Thinking Outside the Chute: Following a Rhizome of Waste and Culture

by

Eliana Cristina Mozo Reyes

(Under the Direction of Professor Jenna Jambeck)

Abstract

In the changing landscape of solid waste issues, globalization of waste is becoming a growing concern for engineers. As issues like the amount of plastic in the ocean concern multiple cultures and countries, there is a need to study cultural nuances in relationship to waste behavior and waste generation. This study challenges current conceptual, methodological, and representational assumptions from an engineering perspective in order to navigate questions about the intricacies of waste generation in two different countries. The countries, the United States of America and Colombia, have plenty of differences when it comes to the type of waste and waste problems currently being addressed. Through the use of qualitative inquiry, this study highlights the way cultural differences make their way into waste beliefs and consequent behavior demonstrated in public spaces like the food court of two regional malls. As part of cultural traits, this study explores how history interlocks with waste creation, interaction, ambience, and behavior through the exploration of the poststructural rhizome. Historical events, developments and personal history were found connected to current concepts of waste in both countries. In revealing exploration and connections, multi-dimensional models of historical development represented a new way to learn about waste history. Additionally, this study moves past specific group-blaming for waste creation showing parts of the cycle that make waste possible. Interaction with waste changes according to development and culture in different countries, as do assumptions and beliefs about the process of waste management. Some typical attitudes in each country present different levels of environmental consciousness that are worth noting in the final chapter of the document. In general, the writing style, theories, processes, and representation of this study

challenges the way we conduct engineering research, but at the same time it offers a creative way to think outside the box of objectivity, replicability, and generalization.

Index Words: Rhizome, Waste, Culture, Globalization, Engineering, Research

Thinking Outside the Chute: Following a Rhizome of Waste and Culture

by

Eliana Cristina Mozo Reyes

B.S., University of Saint Thomas Aquinas, Tunja Colombia, 2007

M.S., University of Georgia, Athens, Georgia, USA, 2012

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

Doctor of Philosophy

Athens, Georgia

2016

Thinking Outside the Chute: Following a Rhizome of Waste and Culture

by

Eliana Cristina Mozo Reyes

Major Professor: Jenna Jambeck

Committee: Thomas Lawrence
Trena Paulus
Elizabeth St. Pierre

Electronic Version Approved:

Suzanne Barbour
Dean of the Graduate School
The University of Georgia
December 2016

To my family,

those who are here,

those who have passed away,

and those who are on the way...

Acknowledgements

I want to acknowledge the many people who have influenced and helped me develop this work. Thanks to my wonderful advisor and role model, Jenna Jambeck, who has showed me how to be successful in changing the world from different roles in one's life. Thanks to my committee members Trena Paulus, Tom Laurence, and Bettie St. Pierre, for their time and support as I navigated the complexities of this interdisciplinary study. Thanks to my husband Luis Miguel Cortes-Pena, for all the late nights he put into helping me achieve this goal. Thanks to my parents Jose Vicente Mozo Y Maria Cecilia Reyes and my sisters Diana Mozo Reyes and Liliana Mozo Reyes for always believing in me even when I had my doubts. Thanks to my best friends Carlos, Andres, Andrea, Margarita, y Natalia, who were always there in times of crisis. Thanks to my aunt Mimi and her wonderful family for supporting my research in Colombia. Thanks to the malls' staff who talked to me and offered their great perspectives into this research. Thanks to all the wonderful people I met along the way who wanted to share their experiences with me. Thanks to my grandparents Vicente, Mercedes, and Georgina for the teachings that propelled this study. Thanks to my extended family and in-laws for their support and words that inspired many ideas. Thanks to the custodians of my engineering building (Ms. Louis, Angie, and Aretha) and those who shared with me and showed me part of the world they live in. Thanks to the additional professors who helped me push boundaries to understand the nuances of the human mind. And finally, thanks to all of those who on some way have inspired me to keep fighting for my goals.

Contents

List of Figures

Chapter 1

INTRODUCTION

Imagine a world without waste. Despite the fact that I may not have a job in this scenario, many of us believe that this is a goal worth working towards. From what I have observed in the USA in sustainability programs, states, cities, and universities come together periodically to acknowledge waste reduction and often set goals to lower percentages of waste in the upcoming year. Reducing solid waste is, however, a complicated topic of conversation in other countries and cultures. People in other countries find themselves in confusing situations when it comes to solid waste management. This is particularly concerning since the World Bank estimates that waste generation rates will more than double over the next twenty years in lower income countries (Hoornweg, Bhada-Tata, & Kennedy, 2013). Moreover, as the global impacts of solid waste rapidly grow, solid waste management, especially in low income countries, should be an urgent priority, as well as mitigating the effects of urbanization in developed countries (Hoornweg et al., 2013). It is our job as environmentally-focused engineers to explore culturally appropriate ways to address the issue.

1.1 The Problem: Counting on Culture

1.1.1 Cultural Nuances and Problem Statement

Culture is a complex concept with many parts connected in many subtle ways to people, as in the same way, waste connects to both culture and people. Representing these connections, however, is complicated using current discursive (language) tools in engineering—we use terms like comparison, causation, correlation, generalization that constrain connections. This reminds me of my adventures learning English as a second language, specifically how I struggled a little with the use of *many/much* and related terms, and how I was taught a helpful distinction. I was taught that the former was used for items that could be counted as the latter would help me describe that which cannot be counted. Although, I learned later that this was a grey area and I could use a spectrum of words to describe amounts, this distinction comes to mind as I ponder if I can count cultural connections to people or the variables in the interdependent entanglement of culture. Since most engineering efforts are deeply rooted in the technical, the numerical, and the need for generalization, cultural implications of problems are often a forgotten aspect of engineering strategies. This occasionally leads to ill-advised solutions for "problems" in some countries or cultures. Engineers, then, need to learn alternative ways to explore and explain global waste while being culturally mindful.

1.1.2 Objective and Research Questions

In this study, I propose new design and development paths that take into account cultural nuances when addressing global solid waste management. Specifically, I use the postmodern rhizome[1] theory to explore socio-cultural entanglements of waste in two small cities of Colombia and the United States of America. To guide the study, I explored questions about the history, creation, interactions, and culture behind the current waste management system

[1] See Rhizome in A.

for each country. That is, I wanted to know:

- How do socio-cultural aspects relate to current or historical infrastructures of waste management in countries like Colombia and the USA?
- How is municipal solid waste (MSW) created, particularly in a public urban space, in small cities of the two different countries?
- How do people interact with MSW once created? And,
- What socio-cultural aspects relate to sustainable behavior around waste?

And, the wide umbrella of my questions represented the flexibility that I was consciously trying to include in my outside-the-box engineering approach. However, they also acted as a propulsion system for new experiences, new challenges, and new questions that brought me to this point.

1.2 The Why Phase/Significance of the Problem.

Most children go through the phase of asking why, which is one of the most crucial ways for learning. But, should we grown-ups bother to ask the question? Well, yes. We should. Why? I am glad you asked.

Asking why allows us to explore preconceptions and break through them, opening our minds to new developments and innovation, which is one of the tenets of engineering. We encourage others to question everything. In the same way, we should question traditional engineering methods. I am not the first academic to wonder *why we are doing things this way*, in environmental engineering, not even the first one in people-centered sustainability. Osbaldiston created a tools analogy to explain the need for alternative perspectives with "the hammer of experiments might not be sophisticated enough to drive the nail of behavior" (Osbaldiston & Schott, 2012), meaning that our current engineering techniques might be ill-fitted to explore sustainable behaviors. At this point, we open up two different research paths,

either we focus on the predictable numerical aspects of globalized waste, by, for instance, coming up with mathematical models that work in paper (Santibañez-Aguilar et al., 2015). Or, we create interdisciplinary partnerships and embed ourselves into socio-cultural theories and holistic approaches that allow us to address the problems of an entangled/fluid future. The National Academy of Engineers (NAE) recommends the latter (Clough, 2004, p. 21).

In this impending future, the people aspect of solid waste is crucial as are new analytic tools to explore it. It has been estimated that 2 billion metric tons of municipal solid waste was generated in 2015 globally and our waste will continue to grow with increased population and increased per capita consumption (International Solid Waste Association [ISWA], 2015). Because of this, there is a real need for exploring people's relationship with waste and the socio-cultural structures behind it in different countries (Gille, 2007). Things happen differently in various cultures, and as a bicultural person I am privileged to see from two different perspectives. As an example of socio-cultural structures, languages and dialects play a critical role in the definition of trash. Solid waste (USA term) and *residuos solidos* (Colombian term), for instance, carry the same official/structural meaning, but in the socio-cultural perspective, waste and residuals have significant distinctions that are not taken into account in traditional engineering methods.

By using poststructural theories instead, we can begin to understand the waste/residual distinction as a *point of tension* which is conducive to a more revealing path for cultural exploration (Lyotard, 1979/1984). Through a word search in Google, waste is defined as "material that is not wanted; the unusable remains or byproducts of something." (Google, 2014a). Instead, residual (as waste is called in Colombia) is defined as "a small amount of something that remains after the main part has gone or been taken or used." (Google, 2014b). This simple juxtaposition, takes the conversation to another level of exploration where it is possible to ask if there are clear differences between the kinds of discarded items in the United States of America (USA) and in Colombia. Questions often lead to more questions, usually in connective *chains*, when trying to analyze cultural traits or behaviors—but perhaps it is

better to replace chains with *paths*, since the process depends on fluidity and movement. It is mostly about letting go of the squared answer that could not fit into the round hole of the next question. It is, as my advisor puts it, following an organic process of discovery, or as Angell (2014) describes it, as unorthodox as it seems, following a *stressed rabbit* all the way through Wonderland. It is following *lines of flight* to uncharted territory (Deleuze & Guattari, 1980/1987). It is connection, and wires, and bridges. It is a rhizome (Deleuze & Guattari, 1980/1987).

1.3 Theories, Methods, and the Rhizome: Pick a Wire, Any Wire...

Pick a wire, any wire, pick a bridge, any bridge... Focus on it and follow. Now stop! Stop in the middle... What do you see? Where are you in space? Where are you in analysis? Are you at point A or point B? Neither or both?

It is not easy being in the middle, on the edge, untethered...you are neither here nor there and life *becomes* a world of *meltings*. One of the scariest thoughts for me, as I started my journey into social sciences, was that I would lose my engineering credibility. This fear was reinforced by constructivist experiences of third person studies in which I felt the heavy weight of a researcher privileged position. For example, acting as a fly on the wall felt like abandoning my engineering nature of hands-on seeker of change. Perhaps for that reason, I started clinging too hard to critical theory[2]. I still wanted to achieve positive change in environmental issues and I thought critical theory would offer a good balance between engineering and qualitative inquiry. I was convinced that critical theory would allow me to keep my engineering position while helping me promote sustainable change. I did not want to explore postmodernism[3]. It was much scarier, but then, I met the rhizome, and once

[2]See Critical Theory in A
[3]See Postmodernism in A

I did, that was all I was seeing. Postmodernism did not become less scary, but it became challenging, exhilarating even. It became a way to break through the walls of a box that had trapped me for too long.

I did not come to poststructuralism/postmodernism because I wanted to read the highly philosophical texts of Lyotard, Foucault, Derrida, Deleuze and Guattari, etc., instead, like many poststructural scholars (Cole, 2014; Hundley, 2007; T. A. Richardson, 2008; St. Pierre, 2001), I came to the theory because I needed new language to express myself. I needed a way to express the haunting ideas forming in my mind, playing tug-of-war with engineering principles. I needed theories that allowed me to think what I had not been able to think before. poststructuralism, most specifically the rhizome, allowed me to see my engineering and social learning *becoming* one inside my head in an interchangeable dance of learning metaphors and rhizomatic *lines of flight*. A dancer at heart, I dance by following the music not counting the steps, and the rhizome allows me to dance my way through academic exploration. That is, following *lines of flight* is like coming from one movement to the next organically and naturally forming something else in the entanglement of movement, like following a train of thought...

> With my electronics engineering undergraduate degree, I am familiar with separate parts that connect to form systems.
>
> I learned to see microchips as parts of a puzzle that I could control and manage, but I also learned that they are composed of smaller parts that influence and are influenced by the rest of the system.
>
> In poststructuralism, concepts are like microchips, we can use them to produce strategies and designs, but they also depend on their own connections both internal and external to function properly.
>
> However, concepts, like microchips, have become such a prevalent part of the system that we have stopped questioning their internal connections or their applicability. In the words of St. Pierre Cartesian concepts have "become so normalized, we have forgotten that we made them up." (St. Pierre, 2012).
>
> Blind faith in concepts represents a problem when we are trying to force concept-based strategies into a cultural environment that does not clearly support them.

> Poststructural theory moves past the rigidity of concepts and puts them in display as fluid entities that evolve and develop depending on their part in the story (Schwandt, 1997). In this poststructural study, the concept of waste is analyzed in motion as it relates to and depends on a socio-cultural environment.
>
> Unlike in purely engineering approaches, the concept of waste will not be the star of the show, since the main characters are cultural connections, lines in the middle that took me elsewhere and led me to new knowledge, and my own version of wires and bridges.

Rhizomatic thought allows us to follow seemingly unconnected paths according to our own personal experiences and beliefs to discover a doorway to the metaphorical *big picture*, throughout the entire research, from planning to representation. On the analysis and representation side, for instance, "following lines of flight means making connections between quite different thoughts, ideas, pieces of data, discursive moments." (Honan & Sellers, 2006). In rhizomatic representation, this usually translate into a text living in different *plateaus* (i.e., a non-defined middle), presenting *lines of flight* bringing together seemingly different things—engineering and social sciences—into a moment where they *become* one (Deleuze & Guattari, 1980/1987, p. 24). Hence, there is flexibility to read rhizomatic texts in any order, with chapters as plateaus that do not follow a hierarchical order (Deleuze & Guattari, 1980/1987, p. 9). However, in the same way that the rhizome offers the freedom to fly away chasing a thought, during fieldwork, it wants to work for us when choosing research methods, but asks us to beware of *methodolatry* (i.e., idealizing the method) to avoid constraining a rhizome by forcing methodologies (Honan & Sellers, 2006).

Methodologies and methods are supposed to work for researchers in exploring the research problem, but they also can result in application-driven research adjustments, as I found while trying to force a rhizome into an ethnographic study. I learned that it is very difficult to pursue lines of flight when tied to the method and application as the focus of a study. Planning the research, ethnography seemed like the appropriate choice—one of the only ones—since it would allow me to look at culture in a people-driven methodology, where I could still be part of my research. Ethnography would allow me to identify, define, and connect people to their

environment, but it would mean being tethered to a central context that would interfere with my exploration of waste entanglements. Therefore, following ethnography's rules (Emerson, Fretz, & Shaw, 2011), presented me with a conundrum between methodology and theory in the field: How could I stay in one place when a *line of flight* invited me away? Not ready to let go of living the research, reading, writing, taking pictures, collecting items, and having conversations called *ethnographic interviews* (Roulston, 2010)—which became rhizomatic in nature during research—I adjusted into a case-study with ethnographic methods. I was still trying to fit the theory into a methodology, while my cultural focus and rhizomatic nature made me go through the metaphorical rabbit hole at every turn of the research. Then, after much reading and writing while feeling not methodical enough for social sciences nor technical enough for engineering, I ended up embracing the freedom of a new empiricism and innovation (St. Pierre, 2016).

Innovation is something that engineers are very interested in, be it while building bridges, circuits, addressing global sustainability, or creating new paths for exploration. The role of the rhizome as an analytical tool becomes interesting since engineers are often exploring and optimizing connections. In every engineering area, we are re-designing and re-building in an ever-changing non-stop evolution of our own discipline. In electronics engineering, we connect with adaptable wires. In civil engineering, we connect with bridges or roads. In the same way, environmentally-focused engineers could use the rhizome to make connections. For instance, in global issues, the rhizome allows us to create connections between seemingly unconnected paths, opening up a (quite literal) world of possibilities. In modeling and design, the rhizome encourages iterations through the design of models, analysis, and re-design in multiple iterations potentially for infinity. Constant iteration is entirely rhizomatic, evolving with people, with the needs of the current momentum. Also, the rhizome is living in between yesterday and tomorrow in a constant state of *becoming*, in a fleeting present that is both past and future, which also represents the core principle of sustainable development of creating a prosper future without sacrificing the natural environment (Clough, 2004, p. 21).

1.4 Adventures with the Rhizome: Life Is Messy

Life is messy. Why, then, should we expect research about life to be any different?

As an attempt to keep order and make sense of all the things around us, we have developed structures that allow us to compartmentalize and focus. Priorities let us pick and choose what to observe at any one time and have made countless issues more manageable. Even while conducting this research and writing this text, I realize the importance of separating the work into manageable pieces. However, and this is critical, sometimes we focus so much on one controllable part that we forget to check how the system works together. We can dive so deep into one heavily constrained issue that solutions become bounded and specific. In the case of environmental engineering, and specifically waste management, we focus on numbers control, on places for solid waste disposal, on technical processes and the quality of them (Mozo Reyes, Jambeck, Reeves, & Johnsen, 2016). We focus on how to fix what we already know, on patching up holes on an already flawed system. A system that is currently plagued with uncertainty and whose rules are most of the time random and arbitrary if we expand the focus wide enough (Karadimas & Loumos, 2008).

Therefore, this story is not the story of a trash bin, or a community, or a landfill, although they are both valuable in the grand scheme of environmental sustainability and solid waste management, this story is about the entanglement of life. Thus, entangled, the writing will focus on exploring *plateaus*, in which ideas connect both with the whole, as well as with their internal entanglements in what is both an independent and connected matrix. This type of writing comes from the rhizome postulate itself and the experience of its originators who would watch "lines leave one plateau and proceed to another like columns of tiny ants." (Deleuze & Guattari, 1980/1987, p. 2). They made sure that plateaus could be started anywhere and were circular, "but only for laughs" (Deleuze & Guattari, 1980/1987, p. 9). This distinction is important because if we were to take it seriously and follow the exact same steps that Deleuze and Guattari's followed while developing the idea of rhizomatic thought,

we would not be embracing the true spirit of the rhizome, the freedom of movement with the desire to make it work for us (St. Pierre, 2004).

In this study, the rhizome allows me to tell the story of waste from a cultural perspective, from my own cultural perspective, and that of the people involved in my study. It helps me, like it had helped poststructural researchers (St. Pierre, 2001), figure out that a rhizome makes no distinction between the voices of scholars, participants, colleagues, professors, friends, and even the author of a text because voice is a constraining concept (Jackson, 2003). It allows me to move between countries, cities, places, situations, and even allows me to be one and many at times. I play with pronouns and voices talking as myself (I), as part of rhizo-interested scholars, engineers, Colombians or any group of people (we), and even as devil's advocate by asking and answering questions to myself (you). There are also asides of thoughts or writings that are part of the research experience and reflect how writing helped develop my vision for this thesis. I am in this research the narrator and the orchestra conductor that presents the characters and situations. I am the character through whom the reader gets to experience situations and additional characters, but I am not the beginning, nor the end. I influence my research environment as it influences me leaving me a part of the entanglement, leaving me a middle to be picked up or ruptured depending on the reader's preferences.

Defining characters in a people story is not easy task, much less in a rhizomatic story, where everyone seems connected, but sometimes the characters appear inside the entanglement of the story and from there they help the author explore further. From the one person juggling a thousand things every day to the thousands of people who interact with waste in one way or another; or even the cultures, countries, places, and laws creating structures to manage and define waste; along with tiny samples and personal experiences, there is an entanglement of characters that make up this story. Focal characters were initially customers of mall food courts, however, as my thought became more and more rhizomatic, I found stories that pulled me without initial logic, without progressions and order. In the chaotic

experience of life, I learned the story of a sweeper, of stealthy informal recyclers, of the custodial staff of both malls, and of the leader of formal recyclers. I learned academic/engineering perspectives of the next generation of technology producers. I saw relationships with the past through the eyes of history's official and unofficial curators. I even saw my sustainability-advocate self-reflected on the stories (see Appendix B) of my family and friends, showing me my own rhizomatic *becoming* of past, present, and future that would further blur the lines between researcher and research.

So, this story is about navigating cultures and global perspectives in the rhizomatic journey of one engineer turned part philosopher. As another character of the story, I present the theories that allowed me to think what had not being thought, the history of waste structures contributing to the meaning of waste, the stories behind creation and acknowledgement of waste, the relationship that different characters have with it, and some interesting thoughts through observations and recommendations.

- In the **background/edge people** chapter, I discuss theories and methods used in this study, including the global crisis of waste, some background, qualitative inquiry and poststructuralism, engineering ontological history, the rhizome, context and methods.

- In the **history** chapter, I will present historical waste structures in two cultures, discuss entanglements of waste history/culture, present two rhizomatic models of historical development, and discuss people-waste tradition.

- In the **creation** chapter, I will talk about how solid waste is generated by exploring questions of who, where, and when waste is created, explore life in each city to determine connections with waste behavior.

- In the **interaction** chapter, I will expand upon people's relationship with waste, discuss waste management for the two cities, explore waste interactions of waste management workers, and discuss some ideas and misconceptions around waste.

- In the **hidden gems** chapter, I will talk about cultural traditions tangentially related to waste such as food times and family, and I will share some other cultural curiosities that could potentially play a role in waste behavior.

Closing the document, I will discuss the research questions and what it means for the concept of waste. I will reflect on the present and future of waste behavior and environmental engineering and the engineering obsession for step-by-step procedures and process rigidity. However, I will offer rhizomatic recommendations to explore waste in other cultures and perhaps even to translate into alternative sustainability endeavors.

1.4.1 Disclaimer

This dissertation is not a typical engineering dissertation, but that is probably obvious by this point. It is not even a typical qualitative inquiry dissertation, which it is expected from an engineer. This dissertation, like the rest of the work, lives in a multiplicity which represents my own *becoming* between engineering and philosophy. However, there are some appendices with extra information that provide an escape for anxious readers. For instance, Appendix C presents a simplified *mock-up* summary of the thesis that I only used to calm myself, when I felt I was outside the house, containing the room, containing the metaphorical box, I was supposed to think outside of. So, the appendices are a way to represent other parts of me, alternative lines of flight, outside the scope of this particular entanglement. I understand that this research might seem uncomfortable and unfamiliar for many, for which I apologize here—once and loud—but opening up our minds and navigating this rhizome will prove enriching and worthwhile for future endeavors. So, let us adjust our seatbelts and enjoy the ride!

Chapter 2

WE, THE EDGE PEOPLE...

Writing the literature review for a rhizomatic dissertation is one of the most challenging tasks that I have encountered. I have started the process multiple times, every time deciding that it was not the ideal way to represent my journey from the middle. It is difficult to talk about the point where I realized that there was plenty in the past that influenced the moment in the present and was shaping the future into different possibilities. It was haunting not being able to frame the process and follow the popular form from the biggest to the relevant, but how could I follow it standing in the middle of such an entangled and complex issue? I could have certainly started by talking about the amount of waste that we currently see in the world. Or perhaps, I could have pointed out that waste is becoming a global issue and we need strategies that let us cross frontiers. I could have started with engineering and the issue that is driving the research study, but, to be honest, there has always been more than one driver in this project. From the moment, I opened my eyes to the possibilities of this work, I knew that waste was a system, an entanglement of wires that was hidden for many, but was constructing the way waste is defined.

Furthermore, I knew that understanding that entanglement would be impossible without appropriate thinking tools, thus, from my electronics background to the philosophy of people-waste interactions, I needed to enhance my toolbox. Before I knew the rhizome, I knew

circuits, and it was my electronics background that helped me open the black box of waste—the neatly wrapped package that I had received as a definition and basis for my assumptions of waste. Once I knew that the array of connections inside the box were responsible for the information output I received, I decided to take a closer look. Then, from Human-Computer Interaction (HCI), I learned that the human component of engineering is as vital as often ignored in different fields of engineering, which supported the eco-feedback and environmental psychology approach to analyze human behavior as part of sustainability strategies. Human behavior endeavors brought for me theories of organizational change and the power of knowledge propagation in cultural contexts, finally putting me at the door of qualitative inquiry. Navigating through qualitative inquiry, however, is not an easy task, especially for an engineer who has not been trained on the field of behavior research. Thus, I had to learn about the history of qualitative research, and the origin of theoretical perspectives before I could understand and use them.

Finally, from the multitude of possibilities that qualitative inquiry provides, in terms of theory, methodology, analysis, etc., nothing made more sense for my study that the post-structural rhizome (Deleuze & Guattari, 1980/1987). Understanding the nature of qualitative inquiry requires significant effort and the ability to fight and debate with oneself when encountering points of tension in order to come to terms with new understandings in light of the old ones. At least that was my experience while dabbling through theoretical paradigm shifts and trying to understand their nature. In a similar experience to that of St. Pierre (2001), I moved from engineering's positivism through the theoretical spectrum trying to find words to express what I was thinking and what I wanted to do with my research. It was frustrating and confusing at times, but it was in those confusing moments, in the losing myself, when I managed to come back to push boundaries and think outside the box of waste. It was in the challenging of my own knowledge and training that I found a connection with poststructuralism and from one connection came another, allowing me to finally jump into the train of rhizomatic thought.

Through my reading, the rhizome expertly spoke about entanglements and lines of flight coming together in shared existences of moments that make certain things possible, which made me realize how multiple aspects could produce a perceived reality. I wondered about the nature of the waste we decide to dispose of and what makes it what it is today for different people. I was convinced that different people had various views and understandings of waste depending on multiple cultural factors and the entangled nature of the rhizome would allow me to explore them. Thus, trying to reproduce *points-of-tension* breakthroughs within my own cultural developments, I sought to understand what waste meant for people in Colombia as well as for people in the United States. With the rhizome guiding me through, I realized that waste is an often ignored, but ever-present, part of life and I needed to explore it as such. I started by choosing a place where life and waste were tied to each other, the food court of a mall, and then from there, the study started to expand to places like my own home and, on the other side of the process, the landfill and recycling facilities that I visited in Colombia. It was life and waste in a state of permanent becoming, as I often find myself between engineering and qualitative research, or between Colombian culture and culture in the United States.

That is the state that I think about when I thing about the edge, or the middle, that state were we are permanently becoming being both from here and there, without blending in with the other, but sharing the conditions from both points of view. We, the edge people, have declared our inconformity with one or more systems. We walk on the edges with the sole purpose of pushing boundaries to make things happen outside self-enforcing rules of an established system. We leap at the chance to see different worlds and discover views that others have just dreamt about while keeping in mind what we leave behind. We serve as bridges and connections sprouting in the middle of two stories. Walking on the edge could be muddy or blurry at times, but there are times where the fog makes things a thousand times more valuable (Schön, 1995). The thought of being never enough engineer for engineering nor enough social scientist for social scientists lurks always on our minds. Believing that

we are never enough of one side or the other is how we, the edge people live. We try to prove our worth to ones and others even forgetting ourselves that it's in that edge, in that middle, where things really happen (Deleuze & Guattari, 1980/1987). Lyotard says that it is in those *points of tension* (the same Deleuzian middles) that we find the good stuff, the interesting stuff, a path forward (Lyotard, 1979/1984).

2.1 Thinking Outside the Box...

As engineers, we have heard the request to "think outside the box" plenty of times during our academic life, thus, we adjust to it being one of the most important requirements for our professional development. We know that this refers to innovation, creativity, and sometimes technological development and we tend to embrace the challenge. However, it becomes difficult to recognize where we are around that metaphorical box. Most of us are left adrift when it comes to finding the boundaries, size, or the box itself, which turns into inherently constraining our thought process to familiar concepts. In engineering, we tend to reach towards the predetermined set of rules that along with think-outside-the-box is burned into our brains. We shyly explore our surroundings while still tethered to the known. So, we learn to play the game of innovation and creativity by the rules, the ones we learn and the ones we impose on ourselves to be credible. We even depend on those rules to communicate and evaluate each other, for which we become afraid to untether and explore the unknown. We become afraid of going so far outside the metaphorical box that others cannot understand our language, even forgetting that the only way to advance scholarship is by innovating. Sometimes, as it is the case with the global waste crisis, the best way is by pushing so far outside the box that we end-up outside the room containing the box.

