




2020

## Cartographic Efficacy: Histories of the Present, Participatory Futures

Amber J. Bosse

University of Kentucky, [amber.j.bosse@gmail.com](mailto:amber.j.bosse@gmail.com)

Author ORCID Identifier:

 <https://orcid.org/0000-0002-5206-4466>

Digital Object Identifier: <https://doi.org/10.13023/etd.2020.491>

[Right click to open a feedback form in a new tab to let us know how this document benefits you.](#)

### Recommended Citation

Bosse, Amber J., "Cartographic Efficacy: Histories of the Present, Participatory Futures" (2020). *Theses and Dissertations--Geography*. 69.

[https://uknowledge.uky.edu/geography\\_etds/69](https://uknowledge.uky.edu/geography_etds/69)

This Doctoral Dissertation is brought to you for free and open access by the Geography at UKnowledge. It has been accepted for inclusion in Theses and Dissertations--Geography by an authorized administrator of UKnowledge. For more information, please contact [UKnowledge@lsv.uky.edu](mailto:UKnowledge@lsv.uky.edu).

## **STUDENT AGREEMENT:**

I represent that my thesis or dissertation and abstract are my original work. Proper attribution has been given to all outside sources. I understand that I am solely responsible for obtaining any needed copyright permissions. I have obtained needed written permission statement(s) from the owner(s) of each third-party copyrighted matter to be included in my work, allowing electronic distribution (if such use is not permitted by the fair use doctrine) which will be submitted to UKnowledge as Additional File.

I hereby grant to The University of Kentucky and its agents the irrevocable, non-exclusive, and royalty-free license to archive and make accessible my work in whole or in part in all forms of media, now or hereafter known. I agree that the document mentioned above may be made available immediately for worldwide access unless an embargo applies.

I retain all other ownership rights to the copyright of my work. I also retain the right to use in future works (such as articles or books) all or part of my work. I understand that I am free to register the copyright to my work.

## **REVIEW, APPROVAL AND ACCEPTANCE**

The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student's thesis including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Amber J. Bosse, Student

Dr. Matthew W. Wilson, Major Professor

Dr. Matthew Zook, Director of Graduate Studies

CARTOGRAPHIC EFFICACY:  
HISTORIES OF THE PRESENT, PARTICIPATORY FUTURES

---

DISSERTATION

---

A dissertation submitted in partial fulfillment of the  
requirements for the degree of Doctor of Philosophy in the  
College of Arts and Sciences  
at the University of Kentucky

By  
Amber J. Bosse  
Lexington, Kentucky  
Director: Dr. Matthew W. Wilson, Associate Professor of Geography  
Lexington, Kentucky  
2020

Copyright © Amber J. Bosse 2020  
<https://orcid.org/0000-0002-5206-4466>

## ABSTRACT OF DISSERTATION

### CARTOGRAPHIC EFFICACY: HISTORIES OF THE PRESENT, PARTICIPATORY FUTURES

Throughout history, maps have held a particularly potent ability to inform and persuade their users. Recognizing the power maps and their modes of productions possess, participatory mapping has been celebrated for its capacity to empower systemically disenfranchised communities by way of establishing inclusive pathways for influencing collection and representation of spatial information. What has remained largely periphery to considerations of participatory mapping, however, has been discussions of map design. Decades of scholarship in both traditional and critical veins of cartography, however, argue that it's the careful execution of design choices that grant the map its power. Without attention to design, cartographers warn, the map will not be able to successfully communicate its intended message. However, even with little direct discussion of map design being reported, participatory mapping has a proven track record in an expansive range of locations and contexts of successfully supporting communities in advocating for their rights.

As such, this dissertation takes up this disciplinary dissonance to explore what, ultimately, makes a map effective. Through content analysis of cartographic education materials, interviews with leaders of participatory mapping projects, and participant observation at national and international professional gatherings for cartographers, this research reveals an underlying tension between what informs the established understandings of effectiveness and how that effectiveness is achieved. Such tension can result in instances of disciplinary shaming and gatekeeping which, in turn, limit exchange of information and consequently prevented an evolution of the understandings of effectiveness. This dissertation calls for an expansion of the discipline's framework of cartographic efficacy. I ultimately invite cartographers to allocate resources for understanding forms of efficacy that expand beyond traditional modalities in addition to making space for those who are not professionally trained cartographers to assert their ability to make effective maps and explore design principles with aplomb.

KEYWORDS: participatory mapping, map design, history of cartography, critical cartography, critical GIS, action research

Amber J. Bosse

---

*(Name of Student)*

11/11/2020

---

Date

CARTOGRAPHIC EFFICACY:  
HISTORIES OF THE PRESENT, PARTICIPATORY FUTURES

By  
Amber J. Bosse

Dr. Matthew W. Wilson  
\_\_\_\_\_  
Director of Dissertation

Dr. Matthew Zook  
\_\_\_\_\_  
Director of Graduate Studies

11/11/2020  
\_\_\_\_\_

Date

*For all those who map anyway*

## ACKNOWLEDGEMENTS

Much of what is in this document is thanks to the thoughtfulness and care of the many. First and foremost is Matt Wilson. In what is perhaps the only time in the world's history Pumpkin Center will intersect with Ottertail (or is it Hickory Stick?), Matt has helped me to decipher when to "stay with the trouble" and when to let the trouble go. The rigor of this dissertation owes much to him. I am also indebted to my committee members. Matt Zook has both kept this project tethered to the ground while also finding all the right moments introduce lightness with his wit and humor. Betsy Beymer-Farris has continually inspired me with her steadfast commitment to supporting scholarship that builds a better world. Ann Kingsolver has helped me to shed the pesky blinders of disciplinarity, reminding me of the impact and relevance of considerations that reach beyond the ought anxiety of geographers. This project has been strengthened by each of these folks in immeasurable ways and I am beyond grateful.

Then there are those who I am lucky enough to have met along the way. Emily Barret, Meghan Kelly, Eric Huntley, Christine Woodward, Ian Spangler, and Robby Hardesty, in addition to being incredible folks to think with, have all made me laugh so hard that I've cried and there have been moments where I have run purely on the fumes of joy distilled from memories of time spent with them. Sharon Yam, Laura Greenfield, Rich Donohue, and Sarah Bell have all, in their own ways, modeled for me how to live a full and vibrant life. Jessi Breen, Jack Swab, Jacob Saindon, Araby Smyth, Jessa Loomis, Lynn Phillips, Jeff Levi, and Lori Tyndall generously allocated time and resources to help keep me oriented to my intended path. My appreciation for the sense of community I've experienced at this juncture of my life runs deep.

I have many to thank for helping me find a home within the discipline of geography. First is Devon Hanson who, as the only women faculty member of my undergraduate department, helped me know there was a place for me too. Katherine Hankins, through a combination of relentless rigor and enduring grace, created a space for me to thrive. Sarah Elwood, Carolyn Finney, Agnieszka Leszczynski, Britta Ricker, Douglas Munski, and Bill Wetherholt each guided me through their writing and mentorship to be brave and unyielding in my pursuits. Alex Orenstein, Annita Lucchesi, Aly Ollivierre, Carolyn Fish, and Will Payne continually motivate me to be a better geographer through their excellence. There are also those that have made a place for me within the Community Geographies Collective, the North American Cartographic Information Society, and the Cartography Specialty Group of the AAG. Though operating at different scales, each has played an important role in my journey, making me proud to be a geographer.

And then there are those who know me outside of my role as geographer. Thank you to the wonderful folks who raised me, Carmen, Jeff, Darryl, and Deb; the hilarious people I grew up alongside who made our small town feel big, Cassie, Samantha, Colin, and Megan; those who helped me to heal my body with movement and magic, Nishaan Sanduh, Krystina Carr, and Yianni Stathopoulos; my mentor who long ago showed me how to live and think bigger than I thought possible, Mary Godwin; my favorite dorm neighbor who has done more copy editing than a software developer ever should, Rose Diemert; and, lastly, the caring human with an unrelenting love of mashed potatoes and insatiable sense of adventure who sat next to me in GIS class and came to be my life partner, Damien Bosse.

To all those listed here and beyond: thank you for everything.



## TABLE OF CONTENTS

|   |     |
|---|-----|
| ACKNOWLEDGEMENTS .....                                    | iii |
| LIST OF FIGURES .....                                     | vi  |
| CHAPTER 1. DISCIPLINARY DISSONANCE .....                  | 1   |
| 1.1 Mapmaking as World Making .....                       | 9   |
| 1.2 Mapping the Map: A Methodology .....                  | 15  |
| 1.2.1 Interview .....                                     | 15  |
| 1.2.2 Observe .....                                       | 17  |
| 1.2.3 Curate Disciplinary Materials .....                 | 19  |
| 1.2.4 Analyze .....                                       | 20  |
| 1.2.5 A Note on Tone, Terms, and (Not) Naming .....       | 23  |
| 1.2.6 Mapping My Standpoint .....                         | 28  |
| 1.2.7 Mapping the Dissertation .....                      | 32  |
| <br>  |     |
| PART I CARTOGRAPHIC EFFICACY .....                        | 35  |
| CHAPTER 2. CONTOURS OF EFFICACY .....                     | 36  |
| 2.1 What’s a Map? And Why it (Still) Doesn’t Matter ..... | 38  |
| 2.2 Cartography = Design = Efficacy .....                 | 43  |
| 2.3 The Expectation of Efficacy .....                     | 46  |
| 2.3.1 What .....  | 48  |
| 2.3.2 How .....   | 50  |
| 2.3.3 Beauty .....  | 54  |
| 2.4 The Authors of Efficacy .....                         | 57  |
| 2.5 A New Scale of Mappiness .....                        | 66  |
| CHAPTER 3. ATTUNING TO EFFICACY .....                     | 71  |
| 3.1 Disciplining Power .....                              | 71  |
| 3.2 Sites of Attunement .....                             | 75  |
| 3.2.1 In Person .....                                     | 75  |
| 3.2.2 In Publishing .....                                 | 77  |
| 3.2.3 Online .....  | 80  |
| 3.3 Consequences of Attunement .....                      | 86  |
| CHAPTER 4. EFFICACY AMONG THE MISATTUNED .....            | 89  |

|  |   |     |
|--|---|-----|
| 4.1  | The Aesthetics of Participation .....                     | 89  |
| 4.2  | “But Do They Work?” .....                                 | 96  |
| 4.3  | PRIVILEGING Process .....                                 | 100 |
| 4.4  | (Dis)Orientation: Efficacy in Participatory Mapping ..... | 104 |
| 4.4.1  | The Novice Expert .....                                   | 106 |
| 4.4.2  | Centering Community .....                                 | 110 |
| 4.4.3  | The Singular We .....                                     | 117 |
| 4.4.4  | Considering Community Mapping Centers .....               | 122 |
| 4.5  | Strategies and Shame .....                                | 124 |
| PART II HISTORIES OF THE PRESENT .....           |   | 127 |
| CHAPTER 5. ELUSIVE ELEMENTS .....                |   | 128 |
| 5.1  | A History of Cartographic History .....                   | 130 |
| 5.1.1  | The Rise of Robinson .....                                | 137 |
| 5.1.2  | Influential Elements .....                                | 139 |
| 5.1.3  | Tracing the Essentially Subjective .....                  | 140 |
| 5.2  | The Scrutiny of Judgment .....                            | 152 |
| 5.3  | Tenacious whim, Persistent Fancy .....                    | 154 |
| CHAPTER 6. ADD PARTICIPANTS AND STIR .....       |   | 157 |
| 6.1  | The Roots of Participatory Methods .....                  | 159 |
| 6.2  | Emergence of Public Participation GIS .....               | 162 |
| 6.2.1  | Disciplinary Divides .....                                | 163 |
| 6.2.2  | “You’re Arguing That People Should Participate!?” .....   | 167 |
| 6.2.3  | Technically Empowered .....                               | 172 |
| 6.2.4  | Technically Not .....                                     | 178 |
| 6.3  | The Problem with Participation .....                      | 180 |
| CHAPTER 7. TOWARDS CARTOGRAPHIC CONSONANCE ..... |   | 184 |
| 7.1  | Participatory Futures .....                               | 187 |
| 7.2  | World Building Cartography: A Showcase .....              | 190 |
| 7.3  | Chip, Chip, Chip .....                                    | 193 |
| REFERENCES .....                                 |   | 199 |
| VITA .....                                       |   | 217 |

## LIST OF FIGURES

|  |     |
|--|-----|
| Figure 1. ArcGIS Online Workshop with members of WALT.....                           | 2   |
| Figure 2. Disciplinary dissonance as expression.....                                 | 3   |
| Figure 3. Legend of the WALT Built Environment Survey.....                           | 5   |
| Figure 4. Exerpt from MacEachren’s in <i>How Maps Work</i> (1995).....               | 7   |
| Figure 5. Expert from Rambaldi et a. <i>Practical Ethics for PGIS</i> (2006).....    | 8   |
| Figure 6. Guide for interviews with participatory mapping leaders.....               | 17  |
| Figure 7. Coding scheme applied to interviews with PMLs .....                        | 22  |
| Figure 8. Results of Google Image search results .....                               | 61  |
| Figure 9. The ICA Executive Committee and Commission Chairs .....                    | 63  |
| Figure 10. Attendees at the 2019 NACIS Annual Meeting in Tacoma, WA .....            | 63  |
| Figure 11. Invited attendees of the 2016 Esri Cartographic Summit .....              | 63  |
| Figure 12. The first traceable instance of #cartofail on Twitter .....               | 80  |
| Figure 13. Twitter screenshots demonstrating the use of #cartofail.....              | 81  |
| Figure 14. “Where Commuters Run Over Black Children”.....                            | 90  |
| Figure 15. “Residential Security Map” of Detroit.....                                | 94  |
| Figure 16. Details of key changes among the six editions of <i>Elements</i> .....    | 143 |
| Figure 17. Chapter titles of the six editions of <i>Elements</i> .....               | 143 |
| Figure 18. “Imagination” throughout the six editions of <i>Elements</i> .....        | 145 |
| Figure 19. “Convenience of use” throughout the six editions of <i>Elements</i> ..... | 146 |
| Figure 20. “Functional design” throughout the six editions of <i>Elements</i> .....  | 146 |
| Figure 21. “Integrated whole” throughout the six editions of <i>Elements</i> .....   | 147 |
| Figure 22. “Generalization” throughout the six editions of <i>Elements</i> .....     | 149 |
| Figure 23. “Ggly map” throughout the six editions of <i>Elements</i> .....           | 151 |
| Figure 24. What do we mean by empowerment?.....                                      | 176 |

## CHAPTER 1. DISCIPLINARY DISSONANCE

*What may look to you like  
randomness and chaos  
may be someone else's order  
— Doreen Massey, For Space*

In the spring of 2015, four women from the Westside Atlanta Land Trust (WALT) joined me in a collaborative library space for an workshop on ArcGIS Online. More specifically, these members of WALT had come to learn how to maintain the database and corresponding web map of a built environment survey which I had been invited to build and manage using their organizational account (Figure 1). Put another way, these women and I were partners in a participatory mapping effort where they were the experiential experts (knowing the ins and outs of the neighborhood and the issues that needed tackling) and I was the methodological expert (having skills in the collection and representation of spatial data). For this survey, community members had been going parcel to parcel, assigning conditional attributes to each property using the Arc Collector app, to represent the dilapidation and abandonment caused by absentee landlords in their neighborhood. One of the driving forces behind the creation of this map was an effort to represent code enforcement violations and vacancies that official Fulton county datasets and records failed to capture and represent.

This story echoes those of so many that have come before it: the lack of documentation enabled the city to dismiss the community's request for support. It was a favorite pastime of WALT members to speculate on the specifics of backroom deals that made this erasure possible, making it seem as if the issues Westside members spoke of didn't exist. But they did exist. And they threatened the livelihood of Westside residents in a complex web of ways. The organization's primary mission was to take actionable steps for making these

problems perceptible, demanding accountability and change from local government, and ultimately improving the lives of Westside community members.



Figure 1. ArcGIS Online Workshop with members of WALT. Photo by Pamela Flores

In few days following this workshop, we'll all be standing in front of the city's Code Enforcement Commission to share the damning results of the survey; a visual representation of the caved-in roofs, fire damaged structures, mold infestation, and abandonment. Having been repeatedly denied meetings with their local representative, being on the agenda of the Code Enforcement Commission was a big day for the organization. The stakes were high. But, as you can see coming through even among my attempts to control my expression (Figure 2), I was not optimistic about the outcome of the meeting. But why?



Figure 2. Disciplinary dissonance as expression. Photo by Pamela Flores

Immediately prior to the moment of this picture being taken, I had demonstrated to the women how to change the symbology of the ArcGIS Online map. What I had not anticipated was that they would want to put their new knowledge to use immediately by editing the icons from the original symbology. To be more precise, it was not the desire to make changes that was causing my tense expression, but rather the specifics of the changes that were being made. The moment unfolded as they got noticeably excited about changing the symbology for individual features types and, as is depicted in Figure 3, the visual relationship between groups of related features began to unravel. I wanted so badly to appreciate their excitement, but it was causing them to change the map in ways that all my cartographic training told me would be detrimental to the map's ability to convince and persuade decision makers. Let me be more explicit.

Zooming into the legend of the before and after image (Figure 3), notice how some changes were more banal (like changing Miscellaneous/Other to a magnifying glass icon).

Others (like changing the Fire Damaged Structure icon from an orange house to a flame icon) promoted really strong reactions from my partners, “Oh yeah! That’s awesome!” The Occupied good condition being changed to the icon of a multifamily home with the comment “because you know I’d love to live in a house like that someday.” But in doing so, it now becomes challenging to understand how the different categories relate. The sequential color scheme (when the same color goes from light to dark) is a design principle wherein something of the same overall characteristic increased or decreased in perceived value and the color reflects those changes through its saturation. In this case, the light green icons are occupied homes, but the change represents the condition it is in-- with light green representing “dilapidated” and dark green representing “good condition”. In the updated version, the symbology doesn’t help convey this narrative. Stated more directly, in the updated map that the Code Enforcement Commission would see, there was no visual relationship between “occupied-good condition” and “occupied-dilapidated” and is just one area of many where such relationships were destroyed.

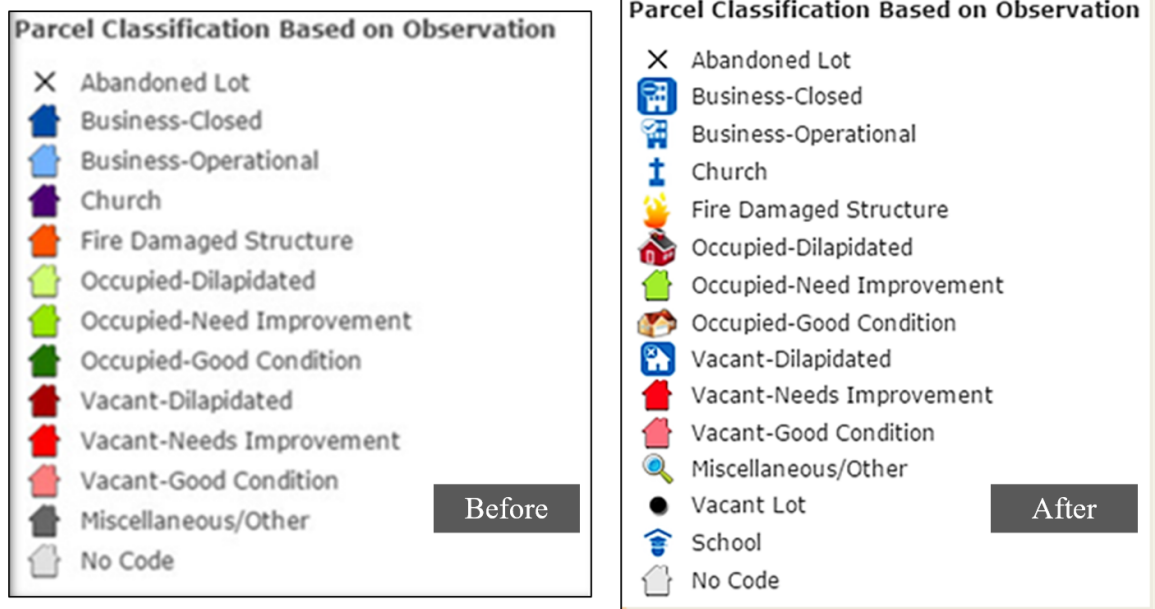


Figure 3. Legend of the WALT Built Environment Survey before and after symbology edits by WALT members

While it seemed that each change, where new challenges to the readability of the map were introduced with each passing moment, directly contradicted everything I had been taught about good map design in the host of cartography and GIS and courses I had taken up to that point—it was clear that the new symbology meant something to these women. They were excited and engaged, vocally expressing their preferences for each individual symbol. Framing this with what the participatory action literature had taught me about centering community in the work, and being sensitive to my positionality as a young white woman having been invited to work in a historically Black community, it felt like I’d be stepping over a line telling them how they should represent their community. So I did what any Midwestern gal would do: stayed silent...and stayed up all night wondering if my decision to not step in and “correct” the changes taking place would lead to the downfall of the project.



It was all for nothing, however, as the presentation (and the map!) was an absolute success. Members of the Code Enforcement Commission expressed being impressed with both the map and the overall methodology. The meeting served as a catalyst for a string of events that provided access to funding opportunities, public and private partnerships, and increased access to local and state leaders (recall again that they were previously being denied meetings with their local representative). Although there is much more to say about the intricacies of this project, I'll set aside the remainder of the details to continue ruminating on the ways it provided the motivation for this dissertation project. Specifically, my own lack of conceptualization of how, exactly, this map was able to be effective and prompt material and political change for WALT members when, given everything I had been taught about map design, it should have failed.

My silence in the library represents a larger swath of silence taking place in the discipline. There are many texts and experts touting the importance of careful design decisions in mapmaking, reconstructing and understanding how to leverage the power of maps, and establishing principles that ensure the map is effective (Figure 4). Additionally, there are many case studies and guidebooks discussing the interpersonal work that goes into enabling meaningful participatory research, advising projects on best approaches for avoiding exploitation and superficial engagement, as well as exploring the ways engagement in knowledge production can influence community empowerment (Figure 5). These areas of consideration, particularly in their attention to power, are extremely entangled. Unfortunately, cartographers have little to say about map production in instances that reach beyond a single mapmaker and participatory mappers don't often speak about their design decisions in recounting the development of their projects.

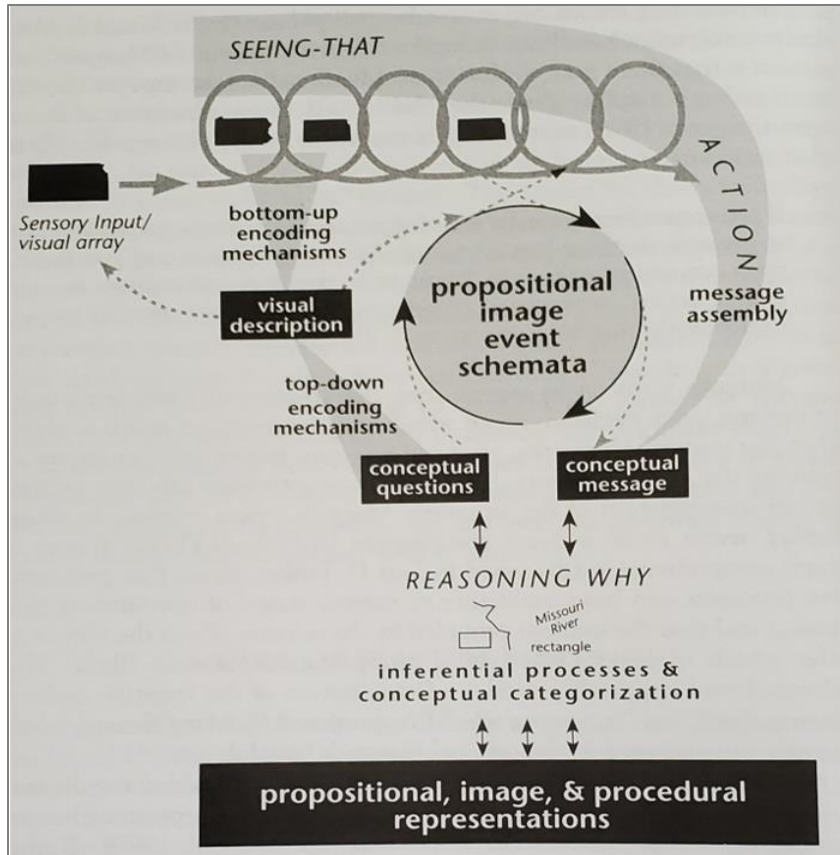


Figure 4. Concerns of traditional cartography from MacEachren's in *How Maps Work* (1995)

| Box 1: Compilation of 'Who?' and 'Whose?' Questions<br>(different sources)  |
|---|
| <ul style="list-style-type: none"> <li>• <b>Stage I: planning</b> <ul style="list-style-type: none"> <li><b>Who participates?</b><br/>Who decides on who should participate?<br/>Who participates in whose mapping?<br/>... and who is left out?</li> <li><b>Who identifies the problem?</b><br/>Whose problems?<br/>Whose questions?<br/>Whose perspective?<br/>... and whose problems, questions and perspectives are left out?</li> </ul> </li> <li>• <b>Stage II: the mapping process</b> <ul style="list-style-type: none"> <li><b>Whose voice counts? Who controls the process?</b><br/>Who decides on what is important?<br/>Who decides, and who should decide, on what to visualise and make public?<br/>Who has visual and tactile access?<br/>Who controls the use of information?<br/>And who is marginalised?</li> <li><b>Whose reality? And who understands?</b><br/>Whose reality is expressed?<br/>Whose knowledge, categories, perceptions?<br/>Whose truth and logic?<br/>Whose sense of space and boundary conception (if any)?<br/>Whose (visual) spatial language?<br/>Whose map legend?<br/>Who is informed what is on the map? (Transparency)<br/>Who understands the physical output? And who does not?<br/>And whose reality is left out?</li> </ul> </li> <li>• <b>Stage III: resulting information control, disclosure and disposal</b> <ul style="list-style-type: none"> <li><b>Who owns the output?</b><br/>Who owns the map(s)?<br/>Who owns the resulting data?<br/>What is left with those who generated the information and shared their knowledge?<br/>Who keeps the physical output and organises its regular updating?</li> <li><b>Whose analysis and use?</b><br/>Who analyses the spatial information collated?<br/>Who has access to the information and why?<br/>Who will use it and for what?<br/>And who cannot access and use them?</li> </ul> </li> <li>• <b>Ultimately ...</b> <ul style="list-style-type: none"> <li><b>What has changed? Who benefits from the changes? At whose costs?</b><br/>Who gains and who loses?</li> <li><b>Who is empowered and who is disempowered?</b></li> </ul> </li> </ul> |

Figure 5. Concerns of participatory mapping Rambaldi et al. *Practical Ethics for PGIS* (2006)

This dissertation not only brings these perspectives into direct conversation, but also considers the reasons for the silences in areas that have observable overlap. While this line of questioning is predicated on the tension that is expressed on my face in that zoomed-in image, it is equally driven by the utter disbelief I was wrapped up in while walking out of

the meeting with the Code Enforcement Commission—the map had worked. And it is through this work that a disciplinary dissonance is revealed. The following section explore the intricacies of this dissonance in more detail.

### 1.1 MAPMAKING AS WORLD MAKING

The discipline’s attention to maps is driven, not only by a cultural affinity for maps (though you’d be hard pressed to find someone who wouldn’t reminisce about tracing their fingers along the lines of a road atlas in the back seat during a family road trip) but also by the power that maps enable. Maps are particularly believable and trustworthy representations (Griffin 2020), so much so that critical scholars have long argued that maps don’t simply represent the world, but they make it (Harley 1989, uwm 2010, Crampton 2010, Pickles 2004). This cartographic alchemy, it has been argued, emerges from the map’s role as an advanced form of communication system. In a chapter titled *Unleashing the Power of the Map*, one author speaks to the intricacies of this system asserting first and foremost, “all that maps do is assert that this is there” (uwm 2010, 53 *Rethinking*). The complexity of this act, the assertion of *this is there*, comes from the translational processes through which the assertion happens.

Assertions that “this is there” occurring thousands of times over in the plane that is interpreted as the map is predicated on a nesting of ontological propositions. For *this* to be *there*, *this* must first exist. The ability to assert the “this-ness” is “where the map’s ability—and propensity—to bring a world into being resides. (ibid, p. 56). Put another way, the this-ness of a map can change the world:

And what makes the map so capable of evoking this existential presence is the implicit challenge: you don’t believe it? Go check it out! Who would pose such a

challenge unless they knew they were right? And this is such a reasonable assumption that instead of checking, you just accept the map...The *this* is now no longer a street or a river or a church but *that* street, *that* river, *that* church. This is no longer a type but the concrete and specific instance of a type, that is, not simply this, but this<sub>1</sub>. Through the posting the this acquires thereeness, a quality or condition of being somewhere, as the there acquires thisness, a quality or condition of being something. Here thisness and thereeness are inseparable: this<sub>1</sub> is there<sub>1</sub> and there<sub>1</sub> is this<sub>1</sub>. (uwm 2010,58)

In sum, those who can make maps can make worlds. The relationship between the *this* and the *there* allowing for the solidification of current and alternative spaces. And indeed, the specifics of the ability of the map to make such propositions is the concern of much cartographic research. Both advancements of methods and undulations in fashion influence the way this relationship is conceptualized and achieved.

For example, the contemporary moment frames maps as a form of narrative storytelling, one where there isn't a single meaning that the map user can take away from the map, but rather the playfulness and discoverability of data that is enabled by the digital, user-driven map allow for a more ephemeral and narrative positioning of the map (Caquard and Cartwright 2014, Fish 2020). Another emerging vein in cartography is its intersection with neuroscience, where analysis of brain imaging in relation to map use tasks are revealing insights on how humans interpret and navigate with maps (Lobben, Limpisathian, and Lawrence 2019, Brugger, Richter, and Fabrikant 2019 ). When framed in a relationship tightly focused on the considerations of the translation and application of the *this* is *there*, cartography seems to be simply a riddle of how to best translate the world.

The interventions of critical cartographers, however, have worked to dissolve the illusions supporting this perceived simplicity and instead locate maps as cultural artifacts that are embedded with power. A significant catalyst for this rupture was introduced by JB

Harley in 1989 with the often-cited argument that, “cartography is seldom what cartographers say it is” (1989, 1) in his influential writing titled *Deconstructing the Map*. In this piece, he offers an interpretation of Foucauldian discourse and Derridean rhetoric to assert “Power comes from the map and it traverses the way maps are made” (Harley 1989, 13). Though later called out for the inaccuracies of his readings of Derrida and Foucault (Crampton 2008), the attention to maps as purveyors of power was sustained through the interventions of other critical scholars. This area of consideration invites a shift of the consideration of how (as in how the maps work) to a consideration of what (as in “what is the map asserting”) and for whom?

Answers to these questions are perhaps as diverse as they’ve ever been as maps are being produced now at a higher rate and by more people than ever before in history (Kraak and Fabrikant 2017). Of much interest, and often concern, for cartographers, is the increase in the number of maps produced by those who are “untrained in cartographic method and interested in context-specific spatial and aspatial information (Gartner et al. 2015, 247). While defining a research agenda for situating the discipline of cartography to accommodate this new reality, cartography focused attention towards contextualizing the user, positioning the user in 2D/3D/4D space, improving multimedia design and presentation, enhancing mobile navigation/use (ibid). This agenda has been critiqued for its centering on the “empowered, mainstream map user” with calls to widen cartographer’s considerations to meaningfully provide for map users of all abilities (Lobben, Brittell, Perdue 2015). Even still, both traditional and critical considerations of cartography’s prioritize the map user at the center of the translational assertion of this<sub>1</sub> is there<sub>1</sub>.

This traditionally conceptualized map user is also a testament to the continued reign of the power of the map. It is the user that ultimately enables the map's power by subscribing through their understanding and subsequent action as enabled by the map. This process is often mediated through a process that lacks a critical lens, leaving most to accept the meaning of the map at face value. This is demonstrated by a 2015 map titled "Favorite Thanksgiving Dish by State". The map's author intended it to be satire, making such outlandish claims would be obvious to the readers. However, rather than being read as satire, many readers accepted the map as true, thereby sparking a wave of outrage and a subsequent wave of virality. Southerners angrily took to the comments when confronted with claims of kale salad being their most beloved holiday dish: "HOW COULD THIS BE? TOTALLY WRONG!" This seemingly silly example speaks to the immense influence maps continue to have in their ability to inform, influence, and (for better or worse) persuade its users.

It is this potency of the map medium that makes participatory approaches of map production so important to consider. Understanding the mechanisms that produce this potency is in the realm of cartography. Cartographers and those interested in the social histories and operations of maps and mappings help disentangle the spiderweb of connections that intersect to make a map a usable artifact that can move and allocate power. There are many areas of attention through which these types of analyses are done. A review of the International Cartographic Association, for example, currently outlines 28 different areas of focus through active commissions that work to promote and collate research and resources on the commission's topical focus. For example, commission focus areas include elements of map production and design (art and cartography, map design, map projections,

generalization and multiple representation), specific applications ( mountain, marine, planetary, early warning and crisis management, topographic), engagement with technical applications and data collection methods (sensor driven mapping, open source geospatial tech, sensor-driven mapping, and multiple mediums maps appear (maps and the internet, atlases). There are only two commissions that focus explicitly on maps in relation to groups of people, one addressing cartography and children, and one addressing map and graphics for blind and partially sighted people. Given the prominence and influence of the ICA, the focus of these commissions is telling. They demonstrate the ways cartography tends to establish narrow bands of attention around particular use-cases for maps, treating them as a tool to achieve a very specific objective.

This dissertation, however, works to offer a new directionality of consideration through an examination of the opportunities and challenges confronted not by the map- but its makers, More specifically, the mapmakers who do not have formal training in cartographic methods. Participatory mapping, as an inclusive methodology, works to use the translational power of maps and mappings to support the arguments and assertions made by those who have historically been excluded from the map production process. While they are not experts in mapmaking, they are experts in understanding the experiences of oppression, the vitality produced through community support, and the life affirming work that is done to rupture the systems that work to dehumanize them. As will be explored in depth, the discipline of cartography, however, works to rhetorically and materially distance themselves from “non-expert” modes of cartographic production. Separations between “cartographer” and “mapmaker” and the justifications leveraged in an inherently subjective analysis of selection processes to be included in atlases, for example, are the



shovels that work to maintain the trenched divide. By examining what is considered an effective map within the context of participatory mapping, as well as the specific mechanisms by which this efficacy is achieved, I work to bridge this divide and widen the disciplinary lens of analysis.

This work serves not only as a call for cartographers to expand their lens of consideration, but as a moment of analysis to consider the modes of map production that best support participatory projects. The current political climate of the United States increases the urgency for continuing to support and streamline participatory approaches to representation. In the age of ‘fake news,’ repositories of open-source or publicly available data are under attack as they are being removed without notice or justification (Chappellet-Lanier 2017). Additionally, there are datasets that are produced by the community to explicitly speak to the direct ways they experience state violence. Prominent examples are the database produced by Annita Lucchesi and the Sovereign Bodies Institute on instances of murdered and missing indigenous girls and women (<https://www.sovereign-bodies.org/>) as well as the Anti-Eviction Mapping Project (<https://antievictionmap.com/>). Both projects highlight the ways that local or state efforts for data collection are inadequate. As such, it is more imperative than ever that we, as members of politically-engaged, activist ‘publics’, take seriously the ability to create repositories and visualizations for information that reflect and make knowable the injustices our communities face. Mapmaking must be put in the hands of those who are not being served by the current worlds. Participatory mapping is one path of many to make this happen.

## 1.2 MAPPING THE MAP: A METHODOLOGY

To ground this project, I begin by examining how cartographic efficacy is conceptualized in traditional (non-participatory) mapping contexts. With the foundation in place of what is meant by efficacy, I then go on to explore the ways efficacy produces particular expectations of map production, how these expectations are performed in traditional mapping, and how they influence conceptualizations of efficacy in participatory mapping. I then contextualize these considerations of traditional and participatory mapping in a broader history of both approaches, examining the ways commitments have emerged and evolved since the 1950s. To achieve this, I take on a host of methods executed through a grounded theory approach (Knigge 2017). This approach is an inductive, recursive methodology that has been popular with feminist and critical GIScientists (Pavlovskay 2002, Jung 2009, Knigge and Cope 2006). For this research, I have completed three modes of data collection: interviews, participant observation, and a review of disciplinary materials which are analyzed through constant comparative analysis.

### 1.2.1 INTERVIEW

Semi-structured interviews were completed with three categories of participants. More specifically, I interviewed 33 participatory mapping leaders (PMLs), two professional cartographers, and three critical GIS scholars for a total of 38 interviews. Interviews, especially less structured formats, function as a type of unfolding, interpersonal conversation between the interviewer and interviewee (Secor 2010). This is not treated as a simple handoff of ideas and information, but rather an active construction of meaning based on multiple planes of “discursive formation” (ibid, 195). While this method does not provide a clear window to examine experiences or perceptions, it will, nonetheless, provide

me with the opportunity to grasp and interrogate questions of cartographic design within participatory mapping settings.

