions, and experiences seriously, and drawing on them so that they actively participate in the work they're doing now. When we practice this alongside others, we get better at remembering that they also want to see their histories and traditions flourish. Sustainability science supporting cognitive justice can advance these kinds of partnerships by including practices that values people's experiential knowledge and the contexts they derive from.

A dear friend and colleague of mine, Sumana Mandala, used the Atlas as part of a project that empowered sexual assault survivors through dance (Mandala 2021). The project brought survivors together with dancers who were trained in traditional Bharatanatyam dance. One of the things they did was to use the dance to tell survivors' stories. The project brought embodiment together with survivors' experiences of trauma

in ways that helped survivors explore, express, and sometimes to work through their experiences. The dances themselves were co-creations of the dancers and the survivors, which means that they contained stories from both. The dances were structured using the traditional Indian Bharatanatyam dance form. But Sumana encouraged the dancers to use Atlas tools to help them explore the container of Bharatanatyam, so that they could use the tradition as a springboard for creative expression, rather than a constraint.

In sustainability science we are constantly working with the legacy of our traditions. What parts do we keep, what do we change, and how we work through and experiences these processes? Consider the example of cultures of feedback I discussed in Chapter 5. Rising Youth Theatre is using CRP to reduce the tenets of white supremacy culture in their organization. This of course relates to racism, but also other dimensions of white supremacy, such as perfectionism, paternalism, avoiding conflict, and scaling up in terms of expansiveness.

What are the cultures of feedback in your sustainability science program? There are many sites for locating feedback cultures: classrooms with student-student and student-teacher dynamics, faculty meetings, student/faculty joint committees, faculty hiring committees, supervisor one-on-ones with students, faculty mentorship programs, and so on. How permeable is your program with other academic programs and off-campus communities? What modes of communication are used, which feedback loops are present?

When you look for cultures of feedback in your program, an important question to ask yourself is: What kinds of information, kinds of stories and experiences, do they encourage? What kinds do they limit or exclude? In a nod to Sumana's work, what kinds of work is possible in your cultures of feedback, and what kinds of work is it hard to imagine doing?

Sustainability science programs often have content focused on questioning the social traditions that give rise to unsustainable trajectories for things like energy, consumption, and development. In addition to this important content, how can your sustainability science program interrogate the traditions of academic knowledge creation itself? One of the many factors that disallowed our proposal for a collaborative dissertation (see Chapter 4) was that the existing culture of feedback in SOS and the university was unable to assess a co-created dissertation using the traditional model based on individual research.

Certainly, the mentality of individualism is at play here. But despite the prevalence of co-authored papers and collaborative research groups in academic culture, I would argue that this problem of feedback culture is partially methodological. Colleges and universities often lack protocols of feedback, like CRP, that treat assessment as a living, breathing dimension of works-in-progress. When feedback is both structured and frequent, not only are individuals' contributions and growths made more visible, but so are the skills that enable co-creation and the impact of what could only have emerged from such collaborations.

Liz's impetus for creating CRP grew out of the toxic culture of feedback in dance and performance work. I have found many parallels between this 'culture of critique' and the peer review process. Certainly some aspects of peer review improve the quality of research. How can a post-normal sustainability science program already working to extend the category of expertise beyond the scientific community change the toxic, unmotivating aspects of peer review while maintaining the benefits? What academic traditions are we afraid to lose, and where does this fear come from? What academic traditions do we want to change, but we fear not knowing or understanding the alternatives? These are the kinds of questions we can ask to help us understand how sustainability science is responding to the particular knowledges and contexts at play in our programs. We can use creative tools to work with big traditions like peer review, like degree-granting, so that they become springboards for including diverse experiences and knowledges of the people involved in our programs, at the moments they are involved.

Recouping Invisibilized and Wasted Experiences

When I was working with the group supporting the study abroad trip to Iyarina, one of the things I was most excited about was how the Kichwa could assess the students. Students who were invited to Iyarina by the Kichwa community were being asked to learn about the rainforest and the priorities of the people living there from the perspective of indigenous peoples, where western thinking is not the dominant way of thinking. I thought that rather than using conventional assessment methods, the Kichwa would be

the best-suited for determining how students' knowledge could be assessed. This simple idea can lead to something powerful: people traditionally marginalized and excluded from knowledge production in western/ized universities can determine the methods of assessment for students whose learning will be accredited by those same institutions.