Globalization of waste issues, or the global waste crisis, refers to the fact that plastic and non-degradable waste has started to be seen as a transnational problem, in which trash from certain places reach and affect global ecosystems, like in the case of the 4.7 to 12.7 million

metric tons of plastic that entered the ocean in 2010 (Jambeck et al., 2015). Jambeck et al. (2015) state that once in the ocean, fragmentation takes place, putting plastic in the menu of a variety of marine life from the biggest to some of the smallest forms of it. "Its small size also renders this debris untraceable to its source and extremely difficult to remove from open ocean environments, suggesting that the most effective mitigation strategies must reduce inputs." (Jambeck et al., 2015). Complemented by the fact that urbanization is growing worldwide and that we will not stop increasing our production of waste before 2100, the global impacts of solid waste are increasing quickly (Hoornweg et al., 2013, p. vii). From human health to GHG emissions and ozone-depleting substances, behavioral issues, such as mismanaged waste, urbanization, and affluence, deeply affect local and global environments (Hoornweg et al., 2013).

From environmental engineering then, we knew that we needed to start developing tools to help us counteract these effects by reducing waste inputs on the system. Therefore, we have been exploring how technology could help inspire proper waste management through electronic devices and technological applications. Eco-feedback technology is an example of this trend and part of the journey to understand the need for further exploration beyond the plug-in solution methods that we engineers tend to rely on. That is, eco-feedback technology is an action-reaction system that focuses on the moment people are about to take an environmentally related decision such as water conservation or proper waste management (Froehlich, Findlater, & Landay, 2010). Therefore, the purpose of eco-feedback technology is to provide information or appealing exchanges—gently nudging people in the right direction—when encountering confusing options that could result in ecologically significant behaviors. Embracing the approach, engineers started to design devices to interact with people in those moments of sustainability ambivalence, but despite promising results, behavioral stagnation was a concern (Froehlich et al., 2010).

Although eco-feedback technology was born based on some of the most popular principles of environmental psychology, both disciplines tended to evaluate rather than explore

pro-environmental behavior. Most eco-feedback technology was based on feedback, information and incentives, proven to modify behavior from a psychological perspective, however, from the same cognitive perspective, eco-feedback technology lacked long-term behavioral exploration (Froehlich et al., 2010). As eco-feedback technology focused on evaluating the technological device or interface, environmental psychology focused on evaluating the individual commitment to environmentally conscious activities, thus foregoing the opportunity to complement each other and explore behaviors in alternative ways (Mozo Reyes et al., 2016). As stated by Mozo Reyes et al. (2016), with the convergence of these research endeavors appeared the need for understanding the social aspects behind the moment of interaction between people and their waste. Social aspects, then, would allow broader interpretations of the forces influencing the specific moment of interaction from the individual to the institutional.

Based on social work principles, there are different social contexts that influence our behavior, but beyond the space-expansion of context, there is a temporal expansion that brings backgrounds into waste related decisions. Social work suggests that our behavior changes according to the people around us, hence, behavioral change can only happen when we explore the social context of the behavior (Zastrow & Kirst-Ashman, 2006). Understanding, for instance, that people celebrate recycling louder when there is a community supporting them, than in a normal day of school when nobody is around, highlights the importance of community in these decisions (Mozo Reyes et al., 2016). However, communities have plenty of unpredictable variables driving specific traditions and customs that are not easily influenced, changed, or even explored. It is especially difficult to explore them inside the medical symptom/solution system employed by professionals who still use the word *treatments* when analyzing an issue. Thus, in order to explore waste behavior in light of cultural/community implications, this type of problem is not to be taken lightly under the symptom/solution umbrella. So, although Anastas and Zimmerman (2003) offer *green engineering* principles to avoid designing for the landfill, the road does not and should not end there for engineers.

Even though, scholars have been arguing that we've been in environmental trouble for at least the last 40 years (Meadows, Randers, & Meadows, 2004), we have not fully realized the potential implications of our work as environmentally-focused engineers. Currently, most of our approaches center on experimentation, however, road blocks have slowly led us towards social approaches (Osbaldiston & Schott, 2012). In pro-environmentalism and sustainability research, scientists have been exploring qualitative inquiry, however, in engineering, we still base knowledge on predictive/generalizable models, confining social and natural science to a product of the *scientific method*. With sustainability moving towards the social sphere and engineers struggling to find ways to address sustainability issues within cultural divergences, approaches based on experimentation, prediction, and projection fail short when analyzing behavior. In Osbaldiston and Schott (2012)'s words, "behavior is just too complex to be understood using the experimental framework," thus, the need for a socio-engineering synergy. This is just another way to say that it is in the convergence of life and environmental engineering, that the issue of excess waste production takes shape and shows a different path to be explored.

Addressing questions of global sustainability should send us, engineers, in alternative pursuits to find different *ways to know* (epistemology) to eventually *know more* (ontology) about the problem and solutions. For instance, while searching for answers to a waste management question, I found myself lost in the middle of ideas, theories, philosophical debates, cultures, and even routine activities in life. However, it was in that middle that I understood my question could extend through multiple aspects of life, that instead of trying to solve a problem, I should be trying to learn more about the question (Deleuze, 1968/1994, p. 157). Therefore, when I asked myself: "Why do we throw away what we throw away?" I started asking questions like: How do we decide to throw something away? Does everyone throw away the same things? Is it easier to throw something away in certain circumstances? And many other questions that rippled over such a wide area that I could not stay "tethered to the box" anymore. So, with a box full of technical tools to explore a global crisis of waste,

I needed to find tools to analyze people interacting with waste, and even tools that allowed me to explore the structure behind the concept of waste. I needed to find something that allowed me to fly in different directions to learn what it was behind the problem of excess solid waste in the world.

2.2 The Rhizome in My Mind

In this way, we, engineers and sustainability researchers, have started to gravitate towards a holistic understanding of ourselves as a connected part of an integrated socio-environmental system. We have parted from the positivist/foundational approach of purely quantitative experimentation and we have passed through a tolerant acceptance of mixed-methods (Denzin & Lincoln, 2000). Lately, however, we have learned to jump between disciplines, adapt studies, borrow frameworks, and constantly search for new contexts to understand and address problems (Denzin & Lincoln, 2000). These socio-engineering approaches, Osbaldiston and Schott (2012) suggests, have been critical for understanding conservation behavior by considering variables and situational relationships. Butler (1994) explains that the "I" that would make decisions, take positions, and behave in certain ways has already been constructed by positions, perspectives, and social structures to behave a certain way. That is, socio-cultural structures create people's circumstances, influencing our identity, decisions, and even our own definitions of and behavior towards waste. Thus, the "I" that make waste-related decisions is a construction of my environment and social structures, requiring social exploration.

That is the job of qualitative inquiry, to try to understand the underlying conditions that make a social situation happen. Qualitative inquiry has been used to explore people related phenomena for a long time, but my encounter with it came during the fieldwork of my first graduate thesis (Mozo Reyes, 2012). From the little voice in the back of my head telling me that science was more than mathematics (Kuhn, 2012) to the overwhelming feeling to try to

communicate something without having the right language to do so (St. Pierre, 2001), my journey through qualitative research has been eventful. Some of the differences to navigate in qualitative inquiry, coming from a positivist/foundational discipline, beyond the hard/soft science binary that we have constructed around them, include the familiarization with terms and equivalents in our discipline. For instance, ontologies and epistemologies in qualitative inquiry are very different from those in engineering because we are focused on using the technical as a *way to know*, thus, making qualitative inquiry a new epistemological pursuit of the socio-engineering ontology—we can actually know the story of waste by exploring it in the context of people.

Moreover, we can get to understand waste behaviors and how they are interconnected and dependent of cultural constructions as well as to explore the way we assimilate/interact with waste in our daily life. "Postmodern discourses are all deconstructive in that they seek to distance us from and make us skeptical about beliefs concerning truth, knowledge, power, the self, and language that are often taken for granted within and serve as legitimation for contemporary Western culture" (Flax, 1990, p. 41). For instance, as we discuss what the word waste means for people in Colombia vs. people in the United States, we start to wonder if strategies based on this definition would be appropriate for all cultures. According to St. Pierre (2011), the terms post-modernism and post-structuralism are both deconstructive in nature and are sometimes used interchangeably, but the key to differentiate them is their purpose. In Lather (1993, p. 688)'s words, postmodernism "raises issues of chronology, economics (e.g., post-Fordism) and aesthetics whereas poststructural[ism] is used more often in relation to academic theorizing "after structuralism." Thus, being part of a theory that challenges current structures not only academic, but also cultural, environmental, and even personal makes the rhizome both post-modern and post-structural.

Coined by Deleuze and Guattari (1980/1987), the word rhizome is used to describe a theory of *connectedness/entanglement* that in opposition to an arborescent representation does not have a beginning or an end, but lives in the middle, in the connection. Before using

the rhizome to explore cultural *waste*, I need to understand how "[a] rhizome ceaselessly establishes connections between ... very diverse acts, not only linguistic, but also perceptive, mimetic, gestural, and cognitive: there is no language in itself, nor are there any linguistic universals, only a throng of dialects, patois, slangs, and specialized languages." (Deleuze & Guattari, 1980/1987). From the waste perspective, languages as part of culture give specific characteristics to the trash in different contexts (i.e. debris, trash, garbage, waste, residuals, rubbish, etc.). This *connection* of seemingly *different* areas describe the rhizome's principles of *connectedness* and *heterogeneity*, however, a rhizome also needs to honor the principle of multiplicity (i.e., the convergence of waste/people/culture/life when the multiple becomes noun) and the principle of *rupture*, in which "a rhizome may be broken ... but it will start up again on one of its old lines, or on new lines" (e.g., waste transcending the food court into life) (Deleuze & Guattari, 1980/1987).

The *lines of flight* in a rhizome are connection paths for the different parts of the system (multiplicities) and, as the multiplicities join lines of flight, the rhizome gets at the same time richer and broader. The entanglement between heterogeneous elements in a rhizome produces a sense of shared existence for the elements, in which one belongs and is part of the other in a process of *deterritorialization* and *reterritorialization* (Deleuze & Guattari, 1980/1987, p. 10). In this state of shared existence each of the parts enters a sense of *becoming* the other, thus, not being one or the other, but both at the same time "not [through] imitation at all but [through] a capture of code, [a] surplus value of code, an increase in valence, a veritable *becoming*" (Deleuze & Guattari, 1980/1987, p. 10). For instance, by using recycled materials in the construction of a building, both materials and building live in that permanent state of *becoming*, where the building is recycled solid waste and the solid waste is also building. They are both waste and not waste at the same time (Hird, 2016). But the rhizome around waste is not limited to recycled materials, since by adding a line of flight towards human behavior and other disciplines, the rhizome expands through *deterritorialization* and movement of new *becomings* (Deleuze & Guattari, 1980/1987, p. 10).

In this study, the rhizome gave me permission to think what I had not thought, and follow waste to depths that I had not considered. The rhizome gave me the ability to think outside of the norm, to think outside the box of waste and follow lines to explore it culturally. It challenged me to try it, to do something with it, to see if it works for me, and to develop my own philosophy. Because following a recipe, even a rhizomatic recipe, was going against the very idea of post-structural thought (St. Pierre, 2001). I understand that for people coming from quantitative research backgrounds, the idea of a theory/methodology in which step one is to *throw the steps out the window* might seem daunting, even scary, as it was for me during fieldwork:

> The idea of the concept as methodology makes so much sense to me. I feel that the rhizome has been driving my research since I met it. The going back and forth between linear structures and a complex web of interactions that form a system. The bridges and circuits in my mind. Although, I feel like I still don't understand the rhizome very well because every time I start to understand a part of it, it sends me in another direction, and I end up somewhere else. I worry that some of this thought process could be confused with an inability to focus, but then I can see so much better from the inside of the entanglement that I ever saw from the outside. So, I wonder if the rhizome is becoming the good teacher who wanted me to ask questions, to not let information just pass through me. If it is teaching me to challenge, to question, to create, to transform right in the middle. Right where it could go everywhere. Right where my mind can expand onto something that hasn't been thought before. Be it because of training, structures, or current discourses limiting perspectives. Deleuze puts me in the middle of the ocean and challenges me to find my way.

I understand because I was there, sometimes I think I am still there, but the view from there is *fantastic*. Granted, it is not easy to find one's way after being untethered, but in a wild journey of lost and found moments, I actually found waste in the middle of every moment of our lives, in an entanglement that the rhizome theory helped me see. The rhizome helps me think outside of structures and strategies (St. Pierre, 2001). It lets me fly wherever direction the waste takes me. It even lets me bring myself into the experience in a way that enriches the study.

Learning about the rhizome became letting it into my life, into my subconscious, and my research, making it so ubiquitous that it was present at every step of the way. As my professor—aka. the voice inside my head—Elizabeth St. Pierre said in class, once I had seen the rhizome, I could not unsee it. I understood that the rhizome is everywhere, making me plug concepts, and theories, and history, and ideas right into my life, into what I experience every day because everything plays on different plateaus, which entangled, make up a life some experience. In my case, behind a simple action like appropriately managing waste, there is a grid of multiplicities. The action is just the middle since there are multidimensional interconnected points in any direction. That is, I could move on a timeline and go to waste management and recycling learning; or I could change directions and go to experiences with waste or cultural norms; or I could go further away to see how the weather affected contexts or decisions; or move towards how culture affect people in present and future waste interactions; all through key connection points/multiplicities that become permanent convergences of elements.

With the rhizome in my mind, it is "rhizome, rhizome, the whole way through ... every road leads back to you ..." even beyond my research, I see the rhizome defining parts of my life. For instance, I never graduated as an environmental engineer, but thanks to my work, I am in the constant state of becoming one. I am still an electronics engineer working as an environmental engineer, so, I am each one and both at the same time. As I follow lines of flight into environmental engineering and move inside cultural entanglements, I get into "the good kind of lost," where I discover plenty. That is, a permanent becoming or following lines of flight does not mean being stuck in a loop, although this is not a rare concern for rhizome scholars thanks to the fluidity of the theory (Cole, 2014; Hundley, 2007; T. A. Richardson, 2008). Instead, as an iterative design, the rhizome takes us from one middle to the next giving us a freedom of movement to go backwards, forward, and especially laterally into any avenue that we need to explore. Independent of beginnings or ends, the rhizome leads us right to the part where we need to be to explore the thousand possibilities to manage any

issue or problem. Therefore, it does not really matter where we begin or end a story since it will always be a middle.

Culture, waste, engineering, science, people, and I, then, need to be part of this project as active participants of an entangled middle, but reaching a point of entrance for the rhizome is still a challenging feat for engineers. So, we know that there is much that came before and there will be plenty coming after our research, but imagining the rhizome as a multidimensional world, in rhizomatic time it is all part of one moment. One moment made up of many moments that pull and push and influence each other like gravitational forces, producing the circumstances that we see, just like the interaction between the moon and the earth influences tides. In the same way we see symptoms of waste interactions, and through the rhizome, we can analyze the hidden components, we can even disturb the electromagnetic forces of this field to destabilize the current waste system. From Deleuze and Guattari (1980/1987)'s work, we know that to design culturally appropriate sustainability strategies we need post-structural disruption, where "[f]orce is not to be confused with power. Force arrives from outside to break constraints and open new vistas. Power builds walls." (Deleuze & Guattari, 1980/1987, p. xiii). Thus, in the pursuit of culturally appropriate solutions to global issues like waste, we ought to consider qualitative inquiry and poststructural theories like the rhizome to guide the plan, the development, methodologies, and representations.

2.3 The Motto of the Wise Is Be Prepared for a Surprise

˜Around the world in 80 days

Engineering companies have started to explore qualitative inquiry to evaluate products and acquire customers and, although they are using mostly methodologies to complement their own studies, qualitative inquiry has encountered an open door in engineering. For instance, technological companies (IBM, Intel, Microsoft, and Parc) are using ethnography

as a diagnostic approach to understand the needs and to design for specific cultural groups (Fitzgerald, 2005). Cultural focusing is part of the process of technological product design or advertising companies that are borrowing qualitative methodologies to study people behaviors and interactions (Glasnapp & Isaacs, 2011; Rohrer, 2008). However, in the academic side, where industry is borrowing from, generalization based on focalized cultural samples that misrepresent a world population is still the norm (Watters, 2013). Additionally, the scientific method or similarly rigid qualitative methodologies are still worshiped as the hegemonic standard of research and human exploration, which sometimes hinder potential paths of discovery (Honan & Sellers, 2006). That said, ethics in research are irreplaceable independently of disciplines, epistemologies, ontologies, or methodologies in people related research.

Ethical behavior ranges from sampling to representation and the main concern for the researcher should be to keep a respectful relation to research participants honoring them throughout. During sampling, respect and honor could be reflected in the way we choose people to represent others. That is, when we choose western industrialized populations to represent global behavior, we need to challenge ethical conceptions behind normalized western practices of sampling (Henrich, Heine, & Norenzayan, 2010). Ethics also play an important role on researcher-participant interactions during fieldwork. In that sense, it is important to keep in mind that the researcher is a learner of the participant's experiences and, as such, exchanges should not be imposing, but dialogical (Glesne, 2011). Following IRB guidelines is a good way to ensure participants' well-being, but different epistemologies also guide these interactions introducing power relations and other relationship nuances that we need to be aware of (Glesne, 2011. p. 89). Analysis and representation are the ultimate test of research ethics challenging the researcher to present results in a respectful manner without enclosing participants into two-dimensional images of themselves.

With these in mind and seeing how culturally diverse explorations are sometimes key to a comprehensive study, I chose to study both the cultures I am a part of, which sometimes become dissonant in my mind. As one of the 41 million Colombians in the country during the

last census, I have a strong cultural background that I have brought with me to my adoptive country the United States of America. Although, I usually have different identities in each country (i.e. daughter and sister in Colombia; student and wife in the United States), there is some blending thanks to cultural permeation and social constructs (Butler, 1994). In the case of solid waste, I have learned to bring (sometimes unnecessary) packaging into my home to be recycled later, but I have also kept clothing or other items until they had actually stop working and I cannot find a way to fix them. Thus, in my puzzled search for the meaning of waste in different cultures, I decided to explore two small cities in both Colombia and the United States to navigate my own tensions and to broaden the sampling pool to include a few of the non-WEIRD (Western Educated Industrialized Rich and Democratic) people who have different behaviors about waste (Henrich et al., 2010; Watters, 2013).

In each of two communities in Colombia and the United States, there is a shopping mall that has a food court with people-waste interactions. Although, both cities have populations of less than 150 thousand people, they receive constant visitors, which also make each mall a tourist destination. The malls differ in retail area (CO˜$25,000$ m^2 vs. US˜$65,000$ m^2), but they have a similar amount of stores and restaurants as seen in Figure 2.1. Although, the weather is different in both cities (CO: Mountains vs. US: Beaches), the mall serves as a place to be protected against the elements (Swinyard, 1998). The block-wide mall in Colombia is located near the richest neighborhoods of a growing colonial city and it is surrounded by green spaces with plants and trees while showcasing majestic mountain views through the corner-to-corner glass walls in the food court. Through one of the entrances of the US mall, the oddly shaped food court has its own glass view of the blue sky of its quaint expanding city, however, the outside nature keeps its distance thanks to the several square meters of parking space that justifies the limited public transportation to and from the mall, which, unlike its plentiful Colombian counterpart, does not cover the entire city.

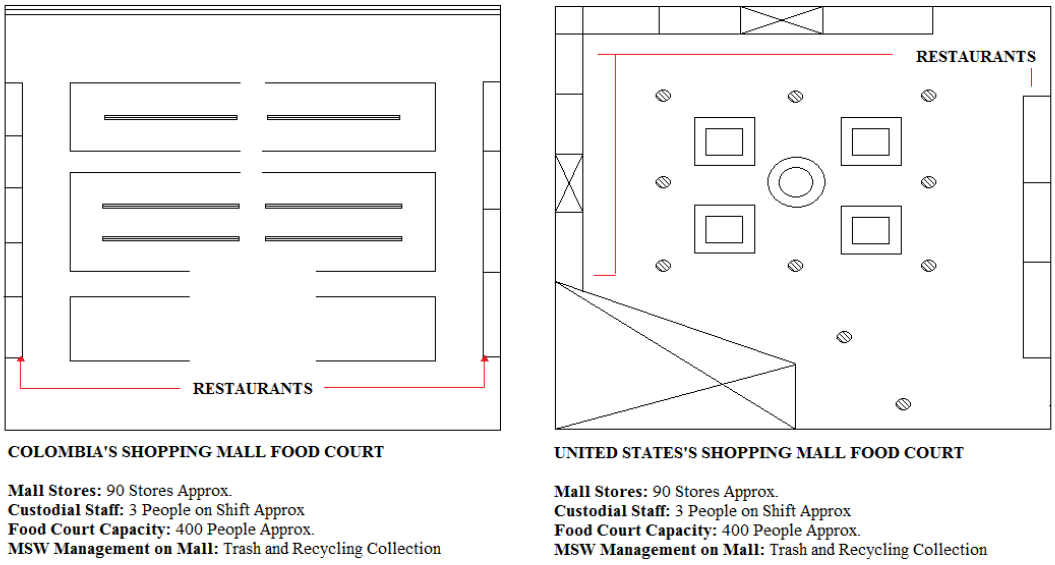

Figure 2.1: Side by side renderings of the USA and CO's food courts.

2.3.1 The Sites

To offer a more personal feeling for the sites, beyond the aforementioned characteristics and information in Figure 2.1, I include two fragments of text describing my experience at each one of the sites. First, I start with the mall in Colombia, which has approximately the same number of stores, custodians in the food court during observations, and food court capacity than the mall in the USA. Then, I explain my experience in the mall of the USA sometimes using my Colombian experience as a guide, but being careful of dichotomized comparisons. The fragments compile information from different observation days during my most common observation time in each food court. However, I start the fragments with a specific date that refers to the first or most descriptive day of the fieldwork as shown.

> *Colombia, 09/15/15. The mornings are chilly in this small city of Colombia thanks to the windy slopes of its landscape, but afternoons are a different story. As I make my way through the short pedestrian road from the bus stop to the shopping mall's door, the shade and wind hide the heat that I will encounter in the food court. From that door, I walk under the skylights that provide most of the light for the mall during the day. I walk straight to the NE end of the mall and make a right to the SE end of the mall where the food court is located dodging teenagers in*

uniform that slowly walk the mall either window shopping or just hanging out. It is not a long walk through the brand stores and city staples, passing by the arcade and cellphone store towards the food court. Opposite to the food court on the SW side of the building is the cinema, one of the biggest attractions of the mall and the most common reason to have dinner at the food court. Most of the time like today, I find my spot free as I reach the food court when the lunch rush starts to dwindle. The people in business casual attires have been disappearing back to work or to continue with their days while a more relaxed dress code becomes popular among the remaining customers. The sounds of dishes and cutlery has decreased enough that I can hear the American classics being played as instrumental versions over and over again. I feel like the ambience is a little charged towards making me feel homesick for the USA, despite the traditions of places like Homemade and Bill's. Out of the nine restaurants in the food court, five use ceramic dishes and metal cutlery that are washed, dried, and reused constantly. At around 3:30 pm, I hear the cutlery clashing after being dried and thrown into plastic baskets ready for its next use in Homemade. The elevated temperature that made me buy an ice cold juice starts to decrease with the sunset and it reminds me of the true weather of this mountain's city. The sunset also brings other crowds including grocery store customers picking up some—usually fast—food for a light dinner at home, besides the dinner patrons—college students and young adults—usually preparing for the cinema or other entertainment plans—there are a few bars and clubs at walking distance—who also prefer fast food.

USA, 02/18/16. The weather is getting warmer, not enough to grant short pants, but enough to not feel cold while walking outside sleeveless. This is different than the Colombian mall where sleeveless was not an option culturally. Driving to the mall gives me more control over times and walking, since most of the time I park on the closest entrance to the food court. This usually means that I don't get to walk through the one-story mall like I did in Colombia. Unless I purposely wander around the mall, I miss the discount signs on the department stores—the biggest at the east-west ends of the building—during weekends and holidays. Most of the stores in this mall are popularly advertised on TV commercials and more budget friendly than stores in other malls in the state. After the short walk of the parking lot, I make my way to the food court, sit down in my usual spot, and start hearing the chitchat and knives sounds that come with the usual lunch crowd. Although the walk is short, I still get to walk through a perfume store and a cell-phone kiosk inside the mall before reaching my table. The dress code in this mall is mostly casual—especially when there are college students around—but I have seen a few people in business casual attire, not comparable with the amount of people in Colombia. After the lunch rush, I can hear some pop music being played on the NE speakers while the West speakers play the ads that TVs are showing on that side of the food court. The speed of food preparation and delivery makes the food court appropriate for short lunch breaks that are common in the USA, so, most people around order, eat, and leave to their work places. Left behind are usually groups or families until the teenager arrive after school.

Teenagers in the food court are not wearing uniforms either because they went home and changed or because they go to schools that do not require uniforms. The food court picks up some life after 5pm when people leave their work and pass by to pick up takeout for dinner. Entertainment at this mall also includes window shopping, but people tend to do some real shopping, enjoy the few arcade games, photo booths, and even the cats and dogs adoption centers. However, there are also cinemas, restaurants, bars, etc. just a drive away from the mall.

In general, both sites have similar characteristics, but their own culture behind them. Entertainment, transportation, food, and waste are differently processed in both places according to their people's cultural traits and backgrounds, thus offering a rich environment for observations.

Specifically for waste related observations, the food courts offered plenty of chances to observe people-waste interactions, however, focusing only on the food court would have left out important cultural observations that entangled with waste in different levels. Thus, although, I followed a schedule of observations for the food courts, moving between participant and non-participant depending on the situation, I also interacted with people and situations outside the food court. During a two-month cultural-immersion period in each city, I observed a total of 140 hours in the food courts mostly after the lunch rush on different days of the week looking mostly for people-waste interactions. However, it was through my experiences and connections inside and out of the food court that I started to unveil aspects of waste history, creation, and interaction that I had not explored before. Observations, then, transformed from a method of research into a rhizomatic tool to explore the journey of waste in our lives and our journey around waste. By then, I had the freedom to be participant when interacting with people whose life depend on waste management to non-participant to keep customers of malls blissfully unaware of my presence, thus, my ties to waste.

In the same way, interviewing became a journey to meeting interesting people and talking about waste in different capacities. Curiosity from people made me talk about my work more often than I imagined I would, which produced interesting conversations that ultimately made it into the study. Semi-structured interviews (see questions in Appendix D)

happened thanks to conversations with friends or people about my work and suggestions for possible participants. For instance, the administration of the mall in Colombia, supported an impromptu focus group (with multiple members of the custodial morning shift) and one semi-structured interview. Interviewing in Spanish was the logical choice in Colombia, however, while listening to the exchanges for translation and transcription, separating myself from the participant resulted difficult for me—there was so much that the transcriptions were not saying—since it was a moment of cultural convergence of experiences and minds. This is not uncommon for postmodern interviews (Roulston, 2010, p. 64), especially rhizomatic (Jackson, 2003), but it was surprising to see how much of a filter between participants and readers I really am. For that reason, my work does not contain participants' quotations or behavioral descriptions beyond my own experience with them.

In the same way, pictures and documents collected were described based on my own cultural and field experiences and explored through my own creative preferences. That is, as I would record, write, draw, or take pictures of my experiences inside and out of the fieldwork, I explored internet documentation, books, articles, and written references to complement and try to answer questions about the history, creation, interaction with waste, and possible avenues for waste management. Historical accounts of waste brought a nostalgic side of the research through the look into old newspaper clips (see Figure 2.2) and stories of nature and grandparents slowly leaving us to fend for ourselves. Through pictures and—second-rate—drawings as a form to communicate some of the most memorable moments I experienced, I wanted to bring alternative perspectives to the story of global waste management at different levels. Finally, writing as a method of inquiry (L. Richardson & St. Pierre, 2008) took different forms in this research, descriptive poetry, confessionals, and even parody, in order to explore ways to tell the untold story behind waste behaviors in different cultural contexts, which served as a data exploration, analysis, and representation.

Analysis, interpretation, and representation followed the same rhizomatic fluency of other parts of the research challenging me to explore *lines of flight* outside the box of waste and

Figure 2.2: Paper clippings El Tiempo Archives.

represent its entanglement with life, engineering, and behavior. Coding and similar analytical tools were not used in this study since every time I tried them, they kept enclosing the research to two-dimensional areas, however, themes like history, custodians, restaurants, trash, recycling, people, spaces, and me were as helpful as drawings and pictures to navigate through the data. Used to formulations and recipes, it is not easy to *go off the reservation* of engineering methods, but for this research it was a necessary and welcomed challenge. It is not easy to convey the difference between cultures outside the binary of right and wrong, for which representing waste as a part of life seems like a refreshing freedom. Representing cultures in the entanglement of waste shows relationships that could work together to understand the issues from common perspectives without imposing solutions. Following the example of other Deleuzian scholars this entanglement also translates to the conversations between researcher, scholars (through references), participants, and even readers of this document (Jackson, 2003).