Initial interviewees were invited based on their professional ‘records’ (job title, articles, presentations, publications, portfolio, blog, tweets) indicating that they have experience with one of the three categories. While participatory mapping is a very broadly applied method, I excluded PMLs whose experience was concentrated on 3-D modeling or citizen science modes of data collection (particularly via web mapping services) as these approaches do not as easily afford insight into collaborative approaches that produce what much of cartography is focused on, which is more traditionally conceptualized 2-D maps. PMLs were asked about their history of involvement and interest in participatory mapping as well as their understandings of conceptualization and mechanisms of achievement of cartographic efficacy (Figure 6).

Professional cartographers and critical GIS scholars were invited to participate by similar initial modes of selection. While professional cartographers were not required to have experience with participatory mapping, I specifically sought out individuals who would be able to speak to questions of cartographic efficacy or the history of public participation GIS. All interviewees were also solicited for a common “snowball” sampling (Jenson and Shumway 2010), where each interviewee was asked for 2-3 suggestions of individuals/groups that they believe might qualify to be included in this study.

Interviews were completed primarily over the phone, with a few taking place at in-person conferences. Participants were provided documentation outlining the project and expectations and, at the beginning of the interview, were asked to provide verbal consent for their participation. All interviews were audio-recorded and recordings were transcribed.

Interviews and participant observation (see next section) were “naturally” transcribed (Davidson 2009) for both latent and manifest messages (Cope 2005). As such, transcriptions not only included details of the discourse but also interpretations of non-verbal or more-than-verbal cues such as facial expression, breaks in speech, tone of voice, and use of sarcasm.

**Guide for Interviews with Participatory Mapping Leaders**  
Confirm receipt of IRB documents.  
Request permission to record  
If confirmed, begin recording- ask for verbal confirmation of consent to record.

[Set 1] Background: What prompted you to become involved in participatory mapping?  
Describe your mapping and GIS background? Areas to consider texts, instructors, programs, projects, context, location

[Set 2] Conceptualization of Cartographic Efficacy: what would you consider to be a “good” or effective map within your experience with participatory mapping. Similarly, what would be a “bad” map? What informs this conceptualization?

[Set 3] Achievement of Cartographic Efficacy: select a project (or projects) you believe was successful in producing an effective map (or maps). Within this project, how were the map(s) produced (be as specific as possible). Areas to consider task assignments, decisions on design (color scheme, symbology, titles, fonts, legends, etc.), plans for feedback and design iteration, determination of completion

Ending question: What role would you say map design plays in participatory mapping and GIS?

Figure 6. Guide for interviews with participatory mapping leaders

### 1.2.2 OBSERVE

I also performed participant observation at conferences that hosted sessions focused on cartography and map design. Participant observation includes paying attention to and partaking in the everyday experiences of the lived and sensed world of individuals/groups (Evans 1988, Watson and Till 2010). Additionally, I took-up Matthew Wilson’s (2012)

treatment of “conferences-in-action” (which he models from Latour’s (1987) concept of “science-in-action”) and attended seriously to the ways in which conferences are “space-times...worthy of careful attention” (Wilson 2012, 1268). Observation sites include the International Cartographic Conference (ICC), the cartography and GIS sessions of the AAG, the North American Cartographic Information Society (NACIS) Annual Meeting, and the Esri User Conference.

These conferences allow me to observe how different types of cartographers (academic, professional, participatory-focused), in formal and informal conversation, display/present/promote/resist different approaches to, and results from, processes of mapping. The different goals of each conference allowed me access to a swath of cartographers who are driven by a wide range of goals. While I positioned myself as ‘participant observer’ during my entire duration at these conferences, attendance at paper sessions in particular provided rich moments for exploring the most up to date considerations of map design. I selected sessions to attend based on 1) knowledge of presenters’ background in either academic, professional, or participatory cartography (similar to the selection of interview participants) or 2) the terms used in the title or keywords for the session which suggest a discussion of map design or participatory mapping. I reviewed preliminary programs before arriving on site for the conference and selected sessions based on these criteria. While attending selected sessions, I kept detailed field notes, being careful to be explicit about when my notes were my own, and when they were quotes from someone in the room. Additional sites of observation include the lounge and hallways of the conference centers and spaces of exhibitor and sponsor booths/demonstrations. To aid in my capture of such data, I also completed memoing. This

is a recording of my own thoughts, reactions, and reflections that emerge during the processes of interviews. Memoing was completed in both written and audio recorded formats. Field notes and recordings were transcribed within one week after the last day of the conference.

### 1.2.3 CURATE DISCIPLINARY MATERIALS

Lastly, I compiled and analyzed materials related to the discipline and disciplining of cartography. These were composed of ‘artifacts’ from both material and digital repositories, which speak to the best practices of map design. Of particular interest for this project are materials used for teaching cartography, such as textbooks, tutorials, atlases, and blogs. These materials can offer key insights into the historical trajectory of a discipline (Wolter 1975). As such, two major texts have been selected as primary informants for analysis. The first is *Elements of Cartography* by Arthur Robinson which, according to Judy Tyner (2005), would have been the primary textbook for anyone trained in cartography in the latter half of the twentieth century. The book underwent six editions, with the first release in 1953 and the last in 1995. While one author (Robinson) and the publisher (Wiley) stayed consistent through all the editions, authors with different expertise were added to each edition beginning with the addition of Robert Sale in 1969. The emergence and undulation of this text in particular offers potent insight into the development of cartographic practice over this period of time and helps contextualize the training of an entire generation of cartographers. The second text is the four editions of the *Atlas of Design* published by the North American Cartographic and Information Society (NACIS). This text, which offers a showcase of the “world’s most beautiful and intriguing

cartographic design,” provides insight into the systems of evaluation and celebration that reify the discipline in contemporary terms.

I also compiled and analyzed materials pertaining to the emergence and popularization of public participation GIS. Materials included those pertaining to the event that is often cited as the genesis of PPGIS, the 1993 GIS and Society meeting at Friday Harbor, WA (colloquially referred to as Friday Harbor). I also examined documentation and reporting of the hosting organization for Friday Harbor, the National Center for Geographic Information and Analysis (NCGIA) which was founded by the NSF beginning in 1988. A majority of materials were curated using different NCGIA digital repositories while some were shared by meeting attendees.

#### 1.2.4 ANALYZE

The primary mode of analysis for this project was constant comparative method, which is argued to be at the core of grounded theory (Hallberg 2009). This provides to find a ‘middle ground’ between simple distillations of qualitative data into “crudely quantifiable form” and the generating of theory which often contradicts such rigid categorization, as is argued by one of the originators of the approach, Barney Glaser, in 1965. Such a comparative method is an effective way to produce rich but systematic accounts of qualitative data when there is a small number of cases (Collier 1993).

Constant comparison first includes coding data for categories. Comparisons are made between codes, which develop into categories from which themes can be derived. Using qualitative analysis software, MAXQDA, I began each phase with an initial review of the data being analyzed. This review is used to develop a list of emerging themes, which were

then compiled into a schema of nested codes. This is an open and evolving schema, as edits can be made throughout the duration of the analysis.

Once an initial coding schema of nested codes was created, a systematic review of the data was completed to assign codes to the data. Within this review process, codes were assigned or developed based on a comparison of the data under review with the data currently corresponding to the available codes. If data deemed relevant for addressing one of the three topic areas matches the data within a particular code, then was assigned that code. If not, a new code was created/assigned. This coding was done in two phases. Phase I consists of a “local” comparison (performing comparison between data in the same dataset) and Phase II consists of “global” comparisons (performing comparisons of data for all datasets).



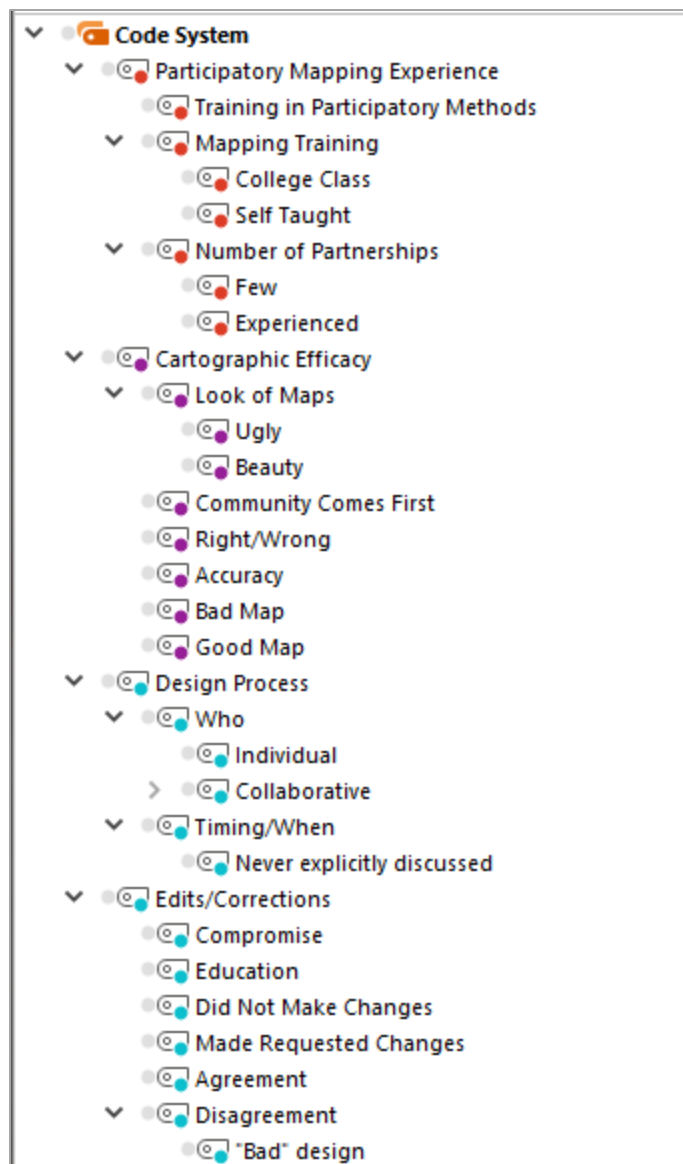


Figure 7. Coding scheme applied to interviews with PMLs

While the following chapters will outline in detail the finding of this analysis, note that there are three primary limitations to this work. First, findings are limited to considerations of the approaches of participatory mapping that was being explored. As discussed previously, participatory mapping is a diverse approach that has been applied to a variety of settings. As such, findings for this research will not be immediately applicable within contexts that differ from the specific approach being studied. This includes 3D landscape

modeling or participation solicited via web mapping. Second, is that findings largely reflect work that is being performed in urban contexts within the United States. The defining criteria, the results of the snowball technique, and response rates from those who were invited resulted in 27 of 33 PML interviewees being based in the United States. Lastly, while discussed for a moment within Chapter 4, there are observable differences between the experiences of PMLs who work within a university hosted community centered research center and those who do not. My interviews, however, did not anticipate these differences and therefore I failed to ask questions that would allow for a more in-depth conceptualization of these differences. As such, more work needs to be done to speak to these departures.

#### 1.2.5 A NOTE ON TONE, TERMS, AND (NOT) NAMING

I would like to take a moment to discuss some of the strategies and language that you will encounter throughout the rest of this document. First, in recognizing the tension between disciplining and accessibility that weaves in and out of the following chapters, I have worked toward writing this document in such a way that it is inviting to individuals with varying degrees of interests and experience with mapmaking. For a dissertation that is about maps, which are typically devices to help locate us, I uphold the tradition of critical considerations of maps and mappings by inviting us to get lost. Getting lost means finding dead ends, uncovering both direct and winding paths from point A to B, experiencing the dissonance of wondering whether that path you are on is familiar and repeated, feeling disoriented when the place you were trying to get to is not there or does not look like it did the last time you saw it. That is, there are many paths you might find yourself along in this document. Depending on your personal skillsets and interests, some may feel too obvious

while others might seem too convoluted. I invite you to find the one that best suits you while appreciating the options that others have available to them.

There are a few terms that I would like to orient to before embarking. First is a term that was appeared briefly already: “participatory mapping leader” or PML. This will be used to refer to the individual who identifies as the person who oversees the map production portion of the participatory mapping project. The role of a PLM is enabled by their relationship to a “community partner(s)” who are members of the public with which the PML has a project-based collaborative commitment. Put another way, PMLs are the methodological “experts” of the project while their community partners are the experiential experts. The quotations around “experts” here is not accidental, as the following chapters will muddle the division between expert and novice. While the researcher/community dichotomy, and dichotomies in general, have been the subject of critique, I engage throughout the document as a shorthand reference. This is not to indicate that researchers or methodological experts do not occupy the communities in which they are working or to imply that underserved communities require the support of “outsiders.”

Additionally, the language surrounding “community” in these contexts is troubled and imprecise. The term often implies that something is already present and that that something is rooted in place. However, community is refined, dissolved, and solidified continually. Mapping can be a catalyst in this process. But, as was articulated in early PPGIS arguments, to include also means to exclude (Elwood 2006). In the growing sub-discipline of Community Geography, my co-authors and I grapple with the tensions of striving to co-produce scholarship in a way that improves lives (Shannon et al. 2020). But (to provide a recent example) what does this mean in the context of Michigan’s ultra-conservative

citizens with machine guns protesting on the steps of the courthouse steps chanting for their government to re-open the economy during a global pandemic? To work around these corners, participatory work, particularly for mapping efforts, has often centered on the “marginalized communities” (Craig, Harris, Weiner 2002). It is important, however, that these communities are not simply placed with this qualifier without also holding accountable those that have allowed this marginalization to take place. Here I reference both interpersonal and institutional negotiations within systems of both privilege and oppression.

Accountability must also be present in our citational practices. In the discipline of geography, Carrie Mott and Daniel Cockayne call for an informed and mindful practice, where the individual citing is aware of how citations are a “tool of reification of, or resistance to, unethical hierarchies of knowledge (Mott and Cockayne 2017, 996). I am a cartographer and I take on *traditional* conceptualization and approaches to cartographic efficacy. The professionalized discipline of cartography (both traditional and critical veins) has been and continues to be dominated by white men (Ahmed 2014). While my work is situated at the intersection of the institution of cartography and the institution of white men, it is not because I am aiming to uphold these structures (though one might surmise this if performing a citation analysis on the references of this document). Rather, I am cataloging the instances of power and privilege that are both indirectly and directly impacting the ways that collaborative mappers can(not) participate.

I also recognize my position as a young woman and a yet to be conferred PhD. As has been made clear to me through interactions at geography and cartography conferences, I must carry the “burden of proof” that I both understand the disciplinary lineage within

which I am situated to prevent white men attempting to correct my assumed miscalculated argument explaining how I have missed a critical part of this theory or this person's contributions. Therefore, I cite white men to make absolutely clear the pervasiveness of the problems I work to expose.

I outline these choices because, in particular moments, the decision/need to cite white men creates a great amount of discomfort for me. I am thinking particularly of the work of Denis Wood, which I engaged closely throughout sections of this dissertation. Like J.B. Harley and Jeremy Crampton, he is a foundational thinker though to be a staple in any bibliography supporting work in critical cartography. Indeed, Wood's work has been instrumental in moving forward understandings of cartographic power and how that power is exercised. *But what does scholarship about power mean when produced from someone who has abused theirs?* To be more explicit for those who many not be aware, Wood pleaded guilty in 1996 to molesting a teenage boy whom he was mentoring and invited to live with his family. While Wood claims it was an amicable relationship, he was charged with attempting to intimidate the boy over the phone and by visiting his place of work. and is reported to have sworn the boy, who Wood referred to as "his project, to silence after the first initial instance of abuse (which went on to occur more than 130 times)" (WRAL News 1996). Wood went to prison for 26 months. As mentioned, Wood remains unapologetic of his behavior, claiming he and the boy were in love and leaning on his anarchist parents and upbringing to assert "Laws are horrible things by and large" (Hodson and Luoma 2016) that his father would be "proud" of him for being a felon and that he "had a good time in prison". Though fired from his position at North Carolina State University following his arrest, he still is actively celebrated in the cartographic

community. Denis participated in the 2017 *Mappingback: Indigenous Cartographies of Extractive Conflicts* at Concordia University in Montréal, has a chapter in the 2019 *The Routledge Handbook of Mapping and Cartography* (2019), has a map included in Ken Field's book *Cartography.*, and was included in Kollektiv Oranotango+'s publication as well as the book launch of *This Is Not an Atlas*.

While we are all implicated in the matrix of domination (Collins 2002) and simultaneously experience both benefit and harm by our relationship to privilege, both Wood and the discipline at large have been disinterested in acknowledging the benefit and harm being procured through Wood's participation in the field. Unquestionably, the anarchism that enables Wood's articulation and subsequent disregard for power that is celebrated in cartography also enables the action and justification of his multiple instances of sexual abuse.

In an attempt to both call out and hold space for this discomfort directly represent it in my writing I will engage in a practice of citing Wood's work while separating it from his name. I will refer to Wood using the acronym "uwm" or unnamed white man, using lower case here in an attempt to prevent confusion with universities or organizations that share that acronym. While there are others who stand on the shoulders of Wood that would allow me to circumnavigate citing him (here I think of Geoff King's (1996) consideration of the relationship between the map and the territory as well as Annette Miae Kim's (2015) thoughtful application of critical cartographic concepts to the mapping of Ho Chi Minh City). However, up until recently I have been an active subscriber to the willful ignorance around Wood's actions that is pervasive among geographers. As such, my thinking has been largely impacted by Wood's work and I feel it only honest to let this document to

reflect that. This approach to cite but not name introduces many opportunities for critique and I fully expect to read this document years from now and cringe with the thoughts of how I could have done this differently. But for now, this is where I land.

Lastly, in addition to trying to navigate my disciplinary relationship with complicated characters in our mix, I also want to take a moment to speak about the folks whose voices appear in this document. Geography is a very small discipline; cartography is even smaller. That means that I have taken extra care to represent both the perspectives I am critiquing as well as the experiences those who I interviewed. There are particular moments throughout the text where I name people, reflecting on content that has been shared in public forums, professional meetings, and on social media. Having presented earlier iterations of this work in a variety of settings, I have already experienced the discomfort that emerges when people are asked to stand beside the work that they produce and be accountable to both the impacts that work has and how it is presented. However, accountability is non-negotiable if we hope to envision and achieve a productive, purposeful future for our discipline. A friend once told me, to critique one's work is to first respect one's work and that certainly rings true for this dissertation. For those that I have interviewed, IRB requires that I not provide any identifiable information in publications. As such, if a name is used in relation to a interviewee, it is a pseudonym.

#### 1.2.6 MAPPING MY STANDPOINT

As has been modeled for me by a host of incredible scholars and writers who have both paved the way (see the work of Sandra Harding, Donna Haraway, Patricia Hill Collins) and continue to deepen the work (Sasha Costanza-Chock, adrienne marree brown, Lauren D'Ignazio and Catherine Klein ), it is important to situate one's work to their embodied

experiences as a knower. Following in this tradition, I do my best here to step out of insecurity and offer my understanding of my current position in the world and in relation to this work.

I am a daughter, sister, wife, aunt-a cisgendered white woman, primarily of German descent, currently living in the Rocky Mountain region. I was born into a working-class family and grew up on a ten-acre hobby farm in rural lakes country Minnesota. This land was stolen from the Mdewakanton, Anishinabewaki and Očeti Šakówiŋ (Sioux) peoples and now serves as the playground for the wealthy folks of the twin cities who flock to their summer cabins on the weekends and holidays. I attended the same public school from pre-K till my high school graduation with roughly the same 27 people throughout that entire trajectory. The school and surrounding community upholds most Midwestern stereotypes: a large majority white with an abundance of Catholic and Lutheran churches and a healthy sprinkling of dive bars that mediate most social interactions. With the exception of attending an ELCA Lutheran youth gathering in San Antonio, TX and a high school choir trip to New York City (my first time ever flying- at the age of 16) I rarely left the county, nevertheless the state. This lack of experience, in addition to co-dependency and anticipation of debilitating home sickness, nearly prevented me from attending college, but thanks to the guidance of my high school mentor, I mustered the courage and showed up to the University of North Dakota as a first-generation college student declared as a geography major on the first day of classes.

My time at UND largely helped me to acclimatize to living in a city. Challenges of living in town, like parallel parking and the discomfort of hearing what seems like a stream of sirens having been assigned to a dorm room facing University Ave, were slowly



normalized while the whiteness and political conservatism of my upbringing persisted. The discomforts of being away from home were present or being the only women in my geography classes could be dulled by putting myself in a position to offer support to others. As such, peer-to-peer mentoring, involvement and leadership within student organizations, and volunteering were balanced among multiple work study positions and internships. This business eventually lead to a coveted “ah ha!” moment, when I discovered a modality to intersect my desire to the “the helper” with my area of study during a service-learning portion of my Intro to Cartography course. As my group members and I created maps that were directly addressing the needs of a local housing organization, I began learning about the intricacies of participatory research and became eager to learn more. In my eagerness, I continued in my course progression in Intro to GIS (where, side note, I met the person who would eventually become my husband!). In the meantime, the instructor of this course as well as my mentor from high school encouraged me to apply to graduate programs which, until that point in time, I did not fully understand were a thing- nevertheless a thing that that would be accessible to me. My instructor had attended grad school with a faculty member in Atlanta who was establishing a community mapping center. I applied, was accepted, visited the campus (my first time flying alone), accepted the offer, and confronted a new wave of home sickness as I made my plans to move to Georgia.

Immediately upon arriving in Atlanta, I confronted my whiteness for the first time in my life (previous moments I had been in diverse settings, the experience was muted by the sea of white peers I was among). This was particularly elevated because the mapping center was still in the infancy stages and had no ongoing partnerships, I was required to develop my own partnership with a local organization that would serve as the case study for my

Master's project. In these moments, I confronted the dissonance of being a young white woman who had just moved to town wanting to offer help to the locals, a great white savior from the Midwest. I hated it. At the time, I struggled to disentangle my discomfort (was it moving from North Dakota to Atlanta, the stresses of a graduate program, the lack of social network, something else!?) but I can now comfortably say that being prompted to develop organizational partnerships in a place I had not been living in for a month in order to serve the own logistics of my degree program went against my ethics. Nevertheless, I what many in academia do and, with a tentative organizational partner, submitted funding applications based on the sketches of what work we could potentially envision collaborating on. It was from such an application that I was awarded the National Science Foundation Graduate Research Fellowship, which almost entirely prompted me to pursue PhD programs. After switching advisors and leaving the community mapping center, I was invited to do some mapping work for an organization called WALT, which I described at the beginning of this text.

Members of WALT held space for me to confront the experience of being the only white body in a room. They taught me about the political and historical landscape of the city and what it meant to be Black in the United States. I mapped the city's datasets and they explained to me how these maps were wrong. The city's data grossly misrepresented the realities of their lived experiences. Together, we made a new map. As you've already read, this led to meetings with the mayor when previously their own city council representative would not respond to their emails. I experienced the whiplash of the situation with them. While I thought I had understood the power of the map and was there to create pathways for WALT to map, this experience upended what the books had told me would

happen. After completing this project in Atlanta, I took this sense of disorientation and, with the guidance of my new advisor, went to the University of Kentucky. Here I made plans to finally marry that boy from my GIS class, but also got the opportunity to close the circle and teach two semesters of my own GIS class.

As a first-generation college student, I perhaps more than others have needed help to do the things that were uncomfortable or did not seem possible to me at the time. The intersections of my class, gender, and race I have experienced both being granted unquestioned access as well as being undeservingly denied access to spaces, resources, and conversations. Stated more directly, I have both been the purveyor of harm and been harmed in these systems. This drives my desire to engage in community centered work, where strategies of liberation can be actualized through the coalescence of perspectives and positionalities. It is through these experiences and ways of knowing that I explore the aforementioned areas of focus and methods to germinate a more fully grounded consideration of map design in participatory mapping contexts, the spaces where emancipatory, world-building maps are being produced.

### 1.2.7 MAPPING THE DISSERTATION

In the following chapters, I trace the impacts and histories of cartographic efficacy. Part I explores the concept in its contemporary form. I begin with Chapter 2 by taking stock of the *is* of cartography, reflecting on who gets to determine the contours of the discipline, and identifying the importance of cartographic efficacy to both the theory and practice of mapmaking. In considering the power of maps, it is important to take seriously the power of the mapmaker as well. As such, I take up Patricia Hill Collins's matrix of domination as a lens to reveal the continued privileging of white men in the discipline at national and

international scales. Chapter 3 goes on to outline the specifics of cartographic efficacy, identifying the alluring promises of a “good” map and how these commitments are upheld by the disciplining of those who do not make maps that keep these promises. Here I take up Sara Ahmed’s concept of *attunement* to observe specific sites within the discipline, as experienced by participatory mappers, that define and protect what is accepted as efficacy. Part I then concludes with Chapter 4’s sustained attention to the ways efficacy is conceptualized and actualized participatory mapping context, revealing the tension and shame caused by traditional conceptualizations of efficacy. In conversation with leaders of participatory mapping projects, I ruminate on the thoughtful strategies as well as pesky contradictions that emerge in service to cartographic efficacy.

Part II places the previous chapters in a broader historical context. Chapter 5 charts the development of traditional conceptualizations of cartographic efficacy over the emergence of Arthur Robinson’s six editions of his influential textbook, *Elements of Cartography*. By marking multiple moments of undulation, stagnation, and disappearance of cartographic principles, this charting provides evidence against the often-held assertion that cartography is continuously providing improved and more robust mapmaking practices that ensures efficacy will be achieved. Additionally, this chapter examines the division between the scientific and artistic elements of map design, revealing the ways subjectivity is yet another weaponed metric the discipline uses to delegitimize maps which fall outside the bounds of traditional modes of efficacy. Chapter 6 provides a similar moment of destabilization for participatory mapping through a close inspection of the development of public participation GIS (PPGIS). This begins with a meeting that has almost gained that status of folklore in the discipline: the 1993 GIS and Society meeting in Friday Harbor, WA. My retelling of

the meeting and the subsequent impacts on the discipline bring into question the approaches overall intentions as well as its capacity to empower communities. This leads to the conclusion, where I call for a more flexible and grounded modality of efficacy that allows for the world-building capacity of mapmaking to reflect more fully the richness and vibrant diversity of our communities. I highlight work by world-building cartographers and model ways in which interventions can be made in our institutions and organization

PART I CARTOGRAPHIC EFFICACY

## CHAPTER 2. CONTOURS OF EFFICACY

*It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories.*

— Donna Haraway, *Staying with the Trouble*

In 2017, the International Cartographic Association’s president, Menno-Jan Kraak, and vice president, Sara Fabrikant, published a report on the state of the discipline of cartography in the organization’s journal. In the twenty-two-page document, they reflect on significant landmarks in their organization’s history and propose a new definition of both “map” and “cartography” to better reflect the contemporary moment of production and use as situated within the digital. This is an appropriate and expected task for a report produced by this organization. Since its establishment in 1959, the International Cartographic Association (ICA) has worked to “ensure that Cartography and GIScience are employed to maximum effect and full potential for the benefit of society and science through promotion and representation of the discipline” (International Cartographic Association 2014). To enable such a mission to function at an international scale, the organization has consistently proposed and updated definitions and guidelines to make clear the specific areas of research and applications their members tend to. As such, the ICA has become an authoritative source in articulating the present and future directions of the discipline at a global scale.

Midway through the report, attention turns to processes of map making. Kraak and Fabrikant reflect on how today’s processes compare to those of the past, doing so with both an air of celebration and warning. They note how the recent increase in open source data

and software has made the resources of map production accessible to those outside of the professionalized context and go so far as to subsequently assert that, “as a result, the number of maps created today can be rather overwhelming, but their communicative quality is not always convincing...However, just because one can more easily map today, this does not necessarily mean one should.” (Kraak and Fabrikant 2017, 18). From here the authors go on to stress the differences between *mapmakers* and *cartographers*. *Cartographers*, they argue, are formally trained to be “technologically savvy”, “artistic”, “scientifically informed” individuals who face the immense challenge of using their skills for making effective maps. A *mapmaker*, by contrast, is a GIScientist or a member of the public who uses templates that are produced by cartographic professionals to symbolize data they (the mapmaker) had collected. What they do not say directly, but can be assumed to exist in this matrix is that a cartographer does not necessarily have a role or responsibility in the data collection process while it is the cartographer’s job to establish and inform programs that will enable mapmakers to produce maps that do not commit the sins that produce ineffectiveness. Put more succinctly, mapmakers are unlikely to produce effective maps without the support of cartographers.

How is it that this disciplinary framing of effective practice has come into being? This chapter is the result of a rumination on this very question. I begin by further contextualizing the divide that has emerged between *cartographers* and *mapmakers*. I then trace the contours of this divide more carefully by examining precisely what it is that cartographers set out to achieve and who decides these metrics of achievement. Through this tracing, I locate efficacy at the center of the cartographic discipline by way of design and argue for



efficacy and its systems of evaluation to be placed in our conceptualizations of the discipline.

## 2.1 WHAT'S A MAP? AND WHY IT (STILL) DOESN'T MATTER

Definitions have long been a source of hand wringing for cartographers. This is demonstrated by well-known critical cartographer and previous member of the Wildcat family, Jeremy Crampton through his articulation of what he calls the “scale of mappiness”. More specifically, in his book *Mapping: A Critical Introduction to Cartography and GIS* (2010) he outlines an experiment completed by Robert Downs. Crampton describes how Downs surveyed his human geography class by presenting them with a series of images, asking them chose one of three labels for each image: this is a map, this is not a map, or I don't know”. Crampton poignantly reports the results of this experiment in a section titled “What is a Map? We Can't Define it and Why it Doesn't Matter” (2010, 42) explaining that, perhaps unsurprisingly, some images were *always* seen as maps, some were *never* seen as maps, and some images were *sometimes* seen as maps. Crampton summarizes “Maps appear to exist on a scale of ‘mappiness’ varying from extremely mappy to only slightly mappy” and goes on to assert that this is why both the discipline and the public more broadly struggles in some moments in formulating a definition. He goes on, “Maps then are part of the cultural knowledge that we acquire by being immersed in a society. Both our expectations about maps (what they look like, how we use them) and the play of knowledge that they produce are deeply related to the shape of that culture and its contours of power” (Crampton 2010, 44).

These mechanisms that enable the label of map to be applied is known as “mapicity” (Denil 2011). This concept frames maps from the perspective of rhetoric and mobilizes

mapicity to describe the process of the map reader, recognizing the artifact as “map” and then subsequently being able to *treat* the artifact in the ways we have been socialized to treat objects labeled “map.” Denil situates mapicity as a literacy, a system that is learned rather than innate to humans where there are three particular rhetorical functions that animate an object into becoming what is known as a map: 1) that it must have a use, 2) that it must be usable and 3) that it must convince an audience of its value as a map. Denil summarizes, “In becoming map readers, we learned not only how to read a map, but, as well, how to recognize suitable candidates for reading” (Denil 2011, 10-11). This recognition, Denil goes on to argue, is grounded in a shared, cultural understanding. “It is through *communities* sharing assumptions and conventions, recognizing common signals, and *together reading* common meaning into signs that a thing like a map is able to even exist as a meaning-bearing artifact” [emphasis mine].

Here Denil is in conversation with Stanley Fish, more precisely Fish’s work on interpretive communities. This places the responsibility of understanding on the readers of the text, rather than the author. Power does not stem from each individual reader, however, but from the cultural context in which the reader is situated. This context creates the stage upon which the text is presented and enables what is possible for the reader’s understanding. Put another way, the reader produces meaning by placing the artifact against the backdrop of society’s script of what is possible for the artifact. Fish writes, “It is not that the presence of poetic qualities compels a certain kind of attention but that the paying of a certain kind of attention results in the emergence of poetic qualities” (Fish 1980, 326). This type of framing regarding the social positioning of maps is reflected both in the ICA’s mission and in the tone of Kraak and Fabrikant’s 2017 report. In particular,

the ICA denotes the ways in which maps with different use cases will be understood differently. This is reflected by the ICA's 28 commissions, which are subdisciplinary areas that inform guidelines and approaches from topics ranging from marine or mountain cartography to sensor-driven mapping and map production to accommodate blind and partially sighted people.

Underlying the drive for such focused attention and definitional precision is not only a belief that maps articulate what is, but they “have the power to make the world a better place” (Kraak and Fabrikant 2017, 29). As such, the organization sees itself as offering pathways to enable both applied cartographers and cartographic researchers to support this intention. In the instance of Kraak and Fabricant, this requires that they outline the specifics of how to know that a map has the capacity to influence the world. They assert, “to explore geographic patterns and processes efficiently, and to comprehend the map data effectively, map displays should be well designed, and attractive to look at. In other words, maps that matter should raise interest, be engaging, instantly understandable, and relevant to society. It is one of the aims of the academic discipline of cartography to realize and facilitate this” (10). The remainder of the report rests on the shoulders of these claims, aligning with the assertion that in order to be a map that has the ability to help the world, that map must be well designed. And, what's more, is that a well-designed map is pleasing to the eye.

By doing this, the map makes possible a type of engagement with the reader that validates the role of the map: the artifact becomes something that can capture the reader's attention because of its beauty, thereby producing a pathway by which the map reader engages with the actual content of the map. The inverse, which the authors do not directly articulate, is an unattractive map which, as a consequence of being ugly, fails to capture a

readers' attention as a map artifact, takes time to understand (perhaps is not understandable at all) and does not serve a purpose to society.

Recalling now the lines of division that are drawn by Kraak and Fabrikant between cartographers and mapmakers, this delineation introduces serious questions about who has the capacity to “make the world a better place.” Though the authors acknowledge the power espoused by maps and the desire to harness the potential of maps to produce change, the ability to produce maps that make the world a better place lies exclusively in the hands of the professionally trained cartographers. It is important to note that this is not a view that is contained in this report but is espoused by many well-established cartographers in both serious and “humorous” registers throughout the discipline.

For example, when speaking to Mark Denil\* at the ICA's bi-annual meeting in Washington, DC about instances of participatory approaches to map design, he asserted that “If they're not going to work with someone who knows how to do it, it proves that they're not serious...they better be wise because they're not going to be taken seriously.” This, of course, mirrors, Denil's commitments to defining the contours of what makes a map a legitimate document as was demonstrated with his articulation of mapicity. Ken Field touted similar assertions, though with a different tone: a flowchart he published on Twitter to promote his book *Cartography*. (yes, the punctuation mark is part of the title). The chart, titled “How to Avoid a #cartofail: A humorous guide to making a thematic map” (where a cartofail, which will be discussed in more detail in later sections, refers to an abysmally bad or otherwise incorrect map) leads the user through a range of situations or contexts in which one is wanting to make a map. The user has 15 different opportunities to then come to a dead-end in the chart where it tells you “Don't make a map\*” or “Don't

share your map\*” with the asterisk referring to a note conveying how his book will get you on the right track to making sharable maps. Whether in a serious or playful tone, similar to “just because one can more easily map today, this does not necessarily mean one should”, the words ring with the urgency of a protective parent: if you’re not going to do it right, don’t do it at all.

And herein lies the rub as while mapmakers are discouraged in multiple registers from making maps, their ability to produce a map that contains the appropriate metrics of mapicity is never questioned. On Crampton’s scale of mappiness, both maps produced by mapmakers and by cartographers would likely be coded as “always a map.” Maps produced by mapmakers would provide a host of visual cues that, particularly when produced with software and tools specifically designed for cartography and GIS, promote an undeniable sensibility of “map.” Rather, it is the mapmaker’s ability to produce an artifact that *will* be read as a map that seems to make them so dangerous, justifying the delivery of staunch discouragement from attempting to make a map. A mapmaker can make maps, but it’s likely to be bad and bad maps do bad things. The specifics of the bad things that can happen if mapmakers make maps without the support of cartographers often remain unspoken. Perhaps if they were to be named, we’d realize that they’re not bad enough to go so far as to discourage individuals from participating in the discipline. Here, I suggest the division between cartographer and mapmaker is not captured in the articulations of the discipline, whether that is through the scale of mappiness or other metrics. Before I propose an amendment to this scale, I want to pause to understand more deeply the justifications for this division and how such commitments inform the disciplining of the discipline that

cartographers are so eager in performing. In the next sections, I do this by locating and analyzing the role of efficacy.

## 2.2 CARTOGRAPHY = DESIGN = EFFICACY

To begin this exploration, I performed a content analysis of five popular cartography journals. Journals were selected based on explicit relevance to considering cartographic practice, excluding journals focused on the history of cartography or geographic information systems. The journals included were the *International Journal of Cartography* as published by the International Cartographic Association, *Cartographic Perspectives* as published by the North American Cartographic and Information Society, *The American Cartographer* as published by the Cartography and Geographic Information Society, *The Cartographic Journal* as published by the British Cartographic Society, and *Cartographica* as published by the Canadian Cartographic Association. As this method is working to contextualize a claim in an article dated 2017 as well as experiences, I had with participatory mapping in 2015, articles published from 2010-2017 were included for analysis. The 2010 marker is selected to provide a more expansive view of the larger intellectual landscape in which these experiences and perspectives have emerged while also attempting to locate a place in the trajectory of the discipline where web mapping was established enough that it was not the center of the debate, as would be with an earlier date. I began first by performing a quantitative content analysis of the most common concepts among the articles in these selected journals.