How does your sustainability science program find pathways for including people and perspectives that have historically been excluded from the academy? Indigenous people are one of many 'groups' whose exclusion comes from the difference between their epistemology and the hegemonic discourse. Having a diverse faculty, student body, and administration is one of the ways a sustainability science program can become more inclusive. Beyond employment and enrollment, programs can use transdisciplinary research methods to build partnerships with people who, like in the case of the Kichwa community at Iyarina, have much to teach western academia when we are invited to learn from them in their own contexts.

At ASU there is a preference for scaling up in impact in terms of quantity and reach. This approach to scale is a double-edged sword. On the one hand, it encourages outreach and collaboration on research projects with people and groups that might not otherwise be involved. This is the case both across and outside the university. On the other hand, when this form of scale interfaces with western traditions of progress and urgency, projects can move faster than the people working on them. In other words, people are sometimes fragmented, taken advantage of, or left behind in the wake of a project beholden to funding cycles, pressures to publish, or the priorities of those setting the agenda.

Scale doesn't always mean building out more broadly. Scale can also be about the depth of a relationship, the number of times you struggle to understand a person or a group and come back to the work, even when it's hard. It's likely that you already have ways of developing this kind of scale in your sustainability science programs. A big question for programs that want to support cognitive justice is how to normalize and incentivize scales that emphasize relational growth. This question is something we are actively pursuing as we work to develop the Atlas as a creative commons.

One important consideration is how the work of people and groups is acknowledged. My experience has been that acknowledgement in various forms is more common in the arts than in sustainability science. Crediting people's contributions is an important form of acknowledgement that happens in both fields, although in the arts I have noticed that more attention is paid to the initial ideas that first give projects their momentum. There are also differences in how people's efforts are compensated. Our Atlas community has a practice of providing honorariums or contracts to people who participate in panels, workshops, interviews, or curriculum activities—work that I have noticed was generally considered unpaid 'professional development' in my sustainability science program.

But beyond monetary compensation, one of the biggest differences in compensation I have seen between the arts and sustainability science is the effort that goes into maintaining partnerships between artists and communities of practice after a project ends. I describe this as compensation (which is in turn a form of

acknowledgement) because it generally leads to future paid work, as well as skill-building and developing one's professional portfolio. Certainly this happens in sustainability science, but in my experience, not with the same degree of recall that exists in the arts. It's not uncommon for someone I worked with several years ago to reach out to me for work on a new project, or vice versa. One of the factors I attribute to these kinds of partnerships is the strength of the relationships between the people working on them.

The way the Atlas contributes to this relationship-building is more subtle than the other ways I have described how people use creative tools. Relationships built through collaborations are underpinned by a commitment to horizontal thinking that seeks for people's perspectives and experiences to actively contribute not only to the projects, but also how we understand and appreciate each other as people. A practical example of this is how we have recently critiqued the Atlas for relying too heavily on western creativity theory, and encouraged practitioners like Marina Basu to pursue her reinterpretation of Atlas creativity in terms of Jiddu Krishnamurti's philosophy and methods. As I get to know Marina, our relationship becomes a blend of ourselves, our perspectives on creativity, our interpretations of the Atlas, and our impulse to seek interesting points of connection and understanding.

Marina: "Atlas for me is so much more beyond creativity. It is self-inquiry, and the creativity comes from the ability to do that. The creativity is almost a byproduct! Because what you are doing with the tools is removing barriers, judgements, blocks, justifications (excuses). You are noticing, observing, becoming aware. You are noticing

the details. And you are not distracted, disconnected, but fully present. You have brought your whole self. And you've let go of the blocks. And you've allowed yourself to be open to whatever comes up... you are ready and alert for surprises, insights. And in that creativity arises... bubbles up, because you've removed the stopper that was holding it in place.”