The Deleuzian rhizome also inspires seemingly separated texts to come together to form a bigger picture and it is the qualitative researcher who is in charge to make it happen. The qualitative researcher as a *quilt maker* comes from the work of Denzin and Lincoln (2000) while explaining one of the ontological movements in qualitative research, but I also

happened to mentioned it to my mother when trying to explain to her why this chapter had taken so much time to write. *Es una capa de retazos*—I told her—I need to figure out a way to explain theories in their own right, as well as how they work in synergy to allow me to explore waste as the multidimensional part of life that it really is. That is, if in engineering, I am encouraged to innovate, but I am tethered to the rules of mathematics as the only givers of truth—unknowingly limiting myself as well as mathematics (Deleuze, 1968/1994). And, post-qualitative theory and the rhizome allow me to explore a cultural juxtaposition of waste based on life, behaviors, and other aspects, I can use qualitative inquiry to expand engineering endeavors into groundbreaking developments (Kuhn, 2012). That is where, we, the edge people really make a difference.

The edge people speak different languages and use different approaches according to their own experiences and disciplines, however, we all understand the need to blur lines and push boundaries. For instance, the advantage of rhizomatic approaches could be seen in sociology's pursuit of understanding relationships and entanglements of waste. From a methodological perspective, Gille (2007) embarked in global ethnographies that allow her to move across the globe following waste related human actors. Although, she encountered a similar cultural clash that inspired her to pursue the meanings of waste between different countries, my own experience drove me through a different path that includes, besides the historical, other aspects of life not necessarily dependent on human actors (structures, animal vectors, waste transportation, waste information and statistics, etc.). On the other hand, Hird (2013) research has focused on defining waste beyond its human entanglement by exploring bacterial degradation on landfills as another line of flight in a waste rhizome that we all have learned to explore on our own terms. Similar to my own, Hird (2016) work, however, in a very rhizomatic way, has also moved beyond the landfill to include tracings of the lines that make waste a phenomenon.

Although for some—I imagine in sociology research—the work of Gille and Hird collide in multiple points (Hird, 2013), from my perspective they are just one part of the whole

picture of waste. Think about *quantum mechanics* and *general relativity*, they have many differences and they both focus on either a tiny universe inside atoms or a vast universe of celestial bodies respectively, but on the edges of a black hole, near the event horizon, they both converge and exist at the same time[1]. In the same way, I believe that global ethnographies of waste and bacterial rhizomes in landfills converge in unfollowed lines of flight that move at their own paces. As a bridge builder engineer, I see those global ethnographies as part of an undiscovered rhizome that begs to be explored and I see the landfill rhizome as part of the construction and management of ecosystems that our human actions facilitate. In my mind, it is all part of the rhizomatic entanglement that we reached from different points and mapped differently according to our training and experiences. In my case, I explored cultural dependent constructions of waste that are inherently human (those that environmental engineers have agreed are producing a global crisis), but that exist in entanglements of structures and life beyond a particular set of actors.

Therefore, armed with my engineering background, the guidance of the rhizome, and the strength of both my cultures, I started a journey full of books, people, papers, news, trash, nature, notepads, and multiple pens joining the characters on the white screen of my dissertation. Scared but thirsty for knowledge, I set out to find the wizard behind the curtain that waste research had so far shown me. However, out there, in the world, I felt impotent and ignorant in light of all the things I was encountering, while the rhizome kept dutifully sending me to read, and live, and write about everything, until I was able to find a way—not *the* way, since there is not such a thing as a universal way of navigating entanglement—just find my experience in the lives of others. I know it might seem self-centered, but that is the nature of post-modern research. It is actually the nature of all research that the researcher is the filter for everything, but in postmodernism, it is acceptable to recognize it because it is not about bias, subjectivity, or positionality, but about what the research does to inspire dissonance and disruption on current structures that are no longer working.

[1]See Hawking Radiation in A.

Chapter 3

HISTORY

"We are not makers of history. We are made by history."
(King, Kasegawa, & Amemiya, 1963, p. 19)

At the beginning, all was dark... or so the many inhabitants of New York thought when they encountered their streets full of decomposing waste and decided to forbid this method of disposition in 1657 (History, 2014). This is commonly the first entry of the history of waste in the United States. Of course, there is a lot of history behind this one particular moment in time and so much more after it, however, this moment, located in the middle of history, represents the beginning of waste management history in the United States. The ripples of this moment have been reaching the globe in multiple ways, most of them positive, such as disease control or organization (Colomer Mendoza & Gallardo Izquierdo, 2013).

The age of sanitation, however, also brought some desire to distance ourselves from trash as much as possible, especially in developed countries. This desire is reflected on the rejection of landfill constructions from nearby neighbors or the popular not-in-my-back-yard (NIMBY) mentality of people (Barr, Gilg, & Ford, 2001). It is also reflected on the description from a USA participant that trash is *dirty, smelly, it stinks, it is something that you should crumple up and throw away, and later on, the waste management guys come and dispose of it.* My participant sometimes wonders what happens after, as there are multiple stories,

but the thought very quickly leaves their mind. It happens, I said, in part to make my participant feel better, and also because it sadly happens to many people. As my advisor and I have countlessly discussed, as engineers, we have created great structures to improve people's quality of life so they can spend less time worrying about solid waste management and trash.

However, we have lately found that it is very important for people to learn what is happening after they throw something away. For instance, Spehr and Curnow (2015) explain that organic litter has a correlation with people assuming that decomposing times for this type of litter is shorter than it actually is. An example of this could be seen in Figure 3.1, taken next to the most popular farmer's market in my hometown in Colombia. These farmers travel and sell directly from their farms where most of their trash is organic and compostable, so, they have trouble managing disposables and plastics in the same way they manage trash at home. However, it is not only them who have trouble managing waste that contain different materials since one of the most prominent excuses for not recycling is the lack of information on how to properly do it (Katzev & Mishima, 1992).

Information plays a vital role on constructing or perpetuating historical structures of concepts like waste. In other words, history brings encoded information about the meaning of waste and how to interact with it through historical moments that carry certain implications. From war times to thriving societies, our history relates to the way we learn about waste, thus influencing behaviors and issues related to waste generation and management that we encounter today. Therefore, to understand current waste behaviors and our relationship to waste, we need to look to the way history influences the concept of waste that we have developed and are transmitting every time we interact with waste.

Figure 3.1: Accumulated trash outside farmer's market in Colombia.

3.1 Historical Framing for Waste

In the same way we are made by history, history also manages to make structures around concepts and perceptions that influence our lives for as long as we remain unaware of such connections. In this section, I will present some examples of historical moments that have had an effect on the way we construct our concepts, definitions, rules, and behaviors related to waste. From the age of sanitation and the birth of nations to the moment we get home today after a long day of work, waste has being constructed in a certain way depending on global, national, or personal experiences.

In the XVII and XVIII centuries, the history of waste in America was still connected to the history of waste in Europe, which included health related historical background that helped shape waste behavior. As the sanitation initiatives started to make their way from France into both Spain and England, these transferred those efforts to the new world colonies

(Barbalace, 1998; Colomer Mendoza & Gallardo Izquierdo, 2013). By prohibiting the disposal of trash on streets and nearby bodies of water, European governments expected to quell the raging plagues and epidemic outbreaks that threatened their subjects at the time. At this time in history, waste started to be connected with disease and as such was expected to be kept away from people, by either burying it or physically moving it away to other locations. This was the beginning of the dirty, smelly concept of waste and the first traces of transportation and trash-accumulation sites in America.

Urbanization and city development also brought new waste related issues that needed to be attended and marked current waste behavior. As the cities started to grow, so did the trash in the streets, and the need for new waste management practices. Keeping in mind the correlation between waste and disease, the authorities of the XIX century needed to develop improved ways to keep up with the amount of new trash that the industrial revolution and urbanization had brought to their cities. They started to develop cleaning commissions and waste management crews that would transport waste to different facilities for either burning or cooking to feed pigs and farm animals. Urbanization then brought the need for groups of people to dedicate their time to deal with the trash of other members of society, which relates to the companies either public or private that provide a waste management service in America's cities. Another concept that this type of waste management brings is the use of organic trash for farm animals feeding, which is still popular among Colombian farmers.

Also, wars forced people to develop new war guidelines for waste management that rippled to today's perceptions of waste. War is usually on par with austerity, and for the most part, that is what happened during many wars in America. During World War I, in the United States mainland, many resources were scarce for which the Waste Reclamation Service was created urging people to "Don't waste waste, save it" (Association of Science and Technology Centers [ASTC], 1998). Among others, the most popular recycled materials were rags and old paper to make new paper. During WWII, recycled materials include rubber, paper, scrap metals, fat, and tin cans to help with the war effort (ASTC, 1998). The constant political

turmoil in Colombia made economic growth at the very least challenging for the country, to such degree, that during the turn of the millennium high schools still taught students how to recycle paper to make birthday cards and paper art. However, not all wars were catalysts of unity and reflection on the ephemerality of resources and materials, but they deeply depended on the messages that people were receiving at the time.

However, it is unfortunate that, even in times of war, most of the messages that reach us all are related to consumerism. One of the most shocking and popular examples of these messages happened during the presidential address on December 20th, 2006, when in 30 seconds the United States president talked about the Iraq war and urged the American people to go "shopping more" (Times, 2006). However, this was not the first time that the United States government mentioned the importance of consumerism, as the chairman of economic advisors for President Eisenhower in 1953, declared consumer goods as the ultimate economic purpose of the country (ASTC, 1998). At the same time, Colombia was looking at New York from thousands of miles away considering that the trash of the bay would make any Latin American wealthy (Tiempo, 1952). The longing, however, did not last long for Colombians, who welcomed television messages and national advertisement about technologies and materials development during the following decades. By 1972, Colombians were throwing away plastics regularly, in part because of lack of information about their properties, and in part advertising led them to believe that plastics were easier to dispose of due to volume reduction after combustion (Tiempo, 1972).

Therefore, besides health, war, and consumerism, information sharing has also changed the world of waste. For instance, looking into the traditions of more progressive cultures has helped Colombia develop behaviors that have become obsolete on the original country by the time it reaches them. Such is the case of wheelbarrows as an official waste transportation method reaching Bogota in 1856, when in Vienna, where the idea came from, had disappeared since 1839 (Anzola Parra, 2015). Or, how Colombian newspapers, in the 1970s, advocate for the use of plastic by saying that United States and European firms are making the switch

to it (Tiempo, 1972), while the United States starts celebrating the first Earth Day and encouraging recycling. From the first developments of mail to current information sharing in the virtual world, information exchange has been constructing new meanings of waste. As the beginnings of mail in the United States allowed for direct advertising to the mountains of paper that we receive at home every day (See Figure 3.2), the beginning of air mail in Colombia opened the door to learn about plastics and the convenience of it over things like glass packaging containers.

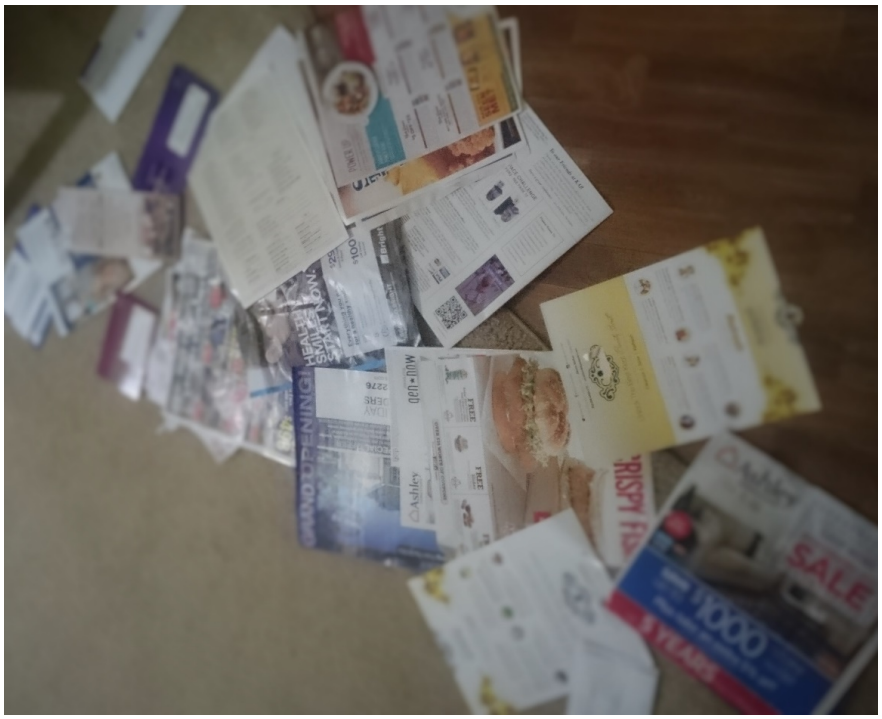

Figure 3.2: Two weeks of unwanted mail at my home in the USA.

Interestingly, those material developments at different paces have influenced some of the main issues that each country currently has. As an example, the packaging for milk in the United States started with the milk bottle in 1880 and from there the bottle made its way to the rest of the world reaching popularity in Colombia in 1950 (Rodriguez, 2014). By that time in the US, people had been using paper packaging for milk for a decade and had introduced the plastic bottle. Twenty years later, the plastic bottle reached Colombia, who had started to adapt on their own using plastic bags for packaging during the 70s and 80s

decades. The milk carton got to Colombia in the 90s, when they were still using plastic bottles, bags, and even reusable pots that along with the *milk car* (See Appendix B) had being around since farms started to commercialize milk. So, as Colombia was still in touch with farms and their organic waste management, the United States had been managing plastics for decades, inherently adapting to plastic and synthetic developments, hence, the US disconnection with nature and Colombia's tendency to litter.

Therefore, in both countries, we have established that historical moments influence the concept of waste to such a great degree, that developments, people, governments, information, and any waste related behavior are a part of understanding waste for a specific country according to its own history. History then becomes the pen by which we construct that definition and characterization of waste that we should use to analyze waste related issues in a country. That is, as historical moments influence different aspects of waste, I realized that a timeline of waste for each country would be insufficient to highlight and explore historical entanglements.

3.2 Historical Entanglements of Waste and Culture

While trying to construct timelines for the history of waste in both the United States and Colombia, I realized that a timeline might not be enough to explore how waste has come to mean what it means today in both societies, how waste has been constructed by history. Timelines, as many other tools to visualize data, has become from popular to mandatory when representing temporal movement. However, as popularity grew, so did its power to generalize and constraint time into a one-dimensional bounded structure, a line, where the diversity could blend together in the illusion of organization (Yakura, 2002). Taking the guesswork out of representing temporal data, also meant taking out the creativity of representation, the relativity of time movement and with it the non-linear exploration of history. Therefore, following the boundary-pushing drive of my study and in need of better represen-

tational tools for the complex movement of time that my history of waste needed, I started to explore time moving in a rhizomatic way.

It is a testament to the ubiquity of the rhizome that while looking at the history of waste, all I see is an entanglement of lines composing a story that allows me to be a part of life through the centuries of waste history. In this way, I see history as nomadic. History moves with us, not only in the way we build it, but in the way we choose to learn and live it, in the way we choose to understand it. For instance, we can choose to follow lines of flight through the years, jumping back and forth through details that could be relevant to the story, making time boundless and relative to our own exploration, to our own perspective. In this case, urging us to look back to historical moments of waste in order to understand the meaning of waste today. Or, we can challenge a *timeline* to not happen linearly, instead to develop multi-dimensionally, in between the lines of waste history that carry plenty more aspects of the human experience. We can choose to explore and represent the history of waste as an entanglement of life in each culture and country through the exploration of *timerhizomes*.

As a rhizomatic model a *timerhizome* would have no beginning nor end, but it would start in the middle and pick up speed through different lines of flight that come together and intersect with each other. For historical models, starting in the middle is not uncommon since there are often untraceable precedents in many areas in the history of humanity. It is also appropriate to avoid forcing an end into historical accounts when humanity is still in development. Thus, from a middle-in-the-history of waste, I devise different aspects of waste, lines of flight, developing mutually in multiple dimensions, creating movement as they come together and pull apart continuing to grow in every direction challenging structures of waste history. It is in this middle, in the entanglement of all the stories, that I could catch a glimpse of what I am looking for. Beyond the history of laws, or waste management, or the history of inventions and people perspectives, it is in their connectedness that I found part of the complex picture behind the history of waste. It is in the convergence of lines that waste *becomes* waste.

In the models of waste history that I developed, I chose five lines of flight to burst out of a historical middle, developing on their own, but coming together on key aspects of waste development. The lines, as represented in figures 3.3 and 3.4, are named after a different aspect of waste development and each circle inside them represents a moment of history that could be moved to another line or connected to it if necessary. For instance, in the United States model, in Solid Waste Management, in 1954, Washington started to pay for aluminum cans, which eventually resulted on Oregon passing a bottle bill that offered cash for aluminum in 1971, thus connecting Laws with SWM in two moments of history that become part of each other in that they are both Law and Waste Management (See the interactive models online in the following references: Mozo Reyes (2016a) and Mozo Reyes (2016b)). In this connection, time and space becomes relative as they refer to the same people-waste interaction giving monetary value to trash. These entanglements and *becomings* in the timerhizomes, thus, create a different view of waste and the history that has shaped it until today.

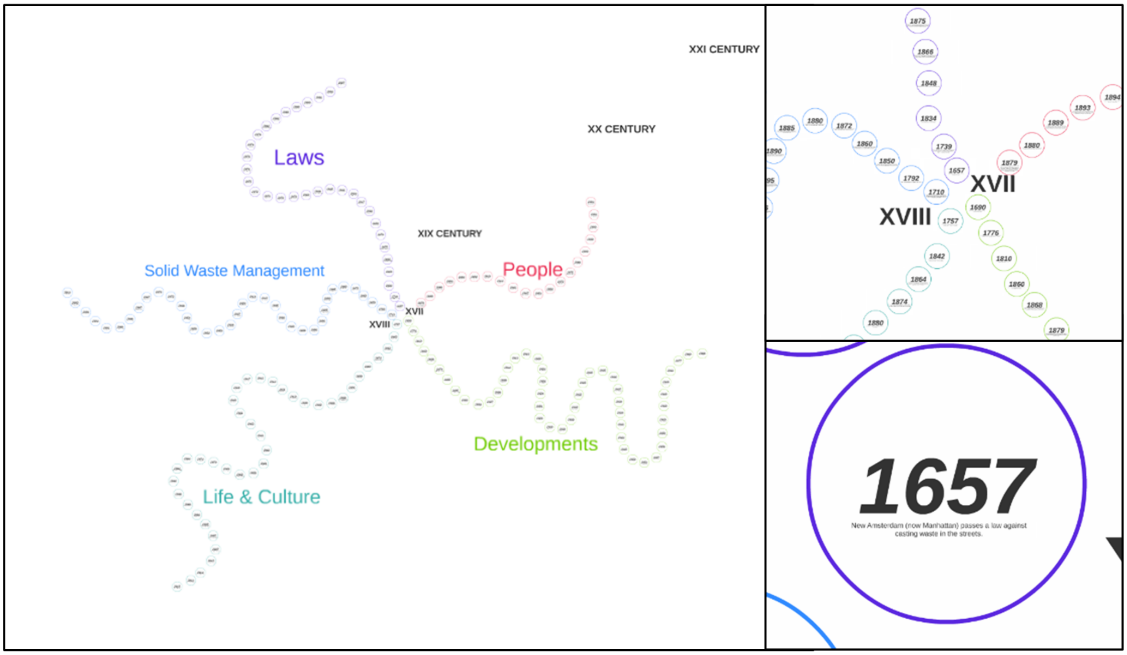

Figure 3.3: Timerhizome of waste in USA.

Some of the lines of flight might seem longer or shorter due to availability of information, however, their location and connections, in their rhizomatic nature, have the capability to

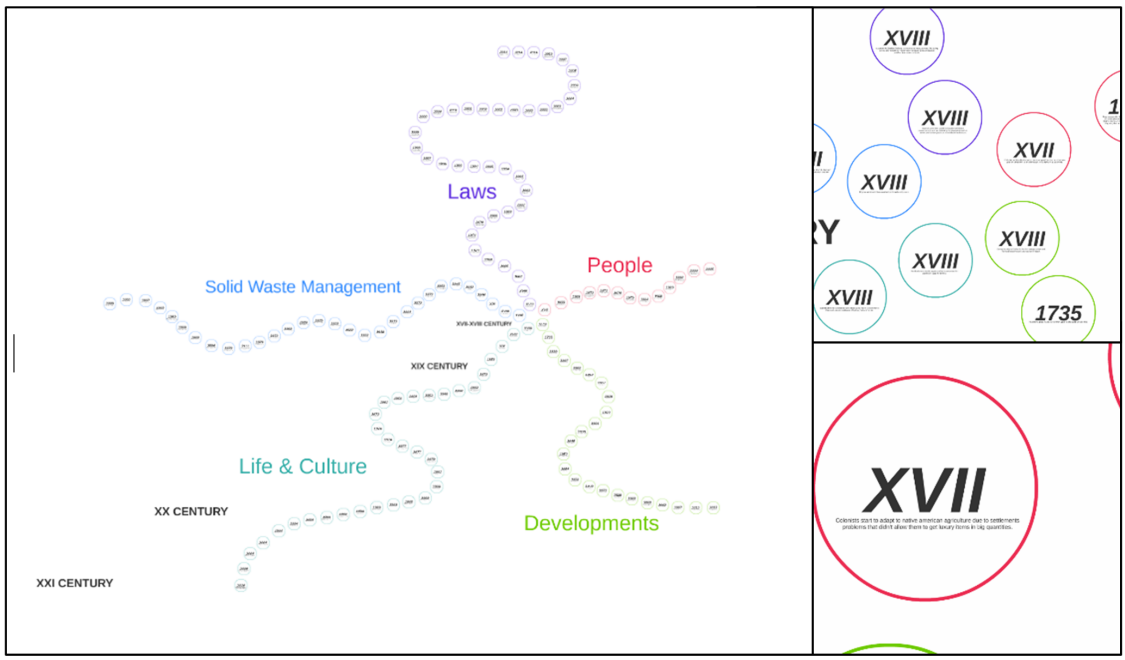

Figure 3.4: Timerhizome of waste in Colombia.

move to different lines and places. The longer lines in both countries are different thanks to their own historical Developments, that is, the industrial revolution in the United States and economic conditions make for a thriving development line while the political focus of Colombia makes the Laws line reach further. In both countries however, the People line was intentionally kept limited to specific records of people influencing the history of waste. The reason being that the influence that people has on writing history, in the case of waste decisions and behaviors, could be highly personal and targeted.

3.3 Historical Development of the People-Waste Relationship Tradition

Beyond the scope of a national history of waste, we all have stories and personal history defining our behavior towards waste. On the day we are born, perhaps even before that, we are part of a cultural group. We are part of a history that will influence our personality. Our first influences, our parents, have been in the world for a while and mostly abide to

social structures already in place that they pass onto us. Specific places have developed their own specific structures regarding almost every aspect of their society, which is what we have to address when trying to promote any behavioral change. Besides clothing or other cultural expressions, the cultural aspects extent to waste related behavior through the intrinsic interactions of a rhizomatic history. Therefore, in order to move forwards, we have to be aware of the way our ancestors shape our conceptions to make the decisions that will affect future generations. We have to know our history, in this case the history of waste in our own cultures and family groups, if we hope to disrupt waste structures and change behaviors surrounding waste.

From encounters with trash bags or trash cans to community projects or strategies to change the behavior of others, personal history influences our behavior with waste and mine is full of memorable moments. For instance, although to my ten year-old self, vacationing in a farm was confusing and challenging, the experience taught me the importance of reducing and reusing, even when I was unaware of it. For the farm trip, my parents' grocery run would experience a heavy reduction of packaging when they opted for bulk sacks, paper wrapping, or box packaging instead of the normal plastic bags. For farm-to-city trips, my elders would pack food tightly in reusable plates covered with a kitchen cloth, or, when space was limited, a rice bag or capped bottled. Reusing transferred to the city with milk pots, most plastics, and even the rubber trashcan that we used to haul, between two sisters, down the stairs of my home when the car was near. Recycling came in the form of crafts and Christmas gifts to loved ones, and I learned about community waste behavior while reprimanding my neighbors through the bullhorn of my aunt's cleaning campaign. However, with these experiences on my back pocket, I seldom thought about waste after I stopped going to the farm, that is, until the day waste shocked me again with its presence in another country.

Through the Colombian interviews, I found that my experience, although unique, was not completely isolated from the experiences of people in my hometown. Reducing, reusing, and recycling was a common topic when participants talked about their family background.

With farmers in their family tree, they were used to farm waste management from their parents, grandparents, or great-grandparents, depending on their age and how long they have been in the city. For urbanized students, these provincial waste behaviors from their elders would create a sense of environmental concern and sustainable drive reflected on their school experiences (Medina-Jerez, 2008). Some of their most memorable experiences with trash come not only from the way their grandparents manage waste, but also from school field trips, campaigns, or projects that urge them to look at waste as more than disposables and see potential on the trash. They talked about recycling as learning how to make birthday cards or boxes from recycled paper; producing ultra-strong bags by knitting strings of standard grocery bags and simply using them again for different tasks; or *recycling* egg shells to add to facial creams.

A common theme among us is the use of organic residuals for farming, not only as a composting base for planting, but as a, long abandoned in developing countries, source for animal feeding. Using organic waste as a food source for pigs and other animals died in the United States at the beginning of the 20th century, after piggeries were abandoned as a waste management system in favor of landfilling. At the same time in Colombia, the concept was picking up popularity in the cities, although, for farms it might have been present since the 17th century, when the government authorized farmers to collect organic waste for planting and animal feeding (Colomer Mendoza & Gallardo Izquierdo, 2013). Some of my participants talk about separating organic residuals in their homes to either give to people feeding animals or using them as fertilizer in their own backyards, which has indubitably come from the way our grandparents manage this type of waste in their own farms. As an example, just a couple of years ago during a family reunion in my grandmothers' farm, I took the picture in Figure 3.5 after the food was prepared.

As a scholar, I felt the need to corroborate if this type of residual management had risks in animals and plants, because as an observant of the blossoming, lush plants, flowers and herbs in my grandmother's backyard I could not object to their appearance. Although,

Figure 3.5: Residuals in the backyard of my grandmother's farm.

not officially composting, throwing organic waste into the garden for planting has provided farmers with some of the most viable sources of food for a long time according to them. This effect could be due to the rich ecosystem around the simple farm garden, in which vermicomposting and biological pest control provide plants with thriving conditions of development (Edwards, Dominguez, & Arancon, 2004). For animals, according to a zoologist and veterinary, who was part of my ethnographic interviews, animals require different nutrition according to their purpose in the farm. For instance, animals raised for their meat require higher nutritional standards that could not be accomplished by food scraps alone, however, foliage and horticulture residuals could still be nutritionally beneficial for them (Ly, 2005). Companion animals raised in farms tend to get used to the food given to them and their nutritional needs adjust according to farm availability making the practice valid and even beneficial for farming.

The dissonance or tension between school and provincial practices is common for students

who, like myself, or my participants, have had close encounters with nature influencing not only our environmental decisions, but also our connection to school and science. Such is the case of the Colombian students in Medina-Jerez (2008) research who had different attitudes towards science and nature according to their level of exposure to nature, being more environmentally conscious, the students who went to school in provincial towns than those in the city. However, as my participants also demonstrated, urbanized students could benefit from educational campaigns to shape their attitude towards sustainability and waste management. It would be especially beneficial, in countries like the United States, where agriculture has switched to more industrialized practices, and there are few people left who could learn from the family farm and their ancestor's practices (Creed, 2000). Science and education have the significant undertaking of teaching environmental sustainability in developed countries, since the family tends to be more independent than in developing countries (Creed, 2000), with some of my participants lamenting never having known their grandparents.

So, personal experiences and history also have a great influence in the way we perceive waste, waste management, and waste behavior depending on our culture, and as such, it is a vital part of the history of waste for the two cultures that I set out to study. Although, similar to a certain extent, both cultures have developed at such different paces that there are many points that they could teach the other, as I have experienced as a transnational messenger. We carry waste history with us wherever we go, whenever we make a decision about what is waste, we are conveying all those historical paths to help us decide what waste is. In the search, of cultural implication of such definition, we need to explore more than the history of waste and delve into creation and interaction of waste in each cultural *zeitgeist*. For that, the development of these timerhizomes would prove useful, beyond historical analysis of waste, into a point of encounter and information to many of the remaining sections of this document.