The results of this analysis revealed that “design” was the concept that appeared most frequently (see Costanza-Chock 2020 for discussion around the multiple definitions of design). Further content analysis revealed that design was a sibling (often appeared

alongside) of “effective” or “effectiveness” in the literature. As such, I pursued a more in depth look at the relationship between design and effectiveness. To do this, I selected a sub-selection of the articles that had been included in the original analysis for further content analysis. To select specific articles to include in the examination of design/effectiveness, I searched for keywords and phrases such as “design”, “map design”, “readability”, “map use”, and “effectiveness” that were included in both the abstract and keywords. Due to the limitations of this method is, it is possible to have excluded articles that perhaps discuss relevant information but fail to use the specific terms searched for (Kent 2014). However, because I am seeking out overarching trends and patterns in our applications and impacts of defining map efficacy, such limitations will unlikely produce any significant impacts on the results.

Analysis of this sub-selection of texts revealed two scales at which understanding of effectiveness took place. First, was research which focused on testing the effectiveness of general map elements. Separating a particular part out from the whole of the map, exploring how different iterations of the elements function. Colors schemes, symbol sizes (particularly with dots), legend design, and label placement are among the most common elements to be examined. Second, was to test the overall effectiveness of maps and map design for use in particular contexts: maps for transportation, navigation, journalism, tourism, engineering, education, climate change, the list goes on. This theme recognizes that there are varied expectations on the appropriate selection and design of map elements for certain applications.

The divisions between these different contexts can be quite stark, so much so that Matthew Edney (2019) proposed that cartography as a discipline has been misguided by

prescribing a singular, overarching ideal of the understanding maps and calls for specific, nuanced understandings of the histories, processes, and uses of different types of maps. It is here where I pause to recognize that, though it is operating at different scales, this line of inquiry focused on traditional conceptualizations of “effectiveness” has a compounding nature to it, both when applied to a specific element or the map as a whole. Situating Edney’s call alongside the expectations of mapicity reminds us that artifacts are read as a map when it displays the particular combinations of visual elements that prompt the reader to understand and treat it as a map. Subway maps from the London Underground to BART are often coded with exaggerated line widths, generalized location placement of routes, and saturated color pallets for routes with neutral colors for the basemap. Researchers explore the best practices for producing readability for map readers in these maps and, in doing so, further solidify the expectations that this is how transportation maps *should* look.

The *should* of the design and the intended use case is ultimately wrapped up in expectations of efficacy. Recall Kraak and Fabrikant’s instance that “maps that matter” are ones that have “well designed and [are] attractive to look at.” Putting this alongside the warning issued earlier, “just because one can more easily map today, this does not necessarily mean one should”, it becomes clear these briefing statements are couched in a system of evaluation of effectiveness. A map that is made by someone who should not be making maps, by their account, is more likely to produce a map that does not raise interest or engage the user, is not immediately understandable, and is not relevant to society. The structures of these metrics will be discussed in more detail in chapter 3 while the risks perceived of maps that fail to uphold these standards are interrogated in chapter 4. For this discussion, this analysis reveals the central location as well as the allegiance to particular



formulations of efficacy in the discipline. I next consider the landscape of actors who are coming together to establish and protect these expectations.

### 2.3 THE EXPECTATION OF EFFICACY

How does a cartographer enable themselves to produce a map that ensures efficacy? One approach to this examination would be to explore the themes of particular design principles as they apply to different categories of mapping (such as general reference, topographic, navigation, etc.). However, what is perhaps more generative is to explore themes that cut across the specifics that would be generated in such a categorical examination. This allows for a broader consideration of the intricacies of efficacy and gets to the deeper root of efficacy's production. Additionally, an examination of design would be dependent on the "fashion" (Field 2014) and technological capacities (Knoppke-Wetzel 2014) of the current moment. As such, here I seek out broad themes of efficacy production using both the ICA and North American Cartographic and Information Society (NACIS) as my point of analysis.

Like the ICA, NACIS serves as a meaningful point of engagement due to its influence as a well-established professional organization that focuses on maps and cartographic production. Established in 1980 with the first of its annual meetings held in Milwaukee, WI, the mission of NACIS is to bring together folks who use and disseminate cartographic information for professional development and education programming to promote the use and preservation of cartographic material as well as influence government policy on cartographic information (NACIS.org). The membership body is a mixture of professional cartographers, folks from government and industry, academics, map librarians, and general map enthusiasts. These folks come together during an annual meeting to share information

on design techniques, data curation, tools and software, business advice, as well as to show off their newest products in a map gallery. The meeting has a reputation for being warm and welcoming; the phrase “NACIS is nicest” and literal choruses of voices saying “Oooh, ahhh, niiiiice” (think of the drawn out tone and pacing you’d use at a fireworks show) set the tone for a casual yet inviting experience. Different from the ICA, NACIS does not work to set definitional standards, though it does influence the aesthetic standards of the discipline. In particular, the recent publication of the four editions of the *Atlas of Design* (AoD) sets the gold standard for map design as it’s “dedicated to showing off some of the world’s most beautiful and intriguing cartographic design” (NACIS n.d.).

I performed content analysis of the three collections of text (the four editions of the AoD and articles from the organizations’ journals *Cartographic Perspectives* and *The International Journal of Cartography*), as well as performed participant observation at the three sites (the NACIS Annual Meeting in 2015 Colorado Springs, CO, and 2019 Tacoma, WA, as well as the 2016 ICA meeting in Washington, DC) to explore the questions: what is effectiveness and how does one enable themselves to produce maps that could be considered effective? I have observed three prominent themes in these two areas. First that cartographic efficacy for traditional cartography is the ability to 1) capture attention of 2) an outside, detached observer and deliver the information in such a way that 3) facilitates its intended mode of temporal intensity. Maps that uphold these standards of efficacy are understood to be produced by 1) the employment of practical skills that are 2) taken up by a single mapmaker in order to 3) produce an accurate representation of the data. There is one theme that weaves surreptitiously among all six areas and that is *beauty*. Beauty is an important standard currently in place within the cartographic community because it, as

cartographers argue, consistently enables the map to live up to promises. Beauty captures attention, allows data to be understood, and creates an air of authority in the map artifact. The following sections explore these areas in more detail.

### 2.3.1 WHAT

The first requirement of an effective map is its ability to *gain the attention* of an *impartial observer*. These are two separate but reifying moments in the qualifications of efficacy. These considerations have only been elevated by systemic concerns around the public's attention economy more broadly. For example, at the 2015 NACIS meeting, a web cartographer at a world-renowned map production company expresses concerns around bad design limiting the engagement potential of the maps their team was producing. When showing an early iteration of one product, they paused to say “no one is going to spend any time looking at this map” and went on to describe ways in which the different elements would ultimately fail in securing the attention of the intended user, who would then scroll on by and not engage with the content at all. The observer is impartial and technically *sees* the map but does not pause to engage the map that would allow them to be then described as a user. Until they engage the map, they are an observer.

There are indeed many use cases in which a map user is a user before they engage the map. This is in specific instances where the map provides a particular service or addresses a need of the user. A map of the bus system in which there is only one map available is not required to capture the attention of those who need to ride the bus. If there were, however, multiple versions or types of the bus systems map that was available, then this reorients the relationship between the maps and user. But how might a decision between maps be made? While fit of use might be one, recent scholarship suggests emotion might play a significant

role here. Some have argued that emotion informs mapping both in how it can be leveraged in cartography to capture attention and the ways in which design can influence particularly affective and emotional responses from users (Griffin et al. 2017, Fabrikant et al. 2012). In particular, emotional response has been reported as being highly effective in engaging a viewer, transitioning them into the space of a user, and helping hold their attention. This demonstrates the increase of strategic deployment of design.

After capturing the attention of the impartial observer, the duration of map use is the last location of overarching measurement for determinations of effectiveness. In particular, cartographers are interested in the map's ability to *facilitates its intended mode of temporal intensity* with its user. The static map in relation to the representation of time has a long history of debate, trial, and error, within the field. An additional vein of consideration in the relationship between maps and time is that of engagement. Here, cartographers are concerned with achieving either immediacy or endurance in the communication of their propositional logic (*this is there* and *there is this*). While the diversity of use cases varies greatly for cartographers, cartography's rhetorical commitment to efficacy does not mirror this diversity, but rather offers two speeds. That is why it is critical to attend to intention.

Immediacy is both celebrated and critiqued, the division being observable in particular between ICA and NACIS. The ICA falls on the side that there is no time to waste, wanting maps to be "instantly understandable" (Kraak and Fabrikant 2017, 10), with imagery and design that can be "processed as immediate attention of the user" (Murphy 2019, 325) and help provide an "immediate sense" of one's surrounding from which to make decisions to move or act (Frederix 2019, 307). NACIS on the other hand wants to draw their user in and sustain their attention. Prolonged engagement, as argued by Tim Wallace and Daniel

Huffman, provides the user possibilities for learning: “We need maps that people enjoy spending time with; maps that they’ll voluntarily look at long enough to learn something” (Wallace and Huffman 2012, 2). Because of the subjectivities of map design, different design approaches are going to draw in audiences with different aesthetic tastes (Field 2019). In this case, it seems that the job of the cartographer is to almost override the intentions of the user, keep them interested and engaged even if they had no intention of lingering by appealing to their preferences. For users who are already intent on lingering on the map, they’ll gain even more out of their time, understanding not only the information but the intricacies of design. As Field asserts, “To appreciate fine maps, one needs to immerse oneself in them, not just to understand what the map is showing but also what the cartographer was thinking” (Field 2014, 2).

### 2.3.2 HOW

Having examined the specific metrics cartographers are striving to achieve, I now discuss the particular mechanisms that cartography lauds as enabling the achievement of these metrics. The first is the deployment of *practical skills*. What is practical cartography? Beginning in the late 1990s, the NACIS annual meeting began offering a full-day pre-conference, referred to as “Practical Cartography Day” (PCD), which was designed to fit the needs of the, “influx of 'practical cartographers' who comprise a vital and growing part of the NACIS community” (Krygier 2003), though nowhere did it note who those people were or what they did. John Krygier’s presidential welcoming message written on the pages preceding the 2003 annual meeting program, announces that, though PCD would remain a full pre-conference, the main meeting would begin to incorporate PCD-like themes into its sessions. PCD continues to function as a pre-conference which one must register and pay

an additional fee to attend. Though the “leaking” of “practical cartography” themes into the full conference likely persists when examining the session titles. However, this distinction suggests that NACIS continues to deem “practical” practice and products as somehow distinct from other types of cartographic engagements.

Through my participant observation, I found that PCD was a full day of a single tract made up of 15-minute tutorial. Presenters walked the audience, sometimes step by step, through their different processes including what workflows of tools and analyzes did they run, what kind of ink and paper did they use, what kinds of new programming extensions did they explore, etc. But to understand what “practical” means, I must juxtapose these sessions alongside those that took place during the main conference. Like Krygier mentioned in 2003, during the main conference (which had three concurrent sessions) many of the talks had a very similar look and feel to the PCD talks. However, the presenters included in session that occurred during the main conference often simply did more work to their project/problem/justifications more firmly. They would provide historical, political, economic context around the place/people/things they were mapping. This contextualization was largely absent from PCD. Practicality is knowing the right (newest) buttons to push. Practical cartography is pushing buttons which will lead to the production of modernly designed, cutting edge maps. For example, sessions such as “Making map movies with ArcGIS Pro”, “Terrain in Photoshop: Layer by Layer”, “Re-thinking Maps for the Web” walked you through succinct tutorials of how to use certain tools to achieve prescribed end goals.

The value emitted by practical skills is pervasive in the field, which I have confronted in several ways throughout the duration of this project. Perhaps most poignant was the

“advice” I received from a senior faculty at one of the meeting’s social events. I had received a funding award and which I was presented directly before the start of the social event. At the event, I was greeted and congratulated by other members, some of whom were experienced and senior in the field and eager to give career advice to a young up-and-comer. One faculty member advised me to “Get into GIS! That’s where the science is and where the science is, the money is...whatever you do, stay away from that *critical crap*.” Put another way, finding a path to “practical” skills was where the most “success” would be found regardless of your path.

The employment of these practical skills to make effective maps is discussed almost exclusively in terms of a *single mapmaker*. This is a subtle theme, but a pervasive one. But it is very often “mapmaker” and almost never “mapmakers”: “Making maps is a great adventure. Each map says something about the phenomenon, but also says something about its maker” (Nelson 2018, 4). The rhetoric of great maps, in particular, is a map that is produced by one: “Genuinely good maps, pleasing maps, and fashionably great maps have some of the sweat and character of their maker in there somewhere” (Field 2014, 4). In a presentation at the most recent NACIS meeting which took place virtually, Nat Case presented in a session on “collaborative” cartography, where he spoke about the ways in which a single mapmaker is in “collaboration” with their clients, the audience, and other cartographers. Overlooking the strange attempt to extend the conceptualization of collaboration into a capitalistic exchange, Case’s overall discussion was an attention to what it means to map *for individuals* in different contexts. Never was it a consideration of mapping *with*. Rather, it was a single mapmaker having to negotiate the relationships at the different scales to make a map the best it can be. This demonstrates how deeply rooted

cartographers are in the soil of *single mapmaker* that even when it's collaborative, it still centers on the lone cartographer.

Lastly, attention to what “best” can mean in the variety of contexts of the map will often, first and foremost for cartographers, be an alliance to accuracy. This applies to both data munging and data visualization. Many meeting presentations, particularly those aimed at beginner or pedagogically focused audiences, advertise how data must be represented through an appropriate modality for the original form and necessary transformation. This is a driving motivation for many of the cartographic standards that are in place today. As one presenter from a well-known cartography-focused graduate program discussed, standards are meant to serve as a shortcut for accurate representation. To name a more straightforward example, if blue is supposed to be water, then when representing water, one does not have to consider how to visualize that component of the map. For a more advanced example, choropleths maps can be used to represent the counts reflected by the US Census. When wanting to map, for example, households living under the poverty threshold by county, in order to produce an informative visualization that will help discern patterns, the data must first be normalized (made into a percentage), otherwise the map will simply follow patterns of population centers. Both normalized and non-normalized choropleths are technically correct in that they can represent the number by county. However, in many contexts a normalized dataset will likely be more informative. The key here is understanding the different representational capacities of the two approaches and, most importantly, being mindful about the use and communication around them. Accuracy also facilitates a level of trust with the map user. Indeed, “Very few would question the value of a well-made map” (Field 2014, 1).



### 2.3.3 BEAUTY

Throughout both of these areas and the six elements contained within them, there is a theme that runs through each aspect of consideration and that is the expectation of beauty, which has become a standard by which all the elements will be satisfied. It is leveraged as both a triumph as well as a warning: “Your map is likely to fall upon a disinterested audience if you fail to consider whom the map is made for. But when beauty is in the eye of the beholder, how do you craft a map that people see as something pleasing—beautiful even? (Field 2014, 1). It shows up in different registers and with several rhetorical iterations. While NACIS members are more likely to refer to the aesthetically pleasing qualities of a map as “beautiful”, ICA members instead say “attractive.” Hearing once again from Kraak and Fabrikant who explain, “We contend that to explore geographic patterns and processes efficiently, and to comprehend the mapped data effectively, map displays should be well designed, and attractive to look at” (10). This denotes a symbiotic relationship between “good” design and look. If the map is well-designed, it will look good. If it looks good, it is well-designed.

In the introduction to the first edition of the *Atlas of Design*, titled “An Argument for Beauty” they explore “Why we should insist on beautiful maps.” As discussed briefly in the previous section, here they articulate what often goes unspoken: a specific warning of what happens with maps fail to achieve the design standards touted by Kraak and Fabrikant.

They assert:

Design and aesthetics matter because form is not secondary to function; form is integral to function... To truly engage map users requires that we present them with something **\*\*worth\*\*** looking at. Something that they will want to spend time studying. Something that acknowledges the human need for beauty...Ignoring aesthetics means ignoring the senses of the reader, dehumanizing the final product.

It yields maps that are consulted only out of necessity and rarely shared. When the data is not pleasant to look at, it reaches far fewer eyes. If we want to understand why so many people have a poor knowledge of geography, we might look at the maps being used to educate them. These maps may be accurate, but are they attractive and engaging? We need maps that people enjoy spending time with; maps that they'll voluntarily look at. (Wallace and Huffman 2012, 2)

If a map is not beautiful, then what is it? It's worth will be questioned. It will have to work harder to gain the attention of the map reader. By doing so, it is less likely to transfer its knowledge to the reader, and less likely to inspire the reader to act. If someone does spend time looking at it, is not of their own volition. By making a map that is not beautiful, you are discounting the reader from the map. The connection between the map reader and the map is the reader who is looking for the map to nourish their need for beauty. You are depriving them.

A beautiful map, it seems, is a more thoughtful artifact on both the end of the creator and the user. Though anyone can "serendipitously" make a beautiful map, the more experienced one is the more likely they'll be successful at producing a beautiful product that should be celebrated and looked up to. Additionally, "through our map-making [cartographers] can interject just the right data, with the most thought-provoking design and capture the policy maker's attention, the child's potential, the lost traveler's way" (Buckingham 2018, 2).

To promote the creation of maps that look good and communicate quickly, a professor at a top research university outlines how he teaches to promote creativity (I'll also add that he also expressed that he said the way he teaches his classes hasn't changed all that drastically since from how Arthur Robinson, the influential cartographer who will be discussed at length in a later chapter, would have taught his classes). Today, this professor

encourages students to make maps on topics that they love and explore them in new ways. Another presenter who is a product engineer at an open source mapping software company insists that this desire to explore is at the heart of cartography, saying “mappers love to play”. Creativity and playfulness were terms that are spoken again and again throughout the two NACIS meetings. But it seems that, only when you have been trained to know when you have arrived at a product which is “good” do you have license to play.

For example, the professor I just introduced uses Bloom’s taxonomy of education which defines creation as “an original design that leverages and confronts design guidelines.” I observed that creativity isn’t a dramatic going off the rails, rather a choice to the path less traveled. Maps that do this successfully get described as beautiful, which I counted to be used over 100 times in formal presentations throughout my 2015 and 2019 conference experiences. Those that engage in play without privileging the design of the product get labeled as “ugly”. One of the eight times I heard this term being used throughout these two meetings was while one presenter, who works as the educational lead at another open source mapping software company, reflected on a map she made when she was first learning to code. Here she said “still online, still ugly” followed by a short laugh. Other times “ugly” maps were discussed were through brief mentions of tip or trick of what *not* to do. The simple quantification of beautiful vs ugly suggests that the NACIS annual meeting serves as a celebration of maps that subscribe to a certain pleasing aesthetic. As mentioned, the celebration is more than simply putting gorgeous maps on display but also convincing others to reify their status as a stunner by educating folks on how to make one for themselves.

Because mimicry is the sincerest form of flattery.

But it seems that mimicry is also the main avenue through which, those of us who don't have the skill sets to be "creative" in ways that will be validated within the discipline, can hope to make useful maps. For example, a cartographer who works in research and development at a company which is a global supplier of GIS software, presented a set of style guidelines that he and another popular cartographer are developing. These guidelines, this cartographer describes, sets out to help those who have less experience with mapping, people who are likely to make maps which say "look at me" but in the wrong way and teach them to make maps which are fashionable. In wanting to avoid gaining attention for the wrong reasons, beauty is a lighthouse in the discipline for those who have supposedly lost their way.

In sum, cartographic efficacy is the beating heart of the discipline, though it is very rarely grappled with directly. This analysis of writing published by and experiences at meetings hosted by the ICA and NACIS reveals that, at its core, cartography efficacy works to capture attention of an impartial observer and deliver the information in such a way that facilitates its intended mode of temporal intensity. As such, maps should be produced by a single mapmaker, who has the appropriate collection of practical skills at their disposal in order to produce accurate representations of the data.

#### 2.4 THE AUTHORS OF EFFICACY

Feminist scholarship has stressed for decades the importance of situating knowledge production among the many axes of privilege and oppression that individuals and groups can both experience and perpetuate (Rose 1997, Haraway 1988, Harding 1986, Collins 2002). Feminist traditions invite us to explore, in particular, the "Big 8" areas of identity construction; this includes race, ethnicity, sexual orientation, gender identity, physical or

mental ability, religion and spirituality, national identity, and socioeconomic status (Allen et al. 2012). Geography has been heavily critiqued for its “patriarchal and sexist disciplinary culture stemming from its colonial history” (Schurr et al. 2020, 317). Such analysis examines the historical development of a discipline (Monk 2004, Garcia Romon and Monk 2007), explores the methodological and applied drivers of research (Monk and Hanson 1982, Mott and Roberts 2014), and reflects on the impacts of representation in professional settings (Evans and Madrell 2019, Kaplan and Mapes 2016). Cartography and GIS have faced similar critiques regarding gender in both the makeup of its practitioners (Knoppke-Wetzel 2018, Kwan 2002, Schuurman 2002, Tyner 2016) as well as the focus of the experiences and perspectives that are mapped (Dando 2018, McLafferty 2002, Schuurman and Pratt 2002). Considerations of race in the discipline, particularly more traditionally conceptualized modes of cartography, remain disappointingly periphery.

What’s more is that recent calls for initiatives that take on questions of diversity at the level of professional organizations have been met with resistance, claiming that using the lens of diversity is exclusionary and that it ingrains difference to our discipline (Field 2020). These arguments, particularly when touted by white men in prominent posts at the largest mapping institution in the world, fail to acknowledge the differences that are already ingrained and that these differences are crucial to developing pathways for liberating futures. While some have articulated the challenges individuals face when acknowledging their own privilege (Kobayashi 2003), this prompts us to understand the limits of the exercise rather than provide us a pass to not participate in the first place. Also, examining the themes and patterns of the individuals who make up our institutions makes a different impact. Even so, articulations of the patriarchy, as I have seen, are received as personal

attacks rather than more substantial critiques of what is enabled and restricted by broader systems in which we operate. As such, I turn here to the work of Patricia Hill Collins to understand why this desire to turn away from conversations of diversity for fear that “perceptions of differences to become ingrained” is insufficient.

Patricia Hill Collins authored a framework for Black feminist considerations of power, referred to as the *matrix of domination*, that examines the “interlocking systems” of race, class, and gender in the formulation and experience of power and its many manifestations. She engages these three systems as they have most significantly impacted the lives of Black women, though she notes that additional systems structure the matrix of domination for other kinds of people. The matrix situates oppression, resistance, benefits, and harm by connecting various forms of privilege, understanding they are linked to one another in ways that make it difficult, if not impossible, to understand one without paying attention to its connection to the others. This allows for more fine-grain articulation of the overlapping and entangled socially constructed possibilities that are available and foreclosed for certain bodies, impacting individual and collective lives. Each person, Collins writes, is both benefited and harmed by their location within the matrix of domination. Though the matrix of domination was introduced decades ago, recent work by feminist design scholars in their considerations of the power of data (D’Ignazio and Klein 2020, Costanza-Chock 2020) has provided resurgence of attention to the concept.

To begin to understand how the systems that influence the domination might be at work in the discipline of cartography and instances of participatory mapping, I turn first to the colloquial understandings of the areas through the immediately perceptible articulations of online image searches. As shown in Figure 8, the image results for “participatory mapping”

offer a reflection of the modes of engagement and gathering that are integral to this approach. People coming together, drawing discussing, disagreeing, collectively deciding in the act of translating some of their claims that something is somewhere. The bodies in these images, in both the excerpts shared here and throughout the broader sea of search results, appear to be almost exclusively Black, Indigenous, and people of color (BIPOC) . A stark shift is introduced when comparing these results with map making approaches that are not participatory. “Cartography” yields results that reflect a host of old style maps and there is no mapper or any bodies included. Results for “map maker” shifts the focus from the product to the tool by showcasing tools of the past and present that can be used to make maps (notably National Geographic’s MapMaker Interactive and Google Map Maker tool which was shut down after digital “vandalism” occurred showing images of the Google android urinating on the Apple logo). This was a surprising result, as the term for me had created expectations that a person would be included in the results.

In a continued attempt to locate bodies in the act of making maps “make maps” and “cartographer” offer intermittent appearances of bodies. “Making maps” delivers one result from 1943 showing a person who presents as a white woman using a contour finder to make an elevation map while “cartography” brings an image of Anton Thomas (a white man from New Zealand who recently publish an entirely hand drawn map of North America that has received attention from well-known sources such as Atlas Obscura and CityLab). Both search terms elicit results that showcase a single person or the hands of a person (almost always a white person) in the act of making a map. These displays of the maker, however, remain outnumbered by the number of images showing map artifacts. These images suggest that groups of Black bodies are mapmakers, while singular white

bodies are cartographers. As has been discussed, the privileges assigned by cartography and mapmaking is the ability to not simply reflect, but *make*, the world. This is a shorthand phrase that communicates the complexity of the cultural potency of maps and their ability to influence perceptions and decisions making processes. However, as has been discussed, cartographers assert that one does not necessarily have access to power simply by making a map. Rather, the map needs to be made in ways that are understood to produce map. As such, an examination of *who* in regard to cartography is insight into who is making the world. I continue this consideration by seeking out more fully grounded examinations of, in particulate, race, in cartography.



Figure 8. Results of Google Image search results. From left to right by column: participatory mapping, cartography, cartographer, map maker, making maps

Below I offer three images of the leadership, token experts, and members of three influential cartography organizations: 1) The International Cartography Association (ICA) (discussed at the beginning) showing in Figure 9, 2) cartographers and data visualization experts participating Esri's Cartographic Summit as shown in Figure 10, and 3) the attendees of the 2019 North American Cartography and Information Society (NACIS) annual meeting as shown in Figure 11. The triangulation of these three organizations



provides insight into the workings of the professional cartography world at three scales. The ICA has worked to be a global organization since its inception. Esri has become the world's most prominent producer of GIS and database management applications since its establishment in 1969. And NACIS has been an active professional community since its establishment in 1980. There are many pitfalls in the intricacies of the following meditation on race, particularly around the problematics of assigning characteristics and identifies to individuals based on metrics defined by determinative standards of patriarchy and capitalism. However, the themes that can already be revealed by a glance at these images suggest that any misidentification of a single individual will likely not influence the fact that, despite celebrations of the vibrancy of the community, cartography is a concentration of whiteness.



Figure 9. The ICA Executive Committee and Commission Chairs at the first meeting of the 2019–2023 term in Gent, Belgium. Image source: icaci.org



Figure 10. Attendees at the 2019 NACIS Annual Meeting in Tacoma, WA. Photo credit: Hans van der Maarel



Figure 11. Invited attendees of the 2016 Esri Cartographic Summit. Photo source: icaci.org/tag/esri

Perhaps worse than the stickiness of whiteness (Saldanha 2007) that is persistent in the discipline is the denial that is taking place around it. This is demonstrated by the blogposts and reports that reflect on the events that both up to and took place after the picture was taken at the Esri Cartographic Summit.

In February of 2016, a group of 50 invited individuals gathered at Esri's campus in Redlands, CA the first ever Cartographic Summit. As reported by Menno-Jan Kraak, the idea for the summit emerged from the 2013 International Cartographic Conference during a meeting held with the ICA's executive committee and Esri president, Jack Dangermond who was serving as the conference's keynote speaker. The intention of the summit, Kraak writes, was to "organize a small, closed gathering among key cartographers and influential professionals who work with maps but who don't have cartographic backgrounds. The purpose would be to discuss the future of the cartographic discipline." (Kraak 2016).

The framing of the soon-to-become exclusive invite list was already suspect as the delineation between "cartographer" and "non-cartographers" is drawn on the level of professionals who produce maps employed as a gesture to increase the diversity of perspectives informing future directions of the discipline. Was the person who makes maps for a living or in professional contexts trained in a specifically cartographic lineage? If not, they're an "outsider" who, while they may be qualified to speak to the future direction of the cartographic discipline, is notably separate. Those who make maps that cartography deems legitimate but are not trained as cartographers, they justify, bring a unique positioning to perhaps envisioning creative solutions for the challenges the discipline faces. Kraak provides no detail on how the participants were selected, only noting that the curation of the list was challenging due to material factors such as "agendas, locations,

finances, differences of interests, and the like.” It is worth pausing to consider why “differences in interests” would be a problem considering the goal of the summit seemed to be to bring together folks from different perspectives. Ultimately, the summit was organized around the three broad themes of data, media, and design. The list of invited participants was not made public, however insight is granted from both the meeting’s agenda as well as the group photo labeled “participants” standing next to a sign for the event “Welcome to the Cartographic Summit: The Future of Mapping.” While names, online profiles, and pictures cannot be accepted as any type of direct identification of the race or gender of any individual, these artifacts suggest the prevalence of participants that are white presenting/passing and posture as traditionally male.

Furthermore, folks who did make it onto the invite list have been similarly critical regarding the representation of race at this gathering. For example, Andy Woodruff, the development lead of Axis Map in Boston, offered a critique of the lack of diversity in a blog post directly following the event:

This was definitely a white male, people-like-me meeting. At the very least, clearly in a group of 50, there ought to be more than 11 women. Diversity is something we need to improve in the cartography community in general, not only in the sense of gender, ethnicity, etc., but also in things like educational and economic background. Most people who actually work with maps don’t come from the world of advanced geo-degrees that we tend to deal with. (Woodruff 2016)

While Woodruff is not as explicit about race as I am attempting to be here, he does make the case that more needs to be done to make the discipline more inclusive of differing (non-white) perspectives while also acknowledging that his own presence contributes to that lack of diversity. Kenneth Field, the Esri employee responded to Woodruff:

Hi Andy – Thanks for the review and, of course, your participation in the cartographic summit. I was on the steering committee as you know and while I'm not at liberty to go into specifics I can assure you that the master invitee list was much larger. We had many people unable to make it who wanted to but couldn't for a variety of reasons (for instance there was an event in Amsterdam at the same time) and some who simply declined. We tried to strike a balance of all sorts of people from many different backgrounds and, specifically, non-cartographers. Over many months lists were drawn up and re-drawn. It's very easy to say this or that person should have been there but I feel we got a good balance and the outcomes and feedback have been terrific. What was conceived as a one-off may very well become an ongoing endeavor and that means, of course, different venues and invitees in the future. Thanks once again. (Field 2016)

Field's comments perhaps reflect a larger performative commitment to "diversity" in the discipline. The politics around creating such a list, though spanning across space and time, is evidence of the self-preserving nature of the domination of whiteness. However, the whiteness often goes unseen or does not perforate the discipline's lens of consideration because, as reflected in the Google image search results, cartography is concerned with the *products* rather than the *process* of map production. This is yet another articulation between the two "camps" that Kraak and Fabrikant articulated. The demarcation between product and process can be observed in the ways that we value and evaluate maps and mappings. Ultimately causing process-privileging modes of efficacy to remain under conceptualized and, consequently, be delegitimized. For the impacts of this demarcation to be grappled with more directly by all of those who make maps, I offer here an amendment to Crampton's Scale of Mappiness so that the tensions of the current functioning of the discipline are reflected.

## 2.5 A NEW SCALE OF MAPPINESS

As discussed, the concerns of the discipline following WWII were largely concerned with the identification of artifacts on the scale between "map" and "not a map". Given the

emergence and proliferation of accessible modes of map production, whether that be through participatory methods or the FOSS movement, this moment has prompted the production of maps at a faster pace, wider topical area than ever before in history. Because the tools being used are specifically curated for the production of spatial analysis and mapping, the products would rarely fall into the category of “not a map.” However, the maps that are being produced, per standards of cartographic attunement to efficacy that privileges outside, detached users and beauty, are not valued or, in many cases, even recognized as legitimate maps by cartographers.

As such, the scale of mappiness is now more intricate. In addition to considering where artifacts are placed between the metrics of “always a map” and “never a map”, the discipline promotes a more nuanced articulation on the “always a map” part of the scale that takes into account the expectations that are held about aesthetics and function that ultimately delineate between “good map” and “bad map”. Markers on this part of the scale can take on many types of dichotomies (since dichotomies are how scales function). First, towards the most valued side of the scale, is maps that are made by professionals. As was demonstrated by the Esri Carto Summit, these don’t have to be cartographers or even those who have cartographic training. The discipline performs commitments to diversity through the incorporation of perspectives that are outside of the boundaries of what is considered traditional cartography but remains in the professional realm. Conversely, at the devalued side of the scale is maps that are produced through participatory/collaborative/co-produced processes. PMLs from varied backgrounds and through multiple modalities experience this critique at the level of the method. Simply because of the approach, without any analysis

of the map and if it achieves the standards of efficacy that attunement supposedly works to protect, their maps are dismissed.

Another label in place is between “pretty” and “ugly.” Maps that are pretty are produced by professionals, uphold the standards of efficacy. While no-one that I’ve discussed in this chapter explicitly referred to participatory produced maps as “ugly”, the rhetoric used at cartographic conferences and cartotwitter form the backdrop of this side of the scale. Products that are not polished, are labeled as drafts that are considered ugly. But here again, turning to the author of the map helps bring into focus some of the other areas where maps might be considered ugly in particular circumstances. For instance, I cannot argue that maps that fail to uphold and reify traditional cartographic principles have a firm place at the “devalued” side of the scale. When a map that breaks out of traditional format is produced by a person occupying the space of “professional” the product can be celebrated as experimental or boundary pushing. Bodies lean in closer, fingers trace, choruses of “Oooh, ahhh, nice”, pre-orders of prints are placed, Tweets are retweeted in the thousands. *Participatory mappers, however, are not afforded the same generosity.* And while I am not arguing it is the goal of participatory mappers to gain a type of celebrity status for the look of their map (we’ll learn in chapter five, these “ugly” maps are well aware of the ways that they defy the structures of cartographic normalcy) the consequences of this dismissal result in a lack of attention to the forms of efficacy that are at work in participatory mapping processes. Put another way, the side of the scale that locates “made by nonprofessionals” and therefore “ugly” works to dismiss the map as being ineffective without a form of meaningful analysis of the maps that are placed there.

And indeed, a brief examination of how maps are tested and examined for efficacy (the themes of which will be outlined in more detail in chapter 3) suggests the ways in which maps produced through participatory means escape the systematized, reconstructed method of map analysis. The primary methodological denominator among the differing approaches is systemization and deconstruction of the overall map as well as its elements. What makes this possible is the base assumption that the map is constructed through the devotion to efficacy. This enables it to be predictable in its presentation and therefore allows the map to be deconstructed and analyzed at a fine-scale level for the particular mechanisms that make it work. If a map is considered to lack the necessary qualification of upholding the traditional considerations of efficacy, then it will not be eligible for analysis to consider the ways in which they work. This is a self-reifying system. The maps that we consider as worthy for analysis of how they work are maps that are considered, by the narrow definitions of the term, working.

As has been briefly outlined in previous discussions, one of the primary tenants of this project is to reveal how the modes of professionalization and institutionalization of mapping into cartography have established systems that have limited our understanding of how participatory maps work. It is not that participatory mappers are desperate to be baptized as legitimate by cartographers for the sake of being included. What participatory mappers do need, however, is a framework by which to understand how the different moments of negotiation around map design can impact their projects. Cartography, in its top down indoctrination, has defined its mode of efficacy and while that mode as evolved over time, it remains consistent in its resistance to considering bottom-up theorizations. Thinking back to the tension I felt in the library with members of my partnering



organization, the resulting feelings of fear of being misattuned, and the misattunement experienced by other PMLs, we are confronting our place in the scale of mappiness. Always a map, but never one that is understood from the perspective of design.

The next chapter pays close attention to all of the offenders from these examples, a pattern emerges with white men, many in senior level positions, asserting that junior scholars and practitioners, who are often white women and people of color, are not doing what is considered “cartography”. While this is unsurprising, as disciplines are upheld by discipline, what is surprising to me is the ways it appears on “both sides of the aisle” in traditional and critical conversations. Critical cartographers argued for decades that maps are social constructions. However, the processes of socialization largely privilege the perspective of those who occupy privileged places in society, erasing the socialization and perspectives of other groups. This clearly demarcates how considerations of maps as an artifact of social unfolding has not become pervasive to the discipline on either side of the traditional/critical continuum. This dissertation, however, examines how efficacy has been conceptualized in narrow and exclusionary ways. As will be discussed in the following chapter, efficacy has also been used to legitimize maps, and their makers, in ways that do not meaningfully analyze or measure efficacy.

## CHAPTER 3. ATTUNING TO EFFICACY

*All paradises, all utopias, are designed by who is  
not there,  
by people who are not allowed in  
— Toni Morrison interview with PBS NewsHour*

### 3.1 DISCIPLINING POWER

To ground these delineations within practitioner validity in the discipline more deeply, I now to explicit considerations of power. I first examine popular considerations of disciplines and disciplining by way of Foucault. For Foucault (1995) discipline is a technique of modern power that depends upon and deploys normalization, routines, convention, tradition, and regularity, and it produces experts and administrative forms of governance. Discipline is deployed in an attempt to “reach and manipulate the body” of the convict, hospital patient, schoolchildren, worker, and beggar – anyplace a “multiplicity of individuals on whom a task or a particular form of behavior must be imposed” (1995, 205). So, rather than maintaining social control through public torture, “humane” social codes are created and maintained through considerations of the norm. Instead of a sovereign power which operates as a top-down exercise of force, discipline is a technique of “arrangements” which does not assign individuals a fixed position, but rather distributes and circulates power through the upholding of norms based on a network of relations and works wherever power is exhibited. Institutions are a popular sight for examining power, but such focused attention does not dissolve the agency of the individual. Indeed, Foucault asserts that while much of his ruminations focus on power, what he is interested in is the experience of the subject (Foucault 1982). Whether seen as productive or destructive, discipline becomes a limb of power through this action:

The exercise of power is not simply a relationship between partners, individual or collective; it is a way in which certain actions modify others. Which is to say, of course, that something called Power, with or without a capital letter, which is assumed to exist universally in a concentrated or diffused form, does not exist. Power exists only when it is put into action...[W]hat defines a relationship of power is that it is a mode of action which does not act directly and immediately on others. Instead, it acts upon their actions: an action upon an action, on existing actions or on those which may arise in the present or the future. (Foucault 1982, 788-789).