In sustainability science programs, space and time will need to be set aside for relational scaling meant to include invisibilized or ‘wasted’ experiences. One of the challenges we face is increasing pressure in academia to do more in less time (Manuel-Navarrete, Buzinde, and Swanson 2021). Faculty and administration can revisit their program policies for tenure or annual assessment to see whether existing metrics can be reframed or adjusted to prioritize their relational dimensions. Collaborative research, for example, inherently involves interpersonal work and skill building, but that is rarely the focus of such projects or how they count toward a faculty’s record. Is it possible to reduce the number of publications required, and increase the depth of the remaining publications to include the interpersonal and relational aspects that affected the trajectory and results of the project?

People in sustainability science programs that support cognitive justice will find a diversity of people, of theory, of methods of communication and collaboration, and of assessment metrics that fit these different approaches. The practical mentalities and foundations-as-principles in the Atlas can be used as markers to guide some of the cultural changes that will be required. Students in particular play an important role in

these shifts because they are often willing to point out the unstated assumptions and absences in university culture, and to experiment with alternatives.

Actionable Creativity for Co-producing Knowledge

Here's a question for those of you who are research faculty: Are there ever times when you want help communicating the relevance of your science to other researchers, policy makers, or the broader public? In an interdisciplinary class called *Animating Research*, we used creative tools as the foundation for artist/scientist collaborations aimed at communicating scientific work through dance, poetry, storytelling, and multi-media exhibitions. The class resulted in many outcomes, including an interactive, live performance dispersed throughout the Biodesign research building on the ASU Tempe campus. The performance was open to the public, and both scientists and artists were able to express their work in ways they had never done before.

We did something similar with the cross-listed Atlas course that combined dancers and natural scientists studying biodiversity. In both cases, creative tools were treated like boundary objects that had enough of a structure to form common ground, but enough ambiguity to be reinterpreted and applied differently by the people involved. I would describe this way of using creative tools as similar to the Mi'kmaw concept of *Etuptmumk*, which is Mi'kmaw for 'two-eyed seeing' (Reid et al. 2020). Two-eyed seeing refers specifically to being able to see, simultaneously, the strengths of indigenous knowledges/ways of knowing and mainstream or western knowledges/ways of knowing.

It is the kind of seeing fluent in people who occupy **liminal**⁷³ spaces, and is used in indigenous scholarship as well as feminist theory.

Sustainability science programs can use the actionable modes of creativity found in the Atlas to create fluency for this kind of two-eyed seeing, which is part of what makes inter/transdisciplinary research and teaching successful. This can happen in two main ways. The first is by using existing Atlas tools as boundary objects, as I described in Chapter 5. The second is by using the toolbox mentality to draw on the existing practices people already have for two-eyed seeing or other instances of liminal thinking and action. An important dimension of the creativity that underpins the Atlas is that the ways we already work, play, fix, express, etcetera—these ways can be practiced using some particular structures so that they can be tested and used in different contexts and, if desired, shared with others.

Rather than treating creativity like a black box, students and faculty in sustainability science programs can use the Atlas as a method for understanding and refining (or creating!) tools that promote effective knowledge co-production. The difference between structuring these as tools rather than methods or activities is more than semantics; a tool supports **productive ambiguity**⁷⁴ where a method or activity remains rigid or dogmatic. For me, the threshold of when something becomes a creative

⁷³ **Glossary:** A liminal space is the space that occupies the boundary or threshold of two spaces (or more), and can occupy both sides of that boundary at the same time.

⁷⁴ **Glossary:** Productive ambiguity is often described as one of the characteristics that makes boundary objects effective. Concepts in language, for example, have productive ambiguity when we can use them in multiple ways that allow people to make sense of the *particular way* they are being used based on the context. It is a form of productivity or utility achieved by being semi-flexible in interpretation and meaning.

tool is when it gains this productive ambiguity, or the ability to retain its structure even while being used in multiple contexts, because it is semi-flexible and interpretable.

Creative tools have origins in particular contexts. They are often developed in moments when people get stuck. When you are working with people inter/transdisciplinary sustainability projects who use different ways of understanding than you do, they might say or do something that leaves you speechless. Being speechless is a form of being stuck, and that moment of being speechless can be scary and frustrating, but also it contains the spark, the seed, for what can come next. Sometimes when we're in these moments, we do something 'without thinking', something that comes from our intuition. The Atlas has ways of trying to understand our intuition—what we're doing and where it comes from. Being able to co-create knowledges from different traditions involves getting into origins. Uncovering origins is a skill, it is practicable. In the Atlas, the practice of locating and understanding origins is one of main procedures involved in using a toolbox mentality.