Chapter 4

CREATION

Unlike manufacturing and generation, creation is a nuanced process characterized mostly by a moment of convergence, a spark of light or singularity if you will, that promotes movement towards the development of that creation. In the case of waste, the singularity takes the form of decisions converging from different paths, thus, making waste a human-dependent structure and as such highly influenced by culture. Culturally, we have learned to develop certain criteria to analyze the existence of waste, such that, learning new criteria from other cultures produces some cognitive dissonance between the two. In the wake of the globalization of waste management, it is important to be aware of the different cultural nuances that bring waste into existence and identify the form it takes when that happens. In order to understand it better, this analysis would focus on the where, who, and when of waste creation.

Identifying a place of waste creation is as challenging as trying to confine a multidimensional history into a bounded structure. It requires analyzing chains of movement and converging points between different aspects of waste in both of the two countries I was observing. Waste could happen at any stage of the residential/commercial, construction, or industrial activities and from there it transfers into one another making its way to what we call the Municipal Solid Waste (MSW) stream. It is there where waste is measured by math-

ematical structures and models and statistical analyses offering generation rates to compare and evaluate possible issues, performance, or problematic areas. Although informative of generation, these rates cannot trace the creation of waste into the cultural implications that even naming waste brings forth. The word *waste*, as it translates to the Spanish language and into participants' interactions, means something to be disposed of, something that it has nothing else to offer to a person and as such should be thrown away and be dealt with. Instead, a *residual* offers different possibilities. It is something that could be rescued and given new life, according to Colombian participants.

However, it is uncommon that people actually think about trash in terms of its life after a served purpose unless it somehow made its way into other aspects of their lives. For instance, manufacturers need to be aware of environmental laws and regulations to be able to keep producing their goods. Distributors need to be aware of manufacturers' provisions and customers' requirements in order to keep a profitable business, but they also need to comply with regulations and policies from their governments. Governments also need to oversee waste at every stage of the process so that it is properly handled and disposed of. However, the type of waste than manufacturers and distributors produce before they reach the customer is classified differently than after it reaches the customer. In this case, there is a great burden on the customer to *do the right thing* after the purpose of a material good has been fulfilled. Following Spehr and Curnow (2015)'s idea that littering and (I want to include) other waste management issues should not be blamed in a person or group of people, I use field work and green engineering principles to share the burden of *doing the right thing* with manufacturers and distributors.

Spehr and Curnow (2015), instead, talk about how circumstances make waste issues happen, thus, shifting the blame towards a series of connections that bring a problem into existence, such is the case of a person walking into the food court of a mall. There are different actors in this setting that could potentially affect waste, however, it is difficult to pinpoint one of them having the power to change something substantially. From the person,

to the restaurant, to the food providers or tableware manufacturers, to the administration of the mall, to governments in both countries, they are all traveling on their own line of flight converging in this point at this moment to produce certain amount of waste. Each of them providing a tiny piece of the puzzle behind the creation of waste and each with different options to modify their participation on the process. This, however, is more nuanced and complex than analyzing generation rates, manufacturing a product, offering sustainable alternatives for customers, or deciding what and where to throw away. It brings economic decisions, personal preferences, bottom-line benefits, and socio-cultural factors into account in the process of creation.

4.1 Where Is Waste created?

Officially, waste comes into existence in a variety of places and it has different classifications once created. Derived from different human activities, waste can come from houses, places of work, places of entertainment, etc. Waste generation rates are designed to keep up with how much waste is being generated by a group of people within a certain amount of time, usually how much waste a country generates per year. However, most information comes from Municipal Solid Waste (MSW) models and it does not show how waste comes into existence from our different activities. We know that MSW encompasses residential, commercial, and institutional waste, and its most common classifications in the United States are by material or by product. Also, that Construction and Demolition (C&D) debris, usually with their own disposal facilities and regulations are not a part of MSW, but are still considered solid waste. While industrial waste comes usually from industrial processes and requires unique standards of management and disposal that makes it mostly wastewater instead of solid waste, it should be considered as a part of created waste (Liboiron, 2016). Human activities have promoted waste as is the case of C&D debris through the search for shelter and mobilization, industrial waste through commodities demand, and MSW through food

and daily needs. Availability of materials makes C&D debris unique to different cultural groups, however, waste management for this type of debris is currently moving on the same direction in both the United States and Colombia. Besides requiring its own disposal sites and regulating institutions, C&D waste management is moving towards the inclusion of recycled materials in construction (Bronin, 2008; Escandón Mejía, 2011). C&D Debris in the United States reached 530 million tons (480.81 MT) in 2013 and was composed of steel (1%), wood products (8%), drywall and plaster (2%), bricks and clay tiles (2%), asphalt (2%) and concrete shingles (18%), and Portland cement concrete (67%) (US EPA, 2015). In Colombia, besides the aforementioned materials, there is still construction with bamboo, rammed earth, and adobe for which the process of waste management and recycling in demolitions becomes challenging (Escandon, 2011). In the United States, demolition accounts for 90% of all C&D waste in the United States while construction only accounts for 10% (United States Environmental Protection Agency [EPA], 2015). The same EPA (2015) report establishes that C&D of bridges and roads produces more waste than for buildings, which adds value to the effort of recycling materials for constructions of bridges, roads, and buildings that is currently happening (Abdelfatah, Tabsh, & Yehia, 2011; Lee, Edil, Benson, & Tinjum, 2013; Lee, Edil, Tinjum, & Benson, 2010; Mariano, de Mello, do Rocio, & Braga, 2013).

The fate of industrial waste is complicated to determine due to the fact that waste from industrial processes require highly targeted and regulated disposal practices that are usually carried out on-site. This means that it is difficult to find actual generation rates or numbers about this type of waste, except for a 1987 self-report of industrial waste mentioned a rate of 7.6 billion ton/year of waste generated, which included 90% of wastewater making the solid waste generation of approximately 228 million tons of waste per year almost on-par with MSW (MacBride, 2011). This number is still highly debated because it relies on self-reporting and also because it does not include waste from industrial processes like mining, which is one of the most common industries in the United States and Colombia (Cardenas & Reina, 2008). Although, industrial processes produce hazardous waste that

has to be properly managed following government regulations and environmental guidelines (EPA, n.d.), some non-hazardous materials make their way to landfills where they can be repurposed or recovered in different ways such as the case of corrugated boxes and industrial packaging or rubber tires (EPA, 2015).

Municipal Solid Waste (MSW) includes the waste produced from residential, commercial, institutional, and even some industrial activities and as such is the richest source of understanding the relationship between culture and waste. With a 15% of the population of the United States, Colombia generated 9.15 million tons of waste in 2013 (Superinterdencia de Servicios Publicos Domiciliarios, 2015) and the United States generated 254 million tons the same year (EPA, 2015). From that waste, according to the EPA (2015) residential refers to newspapers, clothing, disposable tableware, food packaging, cans and bottles, food and yard trimmings; commercial waste included corrugated boxes, food, office papers, disposable tableware, paper napkins, and yard trimmings; while institutional waste referred mostly to office waste and cafeteria supplies. Therefore, most human activities include waste generation, but not all of them produce the same type of waste. In Figures 4.1 and 4.2, the majority of MSW generated in the United States comes from plastics and paper, while a significantly higher percentage of waste in Colombia comes from food sources. These types of differences makes it difficult to generalize waste at a global scale and supports localized research to uncover the meaning of waste for different cultural groups.

In the sample representation of municipal solid waste that I chose to observe, there are many human activities that deserve attention to understand waste. For instance, the mall sees a variety of waste producing industry groups like restaurants, food stores, events, offices, goods distributors, retail stores, and even a component of guest hosting through furniture placement and general ambiance. In Colombia, the mall was an enjoyable place to share with family and friends even when there was no purchasing of any kind. In the case of the United States, this happens with teenagers who consider the mall as a safe place (Vanderbeck & Johnson, 2000), which in turns develops in Generation Y adults finding exploration of

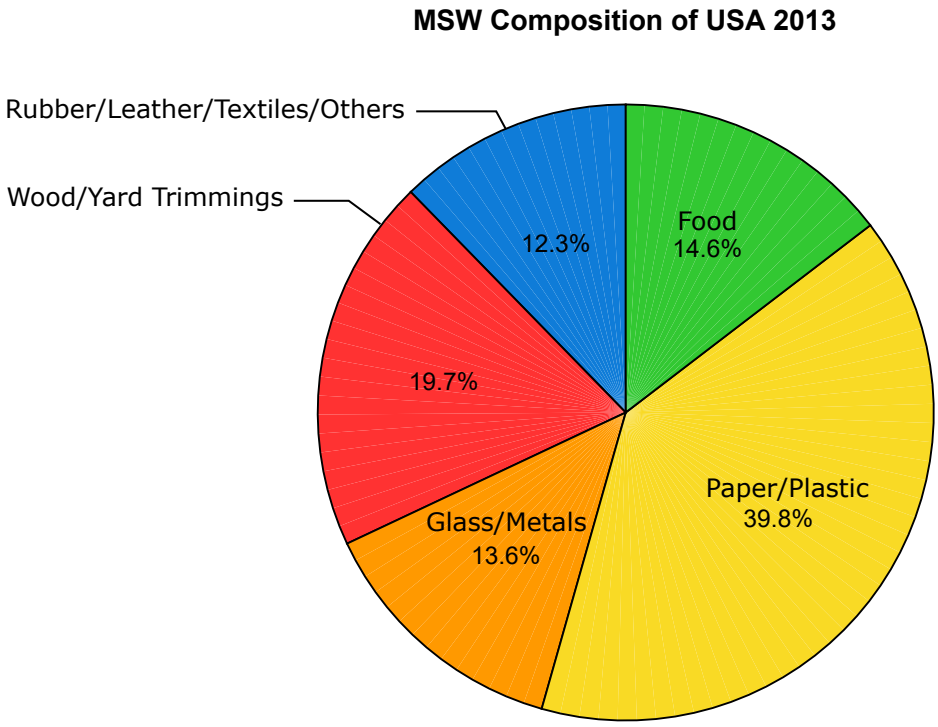

Figure 4.1: Composition of municipal solid waste in the USA.

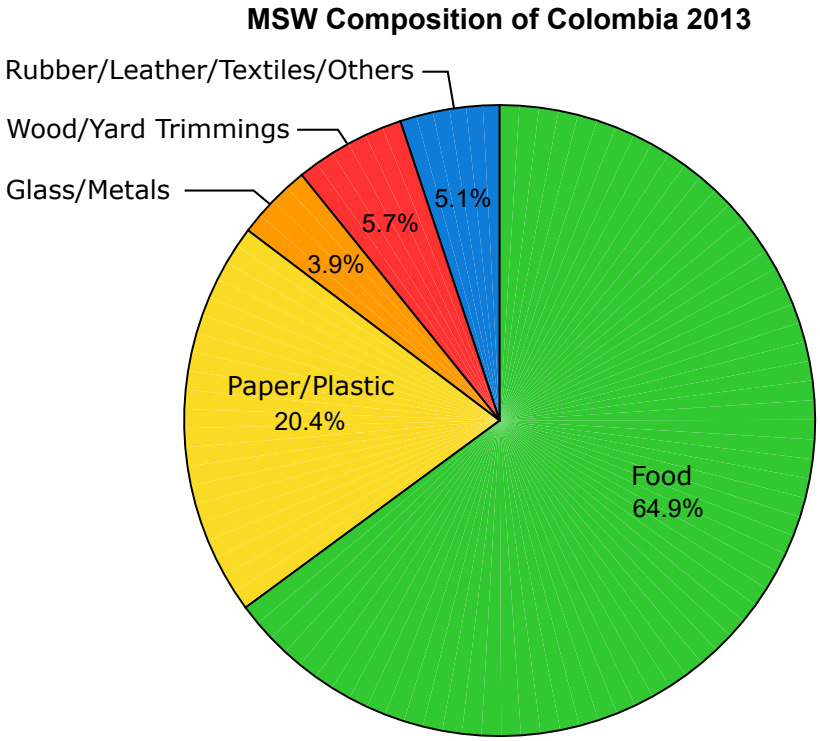

Figure 4.2: Composition of municipal solid waste in Colombia.

these environments an interesting experience (Lachman & Brett, 2013). Shopping malls in California produce $1,25$ tons of waste per year per thousand square meters (Group, 2006), which may not seem significant until we compute the total amount of malls in the USA and that they are in average $20,000$ (Community Centers) to $116,000$ (Super-Regional Mall) square meters in size (International Council of Shopping Centers [ICSC], 2016). For the amount of waste, the social component, the variety of activities, and because recycling-on-the-go is a serious challenge, observing waste behavior at the mall food court was the most attractive prospect to understand waste from cultural perspectives.

Of course, waste is coming from industrial places, construction activities, and residential/commercial sources, but it is the latter that involves the most culturally divergent experience with waste. Waste generation rates are a good indicator of the amount or type of waste that a country produces, however, it lacks depth to understand what waste means to a certain group and how to address the global crisis of waste. In order to understand that process of creation we have to involve people, and it is that human component, which combined with the circumstances of a place and cultural backgrounds, makes waste come into existence.

4.2 Who Creates Waste?

If history has taught us something about waste is that no matter who we are or what we do we have a role in the creation of waste. Understanding and acknowledging that role depends not only on our background, but also on the circumstances around us. We receive feedback from our environment and that feedback and our programming determines how we behave towards waste. For instance, during the 16th century it was common to throw trash away into nearby bodies of water, then, regulations were promulgated to make that behavior inappropriate and we started to adapt. In the same way, we are always trying to weigh options to decide what to throw away and where. Anti-littering campaigns and single-

stream recycling seem to make the process easier by limiting options towards a good and bad behavior, however, it is important to keep in mind that "one size does not fit all in the business of changing behavior [and we] need to understand how [things are] currently working before [plunging] in half-prepared" (Spehr & Curnow, 2015, p. 11) into the dichotomy of right and wrong. That is, throwing everything inside a single bin might work when there are issues of convenience or material confusion, but it is important to understand the issues from every perspective.

On the industrial side of things, there are very few people who could make decisions about products and waste, fortunately engineers are one of those people. From our profession, as some of my participants agreed, we can turn people's focus from getting the newest, fastest technology every year towards considering the benefits of environmental sustainability. The principles of green engineering help us justify this new endeavor since they, quite literally, call for broader analysis and design approaches in engineering (Clough, 2004, p. 21). Through sustainable product design, we could avoid either accidental or purposeful waste generation, since "there are plentiful examples where [waste] is not inadvertently generated; rather, waste generation is thoughtlessly designed into the process." (Anastas & Zimmerman, 2003). For an engineer in electronics like myself, environmental sustainability seemed utopian in a place where the newest technology pushes working electronics to the dumpster, until I learned about sustainable technology and cultural diversity that allows for different design options making waste or sustainability part of the design of products.

Stores and providers interact with both customers and the industry making them a link between producers and consumers. It is the job of these distributors to provide for customers based on supply and demand. They also need to abide to government laws and environmental protections, but sometimes they struggle. According to one of my participants who worked in the office of administration of the mall in Colombia, they struggle with the amount of waste produced in the food court. He mentioned how perhaps, we should go back to simpler times and eat from leaves like our ancestors used to do in pre-columbine Colombia. The comment

made me thing about biodegradable tableware made out of corn that some of the restaurants in the food court could use, however, I did not know enough about waste behavior in the mall yet and waste reduction could come from different options. Distributors have to decide what to sell and how to present it to the customer, which makes a great difference on the way waste is created at this level. In the mall, deciding between serving a meal in reusable tableware or disposables, even between foam, paper, or plastic disposables carries more than economic significance.

In the same way, consumers make decisions about what to buy and indirectly support certain practices even when they are not aware of them. For instance, fast food restaurants use mostly disposable tableware in both countries (except for the trays where the food is carried). In the United States mall, however, all the restaurants were considered fast food even if they include entrees and sides because the food was mostly served as the customer passed through the counter. In Colombia, every restaurant in the food court had a system to call on customers after they had placed the order because of the time it would take to process. Both food courts had different food options, but in Colombia five out of the nine restaurants used reusable plates to serve traditional dishes, with entrees and sides. In Colombia, fast food, or *junk* food how I heard a participant call it, is mostly burgers, chicken sandwiches, pizza, fried chicken, and other typical American fast food staples usually preferred by teens, preteens, and children. Younger adults, however, consider the options of the mall concerning taste, prices, and health without regard for the tableware options.

In each country, adults had different options to explore in the food court and through them they managed to affect waste differently. Although, bringing food from home to the food court was rare, I did observe it happening at least once in each country, perhaps for different, but related reasons (Price/Health/Price of healthy food). In this case, they forwent the options of the mall and used a container from home to carry their food. Another option was to choose the traditional presentation of a regional dish, which was one of the best features of the food court mentioned by one of my Colombian participants. Most

traditional dishes are popular with older adults who like the food and presentation of the five restaurants in Colombia, especially during lunch time or on the weekends. Fast food is mostly reserved for the younger generations when there are few adults supervising. On the other hand, in the United States, the only options are fast food options being Picpeep (chicken sandwich place) the most popular despite the Asian food restaurants (Sushi & Changs) handing chicken samples every day (in tiny plastic cups with toothpicks). Peppers had plenty of customers especially on Sundays when Picpeep is closed, but all these popular options manage disposable containers either paper (Picpeep), plastic (Peppers), or foam (Sushi & Changs) containers.

In the food court of the mall, then, the entanglement between people, life, and waste becomes stronger as each line converges into a rhizomatic movement. That is, from their own day-to-day operations producers are in charge of the different materials options to present the food. In the same way, distributors, moving on their own line, decide how to serve the food or samples converging with both producers and customers. Customers, in turn, decide if they want to buy or not and from where if they decide to do it according to personal preferences or their own lives development. Customers could also reach producers as it happened in the United States in 1990 when a major fast food producer decided to change the packaging of their brand from foam to paper due to consumer protests (ASTC, 1998). Figure 4.3 presents some of this entanglement and interactions as they move between their own lines of flight and come together in producing the ecosystem of a food court mall. In this setting that represented a small-scale development of life interactions, no one person or entity is entirely responsible for the creation of waste, but is a socio-cultural action developed as a rhizome.

With their own lines of flight each actor has their own interests, goals, and ways to manage solid waste, but when they come together they become part of a system that they affect as much as it is affecting them. The amount of waste produced in the food court mall is only one area in which these environments demonstrate the effects of interaction, but in that area, as we collectively create waste, we individually receive feedback that adjusts our

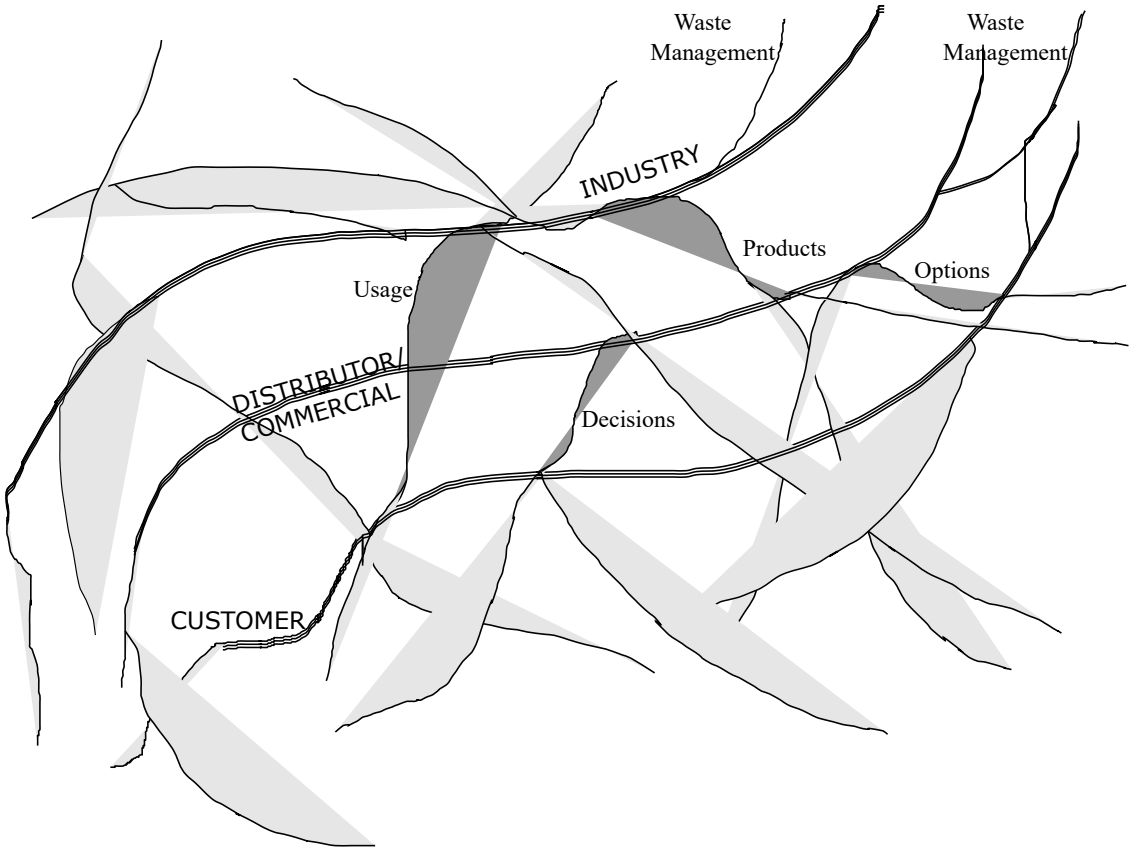

Figure 4.3: Food actors' rhizome.

point of view, normalizing behaviors about waste. On one of the first visits to Colombia's mall, I shared a meal with a friend, and as soon as we finished, he pushed the tray out of the way, as I was lost into the action. I had never noticed it before, but, at that moment, I started to wonder if the action symbolized our need to separate ourselves from waste since it does not happen until we feel that we cannot benefit from that plate that a minute ago was providing food for us. Analyzing waste, then, became reflective, even philosophical, but such should be the nature of creation analyses. I thought about that trash-containing tray and I pondered when had a meal became waste.

4.3 When Does It Happen?

It is in the entanglement between places and people when waste becomes waste. Bringing together both people and the right circumstances could change waste behavior and beliefs to construct the concept of waste. Thinking in terms of untouched nature, *if a tree falls in the forest and there is no one around to see it*, is the tree considered waste? No, nature takes charge of dealing with the tree in a way that is beneficial for the system. There is no waste without people since "the concept of waste is human. In other words, there is nothing inherent about energy or a substance that makes it a waste. Rather it results from a lack of use that has yet to be imagined or implemented." (Anastas & Zimmerman, 2003). For instance, on a Sunday morning in the food court before the restaurants open, there is no waste. It takes a person, surrounded by potentially unusable things, to disrupt the system and put in motion the dormant process to create waste. It takes a spark, a convergence of lines, a singularity, to push creation into effect. It takes movement of people, circumstances, and culture to bring waste into existence since modifications in all of these aspects affect its creation.

Culture not only affects the type of waste produced in a place like a food court of a mall, but it also affects the amount of waste produced in such a place. Looking for fast food in both countries has different connotations for the people visiting the mall's food court. For instance, as in Colombia, participants mention fast food as a moment of socialization with friends that usually takes time, in the United States, the most popular place is praised by how fast the service is so that they do not have to spend a long time waiting for their food. This also applies to the average visit time of 20 mins in the United States food court, opposite to the 40 mins of time in Colombia making Colombian patrons more likely to wait for a prepared meal served in reusable plates. Early adaption of strategies also makes the United States food court's visitors take advantage of the convenience to throw everything away in a single trashcan, which produces more custodial spills when changing trash bags and a higher percentage of liquids in the waste stream than their counterpart in Colombia.

The mall in Colombia carefully observes the source separation laws making most of the waste coming out of the food court disposable tableware, paper, foam, food-contaminated cardboard, and other non-organics waste.

Amount and type of visitors also change the amount of waste coming out of the food court in interesting ways. On Sundays, in the food court in Colombia, the crowd has older faces and the tables have more reusable tableware, thus, despite the amount of people, the trash that gets to the dumpster is less than other days of the week (See Figure 4.4 representing the walked out trash bags during 3-hour observation times and the amount of customers that the restaurants had on that time). In the United States, a similar phenomenon happens during dinner time when people decide to bring takeout home for dinner (See Figure 4.5 based on the walked out trash bags and the amount of visitors sitting at the food court tables during 3-hour observation times). However, in both countries the amount of people in the food court during observation times mostly behaves like the amount of waste in both places during the same time. That means that having a varying amount of people in the food court, depending on their cultural traditions, correlates with a variation on waste produced in the place. Figures 4.4 and 4.5 also make a distinction between different days of the week concurring with custodians' statements that the weekends are the busiest days for the food court. The slowest days tend to be Mondays although pre-weekend activities make a Friday on the mall an unexpectedly dull plan, according to interviews in both countries.

The same applies for special occasions such as Valentine's day in the United States, where other type of events call bigger crowds similar to the crowds attracted by culturally dependent events in Colombia. Special events are another one of the culturally dependent variables in waste creation attracting different crowds, who introduce different waste. Sales and discounts are one of the most popular forms to attract people to shopping malls in the United States, and as heavily advertised on TV, they usually happen close to national holidays. This affects waste in the food court as people taking advantage of these deals visit the food court of the mall with shopping bags and additional packaging that is not usual to

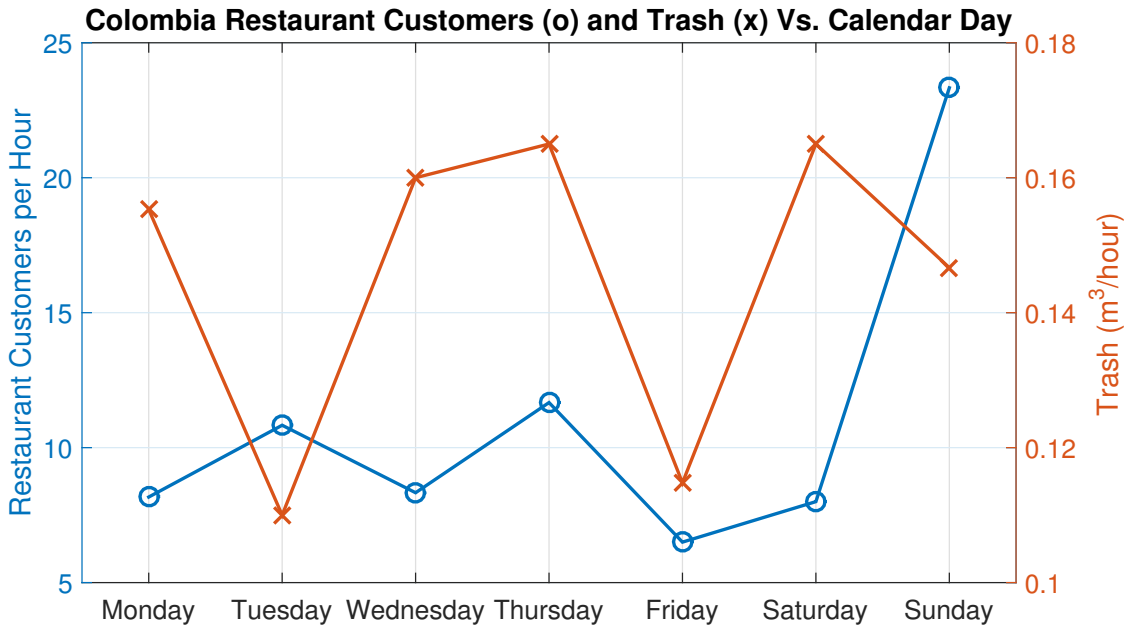

Figure 4.4: Customers and generated trash in Colombia per day of the week.