This helps contextualize Foucault's analysis of power as it is enacted and experienced as violence. Knowing that power is "an action upon an action" solidifies that "in itself the exercise of power is not violence" (ibid 798). Violence, through modes of disciplining, is rather one of many modalities, or actions, that power can work through. As such, Foucault provides the context for understanding power not as a thing that exists that is then put into action, but that is only actualized through action. It is the actions that normalize the *is* that produce the contours of the discipline of cartography that were outlined in Chapter 2. As such, this current chapter works to go deeper and examine these actions more closely.

Sara Ahmed articulates *attunement* as a way to observe and trace the impacts of disciplinary power. In *Living a Feminist Life* (2017) she discusses how objects serve as a site to facilitate Foucault's "an action upon an action". Ahmed has a policy of not citing any white men in this text and, as such, does not reference or engage Foucault's considerations of power directly. However, Ahmed is expanding such discussions of discipline by observing the ways individuals are disciplined by objects in ways that tend to the emotional experience of the subject.

To demonstrate the workings of this concept, Ahmed retells the story of Claudia as first shared in Toni Morrison's *The Bluest Eye*. Claudia, a young Black girl, receives for Christmas a white, yellow-haired, blue-eyed baby doll. The adults surrounding her "cluck"

with the sounds of pleasure (an action), responding as though they themselves had just received such a seemingly precious gift. In doing so, Ahmed explains how they are asserting the joy that the doll should be bringing Claudia. Through their coos and clucking, the adults offer clear direction for attunement, that the doll should be loved and treated in a way that reflects the preciousness of the object. In other words, they are directing the future actions of Claudia, making this an instance of power (an action upon an action, per Foucault). However, Claudia is not overcome with joy. “I could not love it. But I could examine it to see what it was that all the world said was loveable” (Morrison 1979, 14). She goes on to dissect and destroy the doll. Claudia understands the clear cues of direction she is being shown but does not follow them. She is “willful”, the concept Ahmed uses to attend that which does not follow the direction it is given. Claudia’s misattunement, by her poking at and twisting the doll rather than caressing and cradling, is experienced as an act of violence and aggression, “disaffection, disloyalty, ingratitude” by those who are attuned. Ahmed writes, “If misattunement is expressed as a mishandling of things, then misattunement is worldly. Objects bring worlds with them...to be misattuned is to be out of sync with a world” (Ahmed 2017, 41). Misattunement, as captured through the interaction with the object, is the action upon the action. The object is the conductor, making one’s misattunement knowable to the world. To be misattuned is to “generate counterknowledge” as you “learn more about wishes when they are not what you wish for” (ibid). As such, misattunement invites a multi-scalar deconstruction and understanding. Claudia dismembers the doll-allowing for her to examine the hair, the skin, the eyes, seeing how each piece contributes to making a single doll to which she is misattuned. As such, attunement is the shared experience of taking up a direction that has been provided. When

you are attuned, you also work to attune others. To attune others is to provide them a direction, to enforce and reinforce expectations through normalization, routines, convention, and tradition. To be misattuned is to resist this direction.

For this consideration, attunement is a particularly supportive lens because the analysis is enabled by the object, in this case, the map artifact. (Mis)attunement enables a deconstruction of the object, and an understanding of the pieces that make the object one that provides particular directions. As cartographers have modeled for decades, this is a catalyst for power and disciplining. Additionally, attunement is multi-scalar and allows focus on an individual subject while also giving voice to the experience of those that fail to attune or are *misattuned*. Ahmed offers a broader grammar by which to capture this misattunement. Maps as artifacts both bring a world in where the map is understood to be authoritative and assert what is knowable and known in the world. They make worlds. “Objects bring worlds with them” is elevated for cartographers. By bringing worlds with them, they re-inscribe their power.

Throughout this chapter and the next, I trace attunement and misattunement in cartography. I explore the moments that produce cooing and clucking and the moments that produce poking and twisting. I explore what makes maps lovable and what happens to those who cannot love them. This reveals the direction, those who influence the direction, and those who resist it. The object is the effective map. Having explored the contours of efficacy in the previous chapter, this chapter examines the modes of disciplining that are taking place in cartography that support the creation of those contours. So, first things first: what exactly is cartography attuning to?

## 3.2 SITES OF ATTUNEMENT

Here, I tend to the ways professional cartographers work to provide direction for those who they do not consider to be professional cartographers, those who *need direction* so that they might attune to the discipline. To do so, I examine the different sites in which this takes place, as reported during interviews with participatory mapping leaders (PMLs) (see Methods section in Chapter 1). The three primary sites are at in-person conferences, in interactions with editors of academic journals, and online in the active carto-Twittersphere. I'll take each of these sites in turn, offering up more substantial experts from interview transcripts so that the voices of those who have experienced these moments firsthand can provide a broader contextualization of the intricacies enabling their experiences to occur.

### 3.2.1 IN PERSON

Towards the start of this chapter, I shared a brief retelling of my own experiences in conversation with cartographers at the International Cartography Conference in Washington, DC. While it is no secret that gatherings of experts can produce particularly potent moments of performative demonstration of one's skills, the most strongly confronted moments are those that work to actively delegitimize the work of another, casting it out of the category of cartography altogether.

It is not just in theory or concept that this type of policing takes place, however. Beyond my own experiences, conferences have proved to be hostile sites for PMLs directly, particularly those from underrepresented backgrounds. One PML, who I'll call Leah, shared about the ways in which her work as an Indigenous cartographer was directly dismissed throughout the duration of the same meeting discussed previously, the International Cartographic Conference, as well as others-some that were explicitly gathered

around the theme of Indigenous Mapping. I quote them here at length to convey the impact these interactions have. Leah explained:

So, I then started presenting my [work]... I had a lot of white people come up to me and tell me, "Indigenous people don't make maps." They would insist [cartography] is a colonial technology that Indians can appropriate, but it's not ours, and it's always colonial. And I have been repeatedly told that, over and over. And every time I hear it, it pisses me off more. "So, the ones that have said Indigenous people don't make maps are like, so serious about it. They won't budge. For example, I was at a gathering of Indigenous and allied cartographers looking at using maps to fight destructive industries on Indigenous territories. Denis Wood was there. Denis Wood was one of the people that said that to me... He was insistent that maps were colonial technology. And he was willing to acknowledge that Chinese people also had maps at some point in the past. But that they're fundamentally a colonial tool that even Chinese people invented them to colonize other Asian groups. And that's that all a map does, is just colonialism. That's it. Ever. And it's bizarre for him to say that at that gathering. 'Cause we had Indigenous people from all over the Americas there...there was some Canadians, there were folks from Venezuela, from Chili, from Mexico. There was such a robust and diverse gathering of folks... I think it was half Indigenous, half not. So, we were all sitting there and I remember I was sitting next to these guys from Chili who are cartographers who work to protect their water. They had headphones on and were listening to the translation. And as Denis Wood says that, we both look at each other ... our brains were just exploding. I was like, "No. We've always made maps. Yes, maps have been wielded in that way. But that's not fundamental to what a map is. I've never heard an Indigenous person say, "We don't make maps. There's a lot of cartographers who look at cartography, the professionalization of it, if they don't get the training that includes the stuff on power dynamics, design choices, all this stuff, it becomes ... they presume it to be neutral. So, then any map that's made is explicitly tackling power dynamics or challenging them becomes really stressful to them. Because it's not part of their world view about maps.

Quoting here at length conveys the complexity of the impact such interactions can have. Leah attends conferences for professional development and networking opportunities, only to be faced with repeated instances of gatekeepers attempting to close and lock the doors of the discipline. Participatory mappers and their projects are dismissed outright because participatory mapping is understood to be misattuned with the priorities of cartography. While earlier in the chapter the dominance of white men in the discipline was made clear,

these moments highlight the mechanisms by which attunement to their conceptualization of the discipline and, more specifically, considerations of efficacy are situated. The misattunement becomes apparent because Leah showed up to these spaces to speak about the maps she's made that resist the erasure and colonization of their tribe and tribes around the country. And yet, white men speak clearly and firmly to assert that it is not possible that these maps are effective or have a place in discussions among cartographers. I include the interviewees use of Wood's name (see section 1.2.5) as a way to indicate that it is not only the traditional cartographers who have their heels dug into the traditional conceptualizations of the discipline, but also the supposedly "critical" who have bought into a particular, colonial history of mapping who feel compelled to speak out and tell others what is and is not considered cartographically legitimate. Rather than recognizing the success and pervasiveness of participatory or Indigenous mappers and acknowledging the epistemological differences between the approaches, Denil and Wood chose to not associate these types of mappings with cartography. What's more, is that they cannot allow PMLs to associate themselves with cartography.

### 3.2.2 IN PUBLISHING

Another moment of institutionalized professional engagement with the discipline is through academic modes of publishing. Some journals within the disciplines of geography, cartography, and GIS that have a cartography editor. A primary example is the three journals produced by the American Association of Geographers (AAG): *Annals of the AAG*, *Professional Geographer*, and *GeoHumanities*. As described in a call for applications for such a position, the cartography editor works to "review and enhance the quality and content of cartographic submissions...this includes, working on maps and



figures to ensure that all information is clearly displayed and that figures and maps appear in proper electronic formats, etc. (American Association of Geographers 2017). I made multiple attempts to be in conversation with cartographic editors myself, but my requests for an interview were left unanswered. However, in reviewing the job description, it is clear that considerations of quality are quite subjective yet, as PMLs revealed, can nonetheless produce to serious consequences.

One PML shared the details of what they describe as a “difficult experience” that spoke the very heart of this dissertation. This person had submitted a manuscript to a well-known geography journal outlining the participatory mapping work they and their partners had accomplished. The paper had been accepted but the cartographic editor at the time reached out with critiques of the map that had been included in the piece. The map was one that had been created within the context of the work of the community-based project and was used extensively by those involved. Clearly stakeholders found the map to be usable and informative. However, the cartographic editor had different feelings. The PML described:

The cartography editor came to me and basically said, “This map violates all of these expectations for maps to be published [in this journal]. And so you have to change it. Here's the things you have to change because your map doesn't meet the rules.” I wrote back and said, “Here's the thing, this is not my map. This is a community produced map that is a piece of evidence from my fieldwork. And I have some real concerns about the request to change it. This isn't my map or my data. This map is part of a story of the research.” And he wrote back and basically said, “Either you can do it or we don't publish it”

The ultimatum that is given to this PML offers a clear message that those who operate outside of the realms of traditional cartographic efficacy be delegitimized by way of omission. There is no room or flexibility within this framework for others. It is a rigid structure and does not bend to accommodate those who have not been indoctrinated

properly. This rigidity is a form of indoctrination itself: Do these things. This is the right way to do it. Make these edits and all will be well as you will be attuned.

The PML went on to solicit advisement from a host of mentors and collaborators about how to respond to this demand. In this moment they confronted a complex web of the systems at work influencing their positionality in this situation. To maintain anonymity of this PML, I will refrain from sharing details of their identity, but like any person—they're confronting both the privilege and the precarity by their location among the matrix of domination by their personal identity categories, the intricacies of how they intersected in relationship with their community partners, and their position within the university as well as the broader discipline.

This led to conversations with the folks who had created the map, who gave their blessing for changes to be made. The original mapmakers graciously understood that there were expectations in place for the journal but did not pay any mind to what those expectations were. So, the PML was able to make the changes necessary for the article to be published with the amended version of the map included. The community and its host of organizers continued to use their original map to strategize, communicate, and inform without any changes.

The experience of this PML details the influence that cartographic editors have in formulating expectations of efficacy in the discipline. Rather, it is not about efficacy broadly, as it was clear that the map was being used and seen as effective in that context, but about a particular performance of efficacy that has been evaluated and validated as the “right” modality. The ways in which those who are attuned are assigned by the parameters

of their job description to attune others provides insight into the rigidity of the structures of this form of efficacy.

### 3.2.3 ONLINE

As the previous two sections have explored (mis)attunement through experiences in professional settings, I now turn to a more colloquial exploration. Here I examine the rhetoric of exchanges that occur in the cartography community as it exists on the social media site Twitter. In between events hosted by NACIS or the ICA, Twitter serves as a place to continue the conversation for many. People share their work, ask questions, promote their programs and funding opportunities, and more. Attunement on this platform occurs often through the celebration that will occur around beautiful maps. But because I have previously discussed the celebrations that occur around beauty, the types of attunement I am particularly interested in for this analysis are those that are veiled as teaching opportunities. A prevalent example of this mode of engagement can be observed through the use of the #cartofail as it is engaged in the mapping community via Twitter. According to First Tweet, #cartofail was first used by user @paregorios (Figure 12).

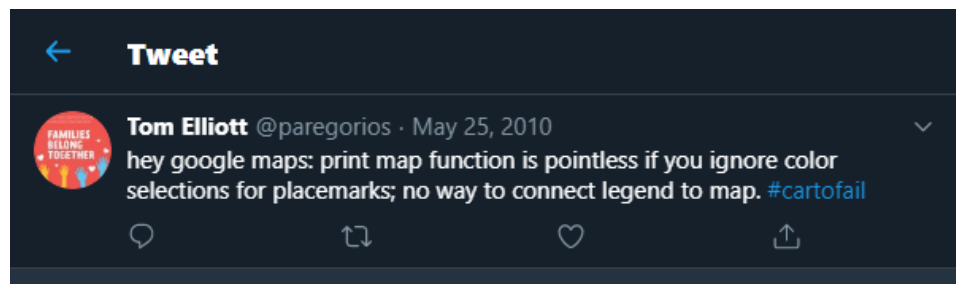


Figure 12. The first traceable instance of #cartofail on Twitter

As the tweet reflects, it was engaged as a way to report an issue with Google Maps. The hashtag was popularized by Esri cartographer, Ken Field and since then has taken on

a different mood. #cartofail now is frequently used in posts with an accompanied image of the map that is on trial for its failures. Many posts simply contain the hashtag and the image with no additional information (Figure 13). Others offer a sentence pointing out the particularities of the cartographic crime. Some hold an exasperated or sarcastic tone. “A very helpful map? #cartofail”, “I can’t even...”

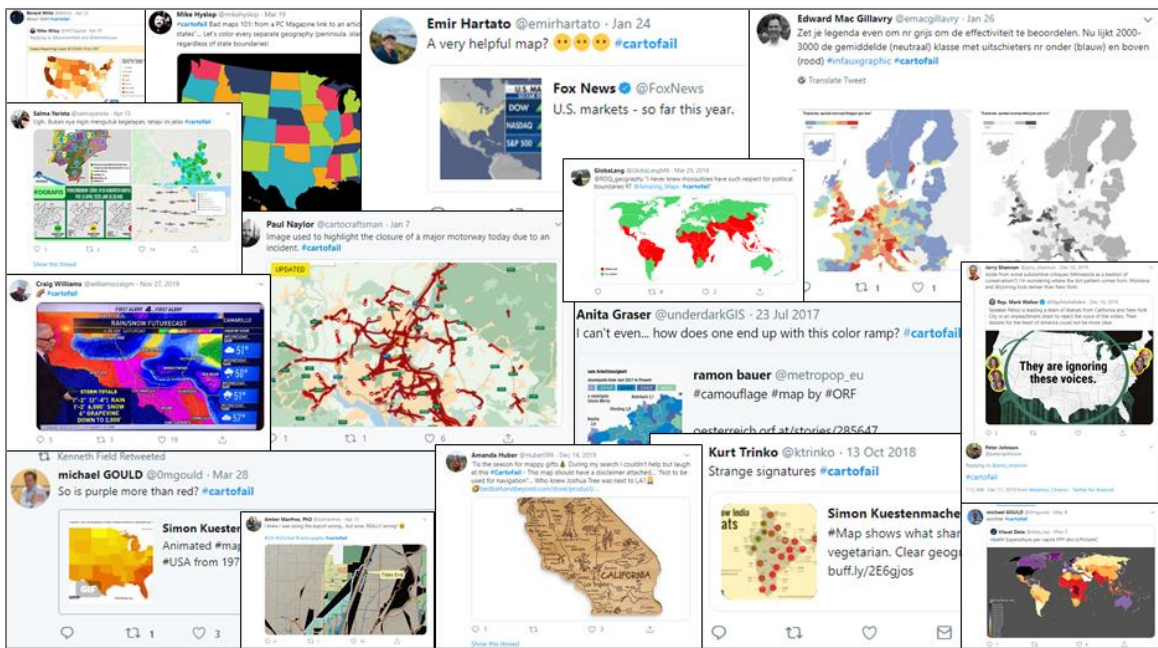


Figure 13. Twitter screenshots demonstrating the use of #cartofail

Those who are involved in cartoTwitter would be hard-pressed to avoid the scathing critiques of the hashtag on their feed. These critiques, however, come at a price, one that I have confronted firsthand while attempting to do data collection for this project.

At the onset of the project, I proposed developing an archive of maps produced through collaborative and participatory methods that I could then visually analyze in order to produce findings around the aesthetics of participatory produced maps. I reached out to close colleagues, acquaintances and flooded relevant listservs with carefully crafted email

language that would direct folks to submit their maps to be included for analysis. With over 75 individual emails and fifteen different listservs, I ended up with only four submissions.

While recognizing that there are many factors influencing someone's decision to contribute their map to be included for a PhD student's analysis, interviews revealed that there were two primary limitations. First, folks did not want to share a map that represented a community that had not given its explicit consent for the map to be shared for this type of use. As one PML expressed, "It feels sort of strange reaching out to my research partners to ask them if we can contribute the map we made to be a part of this study that feels like it won't provide any direct impact or benefit for them. They are under-resourced, as many groups of their kind are, and one way I support them is by being extremely selective about the moments in which I request to take up their time". This exercise of weighing the importance and benefit of an ask is common within participatory partnerships. Participatory partners who are based in academic institutions, in particular, are careful to balance understandings of power and access between the individuals and groups involved (Block 2017).

Second, and directly relevant to this consideration of #cartofail, is that they did not feel comfortable sharing their map in a context in which it would be examined for its design. Many PMLs expressed that this tension emerged because they knew the map failed to meet traditional cartographic standards. Michael shared his experience, of creating maps with community partners that requested changes to the design of the map that would directly contradict cartographic tradition. Michael made the changes and admitted "Those are the maps I don't show geographers" where geographers represent the category of those who would negatively critique his map. I will return to this tension during considerations of

efficacy in participatory mapping context (see section 4.4.3.1), but the message conveyed by this experience is the extent to which folks are protective of their maps for fear of being critiqued in an unwelcomed or unsupportive way.

My critique of #cartofail has been the subject of multiple conference presentations over the past two years and has, for better or worse, caught the attention of those who take to the hashtag like holy communion. Those who are perpetrators of #cartofail culture are unsurprisingly reactive to my critiques of the practice. One moment that caused a noticeable rupture came on the tails of giving an invited talk as a part of Guerrilla Cartography's Atlas in a Day event, which took place on May 16, 2020. By May 20th, multiple blog posts (some in support, some "critiquing", some left unpublished) in reaction to the argument I presented, which summarized the gate keeping practices outlined in the previous section and called guerrilla cartographers to "map anyway" to imagine more liberated futures. The reactions largely stuck to the #cartofail portion of the talk and worked to correct my "misinformed" perspectives on the differences between education and gatekeeping. #cartofail, as its author asserts, is a mode of cartographic pedagogy.

In this instance, who would be the person that is being educated? It is the creator of the map? Those who make up the map's intended audience? Many #cartofail tweets are "retweet with comment" option to add the text of the hashtag. As such, the information is intended to be shared with the re-tweeter's followers. In the instance that the tweeter wanted to be in conversation with the map's creator or intended audience, it would be more appropriate to add their contribution to the "comments" section of the tweet. Additionally, it is uncommon that #cartofail retweets go beyond simply calling out the map as being a #cartofail. In the framing of education, the contribution does little more than label the map

as “bad”. In the cases where there is additional text included in the comments, the tone is most likely to be sarcastic or performatively aghast “I can’t even”, doing little to go beyond outlining the precise “problem” with the map. As such, the consumer of the tweet is responsible themselves for knowing why the map is bad. Put another way, both the person tweeting #cartofail and the person whose feed the #cartofail callout appears in are gesturing to one another that they know that this is a “bad” map, placing them in a sort of superior position to the creator of the map, who did not know that the map was bad. I refer to this as a digital secret handshake for the club of “cartography”. Cartographers love to look at beautiful maps. But they also love to discover bad ones and then tell the world that they are bad.

After seeing my critiques of the gatekeeping nature of #cartofail, cartographer Daniel Huffman reflected on his own past of online attunement via a blog that they hosted called *Cartastrophe*. Here Huffman would post entries that pulled apart and articulated the “bad” aspects of selected maps. The blog was decommissioned by Huffman in 2019 to their estimation. In this reflection, Huffman admits that their critiques were motivated by wanting to establish themselves as an authoritative voice in the discipline. “And it was easier to feel I was a good designer if I could break down ways that other people were not,” Huffman reflects (Huffman 2020). What is powerful about this retrospective is that Huffman is a well-respected cartographer today. Many flock to their sessions at NACIS meetings and they have nearly 8,000 followers on Twitter (a substantial amount for the discipline. For perspective, I have 766, our beloved Matt Zook has 2,378, and Gillian Rose has 5,840). Huffman is particularly known for their informative tutorials whether, through blog posts, YouTube videos, or even live streaming. As such, the vulnerability Huffman

models by “atoning for one’s sins” provides a nourishing moment for the discipline. They go on:

I took people’s maps, uninvited, and publicly stamped my thoughts on them. I did not ask the authors about their goals or process; I made assumptions, instead. I did not ask them if they were comfortable with a public critique. I did not ask them what they thought about the work — maybe they didn’t even like it (my maps sometimes feature parts I don’t want to claim credit for, as clients push me to make decisions I disagree with). I did not invite them to be a part of the process of improvement and learning. They never had a chance to explain themselves before I passed judgment. Now, I’m not suggesting there’s absolutely no value in looking at other people’s designs and trying to learn what we might want to avoid, nor do I suggest we stop having negative thoughts about the works of others. But it’s all about the approach and context: my good and/or educational intentions did not matter as much as the importance of including the original map author as a partner in public critique, which I rarely did.

This excerpt demonstrates how Huffman is grappling with the intentions and contributions of this work with Cartastrophe. By discussing the lack of engagement with the map’s author, the questions of intention come into alignment. The authors of the pieces that are being critiqued are rarely the audience of the criticism in these venues. But what’s more, is that Huffman speaks to the ways in that the ability to enforce a particular form of attunement is a rite of passage for the padawan cartographer. Ultimately, the ability to be able to attune others is the metric by which to ensure that you are yourself attuned. When one’s attunement is tied with the ability to be hired in the area of which you have been attuned, you are particularly eager to demonstrate your own ability to attune others. But what Huffman offers here is a counter-argument for stances on the validity of #cartofail as a pedagogical technique. Demonstrating that there are ways to educate that go beyond performances of attunement. However, examining this framing as “education” reveals the contours of attunement even further.



### 3.3 CONSEQUENCES OF ATTUNMENT

Participatory mappers are misattuned, much like Claudia who ripped out rather than combed the hair of the white baby doll. Here, the object of the map is a precious artifact. Clucks replaced with ooohs and ahhs, caresses replaced with the gentle glide of a tracing index finger. The doll's blue eyes translate to the glowing symbols of firefly maps, the artistic representations of the surface of Mars, the hand drawn depictions of the most powerful country in the world. The adults are curators of atlases, books on cartography, even retweets. Like the blue-eyed baby doll, they are loved because they look a certain way. The power of the perception of beauty. It is not that they are loved and so they become beautiful. They have done nothing except to deliver in the world a sense of beauty but through this delivery, they deserve to be loved. To not love them, is to bring violence onto them. And onto yourself.

For Claudia, she knows that the whiteness of the doll is what makes the doll lovable. Claudia is alienated by her own lack of whiteness. Participatory mappers, who arguably are frequently the largest concentration of mappers with Black and brown bodies, are similarly alienated indirectly related to the color of their skin. Authoritative representations with their seemingly sleek design are used to decide where people of color are not allowed to obtain homeowner loans, where to concentrate police presence, where to set up checkpoints. The meticulously selected colors mask the trauma inflicted by the map's impact. The data doesn't lie, they say.

Participatory mappers reject the bringing/making capacity of authoritative maps first by rejecting the worlds that maps work to create. Authoritative maps perpetuate violence on communities by erasing experience, denying ownership, asserting blame while

concertizing heteropatriarchal claims to existence, ownership, and blamelessness. Rejecting the map's world making capacity is as simple as living a life that was done to explicitly erase that life. Regardless of the color of the polygon, the selection of the basemap, the placement of the legend, life persists. Participatory mappers reject the world the maps bring with them by refusing to fetishize the map artifact. "I don't care about the map; I care about the data"

What is most notable, however, is that attunement is not enabled for efficacy broadly, but for traditional cartography's particular formulation of efficacy. There are few instances where there is any attempt to measure if a map that is being labeled as ineffective has actually been ineffective. In the instance of the PML who was misattuned to the desire of the cartographic editor, the community went on using the map because it continued to and always had suited their needs. So rather than attuning to efficacy in the ways it materially operates, what's being attuned to is the expectations of how efficacy is achieved – particular approaches, particular aesthetics. The discipline of cartography is concerned more with the disciplining of its practitioners than with the power that the map asserts beyond the hands of the cartographer.

Cartographers are sure to protect this power through both offensive and defensive means. They delegitimize any form of mapping that does not privilege the product. Joining in Denil's assertion that "It proves that they're not serious," they refuse to publish maps that don't meet cartographic standards regardless if the community is serious or not. The judges for the atlas select their own, an intellectual and visual inbreeding (see 5.2 for more on this). They protect that which is theirs. Their exclusion is enabled by efficacy. To have

a more diverse discipline, we must first be accountable to the expectations put in place by the discipline and be willing to examine whom these expectations serve.

## CHAPTER 4. EFFICACY AMONG THE MISATTUNED

*It might be that we do destroy things to work them out. Or it might be that working them out is perceived as destroying things*

— Sara Ahmed, *Living a Feminist Life*

This chapter discusses the ways in which efficacy is conceptualized in participatory mapping. I begin by situating – peripherally observing the differences in aesthetics between participatory and non-participatory approaches as can be seen early on in the practice. I then reflect on interviews with participatory mapping leaders (PMLs) to articulate the specific mechanisms that create such divergences in both the process and product. This reveals that the efforts of “novice experts” who lead the participatory mapping projects often are informed first and foremost of participatory methodologies more broadly, therefore centering the community’s concerns and overall relationship to the map becomes the priority. The processes through which this emerges, however, are influenced significantly by expectations of traditional cartographic efficacy. This clash of expectations produces tensions and contradictions in the process and perpetuating the gap in understanding for both participatory mappers and cartography.

### 4.1 THE AESTHETICS OF PARTICIPATION

There are some maps that have the power to stop us in our tracks. *Where Commuters Run Over Black Children on the Pointes Downtown Track* (Figure 14) from 1971, is one of those maps. Produced by the Detroit Geographical Expedition and Institute (DGEI), it is a favorite for critical mappers, data designers, and geographers to cite when exploring the radical potential of collaborative, locally applied mapping efforts. The title allows for no misinterpretation: each small black dot place along the thin lines of road networks

represents a place where a car struck a small, black body. The accompanying text, written by Yvonne Colvard, reads: “Our brothers and sisters are being gunned down in the streets, in their bed, unnecessarily, unmercifully, and negligently. A Highland Park youth waiting on the corner for a bus with his mother is killed by the negligence of a white pig chasing a suspect, totally ignoring the safety of innocent bystanders on the street” (DGEI 1971, 18).

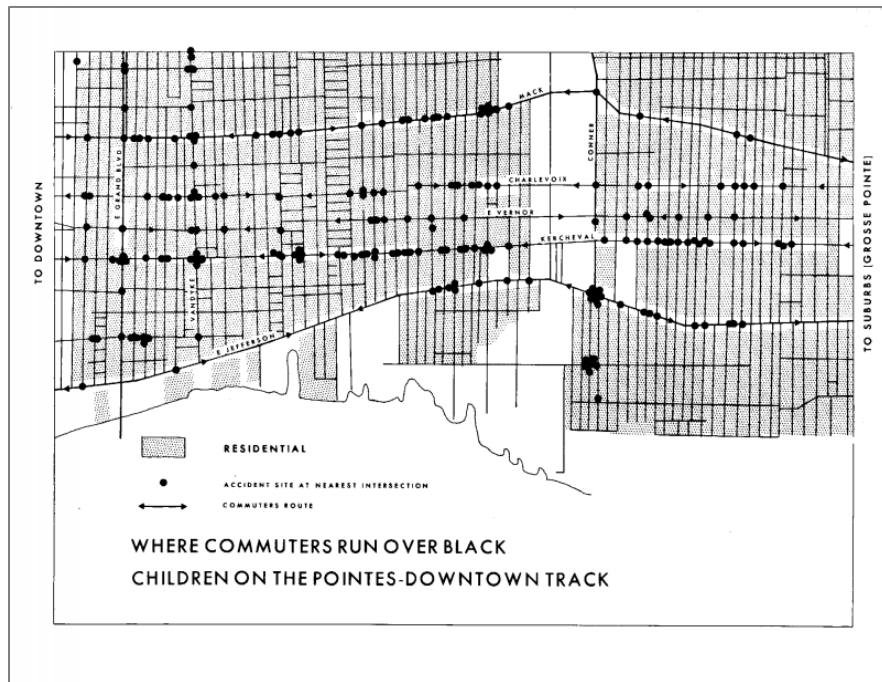


Figure 14. “Where Commuters Run Over Black Children on the Pointes Downtown Track” from the Detroit Geographical Expedition and Institute *Field Notes Discussion Paper No. 3. The Geography of Children*

While the map does not focus only on police violence, Colvard’s words reveal, not only are black children getting ran over and killed in their neighborhood, but this is happening at the hands of police officers. The report at large speaks to the prison industrial complex, how the complex weaving of socio-political contexts in which a child is raised can lead to future instances of drug addiction, crime, poverty, and subsequently, a prison sentence. This study grants holistic attention to the children of the community in an effort not only

to uplift this Detroit community but also the Black community at large. “We must go into the community, our community and save our children’s play areas, schools, text and leisure materials, and paints them with a Black coat of pride. Then we can rest, assured our Black minds will not die. Our children will be our salvation” (DGEI 1971, 18 emphasis original). To keep from dying, members of the DGEI took to understanding the mechanisms that were killing them.

The DGEI, more broadly, has a significant and mythologized history, particularly for radical and activist geography. Though popularly accredited to the efforts of Bill Bunge, the herstory of the partnership starts with Gwendolyn Warren. A Black woman from a neighborhood university researchers were using as a “field site” for their research, Warren was a pivotal actor in establishing a partnership between the researchers and local community members (mainly teens and young adults) that eventually evolved into the DGEI. In her recent reappearance on geography panels and conferences, she explains how these academics needed a “Sacajawea” to be able to better understand the challenges being confronted by “ghetto residents” (a term used by the university researchers, not the neighborhood residents, see *Gwendolyn Warren and Cindi Katz in Conversation* on Vimeo) Warren used this as an opportunity to negotiate for community members to receive college credit through their participation in the “expedition” of their neighborhood, thereby adding “Institute” to the name. The DGEI “combined geographic concepts and methods with personal hypotheses and definitions of problems. The result was a series of innovative studies of health hazards, income flows, traffic flows, death rates, and other variables of concern to the students” (DGEI 1971, 1).

The first round of courses and credit offered through the institute led to a need for more courses, specifically around the area of cartography. The Administrative report reflects that, “Initial efforts lead to a need for cartographic instruction so that the maps from the first studies could be refined for publication. Hence, second credit courses were organized, in cartography, through Michigan State University. Geographers from other institutions also donated instructional time at this stage” (ibid). This is the extent to which the cartographic methods of the DGEI are discussed. The maps that are published in the report, however, have no clear statement of authorship. Additionally, Warren notes, “One of the biggest oversights of [the project], for all the geographic inspiration that it has created, was that Robert “Snoopy” Ward, who made all the maps for the DGEI...is not credited for all his cartographic skill and creativity” (Warren, Katz, and Heynen 2019). These claims of Ward having “made all the maps” creates a tension with the report that there were classes provided for community members that specifically addressed the maps produced in the project, the explicit goal of improving them for publication.

The moments of confusion around accreditation and the process of the production of the maps included in their reports are representative of a larger silence in the discipline. These gaps of understandings around who produced the map make it challenging to understand precisely how the map was produced. But the map was indeed made, and certain design decisions were made along the way.

Though it is known that Ward was the cartographer and courses were offered in cartography, it remains unclear exactly what was informing the design of the map. Was Ward the only one who had a role in deciding the design of the map? Or did community members of the institute, Black students from Detroit, contribute to its production? Were

there opportunities for feedback or quality control? Did Ward specifically train students in cartographic production? The field notes unfortunately do not provide us with any insights. While the design has not been considered deeply, as previously mentioned, the map artifact itself has been. Critical cartographers point to it not just because it subverted the top down considerations of the knowledge production process in the curation of its data but also because of the pointedness of the information it conveys. The title alone causes the pause. A damning claim, demanding change.

In *Data Feminism* (2020), Catherine D’Ignazio and Lauren Klein use this map as an example of what it means to challenge power. They highlight the ways the DGEI, driven by a collective of black youth, gathered their own data and visualized in an effort to specifically speak back to the experiences of oppression they were facing in their everyday lives. D’Ignazio and Klein situate the emancipatory potential of this map by juxtaposing it against the Residential Security Map of Detroit (Figure 15). This map was one of the earliest instances of redlining (a term used to describe the racist practice of demarcating maps, often in red pen, to indicate areas that banks were advised not to allocate homeowner loans to) and that is technically a collaboratively produced map as it was made in partnership between the Detroit Chamber of Commerce and the Federal Home Loan Bank Board. In this comparison, they take to looking at the design of the maps. D’Ignazio and Klein state, “Both maps use straightforward cartographic techniques: an aerial view, legend and keys, and shading. But the similarities end there. The maps differ in visual style of course. But more profound is how they diverge in terms of the worldviews of their makers and the communities they seek to support” (2020, 49). They go on to describe intents



driving the Detroit Board of Commerce’s mapping initiatives (reinforcing inequalities) compared to the DGEI (challenging power by highlighting inequalities).