A Final Remark

While research and storytelling can be very motivating, nothing is a substitute for practice. I hope you have found this research compelling and helpful. If you are curious to learn more by trying the Atlas for yourself, I will have done a good job. I really enjoy deepening and challenging my knowledge of the Atlas by sharing creative tools with others, and there are many others who feel the same way. Now is a good time to explore

how you can use some of the ideas and tools from the Atlas in your sustainability science work. Here is my final invitation to reach out if you have some questions or want guidance. Thank you for your interest in my research.

Warmly,

Matt Nock
Tromsø, 2023

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APPENDIX A
IRB EXEMPTION

EXEMPTION GRANTED

David Manuel-Navarrete Sustainability, School of 480/727-9235 davidmn@asu.edu

Dear David Manuel-Navarrete:

On 6/12/2018 the ASU IRB reviewed the following protocol:

Type of Review: Initial Study	
Title: Exposing our creative powers	
Investigator: David Manuel-Navarrete	
IRB ID: STUDY00008306	
Funding: None	
Grant Title: None	
Grant ID: None	
Documents Reviewed:	<ul style="list-style-type: none"> • InterviewScripts_Classroom_Movahed&Nock.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Intervention_ConsetForm_Movahed&Nock.pdf, Category: Consent Form; • InterviewScripts_Longitudinal_Movahed&Nock.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • 503A_Final_Movahed&Nock.docx, Category: IRB Protocol; • Classroom_ConsetForm_Movahed&Nock.pdf, Category: Consent Form; • RecruitmentFlyer.pdf, Category: Recruitment Materials; • Longitudinal_ConsetForm_Movahed&Nock.pdf, Category: Consent Form; • RecruitmentScript_Movahed&Nock.pdf, Category: Recruitment Materials; • InterviewGuides_Movahed&Nock.pdf, Category: Measures (Survey questions/Interview questions/interview guides/focus group questions); • Procedures_Detail.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • InterviewScripts_Interventions_Movahed&Nock.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (1) Educational settings, (2) Tests, surveys, interviews, or observation on 6/12/2018.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,
 IRB Administrator
 cc: Matthew Nock

APPENDIX B

SAMPLE INTERVIEW CONSENT FORM

Consent Form

Title of research study: Exposing our creative powers

Research Team

Principal Investigator:

David Manuel-Navarrete, Assistant Professor, School of Sustainability Arizona State University

Research Facilitators:

Matthew Nock, PhD Student, School of Sustainability, Arizona State University

Why am I being invited to take part in this research study?

We are inviting you to participate in this research project since you have some relationship or practice to creativity, creative tools, interdisciplinary work, or the critical response process.

Why is this research being done?

We are curious about the role that creativity and people's quest for meaning can play in larger scale efforts for social transformation. We wonder how people navigate the difficult reactions, feelings, and choices that sometimes accompany thinking and acting creatively.

How long will my participation in the research last?

Your participation in the research can last for as long as our interview lasts. If you feel inspired, you may continue to contribute to the research after our interview by sharing more about your use of creativity or creative tools in your field.

How many people will be studied?

We expect about 20 people will participate in this research study.

What happens if I say yes, I want to be in this research?

You will participate in an open-ended interview about creativity and creative tools. The interviews will be transcribed and used as data for this study.

What happens if I say yes, but I change my mind later?

You can leave the research at any time it will not be held against you. In particular, you may choose to tell me that you want the recorded interview to be deleted or for you to remain anonymous contributor to the research.

Are there any risks posed by participating in this study?

We do not anticipate any physical, social, legal, or economic risks. You may engage in reflective conversation that may lead you to consider deeply held beliefs, habits, attitudes, and assumptions about yourself. You may feel uncomfortable when you participate in dialogue that ask you to confront these personal dimensions. While we do not foresee any significant psychological risk, the potential exists for you to desire more psychological support

than we may be able to provide. You can withdraw from the study at any time. The following resources are available you from ASU and in the Tempe area:

ASU Counseling Services: <https://eoss.asu.edu/counseling>

- Downtown Phoenix: 602-496-1155
- Polytechnic: 480-727-1255
- Tempe: 480-965-6146
- West: 602-543-8125

Tempe Counseling Program: <http://www.tempe.gov/city-hall/human-services/care-7/counseling-services>

- (480) 350-8308

Will being in this study help me in any way?