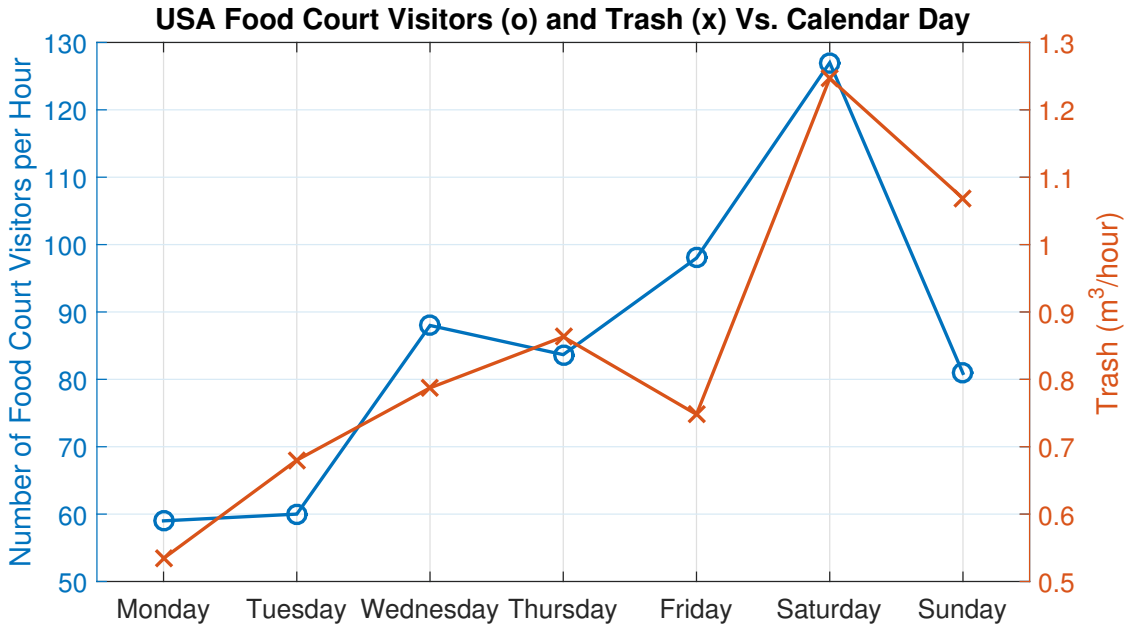

Figure 4.5: Food court visitors and generated trash in the USA per day of the week.

see in the food court. In Colombia, national events, like soccer games, have a similar effect, bringing people to watch the game while having snacks or beverages that the food court does not provide, thus introducing other types of wrapping and packaging waste to the food court. Valentine's Day in both countries also brought decorations for the restaurants and the food court adding balloons and paper or plastic banners to the waste generated at the food court of the malls in Colombia and the United States.

Ordinary circumstances that influence the creation of waste in the food court also include different stages of the process of waste generation. For instance, if we establish that items in the dumpster are waste, the people who put them there are the custodians. However, these items were already waste when they received them from customers. If these customers receive food from the restaurants, do they transform it into waste as soon as they finish? Perhaps, when they receive their food from distributors, part of the package is already waste, designed by producers for the landfill. Or perhaps, that packaging and wrapping part became waste as soon as it came in contact with food, in which case, the United States use of entirely disposable tableware would leave no options for the consumer to avoid contributing to waste creation. If this lack of options were to happen in Colombia, waste would grow to at least double the current rates (See Figure 4.6). Therefore, it is important to understand that people are a significant part of the process of creation, but they are deeply entangled with processes, sites, other people, and of course concepts of food and waste.

Understanding the process of creation of waste, then, takes more than analyzing variables as it becomes a rhizomatic entity, where the entanglement is critical for exploration. This is not a surprising turn of events for trying to figure out waste, since in the words of John Muir, "when we try to pick out anything by itself, we find it hitched to everything else in the Universe." (Muir, 2011, p. 110). From the entanglement, however, I surmise that waste is created as a byproduct of human life at any point and from any point could be easily modified, although, never completely changed or eliminated. Modification is however enough to disrupt the concept and move towards more sustainable practices since the way

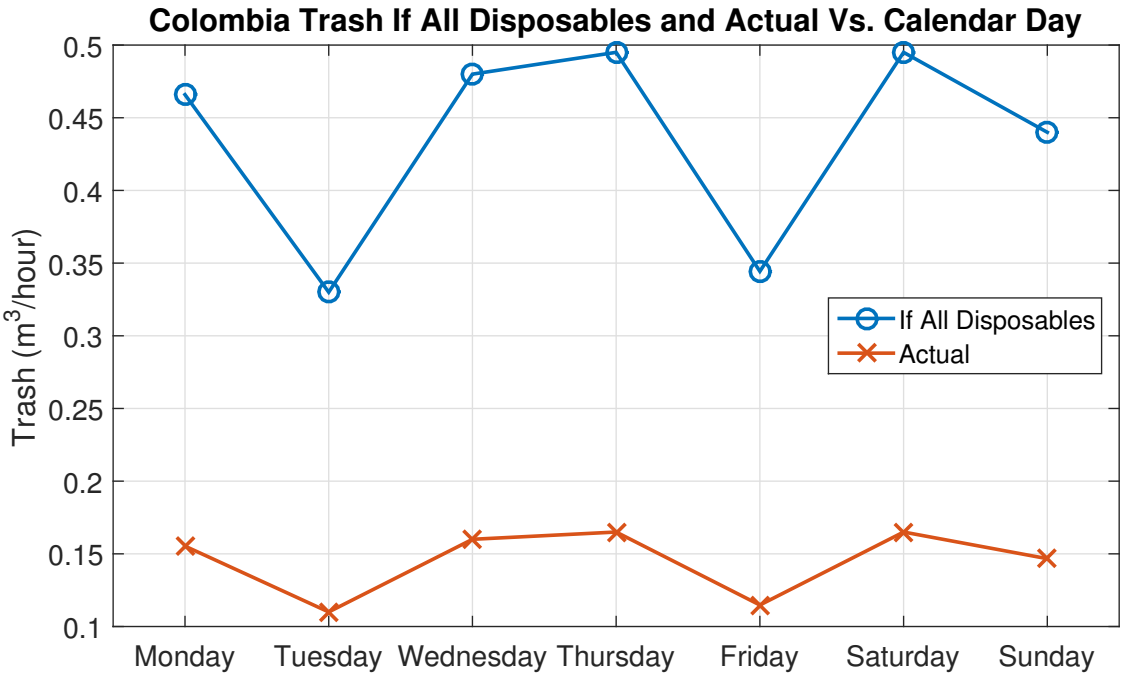

Figure 4.6: What if Colombia replaced all reusable tableware for disposables?

people "behaved [in the food court, for instance] was a result of the interaction between their beliefs, the place itself and what they perceived others around them were doing, including those managing the place." (Spehr & Curnow, 2015, p. 7). So, as waste is a reality for both countries, it has a different connotation for different cultures and through their interaction with it, people develop sustainable behavior sometimes even without awareness.

Chapter 5

INTERACTION

While physics and mathematics may tell us how the universe began, they are not much use in predicting human behavior because there are far too many equations to solve.
Stephen Hawking

As the universe has its own laws, it is inevitable to wonder what, if anything, can we do help our planet. At least that is what one of my United States participants asked me after we talked about my work, which made me wonder what sustainability really means and what it could really do for the planet. If we consider the planet as the sphere-like mass orbiting around the sun, there is not much we can do that either dooms it or saves it. If on the other hand, we consider the planet as the assortment of species that currently live inside the atmosphere of the little blue ball we call earth, there is plenty we can do and change to procure harmony between and sustainability for different species. As, I finally answered this person, we are not fighting for the planet because it does not need us to, but we are fighting for our way of life and that of species that do not have a say in it. The way this relates to our interactions with waste is the same way that our history, our culture, and our definitions of waste influence our behavior. The targeted array of experiences in our life plays a significant role on our decisions and actions. Therefore, the way we interact with waste depends on who we are, where we are, and what we do.

Our jobs are not the only determinant on the way we interact with waste, however, if our job depends of our interaction with waste in any way, we definitely carry strong opinions about certain behaviors. From both sides of the coin, if our jobs depend on the production and provision of disposable items or if we investigate ways to reduce waste generation, we understand waste in a different way than most people. That is also the case of custodians in both countries, who make sure trash gets to the places it is supposed to go. Also, professional street sweepers in Colombia get to see firsthand, and deal with, the results of behaviors like littering. Landfill and materials recovery personnel have different degrees of interaction with waste depending on where exactly they work and what they do, and from each perspective they evaluate behaviors differently. Recycling workers, formal and informal, also have been experiencing waste in a unique way from the beginning of their profession. Even people who live close to landfills have their own particular opinions and behaviors surrounding waste.

Our interaction with waste also depends on where we are and what we are doing at the moment. For instance, our behavior towards waste is different at home, in school or work, and in the food court of the mall. That is, usually when we are at home, there are enforced tenets of behavior towards waste in order to take care of the personal and shared space. In school or work, there are also conditions of behavior that we are expected to follow even when some of the people around us have different backgrounds and ideas about waste behavior. The food court of the mall serves as a place of work, entertainment, and even a temporary home for the lunch seeking people of Colombia, for which waste interactions on the food court provide rich explorations of the type of interactions that we have with waste. Also, in the food court, generational divides offer insights into background stories of younger generations being taught how to interact and create waste. These lessons would become part of the future behavior of people and along with other lessons learned would become part of a set of beliefs that people hold about waste.

For those of us who do not have a close relationship with waste, understanding behaviors and processes related to it could be challenging and sometimes confusing. From a variety

of misconceptions about solid waste management to letting waste fade into the background of life, we tend to ignore the effects of waste until we actually have to face them, usually during crises. It is easy sometimes to separate ourselves from waste knowing that other people are taking care of it, however, it comes as a surprise sometimes that in the process of waste management we play the most important role. If it is true that waste management companies are responsible for properly managing our waste once produced and for the most part they do their job properly, it is also true that some actions from us could help improve the system. For instance, source separation is one of the most sought after behaviors related to waste management and sustainability, and in a systems perspective it greatly favors the environment (Eriksson et al., 2005). In countries like China and Iran, source separation of waste has offered significant results, but it takes plenty of effort and funding to plan and develop such behavior (Damghani, Savarypour, Zand, & Deihimfard, 2008; Tai, Zhang, Che, & Feng, 2011).

Source separation has different connotations for people, usually relating to recycling of some sort, however, source separation includes the way we interact with waste in different scenarios. For instance, as Colombian participants mentioned repeatedly, they have learned to separate organic waste for specific purposes (i.e. gardening or farming), but when talking about trash separation their minds go to recycling first. That is also the case in the United States, where participants talk about their municipal waste management providing both recycling and landfill bins on different colors. It is very common for people to confuse sorting with recycling, I actually started to understand the complexity of sorting while observing people's interactions at the mall. People's journeys in the food court are filled of options and opportunities to make decisions about waste. They interact with waste from the moment they enter the food court, when they choose their food, when they order and receive their order, while they are eating and as soon as they finish, to the moment they walk away from the food court having reinforced something or learned something new.

5.1 If Trays Could Feel, Would They Feel Empty?

When customers enter the food court, they find an environment under certain conditions and the way they react to that environment depends on multiple factors. Even in my own experience, I found myself debating to make a purchase in the food court depending on weather conditions, hunger or thirst, healthy vs. sustainable, and even the status of my research. Although, I am certain that this mental debate applies only to my own experience, I also know that participants in the food court face similar debates on their minds based on different choices. One of the most common decisions to be made when entering both malls, although greatly accentuated in Colombia, is choosing a clean table to sit at. During busy shifts in Colombia, custodians have to work very hard to keep up with the cleaning of tables, and even so, sometimes they might miss a couple tables here and there. Custodians then would ponder over the fact that people chose cluttered tables to sit over clean ones sometimes expecting them to drop everything and run to clean the table they chose. I would later find out, outside of the food court, that there are preferred tables in the place and that people are willing to interact with a waste for a while just to get a specific table.

That first interaction with waste in the food court starts to entangle with the rest of the process highlighting behaviors that carry a lot of cultural implications. The first encounter with waste, in the US food court, would probably be the sampling offered outside Sushi & Chang restaurants. As people walk through the hallways of the food court, they encounter a server of the Asian restaurants standing out there offering little plastic cups with pieces of chicken to anyone walking by. In the United States, I have previously chosen to indulge approaching the counter to taste something from a toothpick, instead of collecting on-the-go plastic cups. The difference between the two could be that the cups are non-committal as people grabbed one and kept walking without engaging with the servers sometimes. In Colombia, since samples are not typical in the malls I have visited, the first interaction with waste happens at the table. So, as people in the United States tend to embrace the efficiency of tasting while walking as a part of the convenience driven way of life, people in Colombia

are willing to wait for a while, in order to be comfortable where they want to be, thus, choosing tradition over efficiency. Without trying to put one culture on top of the other, this difference offers insights into why an efficiency-based approach could potentially fail if imposed in a culture like the one in this Colombian mall.

As a traditional culture, Colombia takes decisions about interacting with waste again when choosing a restaurant, not unlike the United States, this decision usually has less to do with waste than with flavors and prices. In both countries, people choose to interact with waste when they choose a restaurant. In Colombia, they have the option to go for traditional food and keep most tableware away from the trash bags since napkins and plastic cups for beverages are still used in traditional restaurants (and custodians sometimes find reusable plates in the trash). In the United States, when people get asked about their food container they most of the time ask for containers to-go even when they want to sit down and eat at the food court. The impact of this decision is mostly seen in places like the Asian restaurants, where takeout containers are made of foam while dine-in containers are reinforced paper or eco-fiber plates. With a similar case in Peppers, it is also understandable that people would like to have the option to take leftovers home in case they cannot finish their food. In the same way, it is understandable that people decide to choose a restaurant based on their food preferences or the food prices and taste.

These individual preferences have a noticeable effect when different distributors offer the same food options with different packaging. This is the case of MB Burger and BT Burger, in Colombia, both with burger options, but MB serves in reusable tableware, while in BT everything is disposable. When asked about both places, participants preferred BT Burger because of taste, texture, and even the traditional presentation of fast food, which made a lot of sense because BT is part of a national chain highly specialized in burgers, while MB is not. Chicken was another popular option to choose from in both countries, with the Colombian food court offering three options in different restaurants and the United States offering multiple options of chicken in many forms in their widely varied places. In

the US food court, the most popular presentations of chicken include two places of chicken sandwiches, both wrapped in paper inside a bag, one plastic the other paper, and the Asian place's chicken as an entrée, with their polystyrene foam and fiber containers. Chicken as the main actor is the preferred presentation in Colombia, where the three options of fried chicken include fiber boxes, paper boxes, and polystyrene foam boxes all with different price tags and different flavors.

Although implicitly tied to type and amount of waste, the decision between different restaurants will usually come based on factors over which the customer has no control, unlike their actions after receiving the different presentations of food. As people walk away from the counters, usually trays in hand, they all keep it close to their bodies in an action that either for balance or food temperature gives the impression of people embracing the waste that they just received in the form of food container. In one occasion, in Colombia, a young child saw their parents doing this and demanded their own tray to bring food (onion rings) to the table. This action of children carrying part of the food items to the table is made easier by fast food places that usually put everything inside a bag or box designed specifically for that purpose. Some of these boxes, especially in Colombia, are designed specifically to appeal to children including children menus and plastic toys or some form of entertainment inside the box, which in turn drives adults to purchase at those places most of the time. These actions are so powerful that, in Colombia, I saw a couple of parents struggling so their children would focus on eating the whole meal instead of playing with it (dinosaur nuggets) or with the surprise toy.

Box meals for kids are still a new concept for Colombian children, but choosing to buy them is still a way for parents to implicitly communicate messages to their children as it is the way they themselves behave around other waste related decisions. The most explicit example of this was a parent in the United States teaching their child to pack everything back inside the paper bag that the restaurant had provided for them and pointed out where the child should throw it, and celebrating once the happy skipping kid reached the trash

can and threw everything away. In the USA, I also observed parents and children throwing away half full cups of liquid inside the trash cans as they walked away and I observed tables full of forts of paper bags and containers separating children and parents on both sides of the table. Similarly, in Colombia, children with tall boxes or bags full of children-targeted food and plastic toys would focus their attention on them instead of their parents. However, there were some cases where parents would offer a certain food to their children, especially when the food was hot or non-children friendly, as it was the case of parents spoon-feeding some soup to their babies or other adult foods to their toddlers and children.

Although, each of our actions in the food court could teach our children about waste interactions, nothing is perhaps more telling that our actions once we have ended our meal and walked away from the place. In the United States food court, the message is simple "pick up after ourselves and dispose of trash" while walking away with some containers to be later disposed of, perhaps in another place, however, there are cases when people still leave their waste on top of tables or even on the floor. In the Colombian food court, however, the existence of reusable tableware makes the message a lot more nuanced since there is a process going on behind the curtain that customers rarely notice. Depending on the restaurant, the trays have a different destination than just a flick of the hand in front of a trash can in order to leave the empty tray on top, which is the case for fast food restaurants in Colombia and the United States. As done at home, in the Colombian food court, people choose to organize their plates in towers, sometimes placing napkins and disposables on one side and reusables if any in another, but there are cases of people just walking away from the table without making the minimum effort to organize their waste. In this sense, as people get to walk away from waste, there are other left behind whose livelihood depend on it. It is at this point that the trays start to come to life disappearing from tables and trash *chutes* (trashcans in Colombia's mall), and I wonder what they feel.

> *I wonder what the difference is for trays carrying plates, and trays carrying trash? Did the fast food trays know that they're carrying trash as we hugged them close to our body? From observing their last interaction with the custodians, I wonder*

if the trays carrying disposables feel empty. These trays are carried in a simple, far, cold way compared to the others. The trays with reusable tableware get closer, both hands are used to pick them up and carry them. They are heavy trays. They don't end up with a pile of nothing. They have a purpose. I wonder again if the trays from fast food places feel empty, useless. If in the way we interact with them they get to fulfill their destiny.

I wonder and I notice the way trays are one of the main characters in the food court, thanks to the actions of custodians, the waste fairies, that most of the time we tend to ignore. The ones that, after we walk away from a table, make sure that the place is ready for the next customer. They are the ones in charge of waste after we finish interacting with it. They sweep and mop floors, clean tables and pick up after us. They take charge and do whatever needs to be done to put the waste where it belongs. They dance a dance that no one sees, but everyone benefits from. It is the custodians and similar cleaning workers who are constantly making a difference on some of the most crucial waste issues.

5.2 The Tales of Invisible People

The people I call invisible in this chapter are everything but invisible. However, because of the nature of their jobs, people in the waste business tend to be ignored when doing a good job and acknowledged only when something is wrong. Much as magical creatures in other planes of existence, custodians, cleaning workers, landfill operators, recyclers, and many of the people in the world of waste do their jobs as unobtrusively as possible, reinforcing the walls of the NIMBY bubble that for different reasons (historical, cultural, etc.) keep people away from waste. They are part of an engineering design and current structures of waste management that allow users to effortlessly separate themselves from environmental issues. They find it odd for people to ask about or admire their jobs, but understand that what they do has an impact on the environment. Often, these humble people have not had many opportunities in life, but have learned that their arduous solid-waste-management work could offer insights into solving waste issues (i.e. Organized source separation in Colombia's mall).

In Colombia, specifically in this city, where the line between farming and the urban environment is still blurry, a group of people in the food court mall blends tradition with environmental progress. As we understand it now in the pro-environmental community, source separation is one of the most favorable ways to ensure sustainable waste treatment, but for the custodians in Colombia is simply a way to keep trash with the trash, recyclables apart, send liquids to liquid treatment centers, and most importantly keep some animals fed. Born in nearby towns, the custodians in Colombia have access to farm animals and pets that they happily feed with mall leftovers, sometimes even at the chagrin of administration people who would like more advanced techniques of management. In their interaction with waste, the richest in this mall, they dance the dance of trays; filling individual buckets with liquids, leftovers, bones, and dirty water where they rinse their rags; filling used trash bags with packaging, wrapping, and napkins; and filling the aluminum buckets lined with clear bags with bottles that they pick up from the tables. They also keep, in their cart, alongside trays, buckets, reusables, and the attached active trash bag, some boxes from kids' meals and other recyclables that have not been contaminated.

In an endless parade of trays, custodians walk to a table, pick up the trays, clean the tables, bring the tray to the cart, dispose of the trash, and walk the tray and tableware to the respective restaurants to be cleaned. Plastic cups and containers contaminated with food never make it to a recyclable bin as do bottles, cans, and paper. Reusable plates are thoroughly wiped before walking them towards the restaurants. Customers ask the custodians where should they put the contents of their trays and they swiftly offer to do it, or they tell people where they should do it when it is mostly disposables. It is an eternal parade, a dance, a fashion show that most people ignore, even when the floor is recently-mopped/wet or when a custodian stands waiting around to finish cleaning what they started.

> *As the sun sets on observations day, the fashion show doesn't end. It's solemn and graceful. It happens in another level. Wearing the same clothes it's not normal in a fashion show, unless it is another type of fashion. A fashion that's becoming a big part of our life, but we are destined to not notice. As magical creatures,*

custodians strive to be at the same time ethereal and omnipresent. They live in their own world . . . or perhaps they live in my world, where the tedious becomes magical. In this world the monotony becomes rituals, and dances, and life. They dance with their cleaning tools expertly and around unsuspecting people from other dimensions. They dance to the music of American classics even though they don't notice. They follow their rituals sacredly because their existence in their dimension depend on it. And for the customers, there is a band of fairies taking care of them in this place.

Their jobs are extremely hard and complicated, but there so much to them that I cannot help, but feel inspired. They know exactly where everything goes. They almost mechanically separate all these different types of waste, make sure that it reaches its destination, and they manage to have some fun doing it.

However, this almost magical moment is extremely rare and focused on a specific, environment, specific rules, and specific people making it happen. The magic used to happen only in the middle of the food court where two of the several aluminum bins were specifically dedicated to recycling, where they would usually park the housekeeping style cart that in two handles and three levels separated waste. Outside that area, recycling bins had been used as trash cans for so long that their bags had been changed to black a long time ago, thus, providing confusing information to customers. As I noticed after a rhizomatic exchange, when my participant asked me how to identify the recycling bins from the trash ones and I pointed out that recyclables needed to be packed in clear bags unlike trash. The color code of trash bags provided also a moment of confusion for me while in the food court of the United States mall when they started to use clear bags to line the trash cans. I asked for the reason behind it, surmising that they would not have the need for the bags since there was no collection of recyclables in the food court, discovering that they had just ran out of black bags and they had those on hand.

Without recycling at the food court in the United States, the work of custodians is a little different, although, not in the least less complicated. With less people to attend twice as much space than the custodial team in Colombia, they have to take on different tasks around the mall during their random shifts. While Colombian custodians had two defined

shifts from 6am to 2pm and 2pm to 10pm, the shifts in the United States were highly customized having people from 7am to 2pm, 8am to 4pm, 9am to 3pm, etc., which would leave the bathrooms, part of the food court assignment in the US, unattended for a few hours sometimes. Other responsibilities of the custodians in the United States included floor cleaning (sweeping, moping, and picking up any mess), wiping tables, trashcans, and other surfaces (that in Colombia was done every morning), as well as helping out with furniture polishing and mall cleaning before the mall opens. They also dealt with collecting trash bags and walking them to the dumpster to be collected by the waste management company, as well as collecting boxes sometimes for the only recycling that happened at this mall. In general, the custodial work in the food court in Colombia is very different than the one in the United States, but they all help waste get to the places it is supposed to be.

In Colombia, once the custodial staff passes the torch to other municipal waste management teams, the people-waste interaction becomes a little different. As custodians were joking and playing while rinsing recyclables, in a cold Colombian morning, an MSW collection truck slowly approached the platform with two people hanging from the sides who would help make sure that all collected trash made it to the truck's compactor. That job grows exponentially challenging with the amount of people they are collecting from and the speed at which the truck is moving. When I was little and we were still using reusable trashcans—instead of flimsy grocery bags full of trash set on the curb—the collection people had to be very strong to flip the rubber trash cans into the truck while moving and patting to get everything out. Nowadays, they have to be able to juggle random pieces of trash left behind by stray dogs as they rip open plastic bags looking for food when people do not come up with clever ways to keep them away from the bags (See Figure 5.1). There is not much time for playing and joking when moving fast between houses and neighborhoods. And, even after big efforts and sometimes because of the speed some items manage to escape from them and become part of the litter in the streets. In that case, the only people that stand between waste and clogged stormwater drains are professional street sweepers.

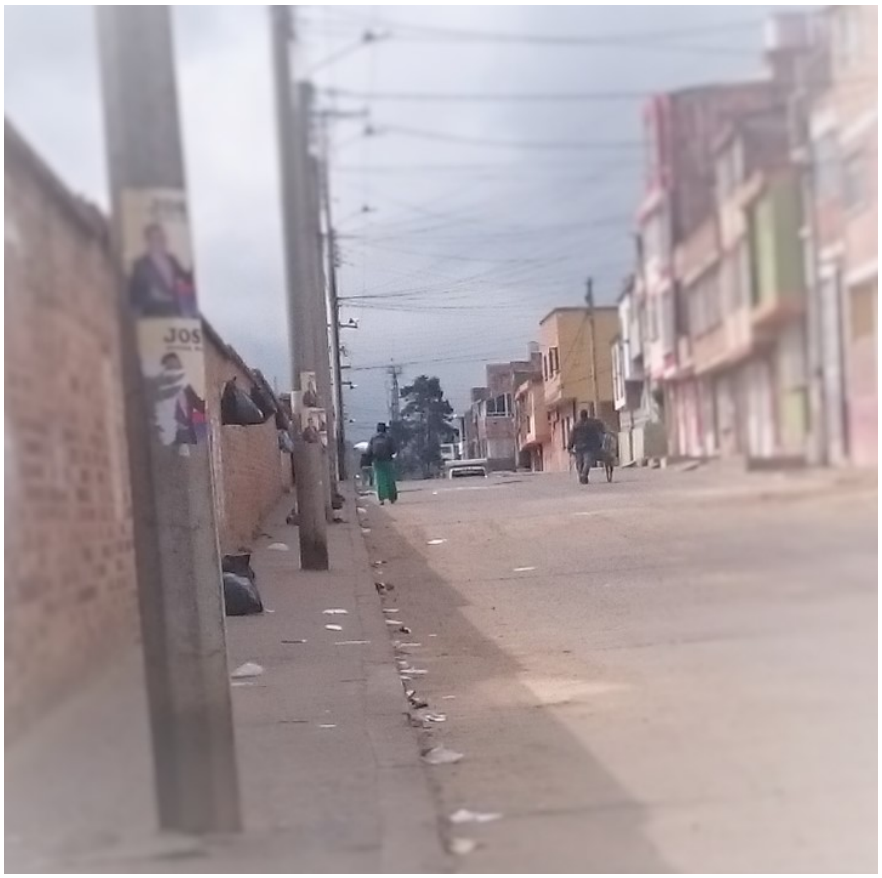

Figure 5.1: Street view on a trash collection day in Colombia.

Almost as an icon of charm in that still small city of Colombia, street sweepers or their little carts are found in different places at all times, sweeping their way into a better world. At least that is what I see when I look into the eyes of the person who has been keeping the streets clean for my aunt for years and to whom they offer a cold/hot beverage every Friday depending on the weather. This appreciation for people who clean after us is not new in my family, I learned to see them through my parents, and I was seeing this person (Figure 5.2). I was thanking this person for their wonderful contribution while they smiled and agreed that it was an important job. They also told me that there are certain days that are harder than others because of the amount of waste after a concert, for instance, or the topography of the terrain while they do their job. Some of the longest, most complicated days at their work are those after a good concert of the traditional week before Christmas municipal festival. On those days, they start at 6 am in the main city plaza (10km^2), where

50 people sweep and pick up trash leaving the place clean in 1 to 1.5 hours before the offices open, and then, they each head their own way to their work zones.

Figure 5.2: Street sweeper at work in Colombia.

Most of the trash during those concerts must be plastic bottles and beer cans, which are considered a treasure by another group of invisible people, recyclers. There are two types of recycling happening at the same time in the city. One of them, the official/formal recycling happens through an association, a cooperative of people who used to recycle informally, but who have received government and other institutions help and have official facilities to process recyclables and sell them directly to factories in the capital of the country, Bogota. The other type of recycling is people who still run with their own carts or animals early morning on trash days and sell their recyclables to junkyards or even the cooperative sometimes. The cooperative considers informal recycling as a dangerous process for people since some-

times, they go through the trash trying to find something valuable and they could injure themselves or do some serious damage. However, with all the effort the cooperative has put into streamlining formal recycling, informal recycling still complements the activity in ways formal recycling does not.