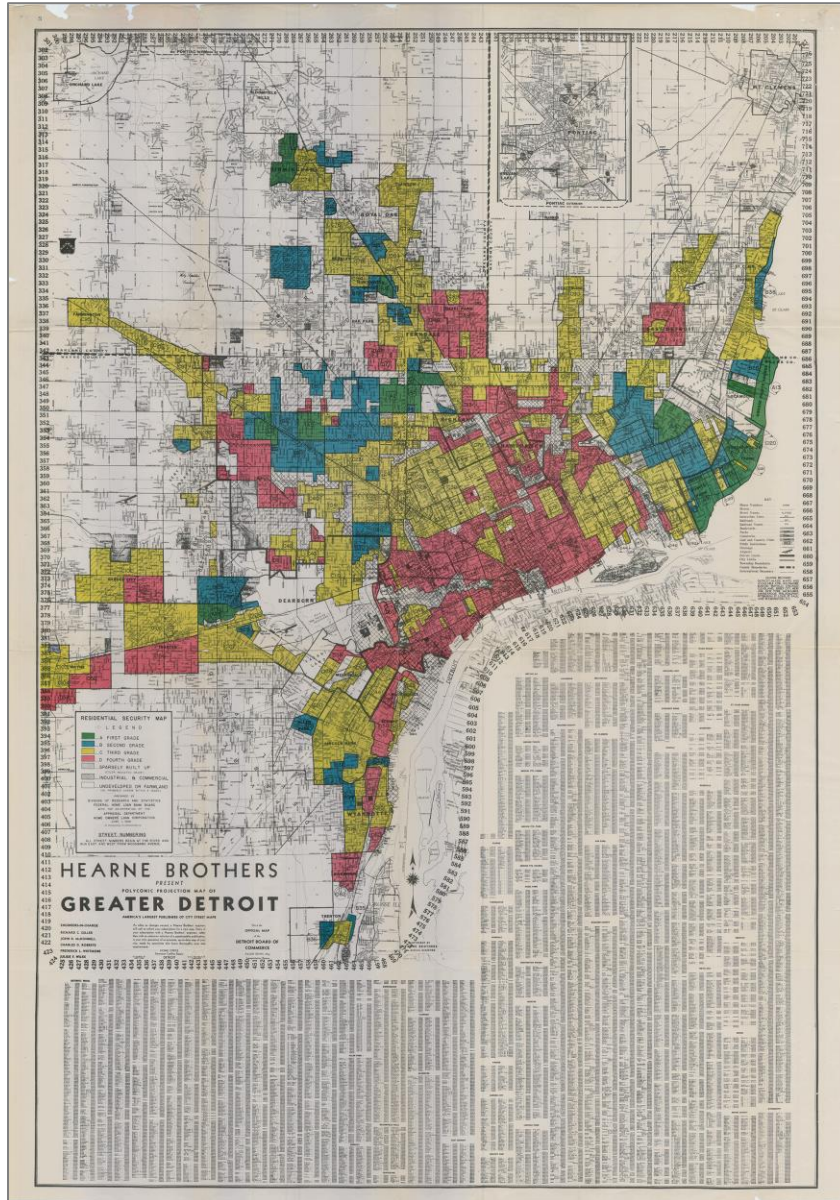


Figure 15. “Residential Security Map” of Detroit published 1939 by Detroit Chamber of Commerce and the Federal Home Loan Bank Board

However, applying a cartographic lens to this comparison reveals a more robust consideration of the ways these two maps differ in their design. A juxtaposition of the two

legends alone reveals significant departures in design. The DGEI map has three datasets being visualized: Residential areas, accident site at the nearest intersection, and commuter routes (showing directionality) with the only additional elements included in the map frame texts that label the streets as well as a thin line to articulate the shore of Lake Michigan (perhaps the most complex symbol of the map based on the complexity of the shape when comrade to the straight lines of the roads and circle symbols). On the Residential Security Map, however, there is a great amount of complexity due to a greater number of datasets being visualized. The legend reflects seven different categories, with additional labels and symbology for streets, house numbers, railroads, parks, cemeteries, golf courses and country clubs, drainage, airports, and different types of boundaries (city, township, county). One could argue that the complexity of the data, which promotes trustworthiness, as well as the use of color, which creates visual diversity and contrast that is inherently attention grabbing and quickly communicates the primary message of the map, grants the Residential Security an unshakable sense of efficacy.

Even exploring the differences in this limited capacity suggests that positionality and approach can influence map design. Again, because the precise processes that drove the production of these maps are unknown, the justification for the design choices also remains unknown. Regardless of the “whys” driving these divergences in design, what this comparison offers is a more historically situated understanding of the questions this chapter examines: how the experiences of present day participatory mappers and the intentions driving their actions inform their map design processes. Priorities for mapping that challenges power has historically resisted the precise methods and modes of refined mapicity (see section 2.1).

This chapter works to fill in the gaps of understanding by articulating mechanisms producing the different conceptualization of efficacy between professional and participatory modes of map design. Up to this point, participatory mapping has been discussed in broad terms. Here I offer a fuller account of participatory mapping with the particular intention of demonstrating the impact that this approach. In doing so, this chapter also examines the silences of participatory mapping around questions of design through a review of nonrepresentational theory. These silences, however, do not result in the production of map artifacts that lack efficacy. As such, the last section of this chapter explores the specific ways by which the maps which are misattuned (see previous chapter) become effective.

#### 4.2 “BUT DO THEY WORK?”

Before considering the ways in which map design is taken up in participatory projects, I want to first address a persistent question. Following nearly every conference presentation I’ve delivered in the past five years, I am approached with some form of the question “but do the maps actually work?” In maintaining a commitment to examining “conferences-in-action,” such a consistent line of questioning demonstrates in yet another register how the cartography/mapmaking divide operates in the discipline. Traditionally trained professionals, scholars, map enthusiasts who attend the ICA, AAG, and NACIS meetings have little in place for theoretical or applied scaffolding to conceptualize the maps produced through participatory mapping to be effective. As such, to attempt to answer the question “do they work?”, which is another way to asking, “are they effective?”, again reveals a primary source of the dissonance. Matthew Wilson confronts a similar division between those who ask and those who are asked the question “But do you actually *do* GIS?”

(Wilson 2017). For Wilson, the intentions of such a question bring to the surface a broader performance of disciplinary siloing and systems of valuation between those that critique and those that do. The questions “but do you actually *do* GIS?” and “do they work” is delivered with the same air of suspicion. Delivered from white men in the back of the conference room, leaned back in their chair, arms crossed, chin up, and a condescending tone that passes for intellectual inquiry. For participatory mapping, a map produced in ways that is markedly different from how a map that “works” is produced becomes effective...because of its ability to work. Rather, the *type* of work that participatory produced maps do is not validated by traditional conceptualizations of efficacy. Put another way: “maps that work” are not the only maps that work. As such, I argue that this locates cartographers in spaces that limit their understanding of cartographic efficacy. If attention is given primarily to those variables that “work” it will be understood that this is the only way things can work.

In order to be able to say “yes, these maps work”, I need to first deconstruct the metrics of measurements that assert a project or the map it has produced has been a success or a failure in its capacity to do work. As previously discussed, in a traditional setting, the map’s ability to perform the parameters of *capturing the attention* of an *outside user* in a way that enables *quick understanding* and — *trustworthiness* of the information being presented via the deployment of *practical skills* taken up by a *single mapmaker* to visualize data in ways that are both “*accurate*” and *beautiful* (see chapter 2). A review of the literature speaking to participatory mapping points to a stark departure from this conceptualization.

The most obvious site of this departure is in the parameter of the *single mapmaker*. At its foundation, participatory approaches are about folding in more people into the process

(Craig, Harris, and Wiener 2002). For mapping, this has been done in an attempt to “broaden public involvement in policymaking” stemming from recognition that maps are used to inform many areas of policy development (Sieber 2006, 491). More specifically, the broadening specifically worked to invite participation from “historically disempowered people and communities” (Weiner, Harris, and Craig 2002, 12). By translating and incorporating personal and neighborhood experiences into the powerful medium that is a map, this established an elevated platform from which to fight for and defend the rights of communities (Parker and Pascual 2002). This was seen as shifting the role of the community member from the “object of geographical research” to “the creator of the agenda and decision makers” (Panek 2016, 304).

In this community driven setting, the motivation for using and making maps can span across a range strategic use cases and desired goals (Craig and Elwood 1998). Many of the instances are for “internal” use by an organization (ibid) whether that is to help gain an understanding of an issue, develop long-term plans for the organization, or to assist in administrative record keeping. Of course, there are plenty of instances where maps are shown to individuals outside of the organization, however, even then it is not the responsibility of the map to capture the attention of its readers through its aesthetics. Returning to the initial goal of the approach, to inform policymaking, the audience of the map, whether internal or external to the organization producing it, is often already invested through some mode of connection, in the outcome. These folks are broadly referred to in the literature as “stakeholders” (Freeman 1984) and are often working to either influence or respond to actions of the (nation)state. This can be scaled, ranging from representing instances of an event that official county datasets blatantly omit (Boll-Bosse and Hankins

2017) to helping inform environmental management strategies for a particular ecosystem (GAP2 n.d.). Maps do not need to *capture the attention* of stakeholders. By simply speaking to the issue that the stakeholder is invested in, their attention is already engaged. This additionally challenges the notion of working to ensure speed, as the map does not need to convince a detached user before they continue scrolling. Along similar lines, there is not a necessity to ensure trustworthiness from the mapped data, as the information exchange that is taking place outside of the map is working to facilitate this.

Along these lines, the concept of “paramap” (uwm 2008) speaks to this process by granting importance to the information that is being provided outside of the boundary of the map that helps situate and provide understanding for the map. In treating the map as a form of sign-signified communication (meaning images and text), the paramap is the information beyond the sign-signifier relationship that influences the way the map is received and read. This can include the quality of the paper a map is printed on, the text of an article a map is included in, or the pamphlet that was used to advertise the presentation the map was shown in. What participatory mapping prompts us to do is expand this consideration of the paramap to look to the socio-political context in which the map is being engaged. The broader network of interpersonal and political relationships enables the map to be trusted. Is it because of the legitimacy granted by such relational understandings of the stakeholders involved, that the map aesthetics itself is not required to do the work of enabling trustworthiness of the data being presented?

Put all together, it becomes clear that the parameters that can produce the effectiveness that the question “do they work?” requires do not ensure map effectiveness in the context of participatory mapping. Participatory produced maps are not used the same way

traditionally produced maps are. And perhaps the misattunement that is facilitated by the mapmaker is actually more related to the map reader. While differences in use cases are common among traditional cartographic use cases (a map for guiding someone on a hike will look different than a map helping someone navigate public transportation), the stratifications of use cases continues to uphold the overarching expectations of efficacy. As such, the remainder of the chapter seeks to understand participatory mapping at the level of efficacy.

### 4.3 PRIVILEGING PROCESS

A primary theme surrounding the departures that are already discernible behind the capacity for participatory produced maps to do work (be effective), is the ways in which their production attends to the intricacies of process rather than the abilities of the product. This process/product divide has been discussed previously in relation to the colloquial understandings of map production via results of Google image search (see section 2.4) Here, this dichotomy helps further situate the dissonance caused by participatory produced maps by revealing the ways that a process focused lens omits attention to map design. Put another way, there is not any clear justification as to why an attention to processes would not lend to considerations around the specific processes that produce design decisions for the map.

To attempt to understand this further, I return to the work of critical cartographers to examine process orientated considerations of map production. The work of critical cartographers has long been to understand the intricacies of the map production to locate power within its production. As such, the process/product divide goes far beyond examinations of participatory mapping. The interventions of critical cartographers, from

the onset, has been to deconstruct process to reveal the subtle but significant moments of the processes that assert *this*<sub>1</sub> is *there*<sub>1</sub> in convincing ways. Perhaps one of the most detailed attempts to demonstrate the intricacies of this function was the meticulous deconstruction of the *Official State Highways Map of North Carolina* (uwm 1986). A 50-page article speaks to the inner workings of the communication system that assert the there-ness of the roads of North Carolina, not simply through a reflection on the color or width of the road, but through considerations of how a line on a piece of paper can come to be understood to represent a road in the first place. In doing so, the lines and supplementary imagery not only indicate to a driver where to turn but also what North Carolina *is*. The overarching attempt is to, in yet another way, dismantle the concept of cartography as creating objective, neutral, apolitical representations of the places they depict and announce the ways that persuasion and argument find their way into mappings.

Process is located at center stage in even more recent critiques of the ontological positioning of maps and mappings. This intervention was spearheaded by Matthew Edney and Jeremy Crampton who came out against the initial wave of critiques leveraged against cartography. In this initial wave, the considerations of process are shrouded by an assertion that an ultimate knowable truth about the world exists, and the problem with maps lies with the people who chose to manipulate the messaging surrounding this truth in order to suit their needs. Edney (2011) and Crampton (2003) instead call for a turning away from the teleological telling of cartographic history (where cartographic practices are presumed to be on a singular path that evolves the map's ability to accurately and completely represent the truth of the world) and call for a relational understanding of mapping. Here, maps are seen as contingent upon the social, cultural, and even technological capabilities that are



present at a particular time and place. This, Crampton argues, produces a “certain horizon of possibilities” (2003,51) through which the map can be read. From this perspective, the definition of the map is flexible, bending to the localities of its emergence. In this way, the call is to locate the *is* that produces the *is* of maps.

This framing is captured by the concept of *mappings*. Mappings shift from a “representational to a processual understanding of maps, from ontology (what things are) to ontogenetic (how things become)” (Kitchin, Gleeson, Dodge 2014:3 494). In this way, maps are not finalized in their ability to capture or reflect phenomena but rather are stopping points that reflect the arrangements for a particular moment. Maps are “fleeting”, “transitory”, “contingent”, “relational.” They are always in becoming, continually unfolding. This framing allows the escape of the taken for granted ontology of traditional cartography, which has an assumed ontology that the world *can* be fully and truthfully represented through a particular approach. Put another way, by expanding the viewfinder of what is considered the “process” of map production to the broader circumstances in which a map emerges from and for, mapmakers and their mapmaking processes are grounded more fully in their positionality and allows for a standpoint theory of cartography.

The epistemological impacts of this framing are reported on in a case study of real estate practices in Ireland (Kitchin, Gleeson, Dodge 2013). They discuss the 300 iterations of the map that, the authors argued, reflected the ceaselessness, and contextualized nature of the mapping process. While they note that mapping practices can be informed by an expansive array of variables, including “aesthetic choices, design conventions, personal idiosyncrasies and ignorance, office routines and cultural norms (Kitchin, Gleeson, Dodge

2013, 482) the specifics of the design consideration are not included in their analysis. Instead, they pay close attention to the evolution and undulations of the map's location. By tracing where the map appeared and the relational networks that allowed for a new location to emerge, they demonstrate the impacts of an ontogenetic approach to the discipline. It seems their call to shift away from "focus of analysis from approaches that prioritize optimal ('scientific) map design and techniques of map construction, or focus on deconstructing the ideological meaning or process of inscription or proscription" (ibid 494) goes too far as suggested by their methodology not taking design into account at all. However, a silence in the discussion around the consideration of design decisions does not mean that design decisions were not made. The map has been designed in that choices about how to assemble the particular elements of the map have been made. Even if the choice has been to stick with the default of whatever the color scheme, projection, or map layout the program that is being used provided-this is a choice.

Yet with these two areas of consideration (critical cartographers that either reveal the political processes behind already produced maps or restructuring the political possibilities of mapping by revealing the ontological insecurity of the "final" map product), neither provides a way to conceptualize the role of design while in a process. Is there a way to escape the securitization of the assumed ontology of cartography while also assigning an influence and possible power to the design of the map? Nikolas Huffman explores this question in his chapter *You Can't Get Here from There: Reconstructing the Relevancy of Design in Postmodernism* (1996). As suggested by the title, Huffman is frustrated by the critical cartographers' process privileging frameworks for map production offer no room for purposeful engagement with cartographic design-leaving the discipline feeling stuck

between a here and there that offers no path between the two. He asserts, “Their critiques have focused primarily on the interpretation of maps as a cultural artifact and have done precious little to engage cartographic design and production as an object of critique” (Huffman 1996, 36). Ultimately, Huffman aligns with the intended outcomes of critical cartographers, to insist upon closer attention to the politics of representation and, as such, goes on to urge designers to take up the burden of resolving the tensions of these critiques through applied integration. This attention is generous, as many design minded folks roll their eyes and gladly turn away from being tasked to attend to their work through a critical lens (Wilson 2017, 139).

My experiences with WALT (as discussed in the introduction), more specifically-the tension I experienced and navigated around during the unanticipated moment of map design, demonstrate that the reconstruction that Huffman had called for has been largely bypassed. There is no substantial discussion, and therefore no articulated approach, around how to be critical of the power of the map while also attempting to strategically leverage the power of the map for the systemically disenfranchised. As such, participatory mappers are individually constructing their processes within their projects, which the following sections work to contextualize and outline in more detail.

#### 4.4 (DIS)ORIENTATION: EFFICACY IN PARTICIPATORY MAPPING

While participatory produced maps do not work to uphold the expectations of efficacy espoused by traditionally produced maps, little has been done to explore the specific modes of efficacy that are enabling the success of participatory produced maps. Through interviews with participatory mapping leaders, I analyze both the conceptualizations of efficacy among PMLs as well as how they work to achieve this standard. Juxtaposing these

two considerations side by side reveals a substantial tension that, I argue, is produced by the PMLs to bring their processes into attunement with broader systems of valuation in spite of being out of alignment with many of the principles of efficacy.

Interviews were broken up into three sections. The first section of the interview script asked participants to speak to their training and thoughts about design and cartographic practice more generally. This was to help provide a framework by which to interpret the information they shared in the rest of the interview. The second was to discuss specifically their experience with participatory mapping. Here I'm interested in the motivations and relationships that enabled their experiences as well as understanding the extent of their experience. It is within this section that I direct the conversation to explore the question: "What is a "good" map in the context of participatory mapping?" The third and final section asked interviewees to ruminate on the specifics of one of their projects and share detailed accounts of the decisions, conversations, and actions that went into designing the map that the project produced. Having contextualized the project's cartographic understanding and goals earlier in the interview, this section allowed for a deep dive into the mechanics that produced the map, thereby allowing for a comparison between the goals and ideals of the "good" map for participatory mappers and the modes by which this is attempted (or not) to be achieved.

In the following sections, I explore an entanglement of three significant themes and subthemes that emerged: 1) that many PMLs self-identify as having little experience in map production and/or cartography yet held a position in the project where they were responsible for overseeing the creation of the map, 2) the centering of community when conceptualizing cartographic efficacy and 3) the ways the first two themes intersect to

create notable modes of misattunement for participatory mappers that can be experienced as shame and, in turn, solidifies the barriers between participatory mapping and traditional cartography.

#### 4.4.1 THE NOVICE EXPERT

The individuals who were invited to be interviewed for this project agreed with my categorization of them as leaders of participatory mapping projects. This means they identified themselves as someone responsible for driving the mapping components of a project. Sometimes, the production of the map is the primary goal of the project. Other times, the map is one part of many of a larger project.

A surprising but consistent theme that emerged throughout my interviews was the assertion, or almost guilty admission, by PMLs to let me know “I’m not a cartographer.” This showed up in multiple places throughout the interview, though it should be noted that no question was ever posed about their specific relationship to the label or category of “cartographer.” In all but three of my interviews, the PML expressed that they were not cartographers in definitive terms. Out of the three interviewees that did identify as cartographers, two of them were professionally employed to make maps for entities that have been globally recognized for their role in developing maps and geospatial information. The third person was self-identified as a cartographer, the specifics of which will not be shared due to agreements of confidentiality. This did not always come up during the specifics of considering their training, it would sometimes emerge in the third section of the interview which involves discussing the specifics of their methods of map production.

A primary motivator to distance oneself from being perceived as a cartographer was to communicate a process of skills development that took place largely outside of formal institutions. Of the “non-cartographers”, they explained how they were either completely self-taught or had taken a single course, often in GIS, that they were supplementing with self-instruction. Sam shared, “During my PhD program...I took the intro to GIS course. I took the course in how use geo-data and how to do special auto correlations, things like that and that was about it in terms of formal training. And then most of the rest of it was just interacting with faculty and learning through doing it, rather than learning through training. I know for sure what I didn't get was anything really with cartography. It's really only been the last three or four years. But I've really gotten much in terms of cartography.” The recent years that this participant speaks to is the time following the expansion of their role as a facilitator for a community-based mapping lab. Like for this person, any type of formal training that was discussed throughout any of the interviews was achieved through university based courses first and foremost which could be expanded through professional opportunities where they were assigned the task of making a map. For those who had received this formal training more recently, however, it was not centered around cartography or map design but rather GIS. While considerations of design are very often one of the considerations being included on the syllabus of GIS courses, it is not the primary area of consideration. In comparison, the folks who identified as cartographers often took a sequence of courses specially focused on cartography and design.

The participatory mappers who had been trained in cartography but did not identify themselves as a cartographer are those who received training on map production prior to the proliferation of digitally mediated map production. Having learned using light tracing

tables and watercolors, they reported not developing skills in digital methods of map production until a project required them to do so. Brian shares, “I took a pen and ink cartography class as an undergrad. I think it was the last pen and ink class they had. In high school as well I took drafting, because I wanted to be a cartographer. Since a really early age, like five years old, I thought I wanted to be a cartographer. But I just was not very good. There’s people who sort of have a good hand. That wasn’t me. [Being a cartographer] then wouldn’t have worked out.” He went on to describe how he had been introduced to more digital means of production through a GIS course taken in graduate school (similar to the previously quoted and many other interviewees). Unsure of what he wanted to pursue professionally, Brian took time off during his graduate program and translated his hand drawn cartography skills and GIS skills to gain employment as a cartographer for a short time before returning to graduate school. Again, this is a person who resists currently identifying as a cartographer. It seems that the category of cartographer is weighty, and that many folks, particularly in the participatory realm, are not willing to bear that weight. Partially due to their lack of professional training. However, this does not capture the entire experience. As is demonstrated by Brian, participatory mappers work to keep a distance between themselves and the label of “cartographer” even if they have professional training and work experience.

#### 4.4.1.1 PARTICIPATORY METHODS TO PARTICIPATORY MAPPING

With the understanding that many of the PMLs go out of their way to articulate a supposed inadequacy of skill due to a lack of professional experience or training in cartography, then it is worth exploring in more detail how these individuals get elevated to the post of what I’m referring to as “participatory mapping leader.” The primary pathway

revealed by interviewees was that that they often came to participatory mapping by way of more broadly conceptualized participatory projects that then evolved in such a way to include a mapping component. Then, for a broad range of reasons, the person who came to be the PML was named as such. For example, Michael has an urban planning background and was very familiar with participatory modes of data collection, so much so that he tried to incorporate it into as many projects he was involved in as possible. He reflects on a particular project understanding equity in relationship to a public transportation proposal put forward by the city. The project developed in such a way that it had a mapping component. As Michael describes, he was “nominated” by the larger research team to be the PML by way of a vague understanding of what the task requires. Here he tries to articulate the contours of the decision: “folks thought... ‘Oh okay, here's some person who knows how to code’...mapping is just code. It's just a computer. You don't need any special experience in geography to map.” For Michael, it was an understanding that he knew how to build and manipulate digital environments that “landed him the job.”

While Michael’s on-ramp was his experience with participatory research via urban planning, for Rachel it was her background in public health. Again, while she was not focused on mapping, or even geography, as a lens for her work, mapping at times would emerge as a method for a particular project which would eventually lead her to being hired as the director of a community focused mapping center. With her experience working with Indigenous groups while working for a global conservation agency, she encountered her first experience with participatory mapping which, she reflection on, “...was all using paper and/or natural materials, rocks and leaves...So when I started my position, I had only my training in participatory methods more broadly and experience using the Arc[GIS]



products that I had been taught in my GIS class.” This suggests that participatory mapping partnership or positions that facilitate participatory mapping projects are taken up by individuals who have very often have expertise in areas that value participatory work. It is through their experience and knowledge of the functioning of participatory work that they then are prompted to develop skills in participatory mapping. This largely counteracts the framing of partnership modes that emerged out of practices of P/PGIS that envisions partnerships being established between those who knew how to use GIS and those who had been excluded from GIS’s modes of production. Rather, when projects or centers are developed in such a way that enables mapping to become an appropriate part of the work, that is when they take up the call to learn how to map.

#### 4.4.2 CENTERING COMMUNITY

It is tempting to assume that since PMLs identify as novices, that they lack any type of strategy about negotiating the design of maps. On the contrary, interviews reveal a number of ways they inform and influence the map design process. What is notable is that many of these strategies are not largely informed by cartographic understandings or considerations about what will produce an effective map. Rather, they are informed by considerations of how to effectively engage in participatory and collaboratives work. PMLs are often first and foremost interested in ensuring that their partners feel included, heard, and ultimately, accurately represented. This takes place both at the level of person-to-person and person-to-group interpersonal interaction as well as between the community group and the map artifact. As such, PMLs navigate intricate entanglement of moments between themselves, the map artifact, and their community partners. Interviews suggest there are two primary moments in which this negotiation is particularly potent.

One of the first ways this is observed is through a precise understanding of the ways in which particular designs hinder or welcome engagement from community members in primary data collection efforts. Some participatory mapping methods work to speak back to official data records by collecting and visualizing primary data, often from first-hand accounts and local knowledge (Sparke 1998, Peluso 1995, Boll-Bosse and Hankins 2017). The primary data represent the gaps in knowledge and erasure being purported by the official data. Data collection can be facilitated through a range of approaches or tool sets that, often, the community interact with directly to collect data that can then be massaged and visualized following the completion of data collection. However, while visualization and design of *the primary data* occur at later stages, often data collection is facilitated by adding to a basemap. The design of this basemap, interviews reveal, is a crucial part in the process and one that varies from the design of the primary data. In particular, PMLs in a variety of contexts, reflect on having gained an understanding that, as Patrick put it, “messy maps invite engagement.” By inherently capturing a feeling of incompleteness, community partners are more open to investing time and committing energy/resources in order to complete the map.

As such, some PMLs spoke to the ways they intentionally made the map “ugly”. Kyle references the way he used harsh color pallets and “unprofessional” fonts to represent the information he did know about the area and gave community members markers with the invitation to mark the map up and make additions and corrections. This is a common theme for PMLs who have a more substantial resume of experience. While sketch mapping is a very popular method of hosting participatory mapping engagements (Boschmann and Cubbon 2013), discussion of design is often lacking, subsequently offering little around

strategies for leveraging design to support the facilitation of the exercise. However, Kyle and others learned from experience that a map that looks professionally made creates a feeling of distance between the map and the community. They speak to folks not wanting to take their markers to something that looks crisp and finished, tidy and organized –almost as if they don't have a place including their claims in the narrative being represented because they know the marker lines will invite a form of messiness to the pristine map. Rafi reported that members of the community he worked with in South America, “they scowled at me when I asked them to make markings on the maps that I had brought that were made by my graduate assistant who had taken a number of cartography courses. ‘I don't trust your clean map’ they told me.” A map that lacks trust is a map that is ineffective. In this case, the graduate assistant has made the maps with the parameters of traditional cartographic efficacy in mind. In order for the approach of participatory mapping to become participatory, design must attune to community rather than to cartographic principles that have been established through the guise of objectivity and scientific discovery.

The second moment of negotiation is in offering reactions to maps that have been produced. PMLs confront this moment in different ways. Some make space and assign time specifically for their partners to provide feedback on the map while it is in a draft form with the intention of presenting them with a finalized draft. Others do not seek out the feedback of their partners explicitly but, for one reason or another, the feedback is offered and the PML has to consider how to move forward. Both moments are completed with the idea of putting the community first. In the instance of including the community in the discussions of early drafts, this serves as both a quality control moment for the data that is

being represented as well as an understanding of how design can be changed to make the community feel more supported. In these instances, many PMLs report working to ensure that community members see themselves represented in the map and have a sense of connection to it. Michael shares, "...for maps to become effective community members need to feel ownership of that map. Even if changing the symbology or color makes it wrong, if that helps that particular community group feel ownership of that map and help them feel that they had a voice...I think that's a win, right?" Here, Michael captures the intricacies of these moments of feedback, where community members might make suggestions or requests that are "wrong" as determined by cartographic tradition. Sam's comments take place in a similar place of dissonance with principles touted by cartographic tradition, but locate the discomfort with his own abilities rather than the perceptions of the community: "I don't think of myself fully as someone who knows a lot about cartography yet. I would say a good map tells a good story, a meaningful story about data in ways that reflect the lived experiences and perspectives of the folks who make the map, whose data make the map" This reflects the previously discussed theme of the novice expert while also demonstrating that there is a commitment to the individuals, the mapped individuals, who the map attempts to capture and translate. With both Michael and Sam, they uphold no responsibility to an outside, detached map user. Again, participatory produced maps are used in spaces where attention is already curated by the gathering stakeholders around an issue, even if coming from opposing viewpoints.

#### 4.4.2.1 FEELING AND UNDERSTANDING

This is a significant change of orientation in considerations of cartographic efficacy. To ground this shift more deeply, I turn return to D'Ignazio and Klein and their discussion

about approaches for providing new systems of valuing data and its related effectiveness. D'Ignazio and Klein explore *data visceralization* as a way to recognize the multiple perspectives and positionality that are made knowable through the data's representation, particularly as it promotes a visceral response from its reader. As has been discussed for cartography, a primary method of working to produce supposedly objective data visualizations was to create a dichotomy between fact and emotion. This proposes a framing wherein data that is embedded in emotional understandings are thought to be biased and not to be accepted as a reliable source of information. Conversely, data representation that are void of any emotion or prompt no emoting from its reader are considered to be more objective, scientific, and trustworthy. The work of feminist scholars, however, revealed the biases that are embedded in all data, even the data that is "scientific".

This has certainly been the case with cartography (Muehlenhaus 2012). This Godtrick (Haraway 1988) exposes the ways in which information that is produced from a singular (often white, often male) perspective is embedded with these biases and is not objective. In addition to the reintroduction of more holistic framings of the perspectives that produce research and knowledge (Harding 1989), comes along with it a reintroduction of the valuing of emotion in data visualization. This process refers to making data visceral by engaging visualization practices that make the reader engage with a particular affect/mood/set of emotions. Doing so acknowledges that "we are embodied, multisensory being with cultures and memories and appetites" (D'Ignazio and Klein 2020, 85), allowing the data to reach beyond a place of centering the visual in a practice by expanding its sensory capacity in which it can be interpreted. In this case, promoting a sense of belonging, affinity, and supportive resonance for the community members in which the map represents

is what participatory mapping is striving towards. Such a sensing releases design from the grasp of the traditional modes of cartographic efficacy.

Until recently, emotions had been explored in relation to map production primarily through the lens of propaganda. Maps that used emotion, it was argued, did so to manipulate data or visualizations with the intention of instilling fear and anxiety in the reader (Tyner 2015), particularly around controversial and urgent topics such as the Cold War (Monmonier 1991) or nuclear power (Muehlenhaus 2012). This recent attention to emotion stratify in three planes: those that consider the methodological intricacies of mapping emotion (Panek 2018, Bleisch and Hollenstein 2018), those that consider the emotions that arise when mapping a place (Caquard and Cartwright 2014, Olmedo and Chistmann 2018), and those that explore the emotional responses to reading a map (Fish 2018, Kent and Hopfstadt 2018). Unsurprisingly, however, these studies are upheld by traditional standards of cartographic efficacy, and therefore attend to the emotional experience of a single mapmaker or outside map user. This is demonstrated through questions of “how does a major political or humanitarian crisis affect the work of a cartographer mapping this topic” (Caquard and Griffin 2019). The cartographer’s relation to the strategy is through the task of mapping, not by way of wanting to map something that one is relating to personally. As such, the orientation taking place in participatory mapping, where the map is examined in the context of how it produces affects for the community the map, departs from the orientation of traditional cartography which orients to an outside, detached user of the map and elevates the importance of the role of emotion in considerations of cartographic efficacy more broadly.

What amplifies this consideration is an attention to the cartographic literacy of the community partners that the map is working to serve. Map literacy or cartographic literacy, similar to reading literacy, is a measure of one's ability to comprehend and interpret the information provided by a map (Head 1984). The inner workings of map literacy can become quite complex (Clarke 2003) with debates around how much of a performed literacy is a function of human cognition versus (Morrison 1978) a by-product of socialization and education (Head 1984). Questions of map literacy were of particular interest at the digital turn of cartography due to the changes in literacy it prompted (Speak and Axon 2012, Dalton 2015, Bachmann 2015). Additionally, challenges with literacy have been one of the many factors helping ring the alarm bells around the "non-cartographer" and their access to the modes of map production (Griffin and Fabrikant 2012). Certainly, due to the increased pervasiveness of maps, the ability to read a map is an important skill (CarterPeoples 2003). While little attention has been given to considerations of map literacy in specific relation to participatory mapping, it has been argued that "many, if not most" of participatory mapping projects "leave cartographic literacy to the imported 'expert' who attempt to translate", the moment of translation taking place is between the assertions and experiences of their partners and the medium of the map (Johnson, Louis, and Pranomo 2006, 87). Based on the criteria used to measure traditional modes of map literacy (Clarke 2003, Kroc and Demir 2014), one could posit that those in the communities that have been systemically under resourced would not rank highly on the scale.

As such, the participatory mapping leaders outlining the ways they privilege how the community the map represents feel about the map are also rupturing perceived understandings of cartographic efficacy in participatory mapping by the process would

center the literacy of the PML. Instead, PMLs navigate through instances of map (il)literacy by bending to the will of community request for edits even if it expands beyond the parameters of traditional cartographic representation. Put another way, the PML will take into account the ways that the map in the first draft (prior to receiving community feedback) form, might present in ways that are confusing, aesthetically incompatible with taste, or otherwise disorienting to community members. Interviews suggest that reactions from community members that lead to requests that contradict the traditional application of cartographic principles are often driven by a lack of understanding of the map as it exists in its current form, which could be driven by map illiteracy. Taking this into account, PMLs will often choose to amend the map in ways that correct the dissonance caused by the map rather than attempting to work to improve map literacy among the community.

#### 4.4.3 THE SINGULAR WE

The third theme I'll be addressing in this chapter is a more direct consideration of the ultimate singularity of authorship when it comes to map design in participatory mapping. The first theme examined the ways in which individuals who do not self-assign as cartographers and work to rhetorically separate themselves from the category as a way to depart from the expectations that cartography would ask their work to be measured against. The second theme explored the ways that, despite the lack of confidence expressed towards traditional cartographic skill sets, PMLs exercise great amounts of strategy when designing the map via an efficacy that centers the community's relationship to the map. This final theme is situated between these two and works to understand the weight of the strategy put in place by the cartographic non-expert by reflecting on their autonomy in negotiating the design of the map in a participatory project.



When it comes to map design, very little of the process involves more than a single person, in many cases that person being the PML. Of the 33 PMLs interviewed, only two reported actively involving community partners at the onset of the design process. This refers to moments of synchronous design, where participants had influence and decision-making power regarding design and visualization parameters. The remaining 31 PMLs spoke to the autonomy they have when designing the maps within the context of their participatory projects. Michael puts it very bluntly, “I myself had cartographic freedom over how [the community produced data] was displayed.” To make the map production process more inclusive, some PMLs host discussions with their community partners around map design prior to beginning the process and following the production of a first draft of the maps. Many of these conversations were to consider organizational branding and to explore ways that the map could reflect this branding through aspects such as color scheme and font. For others, these moments of feedback may not be scheduled, but because of the priorities outlined in the previous section, the commitment to centering community will lead PMLs to accept requests even if they were not anticipated. Returning to Michael, he shares, “When presenting a map where I had used orange...[the community] thought that color had a negative connotation. They asked me to make it blue...originally, it wasn't a check in about the design of the map.” He goes on to discuss that he did go on to make the changes that had been requested. But, returning to the freedom he spoke to, he ultimately was the one who had the power and means to make these changes happen.

Conceptually and materially, PMLs like Michael are the keepers of the map. They are often the ones who have and house the data and software that enables the map production process and, due to this singular access, are the ones who have full control over the design

of the map. The keepers of the map. Put another way: gatekeepers. Both the treatment of the community and the performance of the PML reinforce this notion. Recalling the details of the first theme, the novice expert, elevates the effort that must be exerted to assert the legitimacy of this positioning even further. The novice expert PML does not have a great amount of confidence around the map design process, however they are not only the sole designer for the initial version of the map but they also must negotiate and translate the requests made by their community partners. Again, as was discussed in the previous section, most PMLs report that they will privilege the concerns of the community over cartographic tradition. These moments of negotiation occur differently for those working within the context of a community-based mapping or research center (which will be addressed in more detail in the following section 4.4.4). In the context of a participatory mapping project, this assignment and compounding of responsibilities on PMLs is enabled by the way they become involved in the project. As discussed, many PMLs are first and foremost researchers in different capacities who specialize in participatory methods. If participatory approaches are their specialty, why do the mechanisms of map design not become a participatory process as well, where collaborators who are interested can show up and participate in the map design process?

#### 4.4.3.1 ENDURING EXPECTATIONS

This brings me back to Michael, who was partnering with community groups in a coastal adjacent city. As is a widely acknowledged norm, blue is often reserved for representing water being especially true for locations that are near water. He received feedback from the community group that requested him to make changes to the map's design. He explains, "I used orange...and they thought that color had a negative

connotation. They asked me to make it blue...” As Michael shares this, his voice is low and serious, choosing his words carefully. Almost as if he’s about to spill an incriminating secret. “But I can’t help thinking: “If I make the changes they asked for it’ll become ugly and ineffective...but I made the changes. Because I think for maps to become effective community members need to feel ownership of that map. I made those maps. Those are maps I don’t show geographers.” The secret is out. Editing the map from the originally assigned orange color scheme, to a blue one, Michael confronts the tension between the community’s request and his knowledge of this common cartographic design principles. For him, geographers are those who show up at geography conferences who show up to paper and poster sessions and evaluates the maps he would put on display. So, while he says “geographer” he is speaking more specifically to the host of gatekeepers who evaluate spatial representations. While he ultimately chose to privilege the wants of his partners, it’s almost as if Michael can hear the warnings of professional cartographers: “just because one can more easily map today, this does not necessarily mean one should.” And Michael is not the only one who keeps his maps hidden away.

The original proposal of this dissertation project outlined the steps that would be taken to perform quantitative content analysis (a method by Ian Muehlenhaus (2012) for comparing visual elements of maps and revealing common themes) on an archive of maps produced through participatory mapping approaches. In early 2018 I sent out requests for submissions into what would be made into a public archive of participatory produced maps. Beyond being used for this analysis, I hoped for the archive to be a digital community for participatory mappers to gather and learn across the broad spectrum of applications and design methods—a place where design could be openly discussed. However, because of

the type of tensions reflected in Michael's words, no such archive or digital community ever materialized. As was discussed previously (see section 3.2.3), after sending emails to hundred of folks, I received only three submissions and later learned that folks are actively avoiding entering situations they feel may lead to judgments of their map design. Phoebe expressed, "I don't have anything to contribute to a discussion on map design". She had done work mapping with communities in Mexico, but when approached about contributing her work into the archive she viewed that the project her and her partners were working on lacked design considerations. Having seen the maps in previous settings, however, I can assume that there was thought that went into the design of the map because. That is, not only was the map aesthetically pleasing and clear in its data visualization, but because one who is familiar with the mapping program they were using to map could see that they had gone beyond the default design settings the program would have assigned. In other words, Phoebe *does* have experience to contribute to a conversation on map design in a participatory mapping setting...but the expectations of efficacy have perhaps convinced her that she does not. Similar to Michael, several PMLs admitted to keeping their maps under wraps and kept away from places where they could risk being critiqued for their design.