We cannot promise any benefits to you or others by taking part in this research. However, possible benefits include the processes of self-discovery that result from reflective dialogue. You will also have access to the interview media files and transcript after the session concludes, should you wish.

What happens to the information collected for the research?

Efforts will be made to limit the use and disclosure of your personal information, including research study records, to people who have a need to review this information. Given the digital nature of the interviewing process, we cannot promise complete secrecy. The results of this study may be used in reports, presentations or publications but your name will not be used without your specific consent as to what is attributed to you. Any requests to attribute a quote to you in the research will be made by telephone or email in advance of any publication. Without your consent, your name will not be shared.

Who can I talk to?

If you have questions, concerns, or complaints, reach out to the research facilitators:

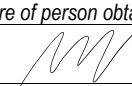
Matthew Nock: mmnock@asu.edu

This research has been reviewed and approved by the Social Behavioral IRB. You may talk to them at (480) 965-6788 or by email at research.integrity@asu.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research participant.
- You want to get information or provide input about this research.

Signature Block for Capable Adult

Your signature documents your permission to take part in this research.

<i>signature of participant</i>	<i>date</i>
<i>printed name of participant</i>	
<i>signature of person obtaining consent</i>	<i>date</i>
	
<i>printed name of person obtaining consent</i>	

APPENDIX C

PERPETUAL PROMPT: I CAN KNOW THE ATLAS BY...

I can know the Atlas by....	Taking the classes about it, learning tools and principles, experimenting, applying them to projects
I can know the Atlas by....	Helping to teach those classes, learning from students and the teaching staff, and understanding the tools as a teacher and facilitator of them
I can know the Atlas by....	Helping to evolve those classes by developing curriculum
I can know the Atlas by....	Working on applied projects where Liz and her team has been asked to come in and use tools from the Atlas for teaching, workshops, etc.
I can know the Atlas by....	Working on sharing projects where the Atlas is being translated and shared into other contexts, such as EdPlus, MLFTC, and YBCA
I can know the Atlas by....	Conduct research interviews with practitioners of the Atlas and a) share those stories; b) analyze those stories in terms of theory; c) look for ways that practitioners' knowledge can inform research and practice in sustainability
I can know the Atlas by....	Integrating tools and principles of the Atlas into my own teaching in SOS
I can know the Atlas by....	Using it in my non-work life, in the context of navigating society and the relationships I am in, paying attention to how it interfaces with my dominant ways of knowing (learned ways/socialized ways) and with cultures
I can know the Atlas by....	Applying its principles to the institutionalized process of individual dissertation-writing in order to propose an alternative to that model

APPENDIX D

DEDUCTIVE THEMATIC ANALYSIS CODE MANUAL

Northern Epistemologies	Epistemologies of the South
abyssal lines	ecology of recognition
imponent reason	ecology of trans-scale
arrogant reason	ecology of productivities
metonymic reason	ecology of knowledges
logic of nonexistence: the ignorant	systems of knowledges
logic of nonexistence: the residual	intercultural translation
logic of nonexistence: the inferior	sociological imagination
logic of nonexistence: the local	epistemological imagination
logic of nonexistence: the nonproductive	valorizing subjectivities
proleptic reason	destabilizing subjectivities
dichotomies masking hierarchies	action-with-clinamen
individualism	
worship of the written word	

APPENDIX E

ABYSSAL THINKING AND ABYSSAL LINES

Santos describes modern western thinking as an abyssal thinking (ibid, 118). Abyssal thinking is a way of thinking that creates radical distinctions. The distinctions form lines, and the lines are radical because they divide social reality into two realms: this side of the line and the other side of the line. I have created some figures to illustrate one of Santos' examples of abyssal thinking.