Although, invisible people predominate in Colombia, they present an alternative perspective on waste, in both countries, that we still have a long way to go to understand. The way these people see waste is different than what we see from the structures we have built for society and cultures. They have so much to share that they should not be invisible any longer. In fact we should try to listen and understand their perspective of their jobs (see Appendix E). Unfortunately, as part of our unyielding constructions, waste is one of those things, people have to worry so little about that there are a great deal of misconceptions surrounding it, which ultimately represents a big obstacle when trying to change waste behaviors. We have learned to see so little and assume so much that we get to points where "[s]omeone's Great Idea' [backfires], creating negative consequences that were never intended as part of the program" (Spehr & Curnow, 2015, p. 10). Out of the multiple misconceptions that people have about waste, I focus on the ones that either through observations or interviews made their way into this project.

5.3 What We Think Happens vs. What Really Happens

Assumptions without learning are not only a mistake of engineers, but they are a big part of the human experience, as it is finding ways to justify those assumptions. The problem with closing our minds to a certain assumption is that it creates barriers of knowledge that do not allow us to explore and understand things in context. In the case of waste, for instance what happens after collection becomes a black box that we are supposed to trust. In the United States, trust comes easily as people assume that the system is working as it should,

while in Colombia, people tend to doubt that authorities are managing trash correctly. Both assumptions could potentially influence certain behaviors or beliefs that make open communication about waste more challenging. That is, asking questions about certain areas of knowledge create some unsolicited explanations and in some cases defensive attitudes in people, who perceiving the gaps on their knowledge tried to be nonchalant about them, finishing conversations as one-sided depositions. That, however, was not the case for many of my participants, who asked questions about waste in conversations that revealed popular misconceptions.

5.3.1 Our Interactions with Waste Are Limited to the Existence of a Trashcan

A popular answer when discussing interactions with waste was to recall experiences around a trashcan. Namely, the leaking leachate when lifting a bag; overflowing trashcans in fraternities; nightly raided dumpsters; or separating recyclables from the trashcan contents. However, almost in the same measure, other experiences highlighted alternative interactions with waste that included interaction with everyday objects like plastic pens, wrappers, and even dust. Some participants openly expressed the fact that we interact with waste all the time since we see it when we walk as we look around, when we eat as we deal with wrappers or napkins, or when we use anything that could potentially become waste. Moreover, if we remember the composition of municipal solid waste, it includes food, paper, plastic, glass, metal, and even clothing, thus reinforcing the fact that we are interacting with waste at every moment of our lives. Also, while talking about waste, participants talked about the way they separate waste for collection.

5.3.2 Source Separation Requires a Lot of Worthless Effort

A commonly held belief among people is that there is no point in separating at the source since everything will end up in the same facility. In Colombia, it even goes as far as claiming that after separating recyclables from trash the collection team threw them together inside the compactor of the truck. As a recently popular belief, I was skeptical to the reality of this claim since my experience when I was younger was that recyclables went on top of the truck while trash went into the compactor. However, that was back when we had reusable trashcans, so I needed to verify the veracity of the claim during my field work. As I took out both bags, a grocery bag filled with trash besides a clear bag filled with recyclables, I expected the truck to take both bags and throw them in the compactor. However, when I came out of the house as soon as I heard the truck, I realized that informal recyclers had picked up the clear bag just a few minutes before and the only bag outside was the trash bag. Additionally, separating waste for gardening in the United States, has provided my house with beautiful grape tomatoes for a year.

5.3.3 Landfills Do Some Separation

Thanks to the close relationships and partnerships between landfills and material recovery facilities (MRF), it is easy to assume that inside landfills there are sorting filters that catch possibly misplaced items before beginning their process of landfilling. However, although some landfills in the United States have to pull materials out of the waste stream (rubber tires), they do not separate out materials once they get to the landfill. The separation occurs only at MRF's either from source separated or single stream materials. The landfill in Colombia also pulled rubber tires out of the current cells, although the destination of these tires was the bottom of new cells to aid with the liquid collection according to the tour guide. In a landfill, everything gets compacted and buried, there is no treatment of solids except for their disappearance under a few layers of soil and clay. As waste materials biodegrade with moisture and microbial activity, landfill gas is created (consisting primarily of methane and

carbon dioxide). Landfill gas can be flared (burned) to convert it to 100% carbon dioxide or utilized as a fuel for energy production with turbines or internal combustion engines. The liquid that percolates to the bottom of the trash is called leachate. Leachate is abundant in the highly moist content of the Colombian trash. This misconception about sorting at the landfill hinders source separation creating issues at the municipal level, especially in Colombia.

5.3.4 In-Land Trash Does Not Reach the Ocean

In a highly organized system of waste management, it is difficult to believe that trash would fly away and escape to the ocean. It is more believable to consider the danger of bringing trash to the beach and not taking it with us. However, it is important to point out that there are circumstances that could unfortunately take mismanaged waste to the ocean without people's intervention. In the Colombia landfill, the tour guide talked about animal vectors that could interact with the trash, which resonated with the park story of Spehr and Curnow (2015). Animals carry trash away to different places, as does the wind with low density plastic, and as does the rain on its journey to other bodies of water. However, it is in the moment that moving water picks up trash that there is little to do to stop it from reaching the ocean, especially, when the waste is not contained since "[m]ismanaged waste could eventually enter the ocean via inland waterways, wastewater outflows, and transport by wind or tides." (Jambeck et al., 2015). This underscores the importance of adequate waste management and people's involvement throughout the whole journey of waste management.

Thinking about landfill stories, invisible people, and sentient trays allowed me include a variety of waste interactions that are highly cultural and often ignored. They allowed me to expand my perspective about waste to include the social and human side of waste that I explored through different writings and media (See appendices E and F). The story of a landfill allowed me to think about interaction with waste from purchase to disposal. Misconceptions and fieldwork offered some insights on the importance of correct and current

information to loosen up the lines that pull waste management into a tight entanglement inside a black box. The story of the invisible people allowed me to appreciate the hard work that others do to properly manage waste. And finally, the story of a dance of trays made me think about how people bring objects to life by interacting with them. Though my narrative reflection about the feelings of inanimate objects, the beauty of picking up trash, and the dance of sweeping, I believe I am falling for my own work. I have started to see beauty where others cannot. I see the importance of what many consider a menial job.

During this highly entangled talk about waste and the construction of a concept that depends on our history, culture, and waste interactions, it is important to highlight that understanding the entanglement is vital before thinking about designing global solutions. Especially, because many cultures have already their own systems in place that instead of a total replacement might only need a tune-up. We need to be careful with imposing solutions upon cultures while sitting behind a desk or inside a lab, since ill-informed solutions could negatively impact a culture. For instance, at the landfill visit, the person in charge mentioned how they got approached about implementing a reverse osmosis treatment for the leachate, which they tried and had to pass on because of the wasteful nature of the process and the danger of the liquid left behind. In our rush for coming up with generalizable solutions, we engineers, might want to jump every time we think we have found something worth pursuing, but we need to pace ourselves and do our due diligence understanding that, historically, imposing one's constructs upon other cultures might not be the best idea.

Chapter 6

HIDDEN GEMS

It is difficult to find a way to help without the ability to listen, to pay attention to the real issues behind the symptoms of a problem. One of the most memorable pieces of advice I received in my engineering life was to listen to the customer, and also to read between the lines on what the customer is really saying. The idea is that our job also includes some detective work in trying to figure out what is really going on behind an issue and coming up with an effective solution. However, when we tend to skip the detective work, we rely on accounts that are not always accurate or are missing important information about the problem. For instance, my detective work led me to find out that the landfill I visited in Colombia receives waste from 58 nearby municipalities, besides the waste collected in the city, that most of that waste is food related. Yet, the numbers in the World Bank report (Hoornweg et al., 2013), taken from generalized sources, do not inform enough about the localized problem to be able to design solutions. Furthermore, even local sources provide limited information focusing on the technical side of collection and disposition (Superinterdencia de Servicios Publicos Domiciliarios, 2015), thus, highlighting infrastructural issues that left out alternative and culturally appropriate methods of solid residuals management.

From that perspective then, we tend to assume that the biggest issues related to solid waste in Colombia have to do with waste mismanagement, which in turn takes us to the

construction of landfills and the importation of new technology to manage the issues. However, this is an unending cycle that has already failed in the past. In 1980, for instance, the MSW management entity in Bogota, imported 59 trucks to collect trash, but by 1986, there were only 10 actively working, having already retired 64 out of the initial 100 imported in 1974 adding to the waste in the city. The waste management entity in Bogota, after many scandals and belittlelings, was liquidated in 1993 leaving waste management to private companies that are still performing those duties with their own new trucks and new technology. The issue with importing new technology is that maintenance and supplies for it need to be imported as well adding costs and complications to the process. Now, if landfilling has proven to be one of the least helpful solid waste treatments in the world (Eriksson et al., 2005), it is important to carefully consider the type of source separation and material recovery happening organically in countries like Colombia.

It is also easy to assume based on national data and even participants' experiences that reusing and recycling is not as widespread in Colombia as it is in the United States, where recycling is one of the most ubiquitous process for materials recovery. In the USA, the development of the three R's, Reduce, Reuse, and Recycling, has been making a difference in waste management during the last few decades, and for many people, the process is a given. However, there are still places like the mall I observed that do not have on-site recycling for non-cardboard materials. In Colombia, one of the biggest examples of reusing has happened naturally since I was a child. Glass bottles containing beer or soft drinks are still collected and exchanged at the consumer level. That is, when a person purchases a personal size beer or soda, said person has to bring an empty bottle to buy the new one, or return the empty bottle after. The system has been in place in Colombia for a long time, however, the introduction of plastic bottles and carry-out personal size glass bottles has started to disrupt the system. So, much so, that in the food court of the mall, returnable bottles are no longer used, being replaced by fountain sodas or non-returnable containers (bottles and cans). The returnable bottles are still used in restaurants, cafeterias, and corner

stores around the Colombian city, but the behavior seems to be dwindling with Colombians adapting to be constantly on the move, carrying water bottles around.

6.1 Is breakfast the Most Important Meal of the Day?

As the United States has been moving towards the widespread use of coffee mugs and reusable water bottles, plastic water bottles are becoming popular in Colombia. A few years ago, soda trucks would carry 4-5 gallon bottles of drinking water made out of heavy glass. Those bottles have been slowly replaced by reusable plastic bottles that are still used nowadays in Colombian homes. Outside the home, in Colombia, people tend to get snacks at one of the many coffee shops and cafeterias around their work or school, thus, usually getting water and other drinks in reusable containers. In the United States, reusable to-go containers, such as water bottles, have been at the forefront of sustainable strategies by providing people with an alternative to the environmentally costly bottled water (Saylor, Prokopy, & Amberg, 2011). However, personal preferences about taste, convenience, and safety have hindered their widespread use, making bottled water one of the most sold items in universities in the United States (Patel et al., 2011; Saylor et al., 2011). And sustainability efforts in educational institutions have focused on reducing certain plastics on their campuses, through the introduction of reusable containers and other alternatives.

Biodegradable plastics, paper, and reusable containers have made their way into schools in different ways in the United States. Fighting against childhood obesity, Patel et al. (2011) introduced reusable water bottles into a United States middle school coupled with education and water fountains. Similarly, universities have provided water refilling stations with electronic feedback to educate the public about the amount of plastic bottles kept out of the MSW stream. Biodegradable plastics have also made an appearance in some of the most sustainable university campuses through the use of biodegradable plastic cups and plastic-lined paper containers. Although the biodegradability is only feasible in an industrial

composting setting at this point (United Nations Environment Programme [UNEP], 2015). This sustainability initiative in the United States could provide a viable option to keep the convenience of disposables with a smaller environmental impact, however the current plastics don't biodegrade in the ocean (UNEP, 2015). Also, a packaging industry representative stated that the degradability of these type of disposable items can makes them a risk for companies during transportation and warehouse storing. For this reason, it is important to develop better alternatives to current disposable tableware that is easily transferable to other countries.

Food related waste is an important part of the global analysis of waste because different food traditions around the world influence waste generation and management. For instance, the expression breakfast is the most important meal of the day, loses veracity in the United States and Colombia. In Colombia, lunch is the longest, most socially interactive, thus, most important meal of the day, featuring soup/salad, one entree, dessert, and a drink. In turn, in the United States, that meal is usually dinner. For such a meal, we get to dedicate time outside of work since standard US shifts finish at 5pm, and most Colombian workers have two hours of lunch to share at home with their family. At those times, we expect to sit down, enjoy the food, and talk. At home, the standard practice is using reusable tableware differing from fast-food restaurants. Even *utility* (meal-of-the-day home cooked menu) restaurants in Colombia tend to use reusable plates for the different options offered to patrons who cannot travel home during lunch. The prices of these complete meals are relatively low compared with their fast-food counterparts or with elite restaurants, and they also have a staff of people cleaning tables and organizing after people.

6.2 Growing-up Multicultural

It is important that in the wake of waste globalization, we understand that most people in the world are part of cultural groups usually neglected in behavior research. In turn,

WEIRD- Western, educated, industrialized, rich, and democratic people, being them some of the rarest people in the world, are the basis for multiple behavioral studies that usually determine strategies for the rest of the world (Henrich et al., 2010). That means that much of the information about waste behavior in the world comes from people under certain conditions in developed countries, who have their own traditions and cultural backgrounds. In order to understand and address the problem at a global scale, however, it is important to understand other cultures and the way they have adapted to certain situations. For instance, I started to notice that, in the Colombian shopping mall's food court, same as in restaurants, there is a team of custodians actively organizing and picking up after people, while in the United States, people mostly clean up after themselves and throw everything in the trash. Moreover, while pondering about both situations, I found myself analyzing other cultural aspects such as family traditions in both places.

The role of family in the assisted waste management in the food court in Colombia, brought some memories of how things work in the Colombian household. For some parents in Colombia, it is important to teach their children autonomy at a young age, be it either by teaching them about personal care or house organization and cleaning. For other parents, however, their children will always be children and they feel a need to keep organizing and cleaning after them. In both cases, the parents are usually there until the person moves out of the house and starts to develop their own life on their own terms. The age pattern for leaving the parental home in Colombia in 1989 was 23 years old (De Vos, 1989), however, based on relational-intergenerational theory, adults receive family support in different circumstances after that (Marzana, Pérez-Acosta, Marta, & González, 2010). This usually happens before they have children on their own, although, in some cases adults share the parental house with their parents, children, and even siblings' families. Being close to the parental home is consistent for Latino populations independently of their place of residence (Ovink & Kalogrides, 2015), which results in Latino college students in both the USA and Colombia being closer to their parents during their habit-formation 20's (Zastrow & Kirst-Ashman, 2006).

In the United States, however, leaving home for college at age 18 is more normalized than in Colombia, so students at that age are learning to make decisions about their own household behavior. As these students learn about running their household, making economic and health decisions, and assuming responsibility for their own lives (often in dorms their first year though), parents can be across the country from them (Mulder, 2009). The reasons for moving away from home vary depending on the situation, for example, race has been shown to impact the way adolescents and parents feel about going to school away from the parental home, with minorities—like Latino students—tending to stay with their parents (Ovink & Kalogrides, 2015). A student's behavior during college is influenced by previous experiences at home, at school, at camps, etc. In relation to food waste, school cafeterias and observed behaviors in places like the shopping mall might also influence students and their habit formations in the USA. In a sense, young adults in the United States need to be in charge of their own waste management at a younger age than the Colombian adult.

In terms of developed vs. developing countries, the supervision phenomenon easily translated into a family context while I observed both Colombian and USA food courts' waste management styles. That is, while in Colombia I saw the custodians as a group of adults taking care of younger children by picking up everything after them, in the USA I saw people as teenagers trying to organize their room by hiding everything away inside the closable structures provided for them. Even as I talked to custodians in Colombia, they had an overprotective parental position of preferring people to leave trays on the tables instead of contaminating or disrupting the system. Although, not the best option for teaching people about managing their own waste, this is a valid option when they have to pick up pieces of reusable tableware from the floor besides the trashcans—after a pile of unstable trays and reusables falls down and shatters multiple dishes—or when they have to pick dishware and shards from the inside of trash bags—after reusable tableware makes its way inside the bags. Custodians in the United States, however, found that people who did not clean after themselves was the least acceptable behavior in their food court. They felt as long as people

put their trash in the right place, they could deal with other challenging issues like leaky trash bags or sticky floors due to liquid disposal.

6.3 Ambience, Music, and Other Curiosities

Ambiance and music. Music at the Colombian food court was usually instrumental American classics that along with the fast food provided a strange connection to the United States. Although, the taste and presentation of the fast foods in Colombia widely differ from the ones in the United States, the fact that usually fast food is connected with American culture draws a line between the two places. Also, the fact that the shopping mall and food court is only eight years old, in the Colombian city, helps with the perception of novelty and progress usually associated with developed countries like the United States. Now, eating a hamburger, pizza, or chicken nuggets while listening to Dancing Queen offers an old American movie vibe that easily fools me into a sense of happiness and wanting to spend time there as a poor substitution of American culture. This falls in line with shopping malls early theories that they were a place for the consumer to find social interactions, activities and goods, safety, and controlled climate making them nesting places for consumers (Swinyard, 1998). Although, the nature of the shopping mall has been requiring some changes in order to survive in the United States, the early theories still apply to the blossoming malls in small cities of Colombia.

6.3.1 Food Presentation

Despite their transnational bubble, Colombian food courts are still a part of the country's culture making food presentation a creative and important part of the experience. Beyond the existence of reusables in Colombia, the different food presentations make some restaurants more attractive than others. For instance, meat entrees on a wood board are more popular than in a porcelain plate; or the double-decker chicken combo (See Figure 6.1) is

more popular than the flat chicken combo despite having the same fries, soda, and nuggets content. Also, since fast food at the Colombian food court is not always obscured by paper bags, the size and presentation of the food matters when trying to choose between such high value meals. That is, burgers with tomato and lettuce are a better option for Colombians than a simple cheese burger—and for the most part, they actually look like the advertising pictures. Overall, I believe that the Colombian saying, "la comida entra por los ojos" (food enters through the eyes), is a very important aspect of food courts in Colombia, as in the United States "the sizzle sells the steak" was the motto of restaurants like Sushi in the food court.

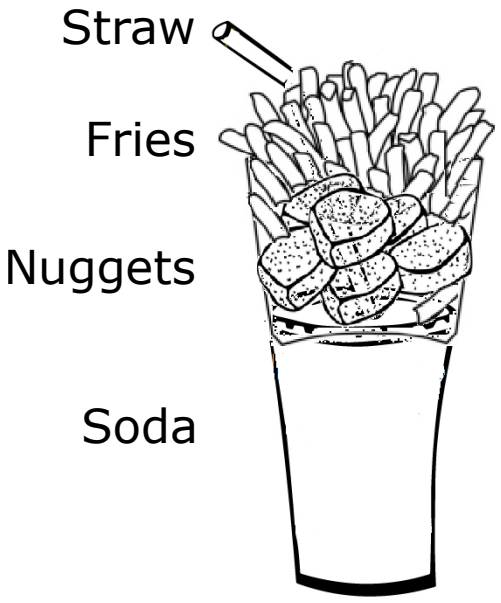

Figure 6.1: Double Decker Colombian snack with chicken nuggets, fries, and soda.

6.3.2 What If

In busy days in Colombia sometimes I would get to see tables full of dishes and tableware before custodians pick everything up from the tables, I was concerned about how disorganized and untidy the Colombian food court would be without the people who clean the tables.

However, the custodians would clean quickly to keep the food court as clean as possible most of the time that I was present. So, I wondered what would happen if people did not pick up after themselves in the United States food court. I thought I might see the tables full of tableware or containers before the custodians pick them up. Then, I thought about how the United States custodians needed to attend different areas and how things would pile up during the times they were away. I figured if I could keep track of one table in the United States and write down every container on it during a whole observation period, I would have an approximate quantity of trash passing through the table. I wanted to register, illustrate, and superpose containers for one of the busiest tables out of the 75 in the food court to have a better picture of trash production that is so difficult to demonstrate to people (See Figure 6.2). So, in three hours, I saw Styrofoam containers (5), plastic bags (2), paper cups (6), paper boxes (1), paper bags (1), and multiple napkins (1 stack).

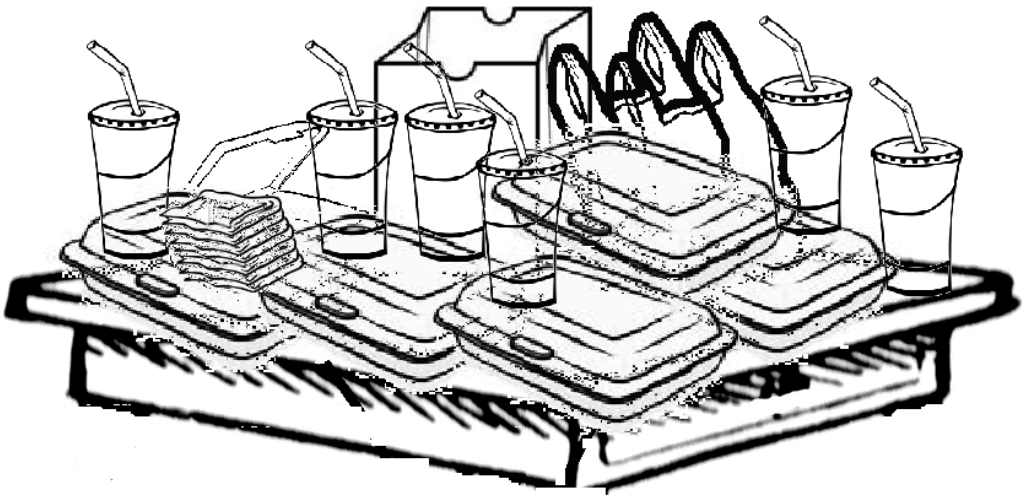

Figure 6.2: Accumulated containers if people would not pick up in three hours.

Chapter 7

CONCLUSION

As people tending gardens have noticed, permanently finishing a rhizome (weeds) is not possible because there is always a new part of it emerging somewhere else. This is not to mean that I am trying to close the book on waste as an entanglement with culture and people, on the contrary, I hope this work opens up doors to the possibilities behind solid waste management and environmental engineering. I hope that after this, engineers feel the freedom to explore their ontological options beyond old empiricisms. I hope their unique work takes them in an intense journey as it did with me. I entered the journey as an eager engineer looking to find a better option to solve the global crisis of solid waste and I leave a humble scholar understanding that a global crisis is difficult to solve without exploring and listening to each other. By each other, I mean cultures, but also disciplines converging in synergy trying to *become* something better and inside the rhizome it is absolutely possible. Inside the rhizome, I can be an engineer, a dancer, a philosopher, a poet, and an artist trying to process information about solid waste, but I can also be an imperceptible part of the complex entanglement of waste and culture.

7.1 Intertwining and Representing Both Independence and Entanglement: Arabian Nights

Are our theories built on the wrong set of psychological constructs, or are our experiments manipulating the wrong set of variables?
(Osbaldiston & Schott, 2012)

Exploring a way to write my study I tried another attempt to integrate ethnography into my rhizome, encountering more appropriate guides in surprising places. So, as I read about impressionist tales from Van Maanen (2011), I thought that although they are similar to my field notes, mine are a little more rhizomatic in the sense of both connection and separation from one another. They can be read in any order or sequence in a day and they will still follow my experience on the field navigating the entanglements of life and waste in different cultural settings. So, although impressionist tales represent both the observer and the observed at one point in time, they are not quite the perfect fit for a rhizomatic study. Thus, I looked elsewhere and found something more appropriate. The classic book known as Arabian Nights/The thousand and one nights (Lawall, n.d.), tells the story of a girl telling connecting stories—it is hard not to feel identified—during one thousand and one nights to accomplish a difference not only for her, but for her realm—exactly. During the book there was compelling moments inside and out the stories that revealed and process information in a way that makes it interesting and that is exactly what I wanted for this dissertation.

In the journey to find the cultural implications of waste, I learned about the limitations of engineering methods, about the shared existence of waste and history, about the creation of waste, and the people interacting with it, but I also learned so much more. Waste and culture live in an intimate embrace where one is part of the other and separating them, even for a short intervention period, leaves an empty space of unanswered questions and ambiguity. For instance, it leaves us with plateaued recycling rates at less than 40% in the last few years that seems deeply puzzling when waste is still a black box. The history of a country,

group, or person is a part of waste in the way that influences definitions, classifications, and interactions. Moreover, the creation of waste surpasses the consumer sphere, where many strategies have been focusing so far, in turn, entangling with the design and effect of the industry and its particular interactions with commercial distributors that needs to be further explored. In a similar way, interactions with waste happen differently for different people according to their own stories, lives, and backgrounds. In general, there is plenty connected to waste with people being a big part of that entanglement, making it important, if not necessary, for engineers to expand our views to new methodologies.

7.2 Obsessing over Step-By-Step Procedures: Give Me the Recipe!

In environmental engineering—and engineering in general—we need to learn alternative ways of exploration in order to open up paths to navigate global solid waste, considering different—as in unique—cultures in a way that can retrofit and enrich each other instead of separating or enforcing comparisons. It is tempting to try and map the journey for those who, like me, ask scholarly articles to provide a recipe every time I read them. However, I believe that if I had gotten a step-by-step manual or methodologically rigid guidance to do this research, I would not have learned as much. I also know that it does not help much, so here is what I wrote about a metaphor that I heard in Elizabeth St. Pierre's class:

> *I remember [she] talked about making a cake from scratch compared to making it from a box, and we discussed how important it was to know the recipe of the cake in order to modify it. I suppose that resonated with me since I have to adapt many online recipes to a vegan, no-sugar, no-salt, no-processed-ingredients, plant based version of them that satisfy my taste/cravings without compromising on health, and, the only way that I can do that is by understanding what every ingredient does in the recipe before replacing it. Being able to know enough to replace ingredients and still enjoy the end result is not only a testament to my adapting capabilities, but it allows me to create something amazing. In terms of research, reading helps us find recipes from other people, and in order to develop*

our own we need to understand those well. However, in order to create something new and groundbreaking, we need to be willing to step away from the formula and modify, adapt and play enough to find our own version of it. In that process it is important to keep track of our progress for which writing is imperative as a method of inquiry. Again, this is not a recipe to be followed step-by-step, but it is one example of studying cultural implications of waste under the guidance of the rhizome[1].

Other examples include the work of Hird (2016) and even the work of Gille (2007), although her approach has different epistemological roots. So, as Hird (2016) pushes our understanding of waste making its meaning *vacuous*, when "everything is waste and nothing is waste at the same time," she challenges perhaps her human-based discipline. From my engineering perspective, however, including the human components as part of the waste analysis allows me to explore unseen dimensions of waste. That is, I need to understand how waste is different for different people before moving into the transcendent nature of it. On Gille (2007)'s work, I see that same need to understand the cultural and global connections, just a little too bounded to theoretical roots to be working for an engineer. Gille (2007) talks about structures from a political perspective, as she values history as part of the understanding of waste, however, focusing on the politics of my study, I could not have gotten so personal in waste/people relations and waste culture in a country like Colombia. Therefore, tracing my own rhizome, I came to a place where I can understand the need to challenge structures and meanings of waste as culturally entangled with people's lives.

In my study, I learned that cultural implications are a significant part of waste making socio-cultural entanglements a necessary consideration in addressing the global crisis of waste. I learned that socio-cultural aspects relate to current or historical infrastructures of waste management in Colombia and the United States. War, shopping, packaging, and even mail practices relate to the way we think about solid waste today. However, it is difficult to pinpoint connections in a history timeline, for which it is important to develop new representational models. Moreover, the history and background of people is more nuanced to

[1]See Recipe in Appendix G

be represented in a model since it depends on personal experience even when some of that experience is shared by entire cultural groups. I learned that MSW is created by different people at different moments of their journey, namely at home, work, school, or recreational activities, for instance, waste in public urban spaces tend to be the byproduct of daily activities like eating or entertainment. I learned that people interact with waste depending of the entanglement of circumstances happening in one specific moment and that aspects like meal times and family influence the way we understand the nature of waste.

In summary, my work offers a new way to consider waste, culture, and the work of environmental engineering. That is, as I ponder the ripples that I want my work to have, I realize that I am trying to present a cultural juxtaposition of the people-waste relationship living in a moment of time, where the entanglement ties everything together. So, interdisciplinarity and thinking outside the box could open a thousand possibilities for the future of environmental engineering as a discipline, by following unpursued lines of flight that connect to different disciplines. And I feel global solutions to solid waste need to consider the cultural implications for a variety of people and countries. Culturally, there are interesting parts of the rhizome that play with the role of people in managing waste, like how efficiency and automatization of processes have reduced the amount of human labor required for solid waste management, or in the case of less automatized groups, how people implement high level sorting at the source—organics for farming, recyclables to recycle, liquids separated from solids, and all the rest (compactable fast-food disposables) to the trash. Additionally, the now ubiquitous fast-food disposables are also making their way through the world by hitching a ride with other aspects of culture like type of food, and the value of convenience and efficiency.