This attempt to distance has been observed before. "Those are the map's I don't show geographers" and "I don't have anything to contribute to a conversation on map design" meet up with "I'm not a cartographer" to create a full, robust chord that rings out the shame caused by expectations on how a map should be produced and should look. All their notes in this chord represent the ways PMLs are recognizing the promises and expected modes of achievement for efficacy in its traditionally conceptualized form. Most significantly,

PMLs anticipating the judgment in regard to the look of the maps produced in their projects and are signaling a departure from the anticipated beauty and elegance of maps made by cartographers. The assertion of, “just because one can more easily map today, this does not necessarily mean one should” does not dissuade people and groups from making maps, it just ensure that these maps are hidden away so that they continue to be misunderstood.

#### 4.4.4 CONSIDERING COMMUNITY MAPPING CENTERS

The findings outlined above are the reflections of experiences who are partners in community based participatory projects, who are located within humanitarian aid organizations, local governments, and universities but in ways not tied to a mapping focused research center. When the analysis is controlled to consider only instances of participatory mapping that are facilitated specifically through university service learning project or through research centers that are established to support community mapping efforts, the themes around centering community and cartographic shame shift, while the themes around the novice expert and the singular authorship are maintained.

In speaking to the intricacies of the singular authorship, Henry explained why he chooses to not include the members of the nonprofit organizations he partners in the design process: “These groups, they have so many things that they are working on. We all know how under resourced and over worked folks working in the nonprofit sector are. Making the map is number one on my to do list, it’s number 183 on theirs.” Henry perceives that the intricacies of the map production process to be a low priority for his partners. This, he goes on to explain, is precisely why the community GIS center that he leads is solicited for such partnerships. He and the students working in his center are able to perform the banalities of the process which have a steep learning curve, requiring a lot of time from a

nonprofit organizer if they would want to gain the skills firsthand. In these cases, often the PML who is also the instructor of the course or the director of the center, navigate these moments in ways that work to uphold the expectations and boundaries of traditional cartography more closely. PMLs located in mapping centers are much more likely to “push back” on community feedback and do not always accept the changes that are requested. In an instance where a community member requested changes that would contradict cartographic principles, these PMLs enter an educational moment to explain why the changes that are requested would be ineffective.

PMLs who are involved in community focused mapping centers, it seems, are also asked to make changes less frequently. When asked if they had confronted the tension of the community wanting a design that failed to uphold cartographic tradition, one PML explained, “It doesn’t happen that often. Pretty rarely, actually” while another says, “I’m sure it’s come up. I don’t remember explicit examples of it.” Those who are not affiliated with mapping specific research centers, comparatively, are more likely to report on both receiving requests to make edits to the map and going forward with making these changes. Sam introduces some possible explanation when he shares, “I make the maps and, when I present it, [the community partners] just don’t often have a sense of what other options might be ”Keeping in mind here that Sam and other PMLs in university mapping centers continue to report on the themes of being the “novice expert”. The identification of “not a cartographer” was slightly more significant for PMLs working in mapping centers.

As such, it seems the expectations of cartographic efficacy are particularly potent within the context of university-based research centers. Based on the location within the university, the performance of “expert” seems prevent feedback from being provided.

There are many additional factors to consider that extend beyond position of the university researcher that play into such interactions, including intricacies of interpersonal relationship with community partners and the deliverables outlined in a possible memorandum of understanding of the project that is common when working these more formalized settings. However, my interviews did not address this area of consideration in enough detail to enable firm conclusions to be reached. As such, I recommend more research be done on the expectations and performances asserted by university researchers who are affiliated with a particular research center. What can be articulated at this time, however, is that cartographic efficacy is an area of tension (though perhaps many would not directly recognize it as such) particularly in these settings.

#### 4.5 STRATEGIES AND SHAME

Cartographic efficacy is a source of great dissonance for participatory mappers. Starting with a brief visual analysis of the maps of Detroit, it seems that maps produced through collaborative, participatory approaches tend to hold a different set of design priorities than traditionally produced maps. This examination of efficacy for participatory mapping reveals an incompatibility with what is considered to be a “good” map for cartographers. Participatory produced maps do not default to prioritizing the engagement of an outside, detached map user. Rather PMLs are careful to consider the directionality and impacts of their design considerations. This requires PMLs to consider a range of intersecting axes of strategy, including the goal of the project, the cartographic literacy of their community partners, the role of aesthetics and design in influencing participation, the context surrounding the establishment of the partnership, as well as the intricacies of their own positionality in relation to their partners. In this way, PMLs are extremely strategic in

their map production processes and often consider multiple avenues by which they can pursue different forms of effectiveness for the maps they produce. Though clearly attentive to design, PMLs often identify themselves as novices in regard to cartographic skill sets—doing so to indicate the departures their maps make from maps produced within the traditional framework of cartographic efficacy. All of these processes, however, are shrouded in expectations instilled by traditional conceptualizations of cartographic efficacy. The ways in which map efficacy are veiled and perceived introduce a level of complexity to participatory mapping projects that, until now, has gone largely unexamined.

When and how a community request changes, if and how a PML chooses to incorporate those changes are all filtered through considerations of traditional cartographic efficacy in both explicit and implicit ways. This installation process is supported by the pervasiveness of maps, a lack of colloquial understanding around the intricacies of the mapping process, and assessments of map literacy and prompts PMLs to enlist a creative set of approaches for negotiating the priorities that are instilled in the map design process. The subsequent success of the map that these processes produce, thereby reveals an alternative form of cartographic efficacy. This efficacy does not require trained professionals to capture the attention of detached map users. Rather, this efficacy offers a resonance to the ontogenetic map, reflecting the ways in which the process maneuvers among moments of map design to center the visceral response of the community that the map represents. For participatory mapping, the work strives to improve the lives of the people the map represents. To make a map that fails to resonate with the people the map represents would, in particular ways, shift the commitments of the project to the oppressor. To make a map that caters to the oppressor is to center the oppressor in the work. Returning to considerations of success,



the maps were able to support the information transfer of community claims to leadership at local, state, and federal levels. Maps were made in order to enable the community members to feel ownership of the map.

The articulations of efficacy offered here are not meant to overwrite the efficacy of traditionally produced map, but rather serve as a rupture to the single model of efficacy the discipline of cartography has been attuning to since the 1950s. Continuing to reify the legitimacy the single model of efficacy has caused cartographers to cast out those who do not subscribe to this model. These are the misattuned. Cartographers are not protecting the discipline or preventing the creation of the potentially tragic maps they envision when presented with images of untrained folks making maps. Rather, a grounding in the attitude of “just because one can more easily map today, this does not necessarily mean one should” limits the capacity of both traditional and participatory mapping. Traditional cartography still has much more to learn about how maps work. This examination of participatory mapping goes beyond the non-representational tracings of the undulations of mappings, to explore the ways in which map design is contributing to efforts for community empowerment. Increased attention to this area will reveal even more about how the ways this process is enabled. By understanding more deeply the ways different modes of efficacy and map production support community empowerment, the more strategic participatory researchers can be about incorporating mapping methods into their projects.

PART II HISTORIES OF THE PRESENT

## CHAPTER 5. ELUSIVE ELEMENTS

*We document, explain, justify, construct, organize:  
these are good things, but we do not succeed in  
coming to the whole...by cultivating the exact we  
have laid the foundations for a science of art,  
including the unknown X*

— *Paul Klee* Exact Experiments in the Realm of Art

Note on authorship: The findings of this chapter were first presented at the 2016 International Cartographic Conference in Washington, DC, a presentation that was co-authored and co-presented with Dr. Matthew Wilson.

This chapter begins with a productive ambiguity at the heart of cartographic representation: the “essentially subjective” elements of map design. Phrases like “you know it when you see it”, which you’ve likely heard versions of, that are pervasive throughout design conversations throughout the discipline. These phrases reflect the moments of engagement between a mapmaker and a map user, and they often elide simple objective measurement of behavior, emotion, and stimulus response. Instead, the discipline provides us certain unwritten rules about cartographic design that are contingent and often subject to eye, fashion, trends, and perhaps most insidious, personal preference. The tendency within more colloquial histories of cartography in the United States is to consider the work of the 20th century as a progressive development of cartographic efficacy: from techniques in hand-drawn mapmaking through functionalistic thematic mapping principles to computational cartography and geographic information systems. These moments of subjectivity persist, and with the resurgence of attention to beauty as promoted by NACIS, are perhaps even more potent than ever.

A key figure of these more colloquial narratives around the history of cartography in the last century has been Arthur Robinson. The 'trouble' (Haraway 2016) of cartographic

efficacy can be clearly observed in Robinson's writing, particularly around what he considers 'essentially subjective' aspects of cartographic design and map use. This chapter ruminates on cartographic education as it emerged from Robinson's 1952 book, *The Look of Maps*. It begins with a consideration of the history of cartography more broadly. I first situate the conventions of the discipline's social histories and then go on to focus on the influence of Robinson himself. More specifically, through content analysis of the six editions of Robinson's influential textbook *Elements of Cartography*, this chapter explores that, alongside this tendency to imagine cartographic efficacy as an area of ever improving development, has been a persistent grappling with what might be meant by 'cartographic aesthetics'. The chapter then concludes with a call to conceptualize a wider notion of aesthetics in map design—conceptualization that incorporates the 'unintelligible' aspects of nonetheless effective cartographic objects and considers the implications of such a conceptualization for the practice of critical mapping.

Having explored how efficacy and broader contours of the discipline operate in a contemporary context, this chapter uses a historical lens to explore the ways in which the development of the discipline in both traditional and critical considerations have produced the exclusionary practices that we revealed in Part I. The history of the development of academic cartography is often focused on a few key practitioners and institutions (for example, the work of John Paul Goode, Erwin Raisz, Richard Edes Harrison, Arthur Robinson, George Jenks, John Sherman, and Waldo Tobler and the programs at the University of Wisconsin, the University of Kansas, and the University of Washington are common landmarks in tracings of the discipline (McMaster and McMaster 2002)). Such histories often share a telling of the actors, locations, and disciplinary developments that

have occurred over time. However, there is also a vein of the history of cartography that critiques the social histories of the maps themselves. This chapter aims to combine the two approaches by both situating the work of Robinson and tracing the ways he and his coauthors have influenced the look of the map.

## 5.1 A HISTORY OF CARTOGRAPHIC HISTORY

Recall the intervention made by Brian Harley in 1989 in his influential manuscript *Deconstructing the Map*—where he articulated the often-cited claim, “cartography is seldom what cartographers say it is” (Harley 1989, 1) This argument made by Harley represents a tear that would grow to become a larger rupture in the discipline, creating a divide that we still experience today (Kent 2017). Harley argued that rather than operating as scientific, objective, and neutral artifacts, that maps should be read as social texts, laden with the politics and biases of the cultures in which the map was produced. This line of scholarship, which came to be known as “critical cartography”, grew to prominence as Harley and a host of other white men who are often cited when outlining these histories, stepped in rhythm to further contextualize the power of maps. Through examinations of projections (Crampton 1994), map symbology and communication (uwm 2010), and other modalities of representation (Pickles 2004), the intricacies of the specific social mechanisms that produce the “truths” touted by maps were revealed.

The foundations of critical cartography are grounded in historical scholarship. As Martin Dodge and Chris Perkins (2015, 38) assert in their reflection on Harley’s contributions to the field, “...he was most comfortable when talking about maps from the past and not the present...It was perhaps easier to critique the “nasty” work maps used to ...when the interactive possibilities were limited to print mapping, instead of facing the

current, complex violence performed by cartography and allied geospatial technologies.” Indeed, Harley comes to his critique from his training as a historian.

Harley, and collaborator David Woodward (both historians of cartography at the Universities of Wisconsin-Milwaukee and -Madison respectively), began the History of Cartography project. This serves as the most significant contemporary synthesis of the history of cartography. This six-volume book series is, “a research, editorial, and publishing venture drawing international attention to the history of maps and mapping...by considering previously ignored aspects of cartographic history, the Project encourages a broader view of maps that has significantly influenced other fields of study” (The University of Chicago Press n.d.). Established in 1977, this project has grown significantly, going on to receive financial support from the National Endowment for the Humanities, the National Science Foundation, The University of Wisconsin-Madison’s College of Letters and Science, as well as numerous private donors. As of this writing, four of the six volumes (1, 2, 3, and 6) have been published, and volumes 1 through 3 are available for free download from the University of Chicago Press website. The first volume of The History of Cartography, “Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean” edited by Harley and Woodward was published in 1987 and was 622 pages long. The sixth edition, “Cartography in the Twentieth Century” edited by Mark Monmonier, was published in 2015 in two volumes totaling 1,906 pages. Volumes 1, 2, and 3 share a similar structure, where the text is divided into sections based on geography or technique and chapters are authored by a range of individual authors, Volume 6 appears to function much more like an encyclopedia with alphabetized entries on a list of specific people, places, events, techniques, texts, laws, organizations, objects, and theories.

From this brief overview of this project, it is clear that the history of cartography was viewed, particularly in the latter half of the last century, as an important and active line of academic questioning and inquiry. But what remains unclear by this surface level examination is precisely how this line of questioning gained legitimacy in the academy? And what have been the impacts of this history on our cartographic practices and preferences? The archives suggest that the International Conferences on the History of Cartography (ICHC) and the journal *Imago Mundi* have played the most significant roles in establishing a burgeoning, global cartographic community. The ICHC is the “only scholarly conference solely dedicated to advancing knowledge of the history of maps and mapmaking, regardless of geographical region, language, period, or topic” (“Map History: ICHC” 2017). Beginning in 1964, and continuing through the most recent meeting in 2015, this biennial gathering of scholars, map curators, collectors, and dealers has been hosted (with the exception of three years) in various places across Europe. Since its inception, the ICHC has received a steady rate of attendance, ranging from 150 to 200 participants. However, the number of annual presentations has grown from 17 in 1967 to over 100 combined poster and paper presentations at the 2015 meeting. The proceedings from the meeting, which was organized by Gerald Crone (Librarian and Map Curator of the Royal Geographical Society) with the help of Raleigh Skelton (Superintendent of the British Museum Map Room) (Sims 2001) as well as the following meetings have been published in the journal *Imago Mundi*.

This journal, first published in 1935 in Berlin by Leo Bagrow, reports that it is the only English-language refereed journal devoted exclusively to the history of maps, mappings, and map related ideas” (“What Is *Imago Mundi*?” 2017). Michael Heffernan and Catherine

Delano-Smith (2014), in their reflections on the cartography of the early twentieth century, note that Bagrow, an avid collector of antique maps, was personally interested in the emerging field of inquiry around the history of cartography. They go on to argue that his business partnership with book seller and owner of Bibliographic publishing company, Hans Wertheim, and subsequent work to establish *Imago Mundi* was “No doubt motivated by [a] desire to add academic rigor and respectability to their commercial activities” (Heffernan and Deano-Smith 2014, 46). Regardless, by soliciting historians of geography and cartographers to write about maps, he and Wertheim were successful in stoking flames of curiosity, intrigue, and desire around maps for a diverse audience, transitioning certain maps into valuable artifacts to all (not only historians).

Within these writings, there was a particular interest in maps representing early northern and central Europe. While this focus was simply reflecting the interests of the selected authors (there is nothing particularly unique about these maps), the maps nonetheless became hot commodities. As these maps became more expensive and increasingly difficult to find, institutions began to advocate for the establishment of map collections and map libraries (Harley 1987) which would, in turn, lead to the development of the ICHC. Because of their growing popularity (and subsequent profitability), cartographers began to mimic the aesthetics and techniques of these maps to create maps representing different areas of the world (ibid).

While the outlining I have provided here is both narrow and simplified, it nevertheless suggests that efforts made by map librarians and vendors toward establishing the professionalization of the history of cartography. This was inspired by a desire to intensify one's own professional endeavors and influence, and therefore highlights the mechanisms



and influences at work in conditioning our conceptualizations of good map design. By formulating specific understandings of history, scholars grant legitimacy to particular strains of cartographic technique and theory which, in turn, informs, inspires, and motivates further map designs. There is a second area of cartographic scholarship which now facilitates this type of cartographic conditioning: instead of looking to the past, this approach looks to the map user. Though some argued to situate maps as social artifacts – others continued to situate map production as the refinement of scientifically supported design practices.

Map design research, or the examination of the behaviors of map users, is one area of cartography that has worked to solidify cartography's place in the realm of "science". Map design research is situated beneath the umbrella of cognitive cartography. In a 2002 review of this work, Daniel Montello described cognitive cartography as "the application of cognitive theories and methods to understanding maps and mapping and the application of maps to understanding cognition" (283). This is in contrast to a "craft" approach to cartography, where maps and design decisions were made based on "convention, whim and fancy" (Robinson 1952). Approaches in map design research have also been referred to as "perceptual cartography", "the human factors of maps", "evaluation research", "usability research", "communication research" and "experimental cartography" (Board 1978, Board and Buchanan 1974, Castner 1983, Hopkins and Taylor 1979, Olson 1979). Since its emergence in the 1950s, map design research, and cognitive cartography more broadly, has undergone two major iterations: pre-GIS and peri-GIS.

There are three significant (and interweaving) developments that supported the mainstreaming of pre-GIS map design research. First, as argued by Montello (2002) was

the dominance of scientific approaches for understanding the world (Knight 1986). This primed the field of psychology, and eventually cartography, to be instilled with systematic modes of understanding its subject, eventually leading to the practice of cognitive cartography. The second brick in laying the groundwork for map use research was the enacting of this scientific perspective, specifically in Arthur Robinson's first book *The Look of Maps* (1952) in which he argues for a functionalist theory and practice to cartography. Pulling from his experience as the Chief of the Map Division of the Office of Strategic Services (OSS) during WWII, Robinson puts into action Max Eckert's call (1921) to establish a theory for cartography by first insisting that maps be understood as a method of communication and, second, determining that in order to make effective maps, one must understand the ways in which design decisions impact a map user's interpretation of the information being presented. Relatedly, and lastly, was the development of cartographic communication models.

While there are several models which emerged during the mid-to-late 1960s, these have largely echoed Robinson and conceptualized map communication 1) as a distinct separation between the user and the cartographer, 2) as an intermediary between the two, 3) as a vehicle that conveys information from the cartographer to the user, and 4) as subject to the cognitive processes of the map user (Crampton 2001, 237). Such models were based off Information Systems Theory models (Shannon and Weaver 1949) which were developed from a mathematical model attempting to limit distortions and maximize information transfer through telephone systems. Consequently, map communication models often incorporated notions of noise, senders, and receivers. Christopher Board created a flowchart conception of map communication in 1967 which informed Kolacny

(1969) who presented the most influential visualized version of a communication model at the International Cartographic Conference, per Montello (2002). Taken together, these three developments pressed the ‘mission’ of academic cartographers towards the development of map design guidelines which would make the process of information transfer from the mapmaker to the map user most efficient and effective (Roth 2011).

Early approaches to the study of map design can be characterized as psychophysics. This sub-discipline of experimental psychology examines the relationship between physical stimuli and an individual's psychological responses to that stimuli. An early example of such work is the examination of symbology size and the perceived value which the symbol represents (Castner 1983, Chang 1977, Crawford 1973, Ekman et al. 1961, Flannery 1971, Gilmartin 1980, Meihoefer 1973). Other aspects of early exploration include the impacts of dot area symbols (Castner 1964), type fonts and lettering (Bartz 1970, Shortbridge 1979), and color (Cuff 1973, Olson 1981), as well as the speed and accuracy of map reading (Dobson 1983) and systematic tracking of eye movements in map use (DeLucia 1974, Phillips and Noyes 1977). The first iteration of map design research reached its ‘peak’ in the late 1970s, as the introduction of GIS initially decreased attention towards conventional approaches to cartography. However, as technological problems were solved, GIS allowed questions of representation and map use to re-emerge as questions of “geovisualization” As such, map design research continues to be an active and influential area of scholarship. This second wave of GIS informed map design research has shifted to explore questions of movement and animation (Kraak, Kobben, Tong 2014, Turdukulov et al. 2014), interactivity and digitality (Andrienko et al. 2014, Roth et al.

2016), data uncertainty (Retchless 2014), navigation (Pingel and Schinazi 2014), and making systems amenable to multiple users (Griffin and Fabrikant 2012).

Map design research was and continues to be a detailed examination of the impacts map design has on map use. The ways in which scholars and practitioners of cartography conceptualize and examine map use has significant impacts on the insistence around how maps must be made so that they may be effective. Situating this review next to the previous tracings of the history of cartography and its establishment in the discipline, it becomes clear that map design, and notions around what is considered a “good” map, has been disciplined in very particular, exclusionary ways. This research aims to interrogate this disciplining further and explore the ways in which the discipline may begin to take-up more inclusive ways of conceptualizing practices of map design. As will be outlined in the next section, the foundation for participatory practice is already in place.

These tracings reveal a disciplinary consideration on how the elements of map production will simply improve with more research. The remainder of this chapter combines these two areas of consideration. By taking a historical approach to consider the ways in which map design and considerations of efficacy have evolved over time. More specifically, through a content analysis of the six editions of Arthur Robinson’s influential *Elements of Cartography*,

### 5.1.1 THE RISE OF ROBINSON

The story starts with Richard Hartshorne, a major figurehead for American geography known for his book *The Nature of Geography: A Critical Survey of Current Thought in the Light of the Past* published in 1939. While on leave from a faculty position at the University of Wisconsin-Madison, Hartshorne was appointed the chair of the Project Committee in

the Research and Analysis branch of the Office of Strategic Services (or OSS, which would later come to be the CIA) (Barnes 2006). In 1941 he established the Geography Division for which he recruited Arthur Robinson, then a PhD student at Ohio State University, to serve as the Chief of the Map Division. The overall mission of the OSS was to “collect and analyze all information and data which may bear upon national security, reporting directly to the President and the Office of the Joint Chiefs of Staff” (Barnes 2006, 150) and which was staffed primarily by academics. Geographers in particular were in high demand at the OSS; at its height there were 129 geographers on the payroll.

Robinson established three primary objectives of the Map Division: 1. Procurement and maintenance of a collection containing comprehensive intelligence and reference foreign map coverage or records of its availability. 2. Preparation of map research and analysis studies pointed toward the evaluation and use of maps in the field of intelligence. 3. Preparation of the maps required in the fulfillment of the intelligence functions of the Branch (Stanford Libraries n.d.)

The impacts of not only the position, but also the specific commitments articulated by Robinson for the production of unbiased and reliable maps, were long term (Crampton 2010). After completing his tenure as the Chief of the Map Division, Hartshorne (who had also returned to academic life and had taken on the task of establishing curriculum around cartography) brought Robinson on as faculty in 1945 to instruct on cartographic production, use, and evaluation. This expanded to include map projections and coordinate systems, the history of cartography, and computer cartography. Additionally, Robinson went on to adjust the topic of his dissertation from population geography to cartography (Stanford Libraries n.d.) which he completed in 1947. His dissertation became the

influential text *The Look of Maps* (1952) set the stage for what would become a significant research agenda for improving the overall efficiency of maps. What was significant about his agenda was its positioning of maps as a communication system that could be improved with empirical research and analysis.

As Crampton (2010) outlines, Robinson's allegiance to functional cartography required he speak to the science/art divide that is present in the discipline. While acknowledging the necessity of artistic skills (convinced by Erwin Raisz and J.K. Wright) he argued that there is more to map production than "whim and fancy". He urged that cartography be grounded in "reason and logic" (Robinson 1953, 11) as pursued by the scientific method rather than seen as an engagement of art. Robinson thought that by transitioning cartography into the realm of science, not only would it make maps more functional and trustworthy, but it would also make the profession available to those who would previously have self-eliminated themselves from pursuing being a cartographer for lack of artistic ability (Robinson 1953, 12). These sentiments carried into Robinson's textbooks as well.

### 5.1.2 INFLUENTIAL ELEMENTS

Indeed, one factor fueling Robinson's rise to disciplinary prominence was the production of the influential textbook, *Elements of Cartography*. The book's first edition, published in 1953, was a companion text to *The Look of Maps*, both having been born from Robinson's dissertation. *Elements* signaled a major change in academic cartography as it represented a shift from systematic descriptions of drawing and drafting, to a post-war conceptualization of "...cartography as an intellectual art and science" (Robinson 1953, Tyner 2005). Subsequent editions were published in 1960, 1969, 1978, 1984, and 1995. As this frequency suggests, the popularity of *Elements* establishes Robinson's role as the

leader of mid-to-late-20th century thinking in anglophone cartography. And this collection of texts presents us with a corpus to understand key shifts in cartographic techniques and mapping technoculture.

As Judith Tyner has argued, “Anyone who took a course on cartography, or who taught cartography in the last half of the 20th century, learned and taught the “gospel according to Robinson”, and the gospel was *Elements of Cartography*. Amen.” (Tyner 2005, 4). Indeed, these texts were used to support the training of entirely new generations of cartographers. As such, discourse analysis of the six editions of this textbook to trace themes around map design, the function of map use, aesthetics, and the processes and characteristics of a ‘good map’ versus a ‘bad map’ serves as the foundation for this analysis.

This work proceeds quite simply to read side-by-side the six editions of *Elements*. They are read in forward and backward chronology. Analysis has have jumped in and out of editions and located and compared earlier versions of the text as well as examining how specific passages were left untouched, altered, or made absent. The attention paid to the text is born of the readings and specific experiences with the project of the map and mapmaking. In other words, this is not intending to provide a definitive critique of the forty-plus years of *Elements*. Neither is it locking one into an accounting of the specific words or phrases, but is instead reading for intent, effect, and the construction of the argument. Your mileage may vary.

### 5.1.3 TRACING THE ESSENTIALLY SUBJECTIVE

Throughout this analysis, what is being traced is multiple instances of the “essentially subjective” elements of map design. As articulated by Robinson in *The Look of Maps*:

It should be possible by testing to arrive at a reasonably accurate area departure factor which when applied to different shapes would bring them to comparable visual size. On the other hand, many of the aspects of harmony, movement, balance, and proportion, seem likely forever to remain essentially subjective insofar as their evaluation is concerned. This does not mean to imply that the principles governing their use are purely a matter of individual caprice; it does mean that *exact* standards probably cannot be devised (Robinson 1952, 72-73 emphasis original).

Even in this moment, Robinson does not fully admit the futility of attempting to instrumentalize all moments of map design. By leaving it up to measurements of exactness and probability, there seems to still be hope. And he holds on to hope in the name of efficacy. He goes on to describe the ways in which “poor” design choices that would lead to “excessive repetition”, lack of producing proficient figure ground relationship, the use of “uninteresting shapes”, and the “lack of focus or contrast” would make the map ineffective while doing the opposite would *add* to its effectiveness. As has been observed in more contemporary discussions of cartographic efficacy, Robinson’s reader is left without any deeper discussion of what precisely makes a shape uninteresting or how it communicates a lack of focus to the reader.

There can be little doubt that if the use of visual techniques to stimulate predictable responses is accepted as within the field of art, then cartography includes artistic techniques. Such techniques obviously should be employed in the attempt to satisfy the functional requirements of a map, for a map is a graphic thing that, by any definition, cannot be visually sterile. The difficulty that arises in interpreting that fairly obvious conclusion is what proportion, if any, of the cartographer's artistic judgment, taste, sense of harmony should enter into [their] creation. Everyone has probably heard the fatuous statement (and a great majority of us have probably echoed it) “I don't know what is good, but I know what I like.” If we proceed on the basis of that grotesque admission, we find



ourselves spurning maps with red on them because we don't like red; we champion conventions because they are familiar; we make brightly colored maps because they are brightly colored, whether they convey the information or not. In short, our judgment of technique is based on convention, whim, and fancy. What alternative bases can we adopt? There are two such. One is to standardize everything.” (Robinson 1952, 19)

To interrogate Robinson’s worry about the essentially subjective, the following traces six particular themes that could be observed and tracked throughout the six editions. Robinson’s search for and evaluation of such standards would remain an undercurrent of his project, present even in the final edition of *Elements*. Indeed, convention, whim, and fancy were persistent troubles. In the 1995 edition, we read “... These manipulations remain rather poorly defined and subject to the whim of cartographers performing them” (Robinson et al. 1995, 461). Over 40 years pass between the first edition and this final edition, and yet there are moments of map design that continue to resist standardization. We continue reading from an early passage in this sixth edition “... Good design simply "looks" right. It is simple (clear and uncomplicated). Good design is also elegant and does not look contrived” (Robinson et al. 1995, 318). These moments Robinson marks for us as the “essentially subjective”.

Here, taking a note from Tyner, let’s begin with the ‘vitals’ of each book as a text: year published, total page numbers, changes in authorship, as well as, key extensions to each new edition (Figure 16. Details of key changes among the six editions of *Elements* For example, the inclusion of stats in 2nd edition, a first mention of automation in the 3rd, and a new chapter on color theory in the 4th. The 5th edition offers a first mention of how the academy is lagging behind industrial advances, leaving the sixth and

final edition to be transformed by the rapid growth of GIS. With this baseline information in mind, I'll now shift to the results of the discourse analysis.

| Vitals  |   |  |
|---|---|--|
| <p>1953<br/>218 pages, 8 appendices<br/>-2 chapters on projections<br/>-1 chapter on design-but interwoven into entire book<br/>-1 chapter on symbolization and distribution maps</p>                                     | <p>1960<br/>281 pages<br/>-4 chapters on projections<br/>-Symbolization was expanded to 3 chapters<br/>-Addition of statistical concepts</p>  | <p>1969<br/>334 pages<br/>Added author: Randall Sale (UW-Madison)<br/>-Chapter on projections relegated to appendix<br/>Added chapter: Air Photographs<br/>-First mention of automation in cartography (in appendix)</p>   |
| <p>1978<br/>448 pages, Reduced to 4 appendices<br/>Added author: Joel Morrison (UW-Madison)<br/>-Added chapters: Color Theory, Generalization, Computer Assisted Cartography<br/>-expanded chapter on air photography</p> | <p>1984<br/>544 pages, 3 appendices<br/>Added author: Phillip Meuhrcke (UW-Madison) (Morrison now at USGS)<br/>-commentary on how the academy was lagging behind advances in the field<br/>-added chapters: The Nature of Cartography, Technology of the Cartographer, Remote Sensing</p> | <p>1995<br/>674 pages, 6 appendices<br/>Added authors: Jon Kimmerling, (Oregon State University) Stephen Guptill (USGS)<br/>Subtracted authors: Robert Sale<br/>-expansions due to GIS<br/>-authors conceptualized cartography as 1) the establishment and use of databases and 2) visualization</p> |

Figure 16. Details of key changes among the six editions of *Elements*

| Chapter Titles                                    |   |                                       |
|---|---|---------------------------------------|
| <p>1953<br/>"Map Design"</p>                      | <p>1960<br/>"Designing the Map"</p>           | <p>1969<br/>"Cartographic Design"</p> |
| <p>1978<br/>"Graphic Presentation and Design"</p> | <p>1984<br/>"Graphic Design in Mapmaking"</p> | <p>1995<br/>"Cartographic Design"</p> |

Figure 17. Chapter titles of the six editions of *Elements*

Beginning with the chapter titles (Figure 17), one can observe Robinson and his co-authors evolving thoughts on the principles of cartographic design. It is within these chapters, as well as the introductory chapter of each edition, I locate the six concepts for this analysis, concepts which loosely identify as the essentially subjective in map design.

More specifically, this traces the consistencies around how the authors thought about the role of imagination and the convenience of use, while also noting departures across the editions around the approaches to functional design and generalization. The six editions maintain that the “elements of cartography” operate as an integrated whole, even while also preserving a somewhat complicated relationship with the “ugly map”.

Examining passages regarding imagination (Figure 18): the first three editions note, “...it is not necessary to be an artist” (seen in 1953 and 1960) or “to have the latent talent of an artist” (seen in 1969) ... “to learn to design effectively” but that it only requires “a willingness to exercise imagination.” In the fourth and fifth editions, however, we observed that not everyone’s imagination is up to producing the type of designs expected by cartographers. The authors now add “some inner subjective sense is not a requirement for good design” (Robinson, Sale and Morrison 1978, 280), or “acceptable design” (Robinson et al. 1984, 139). Robinson et al. draw an interesting parallel here, that, similar to how one can be taught “written composition” or “literary composition”, one can also be taught “graphic composition”. They continue, that even with proper training, “not every individual can become creative merely through study”. For the sixth edition, the authors retain that graphic techniques are teachable and subject to “systematic analysis” (Robinson et al. 1995, 317), however discontinue their insistence that not everyone or everything can be taught and instead return to the generalized potential of imagination, as “a willingness to think in visual terms.” Following such guidelines for tapping into imagination will produce maps which are convenient for map users (Figure 19).

| Imagination  |   |   |
|--|---|---|
| <p>It is not necessary to be an artist to learn to design effectively. The basic elements of good design lend themselves to systematic analysis, and their principles can be learned. A basic requirement, however, is a willingness to think in visual terms, uninhibited by prejudices resulting from previous experience, or, to put it another way, a willingness to exercise imagination.<br/>1953, 120</p>   | <p>It is not necessary to be an artist to learn to design effectively. The basic elements of good design lend themselves to systematic analysis, and their principles can be learned. A fundamental requirement, however, is a willingness to think in visual terms, uninhibited by prejudices resulting from previous experience, or, to put it another way, a willingness to exercise imagination.<br/>1960, 222</p>  | <p>It is not necessary to have the latent talents of an artist to learn map design, any more than it is necessary to be a Potential literary giant to learn to write clearly. Like the study of written composition, the basic elements of graphic composition lend themselves to systematic analysis, and the principles can be learned. A fundamental requirement, however, is a willingness to think in visual terms, uninhibited by prejudices resulting from previous experience or, to put it another way, a willingness to exercise imagination.<br/>1969, 250</p> |
| <p>Imagination is the primary element in the first stage of the designing process. It is here that the others, but some inner subjective sense is not a requirement for good design. Like the study of written composition, the basic elements of graphic composition lend themselves to systematic analysis, and the principles can be learned. This is not meant to imply that every individual can become highly creative merely through study. As has been often repeated, one can be taught a craft (i.e., the mastery of the materials and techniques with which one works), but one cannot be taught the art.<br/>1978, 280</p> | <p>than others to meeting that criterion, but some inner subjective sense is not a requirement for acceptable design. Like the study of literary position, the basic elements of graphic composition lend themselves to systematic analysis, and the principles can be learned. This is not meant to imply that every individual can become highly creative merely through study; we are not all equally endowed with creative intuition. As has been often repeated, one can be taught a craft (the mastery of the materials and techniques with which one works), but one cannot be taught the art.<br/>1984, 139</p> | <p>Like the study of literary composition, the basic elements of graphic composition lend themselves to systematic analysis, and the principles can be learned. A basic requirement in graphic design is a willingness to think in visual terms, uninhibited by prejudices resulting from previous experience.<br/>1995, 317</p>  |

Figure 18. The theme of “imagination” throughout the six editions of *Elements*

| Convenience of Use   |   |   |
|--|---|---|
| <p>The imagination must, of course, be disciplined to some extent, for, like many fields, cartography has developed traditions and conventions to disregard them completely would inconvenience the user of the maps, which would in itself be proof of poor design.<br/>1953, 120</p>                       | <p>The imagination must, of course, be disciplined to some extent, for, like many fields, cartography has developed traditions and conventions; to disregard them completely would inconvenience the user of the maps, which would in itself be proof of poor design.<br/>1960, 222</p>             | <p>The range of imagination must, of course, be disciplined some extent, since, like many fields, cartography has developed traditions and conventions; to disregard them completely would inconvenience the user of the maps, which would in itself be proof of poor design.<br/>1969, 250</p>   |
| <p>The range of imaginative innovation must, of course, be disciplined to some extent since, like many fields, cartography has developed traditions and conventions; to disregard them completely would inconvenience the user of the maps, which would in itself be proof of poor design.<br/>1978, 280</p> | <p>The range of imaginative innovation must, of course be disciplined, to some extent, since cartography like many fields, has developed traditions and conventions; to disregard them completely would inconvenience the user of the maps, which would in itself be poor design.<br/>1984, 139</p> | <p>The range of imaginative innovation must, of course, be disciplined to some extent. Cartography, like many fields, has developed traditions and conventions. To disregard the powerful forces associated with these traditions and conventions would in convenience map users, which would in itself be poor design.<br/>1995, 317</p> |

Figure 19. The theme of “convenience of use” throughout the six editions of *Elements*

| Functional Design  |  |  |
|--|--|--|
| <p>Most maps are functional in that they are designed, like a bridge or a house, for a purpose. Their primary purpose is to “get across” a concept or relationship; it is not to serve as adornment for an office wall. As a matter of fact, if a map is made too much of a work of art, it is very likely that the viewer will be stimulated first by its beauty and will fail to see the concept.<br/>1953, 13</p> | <p>Most maps are functional in that they are designed, like a bridge or a house, for a purpose. Their primary purpose is to “get across” a concept or relationship; it is not to serve as adornment for an office wall. As matter of fact, if a map is made too much of a work of art, it is very likely that the viewer will be stimulated first by its beauty and will fail to see the concept.<br/>1960, 14</p> | <p>Maps today are strongly functional I, that they are designed, like a bridge house, for a purpose. Their primary purpose is to convey information or to “get across” a geographical concept or relationship; it is not to serve as an adornment for a wall.<br/>1969, 18</p>   |
| <p>Maps today are strongly functional in that I they are designed, like a bridge or a house, for a purpose. Their primary purpose is to convey information or to “get across” a geographical concept I or relationship; it is not to serve as an adornment for a wall.<br/>1978, 7</p>   | <p>Maps range in size from the tiny portrayals that appear on some postage stamps to the enormous mural-like wall maps used by civilian and military security groups to keep track of events and forces. They all have one thing in common: to add to the geographical understanding of the viewer.<br/>1984, 4</p>  | <p>Maps range from tiny portrayals on postage stamps to enormous mural-like wall maps used civilian and military security groups to keep track of events and forces. They all have one thing in common: to add to the geographical understanding of the viewer.<br/>1995, 10</p> |

Figure 20. The theme of “functional design” throughout the six editions of *Elements*

| Integrated Whole   |   |  |
|--|---|--|
| <p>The aim of cartographic design is to present the map data in such fashion that the map, as a whole, appears as an integrated unit and so that each item included is clear, legible, and neither more nor less prominent than it should be.<br/>1953, 120</p>  | <p>The aim of cartographic design is to present the map data in such fashion that the map, a whole, appears as an integrated unit and so that each item included is clear, legible, and neither more nor less prominent than it should be.<br/>1960, 222</p>  | <p>The aim of cartographic design is to present the geographical data in such a fashion that the map, as a whole, appears as an integrated unit and so that each item included is clear, legible, and neither more nor less prominent than it should be.<br/>1969, 250</p> |
| <p>The manner of presentation of the many map components so that together they appear as an integrated whole, devised systematically to fit the objectives, includes a variety of elements. Regardless of the positional accuracy or essential appropriateness of the data, if the map has not been carefully designed, it will be a poor map.<br/>1978, 279</p> | <p>The manner of presentation of the many map components so that together they appear as an integrated whole, devised systematically to fit the objectives, includes a variety of elements. Regardless of the positional accuracy or essential appropriateness of the data, if the map has not been carefully designed it will be a poor map.<br/>1984, 137</p> | <p>If a map presentation is to be effective, the signs must be carefully chosen and fitted together so that they form an integrated whole.<br/>1995, 316</p>   |

Figure 21. The theme of “integrated whole” throughout the six editions of *Elements*

With only slight changes of language in-between, all six editions insist that 1) the imagination, or imaginative innovation, must be disciplined to some extent 2) that cartography is a field with well-established traditions and conventions, 3) to operate outside of these conventions would generate inconveniences for the map user which would, and here’s the key, “be proof of poor design”.... To avoid such ‘poor’ designs, would require that cartographers come to grips with the functional and instrumental purposes of their map creations (Figure 20). The 5th and 6th editions explain how a map is anything that “adds to the geographical understanding of the viewer” and can range from the form of a “postage stamp” to a “mural-like wall map” which can be used by civilians and military groups alike. In the 1st through the 4th editions, however, the authors offer a much more constricted definition of maps, insisting that maps are “functional in that they are designed, like a

bridge or a house, for a purpose” and, in fact, it would be inappropriate to have a map which serves as an “adornment for a wall” (or “an office wall” in the first two editions).