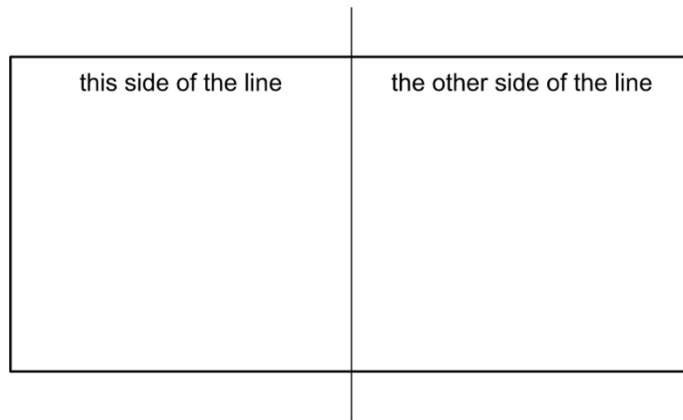


Figure 4. Two Sides of the Line

Distinctions on 'this side of the line' are visible, because they exist within the bounds of the comprehensible realm of existence. By comprehensible I mean that there are methods, logics, grammars, and forms of reasoning that are known and used to structure the distinctions. They are the epistemological soil from which comprehension and dialogue can grow. Disagreement is inevitable, and the lines that create distinctions are thus the subject of scrutiny and debate, struggle and resistance. Consider the distinction between legal and illegal, represented by the red line:

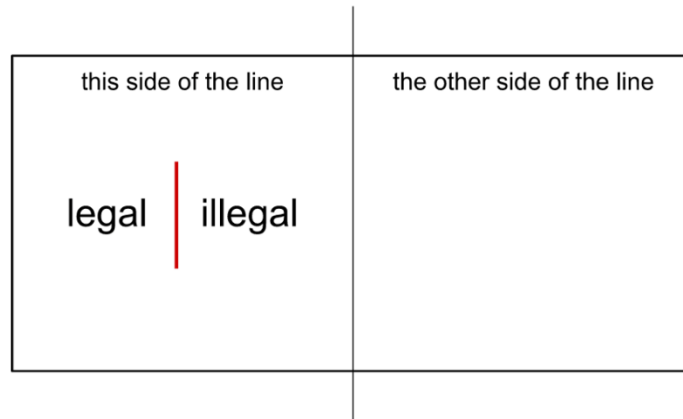


Figure 5. A Visible Distinction

Whether something is legal or illegal is regularly contested on this side of the line. In some democratic forms of government, for example, political discourse and legislation is a common method of contestation. To be sure, a society will have dominant conceptions of legality that by large degrees shape the discourse and trajectory of legal conflicts. This includes both “substantive issues and procedures” (ibid). In the case of US law, issues are those things codified into law (murder, robbery, speeding, paying taxes), and procedures are ways of codifying (legislation, precedent, courts of law, tribunals) and the means by which monitoring and enforcement is achieved (surveillance, incarceration, execution). But no matter how different the various substantive and procedural distinctions between *legal* | *illegal* may be, they have in common that they are visible distinctions on this side of the line.

What of the other side of the line? What can be beyond legality and illegality? Lawlessness, nonlegal, or alegal, Santos writes. Let us consider lawlessness. It is not the negative of legality. Rather, it is the absence of the *legal* | *illegal* distinction. On the other

side of the line, the substantive issues and procedures of legality do not apply. Not only do they not apply, but they are incomprehensible on the other side of the line. It is “the realm beyond legality and illegality” (ibid, 123).

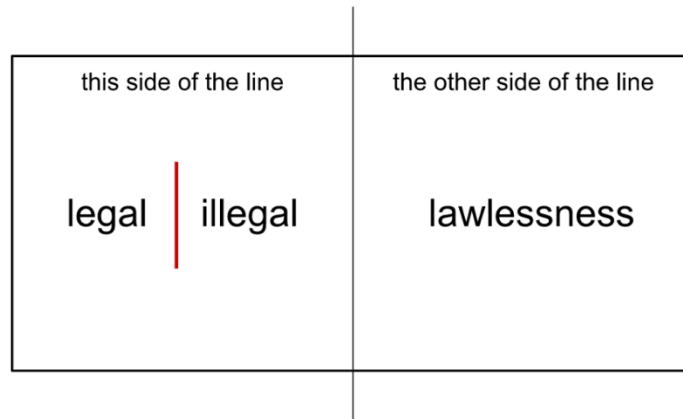


Figure 6. A Radical or Invisible Distinction

Recall that the red line separating *legal* | *illegal* is a visible line, subject to debate. Now we must address the line that separates ‘this side’ from ‘the other side’. What of this line? It is an abyssal line, created by abyssal thinking. Santos writes that abyssal thinking consists of “a system of visible and invisible distinctions, the invisible ones being the foundation of the visible ones (ibid, 118). This means that, in our example of modern law, it is the existence of the abyssal line, or invisible distinction, between *legal* | *illegal* and lawlessness that permits the visible distinction between *legal* | *illegal*. This reformulation of the visual may help illustrate this:

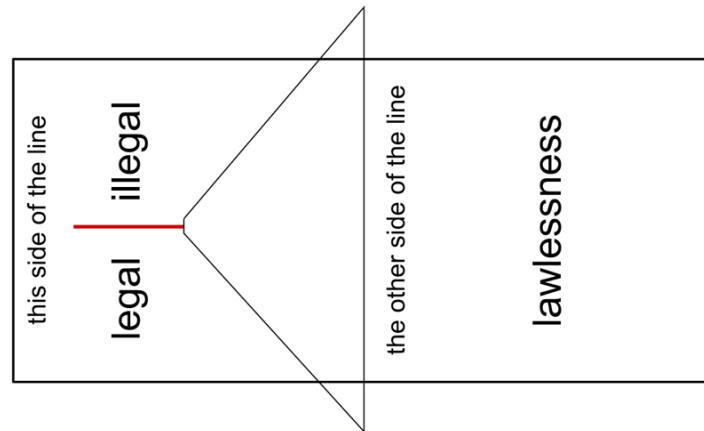


Figure 7. The Invisible Distinction Supports the Visible Distinction

What is the boundary of the universe made of? This question doesn't make much sense if we assume there is one universe, and nothing can exist outside its boundary. This is a metaphor I came up with to describe the the experience of abyssal thinking and abyssal lines. If we think there is one universe, then wondering what the boundary is made of is at best uninteresting, and at worst unimaginable. Upon discovering something surprising at the edges of existence, we would simply expand the boundary to include it ad infinitum. The boundary of the universe would have no meaning, no significance, and thus become invisible.

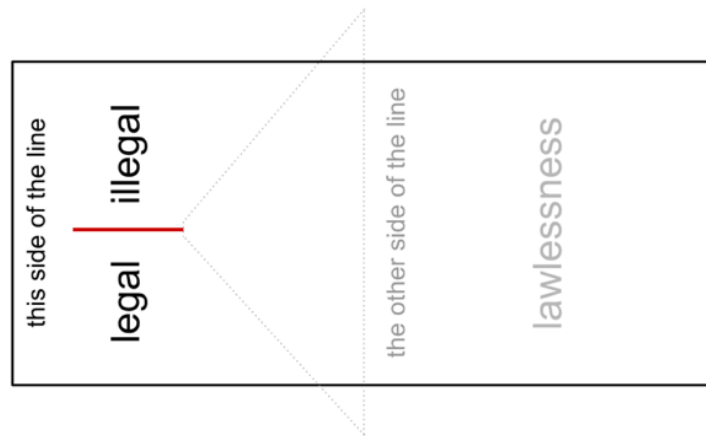


Figure 8. The Line and the Other Side of It Become Invisible

It is the hegemonic character of law in western modernity that makes the abyssal line invisible, or “produced as non-existent” (ibid, 120). By nonexistent, Santos means that whatever lies on ‘the other side of the line’ does not exist in any “relevant or comprehensible way of being”. Alternatives to the *legal* | *illegal* distinctions do indeed exist in the world, but they do not exist in the minds of societies and people who produce them as nonexistent using forms of reasoning, which I discuss below.