7.3 Transferability vs. Generalizability: Could I Use This for My Engineering Problem?

The adamancy that I have over this study being unique and not replicable does not implicitly mean that the process and purpose are so specific to the situation that cannot be used again. On the contrary, my insistence comes from place of freedom where I encourage engineers to trace their own path towards their specific issues by following the example of this thesis. See, I started testing electronic interfaces until I wondered something outside the scope of my testing. As I wondered why people were doing something unexpected with the interface, I entertained the thought that waste interaction went way beyond an interaction, which resulted on the spark that lighted up an extensive way of questioning. I talked to myself through writing in the safe space of my laptop, where I found countless sources of information. And then, I decided to re-learn my science and explore epistemologies outside of my engineering building. Sharing thoughts with people outside my discipline helped me developed new understandings of issues and complemented my research path. However, throughout the whole process, I believe one of the most important parts was the constant cultural, epistemological, and even ontological struggle within myself to proof my worth throughout the process.

Seeing the spark is not the entire process, although, it does help cast away shadows of fear towards the unknown. The value of that first spark translates into the possibility to look again at the same engineering moment and be able to ask ourselves the same question. Wondering what is behind the issue that produces such different results and how to explore it allows us to get outside our engineer minds and analyze non-mathematical factors. Even if our exploration brings us back to numbers—because it is a possibility—at least, our research would be richer for having asked that one question at that critical moment. Identifying the spark, however, requires a certain level of connection to the research and acknowledgement of self in the research process. In that sense, if we cannot accept that we influence our research

as it influences us, we might not be able to analyze the moment as a synergistic moment, where engineering combines with multiple other disciplines and fields. It requires us to listen to the voice in our heads asking us why something is happening in that certain way.

From that moment on, the phase of questioning started following a new path that I had not explored neither I knew how to explore before. I honestly asked myself the complicated questions that I had taken for granted before. This questioning was my step back to appreciate the whole picture and I saw that waste had outside connections and that the connections had ripples in everyday actions. At this point, our inquisitive nature should take over and help us ask as many questions as we can about the issue at hand, so we can actually navigate questions to understand not only probable approaches, but also the nature of the issue itself. When we are children, we learn from asking questions and we process the information while interacting with the world in a way that we connect theory and practice. Asking questions about a research topic should in the same way invite us to entangle our own lives with our research issues to understand hidden structural connections that might exist between engineering and other disciplines.

So, in the entanglement, I started wondering and dive-reading to explore the questions. I would use writing as a method to talk to myself and get outside of my own head when asking questions about research. Then, I would try to find answers in different ressources and reflect on the experience in a space that would only be for me. I would write for myself without worrying about someone else reading and I would play with philosophy trying to find ways to explore unanswered questions. It was through this process that I realized that I needed guidance from outside of engineering to learn new paths of discovery and research. I needed to talk to people and listen from people whose expertise was that new field pervading my engineering issue. In this exchange of ideas with interdisciplinary groups, my thought process became clearer and I identified a theory to guide me through my study. However, the most important thing that I learned outside of engineering is that research is as unpredictable as life itself even when we want to hold on to that illusion of control that a laboratory offers.

As in life, research needs to be in movement in order to develop and we should realize that this movement needs to transcend certain barriers that we have—through the years—established. There is comfort in knowing the basis of something and *standing on the shoulders of giants* to develop our own contributions to very specific areas of research. However, when we are poking holes in the very fabric of our knowledge hoping to discover something new, comfort goes out the window and we start to feel very vulnerable. The key, then, is to read, write, and live our research as a part of ourselves while internalizing that in engineering our job is to think what others have not thought before and bring it into reality. Our jobs as scientists is to doubt of absolutely everything even of science and the scientific method itself when it does not offer a sophisticated enough explanation for what we encounter every day in human-dependent areas like solid waste management.

To finalize, as engineers, we need to remember our mission to improve the quality of life using appropriate scientific tools that allow us to promote change and impact a certain reality. We need to remember that we get to create the world with every advance that we make and it is our responsibility to walk appropriate paths to improve the world. So, although my research is a very small example of what could be uncovered in different communities when we have the tools to explore interdisciplinary issues, a similar process could be taken to explore a variety of similar issues. For instance, we could start analyzing what would happen in different cities of the world when we introduce sustainable buildings designs and if it makes more sense in one place than another. We could also think about the economic and environmental aspects of washing reusables instead of using compostable disposables. Or, we could try to understand the reasons behind technological adaption among generations in different cultural settings. Likewise, we could keep exploring different interdisciplinary engineering issues that offer multiple possibilities of development and world movement.

7.4 Future Research: Can You Paint with All the Colors of the Wind?

Beyond the unpursued lines of flight in this study, I learned that there are many fields to explore in order to open up engineering to the changing world we live in. I learned that global problems require global approaches for which we are not yet qualified and that we need to become familiar with multiple cultures, while considering their own entanglements, before any kind of design happens. We need to be able to understand what we are doing and why we are doing something, because hegemonic thought and quick fixes are not enough for the problems of the new century, requiring an alternative approach. However, more than typical qualitative methods, theory driven methods—think interviews vs. rhizomatic interviews/conversations—could offer multidimensional cultural understandings that allow us to explore the problem at deeper levels. In that sense, cultural immersion provides a promising endeavor, where we might be able to ask questions about cultural aspects of the problem. Immersion, as asking and learning, could also offer us multiple and in-depth perspectives of the situation—perhaps showing us a new side of ourselves since problems can be revealed to be tied to our experiences and consciousness as well as the need to find solutions (Deleuze, 1968/1994).

Reflecting on our own inspirations and experiences, then, becomes important to choose theories and develop an identity inside the research. In this sense, article publication and historical background could inspire the research to take different paths. The issue between innovation and rewards, presented by Schön (1995), as the Rigor vs. Relevance dilemma, refers to the way we tend to abate to traditional and more rigorous research that offers us control and neatness, but usually costs us relevance and ground-breaking discoveries. According to him, it is when we let go of the rigor that comes along with rules and numbers that we get to be relevant to society (Schön, 1995). Now, historical backgrounds, like in my case, lead us to be passionate about issues, but also need to be accompanied by plenty of

reading to avoid closing our minds. Therefore, I used poststructuralism and the Deleuzian rhizome in this study. But there are other paths to follow, which unintentionally take me back to the rhizome, as it allowed me to pick up, in a line in the middle, and follow paths to other connections, and start following paths again and again. Or, as the song puts it:

> *. . . if you walk the footsteps of a stranger*
> *You'll learn things you never knew you never knew*
>
> *Have you ever heard the wolf cry to the blue corn moon*
> *Or asked the grinning bobcat why he grins?*
> *Can you sing with all the voices of the mountain?*
> *Can you paint with all the colors of the wind?*
>
> *Come run the hidden pine trails of the forest*
> *Come taste the sun-sweet berries of the earth*
> *Come roll in all the riches all around you*
> *And for once never wonder what they're worth*
>
> *The rainstorm and the river are my brothers*
> *The heron and the otter are my friends*
> *And we are all connected to each other*
> *In a circle of a hoop that never ends ("Colors of the wind – Pocahontas," 1995)*

As Angell (2014) ponders, this could lead us to think that we went through the rabbit hole, but what is better than to follow our passion, wherever it leads us.

Appendix A

Explanatory Quotes

Assemblage: "In a book, as in all things, there are lines of articulation or segmentarity, strata and territories; but also lines of flight, movements of deterritorialization and destratification. Comparative rates of flow on these lines produce phenomena of relative slowness and viscosity, or, on the contrary, of acceleration and rupture. All this, lines and measurable speeds, constitutes an *assemblage*. A book is an assemblage of this kind, and as such is unattributable." (Deleuze & Guattari, 1980/1987).

Becoming: "The orchid deterritorializes by forming an image, a tracing of a wasp; but the wasp reterritorializes on that image. The wasp is nevertheless deterritorialized, becoming a piece in the orchid's reproductive apparatus. But it reterritorializes the orchid by transporting its pollen. Wasp and orchid, as heterogeneous elements, form a rhizome. It could be said that the orchid imitates the wasp, reproducing its image in a signifying fashion (mimesis, mimicry, lure, etc.). But this is true only on the level of the strata—a parallelism between two strata such that a plant organization on one imitates an animal organization on the other. At the same time, something else entirely is going on: not imitation at all but a capture of code, surplus value of code, an increase in valence, a veritable becoming, a becoming-wasp of the orchid and a becoming-orchid of the wasp." (Deleuze & Guattari, 1980/1987).

Critical Theory: "Critical social science, in general, aims to integrate theory and practice in such a way that individuals and groups become aware of the contradictions and distortions in their belief systems and social practices and are motivated to change those beliefs and practices. A critical theoretical approach to social investigation links hermeneutic (interpretive) and explanatory interests to normative concerns. However, this approach is never innocent; it is never merely a theory 'about' the world. Because critical social scientists assume that their very ways of theorizing the world constitute the ways we access the world (theories provide the categories through which we think about and experience the world), they interrogate (and frequently disrupt and decenter) their way of theorizing by means of reflexive critique." (Schwandt, 1997, p. 51).

Entanglement: "Felt is a supple solid product that proceeds altogether differently, as an anti-fabric. It implies no separation of threads, no intertwining, only an entanglement of fibers obtained by fulling (for example, by rolling the block of fibers back and forth). What becomes entangled are the microscales of the fibers. An aggregate of intrication of this kind is in no way *homogeneous*: it is nevertheless smooth, and contrasts point by point with the space of fabric (it is in principle infinite, open, and unlimited in every direction; it has neither top nor bottom nor center; it does not assign fixed and mobile elements but rather distributes a continuous variation). Even the technologists who express grave doubts about the nomads' powers of innovation at least give them credit for felt: a splendid insulator, an ingenious invention, the raw material for tents, clothes, and armor among the Turco-Mongols." (Deleuze & Guattari, 1980/1987, p. 475-476).

Ethnography: "The methodology born in cultural anthropology, ethnography is a particular kind of qualitative inquiry distinguishable from case study research, descriptive studies, naturalistic inquiry, and so forth by the fact that it is the process and product of describing and interpreting cultural behavior. Cultural anthropology, broadly conceived as a practice, includes both ethnography, which is regarded as the activity of describing a culture, and ethnology, which is the historical-geographical study of peoples or cultures that

involves classifications, comparisons, and explanations of cultural differences. Although there is considerable disagreement in the meaning of the term culture, both anthropological and sociological definitions of ethnography stress the centrality of culture as the analytic concept that informs the doing of ethnography. What ethnography has in common with several other kinds of qualitative inquiries is its emphasis on firsthand field study." (Schwandt, 1997, p. 96).

Hawking Radiation: *Physics.* "The discovery of Hawking radiation... yields a logical contradiction when one tries to account for quantum information absorbed by a black hole: this information can't escape, can't be destroyed, and can't be preserved after the black hole evaporates. ... This situation appears to represent a fundamental conflict between the principles underpinning local quantum field theory: the principles of quantum mechanics, relativity, and locality. Therefore, while it has long been believed that the vicinity of the horizon is well-described by classical general relativity, since curvatures are expected to be small there, many theorists who study quantum evolution of black holes have now concluded that there must be modifications to their description via local quantum field theory, and that in order to resolve the conflict, these modifications must extend *at least to horizon scales.*" (Giddings & Psaltis, 2016).

Landfill: *Engineering.* "Landfilling consists of burial of MSW into lined trenches, with compaction, daily covering with soil, as well as leachate and landfill gas collection." (Louis, 2004, p. 15). *Rhizomatic.* "Landfills are not only spaces where "waste is no longer seen as out of place" (Gille, 2007, p. 3): they are also spaces where bacterial liveliness meets with soil, pH, sunlight energy, clay, moisture, and so on, as well as all of the stratifications of 'stuff' dumped into landfill cells." (Hird, 2013, p. 5) Line of flight: "There is a rupture in the rhizome whenever segmentary lines explode into a line of flight, but the line of flight is part of the rhizome. These lines always tie back to one another. That is why one can never posit a dualism or a dichotomy, even in the rudimentary form of the good and the bad. You may make a rupture, draw a line of flight, yet there is still a danger that you

will reencounter organizations that restratify everything, formations that restore power to a signifier, attributions that reconstitute a subject— anything you like. . . " (Deleuze & Guattari, 1980/1987).

Methodolatry: Also known as *Methodolatory* (Harding, 1987). "The danger of Method (of a fixation upon Method) comes from this: research work must satisfy two demands; the first is a demand for responsibility: the work must increase lucidity, expose the implications of a procedure, the alibis of language—in short, must constitute a critique (let us recall once again that to criticize means to call into crisis); here Method is inevitable, irreplaceable, not for its 'results' but precisely—or on the contrary— because it realizes the highest degree of a consciousness of a language which does not forget itself; but the second demand is of a very different order: it is the demand for writing, for a space of desire's dispersion, where Law is dismissed; hence it is necessary, at a certain moment, to turn against Method, or at least to regard it without any founding privilege, as one of the voices of plurality: as a view, in short, a spectacle, mounted within the text—the text which is, after all, the only 'true' result of any research. (Barthes, 1986, p. 319)" Honan (2007, p. 3). MSW- Municipal Solid Waste: "Our trash, or MSW, is comprised of various items Americans commonly throw away after being used. These items include packaging, food, grass clippings, sofas, computers, tires, and refrigerators. Not included are materials that also may be disposed in landfills but are not generally considered MSW, such as C&D debris, municipal wastewater treatment sludges, and non-hazardous industrial wastes." (EPA, n.d. p. 5)

Postmodernism/poststructuralism: "The terms *poststructuralism* and *postmodernism* are often used interchangeably; however, there are acknowledged differences in their meaning. Lather (1993) differentiates these two terms as follows: postmodernism "raises issues of chronology, economics (e.g., post-Fordism) and aesthetics whereas poststructural[ism] is used more often in relation to academic theorizing 'after structuralism' " (p. 688). Postmodernism is an American term which refers to "the new stage of multinational, multiconglomerate consumer capitalism, and to all the technologies it has spawned" (Kaplan, 1988, p. 4) as well as

to the avant garde in the arts, "the erosion of the older distinction between high culture and so-called mass or popular culture" (Jameson, 1988, p. 14). Jameson (1984) sees postmodernism as a "cultural dominant" (p. 56) that began to emerge after World War II with late consumer capitalism. The term postmodernism first appeared in architecture, indicating a different way of organizing space and, by extension, a different relationship between space and time. Jane Flax (1990) writes that

> postmodern discourses are all deconstructive in that they seek to distance us from and make us skeptical about beliefs concerning truth, knowledge, power, the self, and language that are often taken for granted within and serve as legitimation for contemporary Western culture (p. 41).

Poststructuralism is a French term that represents the European avant garde in critical theory (Huyssen, 1990). Michael Peters (1999) writes that poststructuralism is a "specifically philosophical response to the alleged scientific status of structuralism." David Harvey (1989) writes that "In philosophy, the intermingling of a revived American pragmatism with the post-Marxist and poststructuralist wave that struck Paris after 1968 produced what Bernstein calls 'a rage against humanism and the Enlightenment legacy.' This spilled over into a vigorous denunciation of abstract reason and a deep aversion to any project that sought universal human emancipation through mobilization of the powers of technology, science, and reason" (p. 41)." (St. Pierre, 2011, p. 5)

Rhizome: "[U]nlike trees or their roots, the rhizome connects any point to any other point, and its traits are not necessarily linked to traits of the same nature; it brings into play very different regimes of signs, and even nonsign states. The rhizome is reducible neither to the One nor the multiple. It is not the One that becomes Two or even directly three, four, five, etc. It is not a multiple derived from the One, or to which One is added $(n + 1)$. It is composed not of units but of dimensions, or rather directions in motion. It has neither beginning nor end, but always a middle (milieu) from which it grows and which it overspills. It constitutes linear multiplicities with n dimensions having neither

subject nor object, which can be laid out on a plane of consistency, and from which the One is always subtracted $(n-1)$. When a multiplicity of this kind changes dimension, it necessarily changes in nature as well, undergoes a metamorphosis. Unlike a structure, which is defined by a set of points and positions, with binary relations between the points and bi-univocal relationships between the positions, the rhizome is made only of lines: lines of segmentarity and stratification as its dimensions, and the line of flight or deterritorialization as the maximum dimension after which the multiplicity undergoes metamorphosis, changes in nature. These lines, or lineaments, should not be confused with lineages of the arborescent type, which are merely localizable linkages between points and positions. Unlike the tree, the rhizome is not the object of reproduction: neither external reproduction as image-tree nor internal reproduction as tree-structure. The rhizome is an antigenealogy. It is a short-term memory, or antimemory. The rhizome operates by variation, expansion, conquest, capture, offshoots. Unlike the graphic arts, drawing, or photography, unlike tracings, the rhizome pertains to a map that must be produced, constructed, a map that is always detachable, connectable, reversible, modifiable, and has multiple entryways and exits and its own lines of flight. It is tracings that must be put on the map, not the opposite. In contrast to centered (even polycentric) systems with hierarchical modes of communication and pre-established paths, the rhizome is an acentered, nonhierarchical, nonsignifying system without a General and without an organizing memory or central automaton, defined solely by a circulation of states." (Deleuze & Guattari, 1980/1987, p. 21)

Appendix B

The Story of my Life

The story of my life lives in the entanglement of culture, background, experiences, and history. It is part of shared moments with people, books, and different situations that end up constructing who I am and how I make decisions. According to neurobiologists, our brains make decisions before we are even aware of them (Soon, Brass, Heinze, & Haynes, 2008) indicating that our decisions do not happen on the nanoseconds when we made them. Instead, they come from us finding the connection between multiple parts of a rhizome. In a flash, we weight options and map courses to make decisions about everything, without even knowing how the entanglement affects some of those decisions. For instance, the decision to study waste in two different cultural environments was already a part of me when I envisioned this study having grown up in Colombia and starting to adapt to the United States culture. In a way, the decision to change majors from electronics to environmental engineering was also a part of me according to the stories of my family. Similarly, the decision to look at social and historic connections in our understanding of waste came from my own history and experiences creating a non-hegemonic understanding of waste in my mind.

B.0.1 The Milk Car

When I was in elementary school, my grandparents used to take all their grandkids to their farm during the summer. The farm was a few minutes away from the city when grandpa was driving—more than one hour away when he was not. Before my grandpa bought his car, we had to get up really early to catch the milk collection truck travelling to the farms in the area and use our hefty clothing to avoid freezing with the mountain wind hitting us on the way. That freezing milk car had a different route, but the same process than my grandfather adopted when he got his cozy 70's Nissan Patrol. It would leave the city early morning with empty kegs to store the milk it collected from the farms. Then, it would come back to the city selling the milk by the "bottle" (750ml), measured with a metal jar and poured into pots and other reusable containers around different areas of the city. This milk usually had to be either refrigerated or boiled to avoid spoilage, which for my grandparents meant making cheese at the end of the day with the unsold milk. I might be romanticizing the whole experience now, which is absolutely normal, but I certainly enjoyed seeing the whole process from farm to table that when we were staying at the farm included actually milking the cows and feeding the calves. There was no much waste on those moments, no food waste, paper waste, even plastic waste. It was all about taking advantage of everything.

B.0.2 TV Shows

When I was not with my grandparents or during the school year, my favorite activity was watching TV. The TV set opened up my mind too many things and through educational programming reinforced my love for learning. My family still jokes about the amount of TV that I used to watch, especially now that they can highlight the effects that some of those shows have had in my career. Did I watch too much of the Captain Planet? Absolutely! And, I also watched Colombian shows like Brujula Magica (Magic Compass), Verde Manzana (Apple Green), or Los Dumis. These shows used to teach me that "If you hear a trashcan speaking, you should hear what it has to say, since the only reason a trashcan would talk

is because it has an important message to pass along" ("Los Dumis," 1977–1999); or that "Our planet is a little sick, and from all of us, we need to give it something because smoke is covering its eyes and plastic is giving it indigestion ..." ("Brújula Mágica," 1993–1997); or that Colombia is "... a country, green like an apple, sweet country of corn and oranges ... a country full of palm trees and mountains, sweet country tastes like coconut and sugarcane ... and I am going to take care of [it], with [its] water and [its] air. And I'm going to educate myself, so, the earth doesn't get tired." ("Verde Manzana," 1997). And, they all are a part of me, and my life, and my research, in the same way that other experiences have become part of the journey.

B.0.3 Teachers and Memories

Besides the fact that my father can basically build anything out of anything—including hula-hoops out of straws, chairs out of beer bottles, and jump-ropes out of candy wrappers for one of my home works—other teachers in my life are also part of my inspiration for this project. Teachers make the list thanks to their efforts to connect me to nature and resource conservation/repurposing. That is from waste-repurposing homeworks that are still a widespread practice in Colombia, through planting and fixing gardens in my high-school campus, to *literally* putting me in the shoes of farmers who suffer first with the devastating consequences of climate change. The latter is the story of a Spanish teacher, who loved my poem recitations and gave me one of the longest poems I had ever had to learn to recite it dressed up as a typical farmer of the area. I do not remember much of the poem, but it started like this:

> Once again we're doomed in the farms... The Summer dried all the sown land, and our wages simply cannot keep up, with the raging prices of the basic stuff. The cows don't produce milk. There is no grass. The hens and chickens are starving. The Summer killed most of all crops, barley and wheat are barely standing...

I was reminded of this poem back in Colombia and I was reminded how the poem is a sad reality for many farmers including my grandmother, who has had to slowly leave behind her farm because there is no grass for cows thanks to extended droughts—in a place where natural springs and misty winds were the norm when I was little.

B.0.4 Life's Entanglements at Work

Wondering how I ended up here today requires following many lines of flight that converged perfectly to construct this version of myself. For instance, I met my future husband and decided pursue graduate education in the United States instead of following a job-centered life in Colombia. I was turned down from other schools and pursued other options to be accepted to the University of Georgia, where my amazing adviser and I got paired by an intuitive person. I took classes in social work, human-computer interaction, and organizational change and decided to pursue people's stories to practice better engineering. I explored interpretive and critical theories to realize that postmodern theory was more related to my interests and topic. Meanwhile, I was moving between Colombia and the USA performing in different ways according to the cultural environment and creating cognitive dissonance with some of my actions. I was reusing and reducing in Colombia while I could only recycle in the USA. I was struggling with buying a new piece of equipment, wasting a salvageable one, because in the USA, unlike Colombia, it was easier to buy a new device than fixing the old one.

So beyond any characterizations of self that I can create for me, I believe that I am a part of my life experiences and that we are constructing and becoming each other at every step. For this work, I believe that the most important part of my story is that just like my work, my life is a quilt made out of many things that live tied to one another as we all move together in a certain direction. However, in this quilt, I have the prerogative of move things around and change aspects of my story to highlight or understand confusing areas since it is all about movement and dancing parts that play with one another sometimes without even touching. My story has the right to change through my own understandings and personal

decisions to various degrees from now and forever, until the story of my life comes to an end...

Appendix C

Engineering Mockup

This summary in no way makes justice to the complexity of waste in a cultural setting, but it helped me navigate anxiety whenever I wondered about how much engineering was in my project.

- **Problem:** Since most engineering efforts are deeply rooted in the technical, the numerical, and the need for generalization, cultural implications of problems like global solid waste proliferation are often a forgotten aspect of engineering design and development.
- **Hypotheses:** Culture influences what we understand and do with waste . Environmental Engineering needs better tools to explore this relationship
- **Experiments/Procedure:**
    1. Look through the history of waste in different countries trying to identify:
        - How do people end up with waste or how is waste created?
        - What are people doing with waste?
        - What is the next step?
    2. Analyze waste in two countries and highlight pro-environmental choices in each
        - Find two places with similar characteristics

3. Observe, Ask questions, Read, Write, and Analyze data from both countries
4. Answer the questions in step one and write about it

- **Results:**

1. Timerhizome models showing waste connections through history
2. Waste is created through the convergence of different people, places, and times
3. Waste is a constant part of people's lives, but they interact with it at different levels
4. There are pro-environmental behaviors in each country that depend on culture

- **Conclusions:** Waste depends on culture and it is important to have the right tools to analyze it Something happens that reflects on waste and changes things People on different levels make decisions that affect our perception of waste Our interactions with waste depend on personal experiences, beliefs, etc. The meaning of waste is deeply cultural because it is a part of the life we would live if we were in another place.

- **Recommendations:** We need to be careful and open minded about our approaches to explore global issues We need to get out of the lab and see who we are designing for We need to look to the future while keeping touch with our roots

Again, this overly simplified two-dimensional is just a mockup and I do not condone this representation for a rhizomatic study.

Appendix D

Interview Questions

D.1 Interviews Protocol for Participants

- Tell me a little about yourself like: Who are you? What do you do?
- Now, tell me about your background. About your family. Where did you grow up?
- Is it common for you 2 visit the mall? Tell me about your experience here. What do you like? Now, let's talk trash.
- Tell me about trash. What does the word mean to you? What do u think when you think of it?
- Tell me about a memorable experience that you had with trash.
- Now, how do you remember trash being handled at your family home?
- At this point, how do you see trash in a bigger scale? In your city, country, or the world.
- What do you think is your role, if any, on the way trash is managed?
- ____

D.2 Protocolos de Entrevistas para Participantes

- Cuéntame un poco acerca de ti como: Quien eres tu? Que haces?
- Ahora cuéntame un poquito de tu historia. Acerca de tu familia. Donde creciste?
- Es común que vengas al centro comercial? Dime acerca de tu experiencia aqu. Que te gusta?
- Ahora, hablemos basura.
- Hblame de basura. Que significa la palabra para ti? Que piensas cuando piensas en eso?
- Cuéntame alguna experiencia memorable que tengas con la basura
- Cómo recuerdas el manejo de la basura en la casa de tu familia? Tus padres o abuelos
- En este punto, como ves la basura a una mayor escala? En tu ciudad, pas, o el mundo.
- Cual piensas tu que es tu papel, si tienes uno, en la manera en que la basura se maneja?
- ____

D.3 Interview Protocol for Workers

- Tell me about your day. What do you do?
- Tell me about a great day in your job or a bad day or both
- Talk to me about your work tools (aka. The cart: What's in it? What's its purpose?)
- Now, if I were to train with you for your food court job, what do I have to learn?
- What do you think is your role, if any, on the way trash is managed?
- What do you think when you think about the word trash or about the concept of it?
- ____

D.4 Protocolo de Entrevistas para Trabajadores

- Como es un da normal para ti? Usualmente qué haces?
- Cuéntame acerca de un da bastante bueno o bastante malo en tu trabajo, o los dos.
- Hblame de tus herramientas de trabajo (El carrito: Que hay en él? para q se usa?...)
- Si tú me estuvieras entrenando para trabajar en la plaza de comidas, que me enseñaras?
- Cual piensas tu que es tu papel, si tienes uno, en la manera en que la basura se maneja?
- Que piensas tu cuando piensas en la palabra basura o el concepto de basura?
- ____

Appendix E

Songs Parodies

1 *Just Work*

Parody of Kesha's "Tick Tock'

Eliana Mozo Reyes

1. Wake up with the sunrise
   Depending on my shift
   I get ready and go to work
   Or stay home with my kids
   Once I'm at work, get my tools
   Get assigned all my tasks
   And I start cleaning early
   So, you'll get a clean mall

2. I start with furniture and the floors, floors
   All while the mall is closed, closed
   Cleaning glass doors and walls, walls
   Trying to get out prints, prints
   Lining of all the bins
   The heavier cleaning is restrooms...

3. Non-stop, cleaning all
   Before we reach the rush
   Lunch time is so hard
   Clone myself to keep up
   Gridlock on the court
   But, the patrons keep coming on
   (Repeat)

4. In the US, in the mall,
   Moving trash is our deal
   We move mountains of waste
   Without shedding a tear

5. While in Colombia, we've found
   It depends on the buyer
   We clean reusable plates
   Sort trash out and recycle

6. I'm talking 'bout separate at the source, source
   Sorting out trash and bones, bones
   Napkins and wraps are thrown

7. Clean tables, walk liquids bucket out, out
   Leftovers go to the closest towns
   The girls take them to their house
   For pets at their house

8. My role with trash, dispose or sort,
   Although ignored is important
   Without my work, without my time,
   With all you buy, we'll be hoarders

9. And a shift never stops 'til all is clean

10. Non-stop, cleaning all
    Dinner time is no joke
    At night closing up
    After a whole day of crowds
    It's done, going home
    But, not before organizing all.