Concern with generalization (Figure 22) is a prime example of the tension between standardization and the cartographer’s subjective sensibility which in the 1st edition, Robinson declared that it would be “next to impossible” to provide any useful rules for generalization (Robinson 1953, 117). By the 3rd edition, though it is argued that some aspects of generalization can be automated, the process regardless remains to be an “essentially creative act” or “process” (Robinson and Sale 1969, 53). In the following edition, the authors switch their focus from the messiness of generalization to the robust skillset required by the cartographer to be successfully subjective. In the 6th edition, the challenges of generalization are largely downplayed, only to be thought of as “rather poorly defined” (Robinson et al. 1995, 461), leaving the celebration for subjectivity to go on unencumbered by detailed justification.

| Generalization   |  |  |
|--|--|--|
| <p>It is next to impossible to set down any rules for intellectual generalization. The degree of simplification of a coastline, a boundary, or any other data depends entirely upon the purpose of the map. Experience, knowledge of the subject, and clearly defined purpose are the only possible guides to intellectual generalization.<br/>1953, 117</p> | <p>so far it has been impossible to set forth consistent set of rules that will prescribe what should be done in each instance, It seems likely that cartographic generalization will remain forever an essentially creative process, and that it will escape the modern tendency toward standardization which seems, even in cartography, to be an unfortunate corollary of technical development and specialization.<br/>1960, 132-133</p> | <p>cartographic generalization is essentially a creative act. Some of the elements and some of the controls can be treated systematically, by quantitative methods, for example, and a kind of automatic generalization can be specified even programmed for a computer. Not all can be treated this way to best advantage, however, and it takes long good judgment, and familiarity with the data to manipulate the elements properly, according to the dictates of the controls.<br/>1969, 53</p> |
| <p>Great subjectiveness is here employed by the cartographer-compiler, and the necessity for the cartographer-compiler to be highly skilled and knowledgeable in these processes vitally affects the utility and quality of the map.<br/>1978, 158</p>   | <p>The cartographer-compiler employs great subjectiveness, and consequently the compiler's skill and knowledge about the data being simplified vitally affect the usefulness and quality of the resulting map.<br/>1984, 250</p>   | <p>These manipulations remain rather poorly defined and subject to the whim of cartographers performing them. The cartographers must subjectively specify criteria that allow the aggregation procedure to be applied.<br/>1995, 461</p>   |

Figure 22. The theme of “generalization” throughout the six editions of *Elements*

Generalization is just one aspect of a mapmaker’s efforts to deal with subjectivity. Individual elements of cartography were meant to work as a whole -- as an integrated whole (Figure 21). More specifically, in the 6th edition the authors state that if a map is to be effective “the signs must be carefully chosen and fitted together so that they form an integrated whole”. This precise sentiment is present in all six editions, providing cartographers in training a consistent conceptualization of “the map” as an agglomeration of parts which are not inherently mappy but, when in a certain proximity to one another, become a map. From Robinson’s first edition to the last, the map was understood as a system of individual components, that, when designed well, would work together as a



singular object. Not doing so, would result in a “poor map”. The editions chart a specific shift in the ramifications for such “poor” designs.

For example, poor design creates ugly maps (Figure 23). Here we see how the idea of this integrated whole of a map has remained, while the goals of the cartographer have shifted. You see in the first edition Robinson argues, “...one of the cartographer’s major concerns is to refrain from making the map ugly, and in this respect he is definitely an artist, albeit in a somewhat negative sense” (p. 13). This quote remains almost completely intact throughout the first four editions with the one notable exception being the replacement of the male gender pronoun with “the cartographer” in the 4th edition. In the fifth edition, this viewpoint shifts dramatically. The cartographer’s job is now to, “explore the ramifications of each mapping possibility and to select the most appropriate for the intended communication” or “task” and the look of the map is now seen as a reflection of what needs to be communicated. Rather than merely avoiding a subjectively-understood ‘ugliness’, map design is recast as an analysis of possibilities in the design process.

| Ugly Map   |  |  |
|--|--|--|
| Probably one of the cartographer's major concerns is to refrain from making the map ugly, and in this respect he is definitely an artist, albeit in a somewhat negative sense.<br>1953, 13                 | Probably one of the cartographer's major concerns is to refrain from making the map ugly, and in this respect he is definitely an artist, albeit in a somewhat negative sense.<br>1960, 14   | On the other hand, one of the cartographer's concerns may be to keep from producing an ugly map; in this respect he is definitely an artist, albeit in a somewhat negative sense.<br>1969, 18  |
| On the other hand, one of the cartographer's concerns may be to keep from producing an ugly map; in this respect the cartographer is definitely an artist, albeit in a somewhat negative sense.<br>1978, 7 | With the communication focus the mapping process is seen as a series of information transformations, each of which has the power to alter the appearance of the final product (Fig. 1.15) ...cartographer's task is to explore the ramifications of each mapping possibility and to select the most appropriate for the intended communication.<br>1984, 15-16 | The mapping process is a series of information transformations, each of which has the power to alter the appearance of the final product will possess certain communication advantages as well as limitations. The cartographer's task is to explore the ramifications of each mapping possibility and to select the most appropriate for the intended task.<br>1995, 18 |

Figure 23. The theme of “ugly map” throughout the six editions of *Elements*

These reconsiderations and consolidations in map design highlight the need for more discussion about ‘cartographic aesthetics’, which we note to be both narrow and, at times, ambiguous throughout this history of the *Elements of Cartography*. The disciplining of ‘cartographic aesthetics’ has meant that new lines of exclusion have been drawn between ‘pretty’ and ‘ugly’, ‘good at research’ and ‘good at design’, between the functional and purely emotive. As a result, use and function and even notions of interaction are married to unresolved questions around the subjective elements of cartography. The sharpness of these distinctions (and the dichotomies that are necessarily produced) runs counter to our insistence on a radically open, critical cartography as well as continued experimentations and trials with making map use and map design more democratic.

## 5.2 THE SCRUTINY OF JUDGMENT

As has been discussed in different registrars in previous chapters, the influence for better or for worse is still being debated today. The NACIS *Atlas of Design* is a particularly potent site of examination for the influence of the essentially subject because of the focus and intention of the atlas. Frequently, the maps selected for inclusion in an atlas are chosen by one of two modes. First is that they are created by the same cartographer or organization who are creating the maps to apply the same style to a range of different geographical locations. An example of this is the popular Rand McNally atlases showing the political geography of the world. Second is that they gather around a particular topical theme, so while the style may vary from map to map, they are similar in that they directly speak to the same theme. An example of this is the Guerrilla Cartography *Food, an Atlas*. The Atlas of Design departs from these approaches in that each map is made by a different cartographer on a wide variety of topics. Rather the maps are included in the *Atlas of Design* show off “some of the world’s most *beautiful and intriguing cartographic design*” (NACIS, n.d.).

To date, four editions of the *Atlas of Design* have been released with a fifth edition currently in development and available for preorder at the time of writing. This fifth edition, with editors Vanessa Knoppke-Wetzel, Brooke Marston, Nat Case, and Caroline Rose, allowed me a peek behind the curtain into how maps are selected to be chosen for inclusion. Knoppke-Wetzel and Rose were kind enough to share with me the criteria that is used to select judges to evaluate maps. The main mechanism for evaluation is providing judges to rank each map submitted for evaluation with the following criteria:

- 5 = This map is extraordinary and should definitely be in the atlas!
- 4 = This map was really well made and could be included, but it didn't genuinely excite me.
- 3 = This map is of good professional quality but doesn't necessarily belong in this atlas.
- 2 = This map is acceptable.
- 1 = This map is not good.
- Defer = I (or my organization) made this map.

Knoppke-Wetzel and Rose explain that there is no description of the contours of the intended purpose of the Atlas to judges, perhaps because judges are assumed to be indoctrinated into the institution that is the Atlas of Design and NACIS more broadly. This also confronts something provided later in the guidelines, which is that each judge is an expert in their own right and has the authority and wherewithal to know what *should* go in this atlas. The editors share:

This system is pretty subjective and simple, and that's intentional. There's a lot for you to go through, so we want to keep it basic. We also want you to embrace your own personal opinion of what's good and what is not. We have a big pool of judges and we want to bring together a broad set of viewpoints. (Knoppke-Wetzel and Rose, 2020)

In editions 1-4, the maps are not published alongside any articulation of the judges. The judges become a simple list of names included in the notes from the editor/acknowledgments. Just names. No affiliations or professional qualifications of what leads these people to be the folks, the ultimate authority on the goodness of a map. However, as with feminist pedagogy, gaps invite more examination, a chance to make known what is assumed and taken for granted.

Judges are recommended from NACIS members, though it remains unclear how those recommendations transition into selection. One editor reported, "We made an effort to

include as many women as men on the judging panel, and we also try to recruit some judges from outside the United States.” Diversity is often an attribute that NACIS advertises, due to the range of institutional background by which people come to the organization-and the same is said about the judges. A blog post posting a progress report on the production of the first edition celebrates, “We’ve got a diverse panel of judges, eight great people drawn from academia, government, private design firms, and the media” (NACIS Atlas of Design n.d.). Throughout the four editions, half of the 30 judges graduated or worked for the University of Wisconsin-Madison, half of them judged for more than one edition, and (as far as analysis of internet profiles allows me to make an assumption) only one has been non-white/white-passing. What are the metrics of diversity by which cartography celebrates its achievement? It seems that current professional affiliation is where the considerations of diversity begin and end, as was observed with the stickiness of whiteness.

Although the judges and their employment of the essentially subjective elements of map design are integral to the continued reassertion of what *should* be considered a good map, this labor becomes background to the map artifacts themselves. The maps are offered up with text supplied by the map author, though they are not the ones who assert their design as *should*.

### 5.3 TENACIOUS WHIM, PERSISTENT FANCY

As this analysis has revealed, in both historical and contemporary terms, the operating procedures behind the essentially subjective elements of map design have undulated significantly over time. What this tracing of the six editions of *Elements* reveals is the shifts in approaches, the change of perspectives, the challenges and sometimes uncomfortable negotiations with what is and is not considered a standardizable element for cartographic

practice. Juxtaposing this against the contours and disciplining of efficacy discussed in the previous section and the reifying processes of beauty expectations as understood through the *Atlas of Design* reveals this deep-seated commitment of cartography to cartography in the hands of the lucky few who can wrangle the subjectivity "correctly" and make the maps "just feel right". The valuation and celebration of beauty in the discipline alone is not inherently problematic, however it has left a void of understanding regarding the operations of the maps that do not take up the operationalized moments of map design and also make no attempt to being pretty.

Additionally, this chapter provides a moment to grapple with the discipline's treatment of "ugliness" where it is superficially offered as a quality that is to be actively and urgently avoided at all costs. This echoes many of the warnings that have been encountered previously, where the stakes seem high but we're not sure what for. Why should ugliness be avoided? Because it's the opposite of beauty, and beauty is what cartographers strive for. There is likely more richness of understanding to be gained in situating this evolution alongside additional texts such as Esri's *Map Use: Reading Analysis, Interpretation* which is currently in its eighth edition, or *Cartography: Thematic Map Design* which has six editions as well as untangling how such undulations move in the realm of web mapping. This chapter works to re-conceptualize the division between standards and subjectivity, to expose the ways in which both provide barriers of access to the discipline. In order for the discipline of cartography to reflect the diversity of the world and be able to address the vast array of complex social and environmental challenges our world is facing, we must search for more inclusive metrics by which to evaluate the effectiveness of maps. In the following chapter, I will explore the ways in which these shifts must come from a place of

emancipatory commitments to succumb to performative interventions that are reinforced by current structures of oppression.

## CHAPTER 6. ADD PARTICIPANTS AND STIR

*Every city is full of ghosts, and learning to see some  
of them is one of the arts of becoming a true local*  
— *Rebecca Solnit, Infinite Atlas: A San Francisco Atlas*

In the *History of Cartography* alone, spanning across its six editions, there are over 9,000 pages of text dedicated to tracing the multiple arcs of development of mapmaking practice since prehistoric times. The history of participatory approaches to mapping, however, is often condensed into a citation of one or two sentences, outlining the prominent set of meetings in which the term “participatory” began to be colloquially used in mapping contexts. More specifically, the emergence and popularization of *public participation GIS* (PPGIS) as was prompted by disciplinary meetings hosted in Friday Harbor, WA have become the sacred genesis of the approach. Unlike the history of cartography projects, however, participatory approaches to mapping lack a detailed tracing of its development. This chapter works to fill this gap by providing a more detailed social history of the approach.

While articulating a social history of PPGIS, I pay close attention to the materialization and evolution of claims of the approach’s capacity for empowerment. The notion of empowerment has been critiqued by the participatory mapping community for its slipperiness. While the assumed ability to facilitate empowerment is one of the aspects that draw many to participatory modes of engagement, it is a term that very often remains uncontextualized or fails to be operationalized in writing (Mukherjee 2015). Some have outright called out PPGIS for being entirely able to support community empowerment (Brown 2012) while others celebrate it for its ability to prompt action and create visibility (Kollektiv Oranotango+ 2018). As such, the expectations of what empowerment is and



how one can know when it has been achieved remains a tension at the heart of the approach. By placing the history of PPGIS in a broader history and examining the micro-moments of its development, I can ground the dissonance caused by empowerment more firmly.

This research, through its potential to expand the framework of PPGIS to include considerations of map design, adds to considerations around the complexities of access and technology as well as questions of who participates and how. By critically examining the impacts of our perceived histories and scientific approaches to map design, this chapter will explore the ways in which approaches to cartography have been conditioned in intrinsically exclusionary ways. Through examinations of the ways in which PPGIS takes-up or challenges these notions of cartographic efficacy, scholars and practitioners of PPGIS will be better positioned to understand the mechanisms at work within such projects. An increased understanding helps support public efforts in making their voices heard through maps and mappings. Primarily this reveals the ways in which the questions persist, but the work and unoperationalized claims do not, as has been a recurring theme throughout many of these chapters. Claims of empowerment and claims of effective maps. Both are often made, not because they hold any relationship to the world, but because they legitimize the act of mapping.

While it is important to recognize the limitation of an analysis that focuses so tightly on the NCGIA. There are additional locations in which conversations were being hosted including the American Association of Geographers, the International Cartographic Association, and the Cartography and Geographic Information Society. Interviews reveal, however, the prominence of the NCGIA given the substantial amount of funding the organization had received from the NSF.

## 6.1 THE ROOTS OF PARTICIPATORY METHODS

To contextualize the contours of participatory approaches to mapping more broadly, this section outlines the commitments of research that is tagged as participatory. More specifically, a tracing of the development of participatory research allows for a more robust juxtaposition against non-participatory work and highlights the reasons just a distinction is called for.

While the origins of participatory research are highly distributed and cannot be traced to a single source (Glassman and Erdem 2014), it is often cited as having emerged as a methodology that performed research on social problems by incorporating the participation of those who have first-hand experience confronting the problem as active developers of the research project (McTaggart, 1991, Brydon-Miller, 2001). The stages of fact-finding, conceptualization, planning, implementation, and evaluation are done in collaboration between methodological experts and experiential experts in ways that generate new knowledge that can be applied towards systemic problem solving. (Khan and Chovanec 2010). Most importantly, participatory approaches to research emerged out of a context of resistance, a response to the “ongoing struggle of the oppressed to break free from their oppressors, the struggle of the colonized to escape structures and narrow expectations established by those who colonized them, and the struggle of those made invisible or subordinated by more powerful elements in their society to take control of their life trajectories and social and economic destinies” (Glassman and Erdem 2014, 2007). This is very much based in the theories put forward by Brazilian educationalists Paulo Freire. His foundational text *Pedagogy of the Oppressed* was first published in 1968 in Portuguese, following by an English version in 1970.

Freire created pathways for adult education programs to increase student autonomy, allowing departures from the “banking” model of education which established and maintained beliefs of dominant groups (Freire 29). He put forward models for student/teacher co-operation which lead to a participatory experience of education that could ultimately lead to personal and societal transformation. The non-hierarchical nature of this approach, where all were valued as equally important contributors to the work, democratized the research process. An additional shift proposed by Freire is a recognition of the cyclical and iterative nature of research focused on community relationships and social problems.

In the early 1980s, Budd Hall began writing about his work in Tanzania the importance of reflection in participatory research, arguing on behalf of the intricate relationship between action and reflection. Participatory research took applied the cyclical nature of planning, activating, observing, and evaluating topics of “thematic concern” (Kemmis and McTaggart 1988) that were identified by groups sharing experiences in this area. While the concern the development of the project, the goal was often a commitment to enacting improvement or change to address the concern. Just as action and reflection were intimately entangled, activism and calls for social change were inseparable from the participatory research process (Hall et al 1982, Swantz 1982). Similar approaches were developing in other parts of the world. Namely, Fransisco Vio Grossi was exploring approaches for farmer-led land reforms in Chile and Orlando Fals Borda (who was living in Geneva having been exiled from Columbia) was also examining land reform but from the perspectives of Columbian Indigenous groups. Here the constellation of this emergence of participatory research approaches as prompted by Freire begins to take form.

The United States has a rhetorical place in the constellation, as there were practices that emerged under the terms “action research”, “participatory research” or “participatory action research” that overlapped in particular ways with the emergency of PAR in other parts of the world. However, these approaches were often linear and lacked an activist intention. For example, Kurt Lewin’s (1946, 1952) action research offered a strong emphasis between theory and practice and emerged particularly as a form of resistance to the discrimination experienced by religious and ethnic minorities following WWII. More specifically, he offered a (progressive and linear) comparative research on the conditions and effects of various forms of social action, and research leading to social action nestled in the belief that “research that produces nothing but books will not suffice” (Lewin 1948, 202-3). William Foote Whyte (1994) developed a type of PAR that was not informed by Lewin’s AR approach that was a way of attempting to create cohesion in organizational structures, however the action here was to “resolve conflict between the majority and the minority in order to maintain the status quo and social order” (Glassman, Erdem, and Bartholomew 2013 in Glassman and Erdem 2014, 207).

Trust between methodological and experiential experts is often touted as one of the key elements for enabling successful PAR projects. However, trust alone can also allow experiential experts to be exploited. Rajesh Tandon (1988) identified three areas in particular where experiential experts can be clearer on the type of engagement they are making room for. First is their role in setting the agenda of the topic being investigated, second is their participation in data collection and analysis, and third is their control over the use of the results. If they are not being treated as co-researchers who have an equal say in these three areas, then they are being involved rather than participating. Being open to

methods that are truly participatory means being open to dramatic changes in the methodology, particularly in cross-cultural research where PAR is common.

McTaggart outline nine key principles that he identifies as the components of participatory action research. They are as follows: 1) Identification of the individual and collective project 2) changing and studying the distribution of power 3) changing the culture of working groups, institutions, and society 4) action and reflection 5) unifying the intellectual and practical project 6) knowledge production 7) engaging the politics of research action 8) methodological resources and 9) creating the theory of the work. Car and Kemmis (1986) outline that PAR is not simply problem solving, research done on other people, or a method for policy implementation.

As such, from early on, “participatory” was a term that was both appropriated by those who misunderstood its original assertions as well as co-opted by researchers wanting to be seen as aligning with the principles that PAR held while not necessarily being held accountable to emancipatory politics (McTaggart 1991, 169). In both veins, research that is participatory works to delineate from research that is done *on* or *about* people. However, centering participation at the center of the research does not require an explicit politics. As is demonstrated by Whyte’s approach to PAR, participatory research can be inclusive without being emancipatory.

## 6.2 EMERGENCE OF PUBLIC PARTICIPATION GIS

Having now traced the emergence of participatory approaches broadly, I next turn my attention to the emergence and popularization of participatory methods for mapping via attention to what was known as public participation GIS. I’ll begin with the GIS Wars of the 1990s with a consideration of their relationship to the quantitative revolution in

geography. This leads to a close tracing of the evolution of an organization called the National Center for Geographic Information Analysis, which was a substantial focal point for the development of GIS related theorization and development for this time. Special attention is given to the GIS and Society movement and the way it informed the organization of several meetings, workshops, and initiatives that shaped the progression of the discipline of GIS. A particular characteristic of this progression was its commitments to “community empowerment” which, this tracing reveals, remained under conceptualized. In the final section of this chapter, I’ll conclude by ruminating on the impacts of this lack of conceptualization.

#### 6.2.1 DISCIPLINARY DIVIDES

While maps and mapping had long been considered to be a member of the geography family, the introduction of GIS prompted a long period of methodological and theoretical vetting before it became the poster-child it is today where departments are adopting into their name (for example, my alma mater, the University of North Dakota, recently underwent a name change and is now the Department of Geography and Geographic Information Science). Academic geographers in particular have historically had a love/hate relationship with GIS, which eventually softened in the second half of the 1990s (Schuurman 2004, 2).

The often-cited genesis of this love/hate relationship is the quantitative revolution of the 1950s and 1960s that made its way to geography (Marshall 2006). This period marked a paradigm shift, away from regional analysis towards empirical law making. Models of spatial structure and phenomenon were proposed shrouded in claims of accuracy and processing as enabled by positivism displaced description, synthesis, and relational

concepts (Johnston 2019). Methods informed by logical positivism situated knowledge production in terms of valuation of knowledge that is neutrally produced. Insisting that it was possible to capture data that is distilled of any bias through accurate modes of measurement, positivism's ultimate goal was to establish knowledge that was value free. Haggett's (1965) *Locational Analysis in Human Geography*; Harvey's (1969) *Explanation in Geography*; and Abler, Adams and Gould's (1971) *Spatial Organization: The Geographer's View of the World* provided the discipline of geography templates for moving away from "mere description" to *science*.

Critics of the quantitative revolution argued that it was not possible to produce value free knowledge in social research and that quantification was a performance of objectivity that was unachievable. Such critics accused quantitative research of approaching individuals as objects and demonstrated the translational limits of separating a person from the context in which they are placed to reveal the limits of the quantitative approach. Ultimately, engagement with quantitative methodologies experienced a downturn as geography moved through its cultural turn (Peet 1998).

The "extravagant ambition for GIS" (Smith 1992, 258) that began to surface in the early 90's allowed for a resurgence of this debate. Some situated GIS as the "new geographic order" in which it would be unethical to turn away from given its capacity to "unlock" key patterns in the world (Openshaw 1991). Others insisted that it was "a return to the very worst sorts of positivism, a most naive empiricism" leaving the discipline "intellectually sterile" in a "high tech trivial pursuit" (Taylor 1990, 211-212). The rhetoric of the moment was particularly elevated as those critical of GIS were called "poor fools" and "technical cripples" (Openshaw 1991, 628) while GIS users, it was argued, were

responsible for creating the “killing fields of the Iraqi Desert (Smith 1992). Lines in the sand were drawn between those who theorize about GIS and those who use and research GIS (Schuurman 2000; 2002). And this was only the first round.

The second round of critiques (of three, as outlined by Schuurman) emerged as the dust from the name calling carried out in the first round was settling. As the debate persisted, critiques became more substantially grounded and sophisticated (Crampton 2010), shifting away from ruminations on positivism to examining the impacts and effects of the technology (Schuurman 2002). Initiating the crest of this second wave, was an April 1993 email sent by Tom Poiker to the GIS listserv (Poiker 1993) inviting folks to attend the first substantial attempt to “discuss differences and mend bridges” (Crampton 2010, 100). In the invitation, Poiker writes, “GIS is developing at a pace which seems to be breathtaking for everybody. In fact, so much so that we often seem to forget what for and who for the systems are developed” (Poiker 1993). The email goes on to name directly the uneasiness being experienced broadly in the discipline, that social theorists are worried about the lack of “moral evaluation of GIS work” and that the ways that GIS work “goes wrong” is often overlooked. This transitions into a call for participation at workshop proposed to take place in Friday Harbor, WA. The workshop, which would become popularly known as “Friday Harbor”, was the first formal gathering on the topic of “Geographic Information and Society”, and had four areas of focus: 1) “How does the design and use of GIS influence society processes...2) How does GIS affect the balance of power and expertise among social groups...3) Will social processes change with the spread of GIS and are these changes desirable...4) What is the position of GIS in Geography and what is its relation to Geography?” (Poiker 1993) The remainder of the email outlines logistical details,



including that the meeting location is only accessible by ferries from Anacortes, WA or Victoria, B.C. which only run seven times a day in November, the planned timing of the event.

To further contextualize this invitation, Crampton shares Poiker's retelling of how the workshop, and the establishment of the Geographic Information and Society more broadly, outlines how Poiker clearly articulated the need for a "discussion between social theorists and GIS people" after reading Pickles's *Geography, GIS, and Surveillant Society* (1991). He presented the idea to a group of folks at the University of Buffalo where David Mark suggested that this be made into a National Center for Geographic Information and Analysis (NCGIA) proposal. The NCGIA, which is a primary player in this social history, originated as an NSF funded consortium of the University of California, Santa Barbra; the State University of New York at Buffalo; and the University of Man in 1988. The award consisted of an initial commitment of \$1.1 million of funding per year for five years, with a broad commitment of reducing impediments to the widespread use of geospatial technology. The project's funding also went on to be extended multiple times (National Center 1997) demonstrating the continued craving for GIS. Today, the NCGIA is an independent consortium between the same universities and with total funding amounts approximating \$5 million per year (NCGIA Overview, n.d.).

The intervention posed by Poiker was submitted to the NCGIA in 1992 with support from prominent GIS scholars, Eric Sheppard (who at the time was at the University of Minnesota, and one of the reviewers of the NSF proposal that initially funded the NCGIA) and Michael Goodchild (who was at UC Santa Barbara, one of the institutions of the NCGIA) and was ultimately awarded. For the Friday Harbor event, the NCGIA award

covered room and board for participants, though they had to cover their own travel (a few \$300 scholarships were available for those who could not find funding). The core planning group listed Tom Poiker, Simon Fraser University, organizer; Eric Sheppard, University of Minnesota, moderator; Nick Chrisman, University of Washington; Helen Couclelis, University of California, Santa Barbara; Michael Goodchild, University of California, Santa Barbara; David Mark, University at Buffalo; Harlan Onsrud, University of Maine; and John Pickles, University of Kentucky. Seven months later, November 11<sup>th</sup> to the 13<sup>th</sup> to be exact, the “critics” and the “GISers” who had answered Poiker’s call successfully navigated the ferry schedule, arriving at Friday Harbor to hear 24 paper presentations and participate in small focus group sessions. What were the impacts of the event and how exactly does participatory GIS emerge from this meeting?

#### 6.2.2 “YOU’RE ARGUING THAT PEOPLE SHOULD PARTICIPATE!?”

An NCGIA report summarizes the discussion of Friday Harbor as attending to questions of, “empowerment, privacy, the military role of GIS, environmental equity, and ‘electronic democracy’” (National Center 1994, 25). The gathering also gets described as a “small workshop” though it was comparable with the reported size of other workshops hosted by the NCGIA; 24 papers having been presented where the Global Modeling and GIS gathering included 27 papers and Exploratory Spatial Data Analysis had 25. Proceedings and discussions of the event were never formally published, though some papers went on to be included in either the 1995 special issue of *Cartography and Geographic Information Systems* or a chapter in John Pickle’s edited collection *Ground Truth* (1995). It is worth noting that plans for Pickle’s book were envisioned prior to the event at Friday Harbor and that throughout the chapters it becomes challenging to discern

which authors would have been participants at Friday Harbor. The seclusion of the location, the rhetorical moves to frame the event as small, and the lack of a publication of the proceedings (nearly all other NCGIA events have proceedings published and hosted on their website) seems to, in some ways, demonstrate the seemingly unbridgeable divide in the discipline, possibly compounding the breathlessness of the situation that Poiker described. Nearly 30 years later, it reads that the conversations happened in hidden corners of the world, in ways that were slightly haphazard. Friday Harbor, however, has had long lasting impacts, an event in the history of geography that caused changes that are clearly observable to even the most untrained eye examining the tree rings of the discipline. One of which is the emergence of questions regarding participation among GIS users.

In an interview with Jeremy Crampton and Matthew Wilson, John Pickles (one of the organizers of Friday Harbor and the source of inspiration for Tom Poiker) reflects on the energy and mood of the workshop. Pickles recounts the “strongly felt views” and moods of suspicion and frustration among participants. He summarizes the conversation as “vigorous but congenial”. Poiker (1995, 3) asserts that discussions, “though very animated at times, were neither aggressive nor intimidating.” All this insistence from established white male scholars as to the supposed civility of the tone of the conversation does begin to make one wonder if there is something else being communicated here. In one such moment, Pickles remembers, “Openshaw and I had a kind of coming together, positively. At one point...he leaned forward and said, “Oh, so what you’re arguing is that people should participate!” And that *was* the argument, yes, that there should be a democratic strategy, ways in which, if we’re developing GIS, there should be forms of mediation, discussion, again these kinds of technocratic usage. Our question was certainly one about

the kinds of participatory GIS might be possible.” (Crampton and Wilson 2015, 32-33 emphasis original). Throughout the meeting “techies” and “intellectuals”, each “carrying heroic images of itself and cruel caricatures of the other” began to reveal the narrow ways in which both perspectives were holding on to narrow definitions of GIS informed by a particular scale of consideration (Sheppard 1995, 5).

The invitation to the meeting had called for attention to the ways GIS was influencing power and process. How were power structures influenced? How was expertise assigned and operating? How were processes adjusted to accommodate GIS? Aptly reflecting the label the conversation was taking place under: Geographic Information and Society. However, it seems that Openshaw, one of the most vocal celebrants of GIS (recall his claim that it was the “new geographic order”) as well as one of the loudest dissenters of the social theorists’ concerns about GIS (calling folks “poor fools” and “technical cripples”) bypasses this broader consideration of society and instead sticks to what he knows: the *use* of GIS. His “ah ha” moment was prompted by a consideration of how to invite people to a space of engaging with a GIS. Importantly, this falls short of capturing the robustness of what Pickles and his social theory inclined colleagues are calling for. Yes, considerations of participation were a prominent area of interest. Pickles describe the different angles from which attention to participation was being discussed. “One model we discussed was an activist one, an expeditionary or community mapping model for GIS...Another related model was more focused on technical concerns and circled around opportunities for opening up GIS platforms to not only new kinds of users but different forms of knowing (Crampton and Wilson 2015, 32-33). However, he goes on to explain, that interventions that examined participation were ultimately grounded in a commitment to understanding

GIS's influence in society more broadly: "The key was not to empower GIS to extend its reach, or to commercial user input, or to develop it as a tool for community or indigenous mapping...but to develop a thorough-going ideological critique of the role and place of technology and social engineering in society." (Crampton and Wilson 2015, 33). Participation, however, seemed to be the bridge between the two sides. Questions of what happens when others participate in the use of GIS was an area of overlapping interest for both "sides", somehow quelling even the staunchest opposer of the theoretical perspective. The "techie" were on board because of their commitment to promoting the use of the technology, the "intellectuals" because it prompted a case study by which to access the social questions they had been increasingly concerned with.

One of the outcomes of the Friday Harbor workshop was the development of a proposal for an NCGIA initiative titled *The Social Implications of How People, Space, and Environment are Represented in GIS*. The emergence of this initiative not only allowed for a continuation of the conversation, but also helped the NCGIA to meet the requirements of its NSF funding, which it was still operating under at that time. More specifically, the original proposal to fund the NCGIA had committed to exploring the social tensions of GIS, which had gone largely undressed in the previous initiatives. The initiative was enacted in 1995 and was the first of the initiatives to be planned mostly beyond the NCGIA's three institutions.

The first event to be hosted by the initiative was a "specialist meeting" that took place in early March in South Haven, MN. The meeting went by the same name of Initiative 19 and was organized by the initiative leads, Trevor Harris and Daniel Weiner. The steering committee for the event focused the meeting on three themes from the broader list of

Initiative 19 deliverables: 1) epistemologies of GIS 2) GIS, spatial data institutions, and access to information and 3) developing alternative GISs. It is here where concerns about the use of GIS beyond the reach of the places that it was easily afforded. This informed breakout session discussion prompts around knowledge capture and representation, the use of GIS for self-empowerment, and employing GIS to support marginalized social groups.

From the reports of small group discussions, a research agenda of seven themes emerged. The theme of *GIS2 and Virtual Geographies*, where “GIS2” was seen as the next generation of developments in GIS—specifically responding to the third theme of alternative forms of GIS. More specifically, the group’s report summarized, “In seeking to develop a more inclusive and participatory GIS, a starting point could be to ask what aspects of existing GIS should be retained and what aspects should be excluded?” (Harris and Weiner 1996). This is the first time that the term “participatory GIS” appears in an NCGIA document. Another theme, titled *GIS in the Community: Local Knowledge and Multiple Realities* marks an additional moment where GIS was being applied in settings that expanded beyond the office-walls of a GIS professional. Their report summarizes,

“This research theme focused on how local knowledge and multiple realities of space and environment at the level of the ‘community’ could be incorporated within GIS. This raises some questions concerning the potential role of academics in community work; the extent to which current spatial data institutions impose constraints on successful community scale applications; and the potential role of community groups and non-profit organizations. Specific questions which emerged from this group discussion include: How do existing GISs impact specific communities? In what ways might community social differentiation influence the effective development and use of a GIS? What kinds of questions, needs, and problems do communities have and how might spatial information and GIS analysis help? What is the relationship between academics/GIS providers and specific community needs? How might academic activism help communities and what are the possible consequences of mapping data in different ways? (NCGIA 1998).