Just as when we imagine there is one universe, when we think in terms of universals, boundaries vanish, and we cannot imagine beyond them. It is Santos’ abyssal thinking that describes the existence of the line that separates this side from the other, how it is produced, and how the very logic that produced it also makes it vanish. It is Gramsci’s hegemony, Bourdieu’s doxa, and Foucault’s power/knowledge that describe experience of universality and normalcy on this side of the line. Universality and normalcy can lead one to view the world and its epistemological possibilities like this:

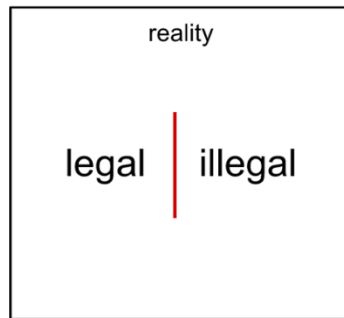


Figure 9. An Idea of Reality Normalized by Abyssal Thinking

Santos describes Guantánamo as an exemplar of abyssal legal thinking. It is a physical place that also occupies the other side of the line as a “nonarea in legal and political terms”. (Santos 2014, 124) The principles of law, human rights, and even democracy not only do not apply to Guantánamo, but are unthinkable in that context. However, he reveals an important character of abyssal lines when he points out that Guantánamo is not exceptional in this regard:

There are many other Guantánamos, from Iraq to Palestine to Darfur. More than that, there are millions of Guantánamos in the sexual and racial discriminations both in the public and private spheres, in the savage zones of the megacities, in the ghettos, in the sweatshops, in the prisons, in the new forms of slavery, in the black market for human organs, and in child labor and prostitution. (Santos, 124)

This illustrates how abyssal lines are more than the conceptual products of abyssal thinking. It is true that one form they take is the ‘conclusions’ reached by individuals, groups, and societies thinking in terms of Northern epistemologies. But abyssal lines are

experienced by the people they affect, as well as those who affect them. People are living in Guantánamo, made possible by abyssal thinking and abyssal lines. It's existence on the island of Cuba is made possible as much by steel and concrete as by the abyssal thinking that formed its epistemological foundation and people's justifications for its continued existence.

So abyssal lines are lived experiences for those on both sides of the line. For those on the other side of the line they are often experienced as forms of appropriation or violence, but for those on this side of the line they may be recast as expressions of saving, civilizing, emancipating, empowering, or in the case of Guantánamo extracting information to save lives and serve justice.

Of course, acts of appropriation and violence do happen in the geographical North, in spaces where abyssal thinking is the dominant way of thinking. There are abuses and murders in western countries, just as land and knowledge are appropriated by corporations and governments. But these acts are (unevenly) subject to and addressed by the laws of those countries. On the other side of the line, often in the geographical south of former colonial zones or current war zones where neither emancipation nor regulation apply, appropriation and violence seem appropriate or even justified.

Santos sees two major global abyssal lines that have evolved over the past few centuries and operate differently, but are interdependent. They are abyssal lines of law and lines of knowledge (ibid, 119). Regarding the lines of knowledge, it is not the *legal* | *illegal* distinction of modern law, but rather conflicts over *true* | *false* between western science, philosophy, and religion that comprise the visible distinctions on this side of the

line (with western science claiming the mantle for the real access to truth since the enlightenment period).

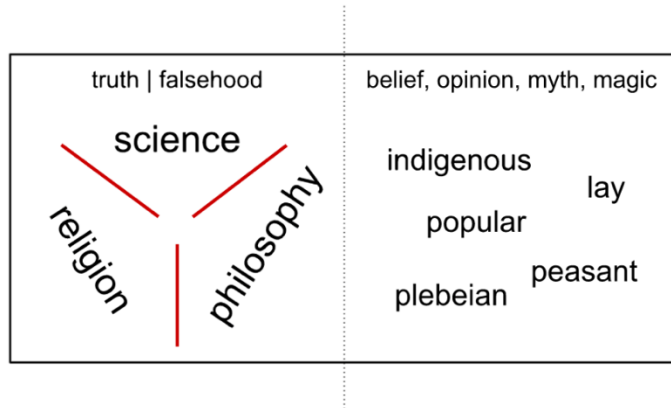


Figure 10. Visible and Invisible Distinctions for Accessing Truth

However, just as with law, these visible distinctions are made possible by an invisible distinction between ways of knowing that have access to truth and those that don't, which are on the other side of the line. These other ways of knowing are "beyond truth and falsehood" (ibid, 120). This was the critique that Polanyi leveled at positivist science, which presumes that authentic truths can only be known through logics and methods that objectify, not from subjective knowledge and lived experience (Polanyi 1966, 99).