2 *For our Children*

Parody of Daft Punk's "Get Lucky"

Eliana Mozo Reyes

1. Street sweeping is no picnic
   Every day, we push our limits
   From the sunrise 'til the evening
   We're so good it might seem easy

2. We mostly have our zones all assigned
   Hills or flat land we'll pick up all the trash

3. We sweep the zones that we've got
   We stay all day 'til is done
   And though, we're often ignored
   We sweep all day for our children

4. We sweep the zones that we've got
   We stay all day 'til is done
   And though, we're often ignored
   We sweep all day for our children (5)

5. Some people get to see us
   How we really make a difference
   Broom in hand the world keeps spinning
   Cleaner cities are our winning

6. Some people get to see us
   How we really make a difference
   Broom in hand the world keeps spinning
   Cleaner cities are our winning

7. We have to talk of the trash left behind
   Concerts and crowds do require all our staff

8. They're up all night dancing songs
   We're up next day with the sun
   They're up again to get lunch
   We sweep all day for our children

9. We sweep the zones that we've got
   We stay all day 'til is done
   And though, we're often ignored
   We sweep all day for our children (5)

Appendix F

Fieldwork Notes and Stories

As a frustrated poet in the body of an engineer, I marveled at some moments of my fieldwork, writing different thoughts and descriptions of my experience. The following thoughts are divided by country and they serve to represent my experience during field work in both positive and negative aspects of waste management and other behaviors. Not meant as a comparison or judgement, these are feelings that arose when I observed or lived a certain moment. They are part of my experience in this research and as such are part of the perception and descriptions of the nature of waste in both countries. They are entangled with the research process, methods, and interpretations in a way that is not easy to separate as a different line of flight. They are also another attempt to push the boundaries of "accepted" methods of representation for engineering data, but I feel that they are enriching enough to widen the field of sustainability research. The reason being that sustainability usually comes from a passionate place, from a place where feelings and poetry are ideal forms of representation.

F.1 Colombia: The Abandoned Shoe and the Story of a Landfill

New shoes on and walking around packed dry soil that makes me cough, I start my tour of the landfill facility. The engineer in charge walks around with us and I notice that it is not the smell, but the dust what makes her cover her mouth. Her eyes are very expressive, but often covered with sunglasses since it is a sunny day in the city. A sunny day means that up at the top of the old cells, the wind lets me feel the cold breeze of the mountain, but in the lowest trails of new cells, where there is no wind, I was getting warm.

I don't know what I expected to see in a real life landfill. It certainly didn't include a deserted looking mountain with plateaus. I was walking on covered old cells, full of methane-producing trash that sometimes shifts and moves moving the whole structure underneath. Imagining the trash underneath my shoes, I kept looking at the floor for clues of history. The history of this town and its people inscribed in the trash that I was currently walking over. Unfortunately, all I could see were small traces of plastic bags trying to escape their buried jails, none of them truly making it. So, all I could do was keep imagining myself walking on a mountain of trash as if I was actually able to see it through the dirt, and linings, and tubes of small chimneys burning gas. I imagined the holes in the ground lined with resistant waterproof materials that held the old tires through which the leachate would flow. On top of them I imagined the decomposing organic components of the trash mixing with old plastics and appliances. However, it was all in my mind until I saw the current cell.

On the current cell, my expectations of a landfill as a little mountain of trash being compacted by layers multiple times on top of one another was real and was happening. In this point, the smell of decomposing organics traveled with the wind like some fugitive plastic bags tried to do before encountering their match on a tall wire fence. Flies as frequent visitors are deterred by soil and plastic temporary coverage in the current cell and the only other living animal on the vicinity is us people. We are present there writing our history

on plastics that I encountered everywhere I looked in this messy testament to daily life and disposal practices. There was plastic everywhere except for one spot. That spot was a soil-covered patch on the floor of a current cell. In that spot, I saw it, tight, pressed against itself, was a woman's shoe. Its broken heel lying neatly besides the shoe like a reminder of the three-dimensional shape it once had. There it was inviting a story, waiting patiently for a narrator, but I could not tell the story of a broken abandoned shoe, not today while wearing the new shoes I had purchased just for this visit. I cannot talk about the past of that shoe that as many other items around me—while relished investments when purchased—end their journey here in the landfill. This is a tomb for items, their final destination, where no one will ever see them or talk about them again. Not unless someone has the interest and tools to explore what lies beneath the surface...

F.2 United States: Gliding Plastic Mountains and the Collection Cart

The black bottom of the cart contrasted deeply with the clear-white color of the new trash bags. Like a mountain of salt, the trash bags had a peak several inches above William's head. Inside the bags, I could see the Styrofoam and plastic containers, paper cups, and paper bags with different logos from the restaurants in here. Not one innocent, not one safe from blame. Yellows, oranges, greens, blues, and reds, the colors of the logos contrasted with the whiteness of the paper and foam disposables pressing tight against the full bags. Some of them even leaking brighter colors making neon purple puddles inside non-sealed bags, which waited their turn to splash contents on the brave man carrying them to the outside compactor. Today William was pushing the gliding mountain of trash bags through the hallways carefully looking around their heavy load to not hit the cart or lose any bags. And, at this point in collection, William still had four more trash bags to collect...

F.3 Colombia: Inanimate Dancing Partners

Amelia sweeps towards the outside of the wood, towards the tiled hallways. Section by section, she dances the same dance, over and over again until her fibered partner has done the job and everything has been cleaned...

Appendix G

Eat, Pray, Love: A Recipe

For those of us who watched the movie, Julia Roberts managed to teach us, in two hours, that we should enjoy our food, that we should have moments with our own mind, and that we need to learn to share ourselves when we feel it appropriate.

Eat, pray, love...

However, there is so much that was left unsaid that truly resonated with me. For instance, while many of the experiences on Italy focused on the food, I experienced how she navigated her own life and social interactions. In India, she learned to listen to herself and others. While in Bali, she learned to share her newfound amazing self with someone else.

There are other paths she could have taken. She could have learned to cook like Julia Childs, write a blog o reflect, and share it with the world. Or, she could have designed a new diet plan, exercise, and buy new clothes to share her new self with the world. She could have also get a makeover, go to school, and become a volunteer.

Enjoy yourself, listen, share...

As there are many paths to achieve those tenets of self-exploration, the exploration of people is no different. In my case, my journey would be called think outside the box, immerse on research, fly away with each lead.

Think, immerse, fly...

Again, that is my experience, it is my own eat, pray, love, but there are many paths to cultural exploration. I started by considering different theoretical epistemologies to explore the issue of waste, finding the postmodern rhizome to be personally and professionally adequate. Then, I immersed myself in the theory until it washed over, every aspect of the research. And, from there, all that was left was to follow one line at a time writing and reflecting on everything I was living and reading. So, my true tenets and recipe for a researcher wanting to pursue similar avenues would be

Read, live, write (repeat as needed)

Read smart qualitative scholars like St. Pierre, Jackson, Richardson, Lather, and of course people in your area of research. Live the lives of those you are studying, learn from and with them, do what you think they could or would do and write everything. Write to yourself, in bullet points or essays, or even in rambling thoughts that only you could understand, because those writings will prove your biggest allies for understanding and pursuing new lines of flight. Then, the formula adjusts to

Read smart, Live research, Write everything...

As I keep analyzing and working on it, I could perhaps find other paths or other recipes, but for now, and for those who are anxious, that is what I would recommend.

References

Abdelfatah, A., Tabsh, S., & Yehia, S. (2011). Utilization of recycled coarse aggregate in concrete mixes. *Journal of Civil Engineering and Architecture*, *5*(6), 562–566.

Anastas, P. & Zimmerman, J. (2003). Design through the twelve principles of green engineering. *Environmental Science and Technology*, *37*(5), 94A–101A.

Angell, M.-L. (2014). Dancing the tightropes: Rhizoanalysis revisited. *Reconceptualizing Educational Research Methodology*, *5*(2).

Anzola Parra, D. F. (2015). *Estudio del manejo de residuos sólidos en el Relleno Sanitario Doña Juana con el fin de delinear un borrador de propuesta para el manejo integral de residuos sólidos en la ciudad de Bogotá dc* (Undergraduate Thesis, Universidad del Rosario). Retrieved from http://repository.urosario.edu.co/handle/10336/11399.

Association of Science and Technology Centers. (1998). Rotten truth (about garbage): Garbage timeline. Retrieved from http://www.astc.org/exhibitions/rotten/timeline.htm.

Barbalace, R. C. (1998). The history of waste: Do you want to be a garbologist? Retrieved from http://environmentalchemistry.com/yogi/environmental/wastehistory.html.

Barnsley, M. F. (2014). *Fractals everywhere* (Second). Academic press.

Barr, S., Gilg, A. W., & Ford, N. J. (2001). A conceptual framework for understanding and analysing attitudes towards household-waste management. *Environment and Planning A*, *33*(11), 2025–2048.

Bronin, S. C. (2008). The quiet revolution revived: Sustainable design, land use regulation, and the states. *Minnesota Law Review*, *93*, 231.

Butler, J. (1994). Contingent foundations: Feminism and the question of "postmodernism". *The postmodern turn: New perspectives on social theory*, 153–170.

Cabildo, M., Claramunt, R., Camargo, M., Escolastico, C., Esteban, S., Farran, M., & Sanz, D. (2008). *Reciclado y tratamiento de residuos*. Editorial UNED.

Cardenas, M. & Reina, M. (2008). La minería en Colombia: Impacto socioeconómico y fiscal.

Castaño, J., Rodríguez, R., Lasso, L., Goméz, A., & Ocampo, S. (2013). Gestión de residuos de construcción y demolición (rcd) en Bogotá: Perspectivas y limitantes. *Revista Tecnura*, *17*(38), 121–129.

Castro, C. J. (2004). Sustainable development mainstream and critical perspectives. *Organization & Environment*, *17*(2), 195–225.

Clough, G. W. (2004). *The engineer of 2020: Visions of engineering in the new century*. National Academy of Engineering, Washington, DC.

Cole, K. P. (2014). *Close encounters* (Doctoral dissertation, University of Georgia Repository).

Colomer Mendoza, F. J. & Gallardo Izquierdo, A. (2013). *Tratamiento y gestion de residuos solidos*. Editorial Limusa. Mexico.

Cooperband, L. R. (2000). Composting: Art and science of organic waste conversion to a valuable soil resource. *Laboratory Medicine*, *31*(5), 283–290.

Creed, G. W. (2000). ‘‘Family values"and domestic economies. *Annual Review of Anthropology*, 329–355.

D´Adamo-Damery, P. C. (2014). *Ontological possibilities: Rhizoanalytic explorations of community food work in central appalachia* (Doctoral dissertation, Virginia Polytechnic Institute and State University).

Damghani, A. M., Savarypour, G., Zand, E., & Deihimfard, R. (2008). Municipal solid waste management in Tehran: Current practices, opportunities and challenges. *Waste management*, *28*(5), 929–934.

De Vos, S. (1989). Leaving the parental home: Patterns in six Latin American countries. *Journal of Marriage and the Family*, 615–626.

Deleuze, G. (1968/1994). *Difference and repetition*. (Paul Patton, Trans.). (Original work published 1968). London: Athlone.

Deleuze, G. & Guattari, F. (1980/1987). *A thousand plateaus: Capitalism and schizophrenia*. (Brian Massumi, Trans.). (Original work published 1980). Minneapolis: University of Minnesota Press.

Denzin, N. K. & Lincoln, Y. S. (2000). The discipline and practice of qualitative research. *Handbook of qualitative research*, *2*, 1–28.

Departamento Administrativo Nacional de Estadistica. (2005). Boletin censo general perfil Colombia 2005. Retrieved August 25, 2016, from http://www.dane.gov.co/files/censo2005/PERFIL_PDF_CG2005/00000T7T000.PDF.

Edwards, C. A., Dominguez, J., & Arancon, N. Q. (2004). 18. The influence of vermicompost on plant growth and pest incidence. *Soil Zoology for Sustainable Development in the 21st century. Cairo*, 397–420.

Eitzinger, A., Läderach, P., Bunn, C., Quiroga, A., Benedikter, A., Pantoja, A., ... Bruni, M. (2014). Implications of a changing climate on food security and smallholders' livelihoods in Bogotá, Colombia. *Mitigation and adaptation strategies for global change*, *19*(2), 161–176.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic fieldnotes*. University of Chicago Press.

Eriksson, O., Reich, M. C., Frostell, B., Björklund, A., Assefa, G., Sundqvist, J.-O., ... Thyselius, L. (2005). Municipal solid waste management from a systems perspective. *Journal of Cleaner Production*, *13*(3), 241–252.

Escandón Mejía, J. C. (2011). Diagnóstico técnico y económico del aprovechamiento de residuos de construcción y demolición en edificaciones en la ciudad de Bogotá.

Everett, M. (1997). The ghost in the machine: Agency in "poststructural"critiques of development. *Anthropological Quarterly*, 137–151.

Fitzgerald, M. (2005). Corporate ethnography. Retrieved from http://www.technologyreview.com/news/404920/corporate-ethnography/.

Flax, J. (1990). Postmodernism and gender relations in feminist theory. *Feminism / Postmodernism*, 39–62.

Froehlich, J., Findlater, L., & Landay, J. (2010). The design of eco-feedback technology. In *Proceedings of the sigchi conference on human factors in computing systems* (pp. 1999–2008). ACM.

Giddings, S. B. & Psaltis, D. (2016). Event horizon telescope observations as probes for quantum structure of astrophysical black holes. *arXiv preprint arXiv:1606.07814*.

Gille, Z. (2007). *From the cult of waste to the trash heap of history: The politics of waste in socialist and postsocialist hungary*. Indiana University Press.

Glasnapp, J. & Isaacs, E. (2011). No more circling around the block: Evolving a rapid ethnography and podcasting method to guide innovation in parking systems. In *Proceedings of ethnographic praxis in industry conference (epic)* (Vol. 1, pp. 190–213).

Glesne, C. (2001). *Becoming qualitative researchers: An introduction*. Prentice Hall.

Google. (2014a). Define residual. Google.com. Retrieved from http://goo.gl/1iwo4A.

Google. (2014b). Define waste. Google.com. Retrieved from http://goo.gl/tyfYcR.

Group, C. C. (2006). Targeted statewide waste characterization study: Waste disposal and diversion findings for selected industry groups. Retrieved March 8, 2016, from http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1184.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and brain sciences*, *33*(2-3), 61–83.

Hird, M. J. (2013). Is waste indeterminacy useful? A response to Zsuzsa Gille. *Social Epistemology Review and Reply Collective*, *2*(6), 28–33.

Hird, M. J. (2016). The phenomenon of waste-world-making. *Rhizomes: Cultural Studies in Emerging Knowledge*, (30).

History. (2014). History of waste management. Retrieved from http://beginwiththebin.org/resources/for-education.

Honan, E. (2007). Writing a rhizome: An (im) plausible methodology. *International Journal of Qualitative Studies in Education*, *20*(5), 531–546.

Honan, E. & Sellers, M. (2006). So how does it work?–Rhizomatic methodologies. In *Australian association for research in education conference*. Retrieved from http://www.aare.edu.au/06pap/hon06003.pdf.

Hoornweg, D., Bhada-Tata, P., Kennedy, C., et al. (2013). Waste production must peak this century. *Nature*, *502*(7473), 615–617.

Hundley, M. K. (2007). *From page to screen: Changing textual landscapes in a digital world* (Doctoral dissertation, University of Georgia).

Instituto de Hidrología Meteorología y Estudios Ambientales de Colombia. (2008). Anexo 1 principales normas ambientales para el diseño del Registro único Ambiental – RUA – para el sector manufacturero. Retrieved from http://www.corpoboyaca.gov.co/cms/wp-content/uploads/2015/11/Anexo1_Marco_juridicoRUAManufacturero_VersionDic2008.pdf.

International Council of Shopping Centers. (2016). U.S. shopping-center classification and characteristics. Retrieved September 23, 2016, from http://www.icsc.org/uploads/research/general/US_CENTER_CLASSIFICATION.pdf.

International Solid Waste Association. (2015). ISWA report 2015. Retrieved on September 21, 2016 from http://www.iswa.org/media/publications/iswa-annual-reports/.

Jackson, A. Y. (2003). Rhizovocality. *Qualitative Studies in Education*, *16*(5), 693–710.

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., ... Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, *347*(6223), 768–771.

Jones, A. M. & Alberti, B. (2013). Archaeology after interpretation. *Archaeology after interpretation*, 15–35.

Karadimas, N. V. & Loumos, V. G. (2008). GIS-based modelling for the estimation of municipal solid waste generation and collection. *Waste Management & Research*, *26*(4), 337–346.

Katzev, R. & Mishima, H. R. (1992). The use of posted feedback to promote recycling. *Psychological Reports*, *71*(1), 259–264.

King, M. L., Kasegawa, K., & Amemiya, T. (1963). *Strength to love*. Harper & Row New York.

Kuhn, T. S. (2012). *The structure of scientific revolutions*. University of Chicago press.

Lachman, M. L. & Brett, D. L. (2013). *Generation Y: Shopping and entertainment in the digital age*. Retrieved from http://www.uli.org/wp-content/uploads/ULI-Documents/Generation-Y-Shopping-and-Entertainment-in-the-Digital-Age.pdf.

Lather, P. (1993). Fertile obsession: Validity after poststructuralism. *The sociological quarterly*, *34*(4), 673–693.

The Thousand and One Nights. (n.d.). In S. Lawall (Ed.), *The Norton anthology of world literature* (pp. 658–693). Trans. Husain Haddawy. New York: W.W. Norton & Company, Inc.

Lee, J., Edil, T. B., Benson, C. H., & Tinjum, J. M. (2013). Building environmentally and economically sustainable transportation infrastructure: Green highway rating system. *Journal of Construction Engineering and Management*, *139*(12), A4013006.

Lee, J., Edil, T., Tinjum, J., & Benson, C. (2010). Quantitative assessment of environmental and economic benefits of recycled materials in highway construction. *Transportation Research Record: Journal of the Transportation Research Board*, (2158), 138–142.

Levesque, J. (2007). *Body anxious* (Master's thesis, University of Louisville).

Liboiron, M. (2016). Municipal versus industrial waste: Questioning the 3-97 ratio. Retrieved August 22, 2016, from https://discardstudies.com/2016/03/02/municipal-versus-industrial-waste-a-3-97-ratio-or-something-else-entirely/.

Louis, G. E. (2004). A historical context of municipal solid waste management in the United States. *Waste management & research*, *22*(4), 306–322.

Ly, J. (2005). Uso del follaje de árboles tropicales en la alimentación porcina. *Pastos y Forrajes*, *28*(1).

Lyotard, J.-F. (1979/1984). *The postmodern condition: A report on knowledge*. (Geoff Bennington & Brian Massumi, Trans.). (Original work published 1979). University of Minnesota Press.

MacBride, S. (2011). *Recycling reconsidered: The present failure and future promise of environmental action in the United States*. MIT Press.

Mariano, L. S., de Mello, M. d. C., do Rocio, M., & Braga, M. C. B. (2013). A feasibility study of recycling of construction and demolition waste for structural purposes. *The Journal of Solid Waste Technology and Management*, *39*(3), 204–213.

Marzana, D., Pérez-Acosta, A. M., Marta, E., & González, M. I. (2010). La transición a la edad adulta en Colombia: Una lectura relacional. *Avances en psicología Latinoamericana*, *28*(1), 99–112.

Meadows, D., Randers, J., & Meadows, D. (2004). *Limits to growth: The 30-year update*. Chelsea Green Publishing.

Medina-Jerez, W. (2008). Between local culture and school science: The case of provincial and urban students from eastern Colombia. *Research in Science Education*, *38*(2), 189–212.

Mozo Reyes, E. C. (2012). *Impacts to public recycling from psychological and technological stimulus* (Master's thesis, University of Georgia).

Mozo Reyes, E. C. (2016a). Timerhizome of waste in Colombia. https://prezi.com/kf7rqil7akln/xvii/?utm_campaign=share&utm_medium=copy.

Mozo Reyes, E. C. (2016b). Timerhizome of waste in USA. https://prezi.com/kqmea_c89kez/1657/?utm_campaign=share&utm_medium=copy.

Mozo Reyes, E. C., Jambeck, J. R., Reeves, P., & Johnsen, K. (2016). Will they recycle? Design and implementation of eco-feedback technology to promote on-the-go recycling in a university environment. *Resources, Conservation and Recycling*, *114*, 72–79.

Muir, J. (2011). *My first summer in the sierra*. Houghton Mifflin Harcourt.

Mulder, C. H. et al. (2009). Leaving the parental home in young adulthood. *Handbook of Youth and Young Adulthood, Abingdon, Routledge*, 203–210.

Los Dumis. (1977–1999). RCN Televisión, Producciones PUNCH, Caracol Televisión, Canal Capital, and Telepacífico.

Brújula Mágica. (1993–1997). Audiovisuales and Canal A.

Colors of the wind – Pocahontas. (1995). Walt Disney Pictures and Hollywood Records.

Verde Manzana. (1997). Señal Colombia.

Osbaldiston, R. & Schott, J. (2012). Environmental sustainability and behavioral science meta-analysis of proenvironmental behavior experiment. *Environment and Behavior*, *44*(2), 257–299.

Ovink, S. M. & Kalogrides, D. (2015). No place like home? Familism and Latino/a–white differences in college pathways. *Social science research*, *52*, 219–235.

Patel, A. I., Bogart, L. M., Klein, D. J., Schuster, M. A., Elliott, M. N., Hawes-Dawson, J., ... Uyeda, K. E. (2011). *Increasing the availability and consumption of drinking water in middle schools: A pilot study*. Centers for Disease Control and Prevention.

Pérez, M. (2009). Historia, cultura y sociedad colonial siglo XVI-XVIII: Temas, problemas y perspectiva. *Historia Crítica*, (37), 217–221.

Richardson, L. & St. Pierre, E. (2008). A method of inquiry. *Collecting and interpreting qualitative materials*, *3*(4), 473.

Richardson, T. A. (2008). *The function of literacy in the life of a former member of the black panther party: A rhizoanalysis* (Doctoral dissertation, University of Georgia Repository).

Robinson, K. (1999). Thought of the outside. *Philosophy today*, *43*(1), 57–72.

Rodríguez, J. (2009). Presentación historia y desarrollo del conflicto ambiental Relleno Sanitario de Doña Juana. Bogotá: Concejo de Bogotá. Retrieved from http://concejodebogota.gov.co/concejo/site/artic/20091202/pags/20091202121107.php.

Rodriguez, L. (2014). Informe: Vidrio, cartón y plástico, la evolución de los empaques de la leche. Retrieved August 17, 2016, from http://contextoganadero.com/economia/informe-vidrio-carton-y-plastico-la-evolucion-de-los-empaques-de-la-leche.

Rohrer, C. (2008). When to use which user experience research methods. Articles, Nielsen Norman Group. Retrieved from http://www.nngroup.com/articles/which-ux-research-methods/.

Roulston, K. (2010). *Reflective interviewing: A guide to theory and practice*. Sage.

Santibañez-Aguilar, J. E., Martinez-Gomez, J., Ponce-Ortega, J. M., Nápoles-Rivera, F., Serna-González, M., González-Campos, J. B., & El-Halwagi, M. M. (2015). Optimal planning for the reuse of municipal solid waste considering economic, environmental, and safety objectives. *AIChE Journal*, *61*(6), 1881–1899.

Saylor, A., Prokopy, L. S., & Amberg, S. (2011). What's wrong with the tap? Examining perceptions of tap water and bottled water at purdue university. *Environmental management*, *48*(3), 588–601.

Schön, D. A. (1995). Knowing-in-action: The new scholarship requires a new epistemology. *Change: The Magazine of Higher Learning*, *27*(6), 27–34.

Schwandt, T. A. (1997). *Qualitative inquiry: A dictionary of terms*. Sage Publications, Inc.

Soon, C. S., Brass, M., Heinze, H.-J., & Haynes, J.-D. (2008). Unconscious determinants of free decisions in the human brain. *Nature neuroscience*, *11*(5), 543–545.

Spehr, K. & Curnow, R. (2015). *Litter-ology: Understanding littering and the secrets to clean public places*. Kindle Edition. Environment Books Australia.

St. Pierre, E. (2001). Coming to theory: Finding foucault and deleuze. *Feminist engagements: Reading, resisting, and revisioning male theorists in education and cultural studies*, 141–163.

St. Pierre, E. (2004). Care of the self: The subject and freedom. *Dangerous coagulations?: The uses of Foucault in the study of education*, *19*, 325.

St. Pierre, E. (2011). Post qualitative research: The critique and the coming after. *The SAGE handbook of qualitative research*, *4*, 611–626.

St. Pierre, E. (2012). Another postmodern report on knowledge: Positivism and its others. *International Journal of Leadership in Education*, *15*(4), 483–503.

St. Pierre, E. (2016). The empirical and the new empiricisms. *Cultural Studies ↔ Critical Methodologies*, *16*(2), 111–124.

Superinterdencia de Servicios Publicos Domiciliarios, C. (2015). Disposición final de residuos sólidos informe nacional. Retrieved on July 20, 2016 from http://www.superservicios.gov.co/Publicaciones/Acueducto-Alcantarillado-y-Aseo/Disposicion-Final-de-Residuos-Solidos-Informe-Nacional-Elaborado-20152.

Swinyard, W. R. (1998). Shopping mall customer values: The national mall shopper and the list of values. *Journal of Retailing and Consumer Services*, *5*(3), 167–172.

Tai, J., Zhang, W., Che, Y., & Feng, D. (2011). Municipal solid waste source-separated collection in China: A comparative analysis. *Waste management*, *31*(8), 1673–1682.

Tiempo, E. (1952). Que es basura en los Estados Unidos. de la vida Americana. cosas del día. P.5. Retrieved from https://news.google.com/newspapers?nid=N2osnxbUuuUC&dat=19521103&printsec=frontpage&hl=en. El Tiempo.

Tiempo, E. (1972). Magia sintética. P. 10-D. Retrieved from https://news.google.com/newspapers?nid=N2osnxbUuuUC&dat=19720426&printsec=frontpage&hl=en. El Tiempo.

Times, N. (2006). President Bush's news conference. Retrieved August 17, 2016, from http://www.nytimes.com/2006/12/20/washington/20text-bush.html?_r=0.

Unidad de Proteccion Minero Energetica. (n.d.). Normatividad ambiental. Retrieved from http://www.upme.gov.co/guia_ambiental/carbon/gestion/politica/normativ/normativ.htm#BM2_9_Normatividad_sobre_residuos_s%C3%B3lido.

United Nations Environment Programme. (2015). Biodegradable plastics & marine litter: Misconceptions, concerns and impacts on marine environments. Retrieved on September 24, 2016 from http://unep.org/gpa/documents/publications/BiodegradablePlastics.pdf.

United States Environmental Protection Agency. (2015). Advancing sustainable materials management: Facts and figures report. Retrieved on March 7, 2015 from https://www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures(previouslyhttp://www.epa.gov/wastes/nonhaz/municipal/index.htm).

United States Environmental Protection Agency. (n.d.). Guide for industrial waste management. Retrieved August 22, 2016, from https://www.epa.gov/smm/guide-industrial-waste-management;https://www.epa.gov/hwgenerators/typical-wastes-generated-industry-sectors.

Van Maanen, J. (2011). *Tales of the field: On writing ethnography*. University of Chicago Press.

Vanderbeck, R. M. & Johnson, J. H., Jr. (2000). "That's the only place where you can hang out": Urban young people and the space of the mall. *Urban Geography*, *21*(1), 5–25.

Watters, E. (2013). We aren't the world. Retrieved from http://www.psmag.com/magazines/magazine-feature-story-magazines/joe-henrich-weird-ultimatum-game-shaking-up-psychology-economics-53135/. The Science of Society, Pacific Standard Magazine.

Yakura, E. K. (2002). Charting time: Timelines as temporal boundary objects. *Academy of Management journal*, *45*(5), 956–970.

Zastrow, C. & Kirst-Ashman, K. (2006). *Understanding human behavior and the social environment* (Eighth). Brooks/Cole.