If the sketches were drafted at the specialist meeting in Minnesota, they were finalized in Main. A follow-up workshop in mid-July 1996 in Orono titled the *Public Participation GIS Workshop* brought together 18 participants (many of which attended previous NCGIA initiative meetings) for papers sessions (no breakout sessions took place). Session themes had been collaboratively developed prior to the gathering via an online forum. A short report of the event provided by Paul Schroeder (University of Maine, Orono) explains that a main topic of discussion was the, “need to extend collaborative models toward communities and the general public led to discussion of the creation of community learning centers” (Schroeder 1996). Although this meeting is often cited as the genesis of public participatory GIS, it appears to have failed to provide any type of research agenda or articulation of the approach beyond this attention to research centers. It did, however, succeed in establishing an online community where discussion could take place beyond meetings and workshop events. The online forum and the development of the website marked a moment of increased consideration of the accessibility of the GIS and Society conversation. When juxtaposed against the tucked away location of Friday Harbor in ways that privileged the locations of the organizers, it seems that considerations of how to create a new form of engagement were being applied to GIS as well as academic processes more broadly.

The first sketches of a participatory approach to GIS in the United States had appeared on the scene.

### 6.2.3 TECHNICALLY EMPOWERED

As the rhetoric of participation began to inform conversations in the GIS and Society research, there was a seemingly innocuous term that often accompanied considerations of

participation. That term is *empowerment*. While it had appeared in passing in earlier work (see Pickle's introduction to *Ground Truth*) one of the first notable considerations of empowerment appears in NCGIA documents in the proposal for the Initiative 19. "How has the proliferation and dissemination of databases associated with GIS, as well as differential access to these databases, influenced the ability of different social groups to utilize this information for their own empowerment?"(Harris and Weiner 1996) was one of the areas of focus outlined by the proposal's authors Michael Curry, Trevor Harris, David Mark, and Dan Weiner. The intricacies of such a question began to materialize throughout the specialist meeting as the exact question offered up in the proposal was used to as a discussion prompt for the second round of breakout groups. While empowerment is not reported as having been a major point of interest for the groups (one group considers the relationship between information and power while another questions what is meant by "access to data" while not going on to deconstruct other terms), it nonetheless began to calcify further as a theme of interests among many of the areas proposed in the meeting's resulting research agenda. Appearing most potently around the theme of *Environmental Justice and Political Ecology* group, the group succinctly posed: "In what ways can GIS empower and disempower community groups?" which is followed up with the prompt , "How might particular 'communities' be involved in the production and use of GIS?"

Such a close reading of this emergence of the rhetoric of empowerment reveals a host of interesting junctures. First, is the overlap and divergences between participation and empowerment. As reflected by the two questions posed by the Environmental Justice discussion group, considerations around the capacity of GIS to empower individuals or groups is not prefaced by their direct engagement with the GIS. Rather, through this line



of questioning, there remains the possibility of empowerment taking place in moments where GIS excludes the community. The complexity of empowerment is reflected further in its relationship with disempowerment. Papers from the event offer a particular insight to the directionality of consideration that deserves greater attention. Here I'm referring to the notable interest in *involving* communities to participate in GIS work. As modeled by the literature review of the participatory research approach, both language and intention are very important. Before exploring the intricacies of this rhetoric in more detail, let's continue tracing the emergence of "empowerment".

This emergence coincided with the continued blossoming of public participation GIS as is reflected by the emergence of the NCGIA's Varenus project. Recall that the original goal of the NCGIA was to support the expansion of the capacity of GIS so that it might have a broader array of applications as well as improved rigor. Only 10 years later, that task could be considered largely as having been achieved, and as such the attention of the Varenus project is the next chapter of the NCGIA. This marked a new focus on the development of tools that support the study of geographic phenomena, an exploration of the way this new technology supports the development of geographic concepts, and understanding the impacts these technologies (and their produced concepts) have on individuals and organizations. PPGIS provided an excellent case study for each.

The event's call for participation expressed the goal of bringing together those who had "deep experience with PPGIS" to reflect on the ways GIS can "reflect community interest and involve and empower its members." This stemmed from a recognition that PPGIS had demonstrated some unintended consequences: namely the contradiction that, along with its capacity to empower was a capacity to disempower. Through observations on red-lining,

local surveillance, and breaches of confidentiality and privacy enabled by PPGIS, practitioners were facing the systemic risks of the approach and were less able to write them off as unfortunately one-off occurrences. As such, the event was titled *Empowerment, Marginalization, and Public Participation GIS* and took place in mid-October 1998 in Santa Barbara, CA. Empowerment was no longer a periphery consideration to GIS's impact on society: it was now front and center.

Despite becoming the star of the show, the rhetoric of empowerment remained largely superficial as it continued to evade any foundational theoretical or conceptual definition. Everyone was using the word, but no one meaningfully knew what it meant. Papers made claims of having achieved “community empowerment” or “full empowerment of community organizations” through an array of settings and applications, ranging from urban GIS data centers and neighborhood planning to emergency response and wildlife management. However, each discussion lacked clear articulation of what empowerment was, who had defined it, and how it has been determined. At this time, Pickle's initial exploration of empowerment in *Ground Truth*, was one of the few moments of contextualization. For him, empowerment occurred by participation in democracy; GIS was a source of “new power” because GIS is in itself powerful through its ability to communicate on behalf of those “who would otherwise have no voice and no space for collective action” (Pickles 1995, 10). The power that is inherent to the technology can mobilize “marginalized” groups to finally participate. This omitted any considerations of whether participation resulted in any change or to the web of socio-political mechanisms that have been put in place to hinder participation in “democratic” governance prior to this moment. Rather, in technology we trust-forever and ever, Amen. This emergence of new

faiths caused by the development of technology was far from new (Sieber 2006), the seemingly blind belief as it applied to GIS became integral to supporting the promises of empowerment. The event's report even admits so. In a "Summary of critical issues raised in paper session" one of the areas identified as needing further attention per a breakout group discussion: "What do we mean by empowerment?" (Figure 24). There were no clear answers. Or at least this was the case in the Global North.

- ◆ What do we mean by empowerment?
  - Who are we empowering and for what purpose
  - In PPGIS are we seeking community input in order to compete against agency based GIS?
  - What of the importance of community self-discovery?
  - How do we redress structural knowledge distortion?
  - PPGIS use for advocacy
  - Are we empowering through participation?

Figure 24. What do we mean by empowerment? from *Empowerment, Marginalization, and Public Participation GIS* by Craig, Harris, and Weiner, 1999

Though the scope of consideration and range of attention around participation greatly increased following the 1996s Initiative 19 meetings, this was not the first-time participation had intersected with mapping and GIS. In the Global South, both participatory rural appraisal (PRA) (Chambers 1994) and developmentalism (Harris, Weiner, Warner, and Levin 1995) had been a catalyst for participatory mapping efforts. Both approaches were informed by participatory action research, though PRA was specifically informed by activist participatory research. Differentiated from PAR, activist participatory research not only works to produce an outcome with research that centers communities, but also focuses on efforts to destabilize systems that cause systemic oppression by facilitating work with those experiencing the oppression (Chambers 1994). Both approaches site Paulo Freire's

*Pedagogy of the Oppressed* (1970) as their foundational considerations of power and empowerment in regard to participation.

Freire's Marxist class analysis explores the revolutionary ruptures that become available through dialogical actions, or the establishment of education modalities and the subsequent experiences of liberation, that occur when learning is expanded to be a co-constructed experience enabled by the entire learning community (both teachers and students). In this model, there is no separation between liberator and liberated, no savior and rescued. But rather, it is through unity and organization that liberation can occur and the oppressors can be reintroduced to their humanity. "Human beings in communication liberate each other (Freire 1970, 133).

This approach, founded on Freire and taking place in the Global South, came to be referred to as participatory GIS (PGIS) as a way to demarcate from public participation GIS which largely lacked a theory for empowerment and took place in the Global North. The differences driving participation and, subsequently, the capacities for empowerment, were often not what was cited as the reason for this differentiation. At the time, PGIS was the use of non-traditional GIS applications that worked to contest the status quo. PPGIS, on the other hand, was a tool to solicit perspectives of those who had traditionally been excluded from Democratic processes. Recent calls have been made to discontinue the separation and collapse them into one as (P)PGIS or P/PGIS. These arguments derive from highlighting the similarities, rather than the differences of the approach-claiming that both ultimately work to produce maps that represent community claims and experiences to support decision making (Verplanke et al. 2016).

Before examining the impacts of this moment, there is one final chapter in this story of the emergence of PPGIS through the NCGIA. More specifically, this tracing ends with an exploration of the book that was largely informed by the discussions that took place at the Varenius workshop.

#### 6.2.4 TECHNICALLY NOT

The foreword of the book *Community Participation and Geographic Information Systems* (Craig, Harris, and Weiner 2002) is written by Michael Goodchild; after locating the emergence of the text within the history of the NCGIA, Goodchild congratulates the authors of the chapters making up the book for expanding reach and capacity of GIS. In other words, the continued attention to PPGIS was without a doubt helping the NCGIA fulfill the final portion of the work their NSF proposal outlined. Unlike *Ground Truth* which had already been in development at the time of Friday Harbor, this book was a direct souvenir purchased by NSF funding. In their acknowledgments, Craig, Harris, and Weiner extend recognition to three important groups who were instrumental in seeing the book come to fruition. First, the folks who supported the development of Initiative 19 and the success of the in-person meeting. Second, the authors who had contributed to the collection. Third, and most discordant, the communities where the authors had completed the work that was being presented in the book's chapters. While, on the surface, it seems appropriate and respectful to extend this formal note of recognition-it provides the first of many moments where the priorities and foundational considerations of this participatory approach come into question. They write, "Many of these communities are struggling to survive, and yet they were willing to invest some of their time to see whether this new GIS technology could be of any assistance to them. These communities are the real pioneers,

and we hope that their daring has paid adequate dividends to them.” (Craig, Harris, and Weiner 2002, xxiv). Acknowledgment of risk and desires that the effort pays off. Would the development of a project that centers the community ask them to take risks when the stakes are so high? Survival, the authors note, is what is on the line for this engagement that is largely situated as an experiment. Would this work? No one knew. But, mimicking the tone at the early days of the GIS Wars, many were hopeful that GIS did have the capacity to save the day.

What founded this hope for the PPGIS scholars was not only their subscription to the power of GIS but also to the power of “participation.” It is here, more than in any other documentation of the NCGIA events to this point, that participation had been operationalized. Plainly stated, it “refers to grassroots community engagement.” (Craig, Harris, and Weiner 2002, 4). This mode of engagement, they argue, creates pathways that are viewed as legitimate modes of empowerment.

Sarah Elwood discusses the challenges presented to the PPGIS in what she refers to as mainstreaming, or a popularization of the approach by governments and other decision-making bodies to foster performative modes of participation in decision making processes. Jessica Breen and colleagues name “crowd harvesting” as a more poignant form of extraction where there is minimal or no attempt to facilitate community empowerment but rather it that researchers or broader data collection agencies are simply using the public to collect data to inform their own projects. Ultimately, there were no promises of empowerment, only promises of results for understanding more about the capacities and boundaries of impact for GIS. What does this mean about PPGIS’s claims to empowerment, as they emerged then and now?

### 6.3 THE PROBLEM WITH PARTICIPATION

As this chapter has explored, PPGIS has struggled to locate power and, subsequently, empowerment since its popularization. Juxtaposing the commitment of participatory action research alongside the social histories of PPGIS in the United States reveals the ways empowerment remains conceptually malnourished due to the diversion of conceptualization of power more broadly; allegiance is split between the power of the map, the power of technology, and the power of collective action. The murkiness surrounding this concept has long been a source of dissatisfaction for many, from the summarizing remarks of the Varenus Projects (1999) to the systematic literature reviews completed by scholars today (Brown 2012, Mukherjee 2015).

This comparison brings into question the use of the term *participatory* in this context. There is a tension around what form of participatory research the practices of public participation GIS are aligned with. As noted, there was a division between participatory GIS and public participation GIS which is frequently attributed to divisions between applications in the Global South and Global North respectively. The differences, however, also track with divisions of the frameworks of partition. Traditionally, as it emerged in the Global South, participatory approaches unequivocally center the needs of the community and often attempt to be distanced from applications and use cases that are largely focused on legitimizing traditionally performed work. Though there has been exploitation, misuse, and contradiction of the approach since its emergence- these central tenants of centering and serving community have not wavered. In the US, the use of participation meant participation in democratic process but did so in ways that often kept the social order intact. The messiness of this division is introduced with PPGIS's commitments to empowerment.

While it seems the participatory approaches of PPGIS mirror simple involvement, the claims for the capacity to empower suggest a more radical, emancipatory goal.

Ruminating here on the questions posed by the Varenius Workshop, in particular “Who are we empowering and for what purpose?” (Craig, Harris, and Weiner 1999, 11), brings to the forefront one unforgiving question: who is the “we”? Connecting the workshop to its lineage in the NCGIA and the GIS and Society debates, suggests that that “we” speaks almost exclusively to the GIS. This version of “we” demonstrates that the power in PPGIS does not begin with the community, but instead begins with who I have been referring to as the participatory mapping leader (PML) and the GIS community more broadly.

With the “we” of the GIS community, what is their purpose? I argue here that PPGIS was developed as an approach to make GIS more palatable at the height of the GIS Wars. Participation was identified as an area of exploration that helped translate the concerns of social theorists on the techno-deterministic nature of GIS to the “techies”. While incorporation of additional perspectives was not the only aspect in the view finder for social theorists, it was treated as a holy site where compromise could take place. This allowed public participation, as discussed by Weiner, Harris, and Craig, to become simply work done alongside “grassroots community engagement” (Craig, Harris, and Weiner 2002, p. 4) in what was largely an *experiment* of a particular form of alternative GIS. Recall the stark imbalances of power in these experimental moments where, in the acknowledgments of their book they acknowledge that survival is a challenge of many of their community partners. The stakes are high. And yet the lens of the GIS community is subsumed by the question: will it work in this setting? While exploitation within participatory methodologies has been examined via crowd-harvesting (Breen 2015) and mainstreaming



(Elwood 2006), the center of the GIS community rather than the local community that the work is supposedly working to support, makes PPGIS in and of itself a form of exploitation.

If the approach does not center the community, then neither can the production of the products that are made through these approaches. Put another way, as PPGIS does not center the community, it cannot provide the discipline a framework by which to approach the artifacts that are produced through its engagement. This offers yet another point of validation for my expression in the library and the efforts of Michael to shield his maps from the eyes of geographers. When one is engaged in work that is, first and foremost, in service to the community,

However, the one thing that the foundations of PPGIS prevented the approach from being was participatory. It was not developed as an approach that explicitly centered the approach of the communities with which researchers were partnering. Rather, PPGIS centers on counter-acting the harshness of GIS. PPGIS works to protect GIS as a tool and science. How can we apply this thing to work for good? PPGIS is not participation by this definition. It is inclusion. In the Global North, what has been come to be known as public participation GIS would more accurately be referred to as “inclusion GIS.” Recall that the language of inclusion had been put in place, particularly around the Initiative 19 specialist meeting in Minnesota. Participation, however, offers a better PR campaign for GIS. As the attention to what became known as PPGIS expanded, the claims of “empowerment” were made, not because there was evidence to support claims that meaningful modes of access and wielding of power emerged from this approach, but because it was a way for the discipline to release steam that had built up during the GIS wars. As such, empowerment became an elevated synonym for “collected local data”, “developed ‘new’ knowledge”,

“articulated local knowledge to decision makers.” This is not to say that empowerment is incompatible with GIS and mapping. And in no way am I working to delegitimize the efforts and interventions made by past participatory mappers, both applications that were early and more recent. Participatory, collaborative, counter, radical, activist, etc. mapping has a demonstrated track record of effectiveness. This is, however, a call to situate our current dissatisfaction with discussions of empowerment in participatory work more deeply. To understand *real* (not simply disciplined) conceptualizations of cartographic efficacy, we must understand power.

## CHAPTER 7. TOWARDS CARTOGRAPHIC CONSONANCE

*We have all the information we need to create change; it isn't a matter of fact. It's a matter of longing, having the will to image and implement something else*

— *adrienne maree brown*, Emergent Strategy

The arguments presented throughout this dissertation has provided multiple modalities of exploration to ruminate on the ways current expectations of cartography leads those engaged in emancipatory, community centered modes of map production to confront a host of tensions and contradictions. The expression of worry, discomfort, uncertainty that came across my face while hosting that workshop with my own community partners years ago is an experience that is pervasive, yet there has yet to be a robust interrogation of the landscape of material and social that produce the realities of these moments. Through an examination of both the contemporary and historical contexts,

The histories of cartographic practices are deeply rooted in colonialism and racism. However, mapping practices were in place before these oppressive applications (Lucchesi 2018, Rose-Redwood et al. 2020). Additionally, the efficiency and trustworthiness socially assigned to a map in its capacity as a communication device make it a potently powerful medium by which to assert claims about the world. As such, it is important to pay careful attention to how the discipline of cartography enables and forecloses possibilities of mapmaking toward individuals occupying different locations within the systems of domination. These possibilities can both rupture and maintain cartography's relationship to colonialism.

As referenced in the epigraph, we have all the information we need. Through the ways we have been attuned and work to attune others so that patriarchy might continue to

flourish, we become the materials, the hammers and nails, that reinforce the systems of domination. To do things differently, all we must do is do things differently – different people from different perspectives in different situations than they’ve been done before. Cartography and participatory mapping have been short sighted in this, making claims for the capacity to empower without confronting the ways in which power operates and is reinforced by our expectations for map production. The examination and subsequent interventions I’ve made here are embedded, and therefore in certain ways continue to enable, the persistence of whiteness in the discipline. The words of brown rest on the shoulders of Simone de Beauvoir, who asserted: “It is in the knowledge of genuine conditions of our lives that we must draw our strength to live and our reasons for acting.” Before change can take place, we must be honest about the realities of our current state. This work is an attempt to begin to get honest about the realities of our discipline.

Through content analysis of cartographic journals, education materials, interviews with participatory mapping leaders, and the rhetoric of social media situated alongside questions of the histories and positionalities that construct the expectations of cartographic practice, this research reveals that landscape of opportunities for expansion and development in the discipline. While rarely discussed in direct terms, cartographic efficacy is at the heart of many of the concerns of cartographers. The particularities of the efficacy that cartographers attune to promises the ability to capture the attention of an impartial observer in a way that facilitates its intended mod of temporal intensity. These expectations are understood to be enabled by a single mapmaker, one who has practical skills, particularly those that ensure data and representational accuracy. Cartographers work to socially enforce these expectations in face-to-face, written, and online engagements, insisting that modes of

production that fail to align with these considerations will fail. The work of participatory mapping, however, demonstrates that failure is not as omnipresent as cartographers believe. Leaders of participatory mapping projects, who are often mapping novices themselves, have developed a host of strategic approaches to map design that work to center community engagement. However, the expectations of traditional cartographic efficacy are so prominent in the lexicon surrounding cartographic practice that it produces moments of contradiction in participatory mapping partnerships. The production of a more expansive consideration of efficacy would likely, in turn, create more clarity and direction for participatory mapping. To ground these tensions more broadly, a historical tracing of the “essentially subjective” elements of map design reveals more specifically, through an attention to the categorization between “standards” and celebrated “whim and fancy”, how the expectations of efficacy create a void which invalidates the mapmaking capacity of many. The realities of this invalidation are masked by rhetoric of “participatory” approaches to map design, which are advertised for their ability to “empower” without any grounded consideration of how power operates or is gained.

With much of this tracing focusing on the dissonance created by the tension and contradictions of cartographic efficacy, what steps can the discipline take to supporting emancipatory modes of mapmaking? The discipline needs a framework that captures the efficacy that is taking place in participatory and activist mapping. One that centers on a theory of liberation for communities. The aim of this work is not to assert that privileging process and community ownership are the only or primary mechanisms by which efficacy is produced within non-traditional settings. It is, however, a start.

Transparent considerations of design can be yet another tool to add to the toolbox of participatory mappers. Understanding the modes of efficacy at work in participatory settings can better inform cartographers of the ways in which maps can and do work in the world and inform more rigorous research in this regard. As such, in this concluding section, I propose an expanded framework *within* cartography that makes room for additional considerations of efficacy.

Making room within cartography for recognizing the importance and utility of understanding the impacts that design makes in all settings can offer support to activists as well as grappling with the complex and multifaceted modes in which maps emerge today can support cartographic research requires a new allegiance in the discipline. Cartographers must pledge allegiance to the *people* even in their considerations of the details and moments that produce the product. We can make use of the diligence and commitment that is currently in place and center it around liberation. To explore this, I offer up a reflection of the ways I have attempted to bridge this divide in my own work as well as advertise the amazing work being done by world-building mapmakers all over the world.

## 7.1 PARTICIPATORY FUTURES

Inspired by Sasha Costanza-Chock, I look to the work of Escobar who argues for “autonomous design.” He reveals that integral to design processes are particular ways of knowing that both drive and are reproduced in each action and product. The current neoliberal paradigm relies on a “one world” ontology, meaning that processes are a tool to expand “capitalist patriarchal modernity and the aids of the market and/or state, and to erase indigenous ways of being, knowing, and doing (ontologies, epistemologies, practices, and lifeworlds)” (Costanza-Chock 2020, 67). Escobar’s approach, instead, centers

collaborative practices that are place-based and grounded in an acknowledgment of the radical interdependence of all people, beings, and the earth. The Zapatista concept of “a world where many worlds fit in” (Subcomandante Marcos 2000) prompts us to move past the current globalized system that is propagating ecological warfare. The results of his approach, he outlines, by the questions of environment, experience, and politics and the ways they can be enacted to recognize this interdependence and promote the creation of more just and sustainable social orders. Escobar’s design is a process that enables the creation of an object. The object created by the map is the world. The Assembly process is conceptual. The conveyor belt of concepts run from the cartographer to the page/screen, from the page/screen to the reader, from the reader to the world. The object that is being developed through this the image of the area being represented. Perhaps that is what makes a map a map. A map is not for creating-that is what plans are for. That is what blueprints are for. Maps do not make things that are physical. They only change our minds. The way we think about a space.

This, of course, takes on the rhetoric of “participation” as emerged in South America and Africa, with is committed to radical, emancipatory, colonial efforts rather than the US’s articulation of participating as a superfix mode of engagement in civic decision making. Additionally, a world building cartography calls for a more nuanced consideration within the discipline of what constitutes design. It understands that for reasons of both ignorance and malice, design can result in the misrepresentation of information. World building cartographers, however, release mapmakers from the fear mongering of these risks, trusting that individuals know what is best for themselves and their communities-subsequently creating opportunities to envision radically supportive futures.

To help bring this to a register of the personal, and demonstrate how we can connect these ideas to our own actions in participating in the discipline of cartography, I lean on the words of adrienne maree brown who ruminates on community strategies for transforming the world. She asks:

What are we as humans? What is our function in the universe?...One thing I have observed: When we are engaged in acts of love, we humans are at our best and most resilient...Perhaps humans' core function is love. Love leads us to observe in a much deeper way than any other emotion. If the goal was to increase love... I think we could actually imagine liberation from constant oppression

Worlding building cartographers create maps through acts of love. Love retools the modalities of oppression to birth radical representations to soothe pain, hold people responsible, and imagine healed futures. When mapping with love, you map anyway, in any way. Love does not ask us to represent the experiences of colonization and white supremacy in ways that the patriarchy considers beautiful because the realities of systemic oppression are far from. Map anyway, in any way. Drag your feet in the gravel of your driveway, trace the path of a firework with your fingers, hold the crayons against the wall as you dance. Each line, an act of liberation.

Through world-building cartography, we hold accountable and reintroduced humanity to the oppressors. As Paulo Freire discussed, because of their position, it would be impossible for oppressors to liberate the oppressed. In perusing liberation, the key moment is that the oppressed do not become oppressors themselves. It is the responsibility of the oppressed, not only to liberate themselves but to liberate the oppressors as well. To be a part of the oppressor/oppressed dichotomy, one is being dehumanized either from the act of being oppressed or from the act of oppressing others. To be liberated puts both parties back into alignment with humanness and escape dehumanization. World-building



cartography reveals the dehumanization that takes place in traditional cartography and its fetishization of beauty. World building cartography centers the responsibility enabled by maps and mappings, that of articulating claims about the social and material world, and subsequently creating it. In doing so, such an approach recognizes that for different worlds, different conceptualizations of efficacy are enacted.

## 7.2 WORLD BUILDING CARTOGRAPHY: A SHOWCASE

There are many world-building cartographers doing incredible work today all over the globe. In order to connect applications to the commitments of a world building cartographer I offer here a showcase of those who are already modeling such intricacies and moving the discipline forward. This is a small but significant sample of the ways activists, community members, allies, those committed to being good ancestors, and feminist scholars not only demand a seat at the table for themselves, but for all that have been denied a seat. The summaries of each in the showcase provides a brief, and perhaps insufficient, introduction to the ruptures of their work.

- *Annita Lucchesi* is an Indigenous cartographer and the founding Executive Director of the Sovereign Bodies Institute (SBI). Lucchesi's maps (which can be viewed at <https://www.annitalucchesi.com/maps>) speak to the experience of survivor violence, both through personal and community accounts, in ways that incorporate traditional symbols and design. The SBI is a non-profit dedicated to Indigenous traditions of data collection and knowledge transfer in relation to gender and sexual violence. In particular, the SBI houses the largest and most accurate database of murdered and missing Indigenous women, girls, and two spirit people from 1900 to present. With her

- work, Lucchesi fights to uplift Indigenous survivors through representation, data, and community collaboration.
- *Guerrilla Cartography* is a group of mapmakers, researchers, and designers to promote the art of map making. Since 2012, the group has gathered in both in-person and virtual venues to produce atlases on a particular theme. They are hosts of the Atlas in a Day event where, with a 24-hour deadline from the time the prompt is provided, anyone who wants to participate can submit a map based on their interpretation of the theme to be included in the atlas. Atlases have been produced around Water, Food, Migration, and, this past spring's event as the United States was in the middle of nationwide shutdowns due to the COVID-19 pandemic: Community (pdfs can be found here: <https://www.guerrillacartography.org/atlases-download>). Through these events, Guerrilla Cartography works to provide a welcoming network of mapmakers of all skill levels.
  - *GeoChicas* is a group of women who work to close the gender gap that persists the OpenStreetMap community. Participation of women identifying contributors remains abysmally low at only 3%. Since its founding as a Spanish speaking group in 2016, the group has since expanded to over 100 organizations across the world working to contribute make the experiences of women perceptible through geodata ([www.geochicas.org](http://www.geochicas.org)). Their work speaks to the barriers of access and participation that have long been in place and continue to dispute the advancements of technology.

GeoChicas work to address exclusion at the levels of the personal, cultural, and institutional through their organizing efforts.

- *LaToya Gray* is a graduate student in Urban and Regional Planning at Virginia Commonwealth University working to use maps to represent the impacts of urban renewal on Black communities. Through attention to the rhetoric of development alongside material considerations of “slum clearance” efforts, Gray examines how black communities were destroyed through the use of maps. Her Esri StoryMap “Planned Destruction” was awarded first place prize in the Education Map category of the 2020 International Esri User Conference (the map can be viewed here: <https://tinyurl.com/y24dduwz>) and walks the user through a case study of Richmond, VA and the efforts of Harland Bartholomew.
- *Meghan Kelly* is a PhD Candidate at the University of Wisconsin Madison researching feminist mapping. Kelly’s work examines the way feminist principles can be meaningfully translated into cartographic practice, exploring the ways such interventions impact the conceptual, symbolic, and material modes of production. Her work around bodies and borders prompts geographers and cartographers alike to examine the ways human experience are translated into representation, paying special attention to the ways embodiment intersects with the state. Kelly’s cartographic work has appeared in a range of well-known publications including *Rolling Stone* and *The Chicago Tribune*, demonstrating the capacity for feminist informed practices (view Meghan’s portfolio here: <http://meghankelly-cartography.github.io/>).

- *Black Girls M.A.P.P* is an organization dedicated to using GIS to investigating social issues in ways that enable community empowerment. They focus on connecting women of color to the GIS field, particularly in ways that can support community-based work. Their recent project #PeopleForThePeople works to facilitate civic engagement with election processes and other modes of community involvement by connecting the personal to the political through information sharing, education on the election process, and curation actin items (more information about Black Girls M.A.P.P .can be found here: <https://bgmapp.org/>).

By making space for more people from more diverse backgrounds within the practices of mapmaking and GIS, these people and groups are playing a role in building the worlds we need. In their building, they are also destroying, demolishing the walls that have been built to keep them out.

### 7.3 CHIP, CHIP, CHIP

Sara Ahmed uses the metaphor of the brick wall to discuss the ways we transform institutional processes. By making invisible barriers into a bring wall, Ahmed enables it be something that can be touched. The touch is in one way, an encounter, of coming up against. Those who make maps come up against being excluded, being misattuned, being “not a cartographer.” Ahmed discusses the way brick walls are a thing that we “chip, chip, chip” away at. This chip, chip, chip is also something that is experienced. Being misattuned can be a chip, chip, chip against your being. Ultimately, Ahmed also celebrates that “we are chipping away, slowly, but we are chipping away!” at the walls.

Here I reflect on a host of ways I have taken up the call to chip, chip, chip against the walls of traditional cartography. Though I was coming up against the brick wall, feeling the texture and solidity of its material, I did not understand my actions to be chip in the moment. In my overwhelm of the grand dimensions and reinforcement of the wall, I could not conceptualize the action, nevertheless the value, of a chip. Through this writing, I have come to recognize both. Juxtaposed against the sizable successes of the world building cartographers offered above, this offers a perspective on the ways that small moments; quick decisions in a meeting, a single line in a syllabus, a phone call that turns into a collaboration; can pave the path for productive ruptures.

One of the first chips was but in motion towards the start of my PhD program when I was elected to be the student representative for the Cartography Specialty Group (CSG) of the American Association of Geographers. At my first business meeting, the group was discussing the funds that would be allocated to the Remote Sensing Group to help sponsor the awards for the Remote Sensing, Cartography, and GIS poster competition that their specialty group hosted. I inquired about the history surrounding the decisions to put money towards this much larger competition rather than sponsoring our own. It was explained that the CSG used to host an individual event that was co-hosted with National Geographic but, once the contact person with NGS transitioned out of their position, the collaboration organically dissolved and the money was, instead, put towards the event co-hosted with Remote Sensing and GIScience specialty groups. I offered to take on the task of organizing an event that would be solely hosted by the CSG which was supported by the rest of the board.

The moment for intervention was particularly potent in that I was able to establish the format, the judging criteria, as well as the judges for the event. Three judges were invited for each of the two years I hosted what ended up being a guided poster session. I invited one traditional academic cartographer (the conference is largely an academic conference), one professional cartographer, and one world-building cartographer (though I wasn't referring to them as such at the time). This is one of the moments where the potential conservative nature of my intervention is notable. I could have invited only world-building cartographers to judge the event. However, in wanting to provide students the opportunity to receive feedback and network with cartographers from different backgrounds, I chose to offer more traditional options as well. The criteria, however, was a notable departure from typical student mapping competitions. Rather than succumbing to the divide between "good design" and "good research" (Wilson 2017), I created a metric that spoke to efficacy as was defined by the parameters of the project. In practice, the student in their presentation was tasked with both setting out the intentions of the map and explaining the ways in which it was successful at achieving at meeting the parameters that it had set out. Since my term expired in 2018, others have taken over the organization of the event and, since then, judging parameters around "good design" have been put in place. The parameter around intended efficacy has remained in place.

In addition to serving students through the establishment of this organizationally based competition, I have also worked through considerations of how to support the development of world-building cartographers through my own pedagogy. In two semesters of teaching *Introduction to GIS*, I made considerations of power and positionality integral to the course. Critical reading assignments contextualized the broader debates of power in the discipline

in addition to exposing students to the work of world-building cartographers mentioned in the previous section. This directly contradicts the expectations of “button pushing” training that is implemented in traditional introductory courses and works to make considerations of ethics on ongoing conversation (Elwood and Wilson 2017). Complementing this, I also provided students with software flexibility in order to best suit their long-term intended goals. The first five weeks were committed to the use of QGIS, the open source GIS software. However, after this point, students had the option of transitioning to ArcGIS, the industry standard that a student would likely be asked to know if transitioning to an industry job. I also assigned work that lead students through the production of positionality statements that would accompany their final projects. Overall, end of the semester surveys report that students emerge from the course with an understanding of how to use a GIS as well as how to socially situate the knowledge they produce when using a GIS.

This is a goal that myself and my collaborator, Meghan Kelly at the University of Wisconsin Madison, hope that all who are trained in mapmaking would soon be able to achieve. In recognizing the ways professional cartographers celebrate and share checklists, guidebooks, and tutorials, we have developed a feminist toolkit that mapmakers can use to incorporate considerations of power in their mapping process. In our paper *Pressing Pause, “Doing” Feminist Mapping* which is slotted to be part of a special issue of *ACME: The International Journal of Critical Geographies* on doing critical GIS, we invite mappers to “press pause” on the mapping tasks so that they can slow down and consider the ways their data, their representations, and their own life circumstances are enmeshed in power. We provide examples of written, audio, and visual practices that can provide a platform for both personal reflexivity as well as creative communication to their map user.

In addition to broadly conceptualized interventions to the map making process, I also offer direct support to world-building cartographers in the form of one-on-one design consultations. I offer what one client referred to as “Map Therapy” where we work together to develop more confidence in their ability to produce effective maps. We come together to discuss their motivation and experience with mapmaking, their intended goals for a current project they’re working on, the specific challenges they are confronting in their map production process. We look at maps they have made or drafts of maps in production and think together through moments of intention, interpretations, and future iterations. Different from most cartographic consultations, I do not make the map for my clients. Rather, I provide support to think through the intricacies of their specific mapping project, co-creating guidance to enable them to achieve the goals they’re striving towards in their own development as a cartographer. Many of my clients struggle with connecting the design concepts that are offered in previously taken GIS courses, massive general design texts, or overly generalized checklists to their mapping work. I work to facilitate this translational moment to support the intricacies of their very specialized map. Overall, Map Therapy helps folks become confident mapmakers in spite of the all the claims that they shouldn’t be.

While none of these tasks on their own offers a massive rupture to the long-established traditions, they are each a “chip chip chip” against the brick wall that is cartography. Put this alongside the world building cartographers mentioned previously, as they are indeed chip, chip, chipping away at the walls too, and we find ourselves making an impact. And indeed, we *must* chip, chip, chip at the walls that keep us out. This must be done with a recognition of our place in the matrix of domination, an understanding of the ways in which



we have both chipped away at others and been chipped away by others. Otherwise we're simply using the dust produced by our chipping to build new walls.

World building cartographers recognize the potent power encapsulated by maps, each one a remedy for the sick and broken parts of our world. Recognizing this emancipatory potential of maps, I counteract the insistence of “just because once can more easily map today, this does not necessarily mean one should” by reorienting the words of an instrumental influencer of the zero waste movement Anne Marie Bonneau and insist on behalf of world building cartographers: we don't need a handful of people mapping perfectly. We need millions of people doing it imperfectly. Because a #cartofail isn't when we make a map that doesn't look how the books and the twitter users tell us it should. a #cartofail is when we fail to show up to make the map that lifts up our voices and the voices of our communities. A #cartofail is tracing, and retracing and retracing the borders that ensure cartography to be reserved for the white, cisgendered, straight, able bodied, middle aged, middle-upper-class, educated sons of the patriarchy. A #cartofail is to deny the healing capacities offered to us by gathering to make maps. How to avoid a #cartofail? You want to make a map. Someone tells you not to. Map anyway. In any way. And if you do it with love, you'll be building the worlds that now, perhaps more than ever, we need.

## REFERENCES

- Ahmed, Sara. 2014. "White Men." *Feministkilljoys* (blog). November 4, 2014. <https://feministkilljoys.com/2014/11/04/white-men/>.
- . 2017. *Living a Feminist Life*. Durham: Duke University Press.
- Allen, Evette, Bryan Hubain, Cerise Hunt, Star Lucero, and Saran Steward. 2012. "Race Matters: Implementing Racial Identity Development Theories into the Classroom." 2012 Diversity Summit. [https://www.racialequitytools.org/resourcefiles/RaceMatters\\_ImplementingRacialIdentityDevelopmentTheoriesintotheClassroom.pdf](https://www.racialequitytools.org/resourcefiles/RaceMatters_ImplementingRacialIdentityDevelopmentTheoriesintotheClassroom.pdf).
- American Association of Geographers. 2017. "AAG Cartography Editor Sought for 'Annals of the AAG,' 'Professional Geographer,' and 'GeoHumanities.'" *Association News* (blog). May 18, 2017. <http://news.aag.org/2017/05/aag-cartography-editor-sought-for-annals-of-the-aag-professional-geographer-and-geohumanities/>.
- Andrienko, Gennady, Sara Irina Fabrikant, Amy L. Griffin, Jason Dykes, and Jochen Schiewe. 2014. "GeoViz: Interactive Maps That Help People Think." *International Journal of Geographical Information Science* 28 (10): 2009–12. <https://doi.org/10.1080/13658816.2014.937719>.
- Anti-Eviction Mapping Project. 2020. "About." October 2020. <https://antievictionmap.com/>.
- Bachmann, Monika M. 2015. "Exploring and Addressing Functional Map Illiteracy in Community College Students." *Papers in Applied Geography* 1 (3): 258–61. <https://doi.org/10.1080/23754931.2015.1014674>.
- Barnes, Trevor J. 2006. "Geographical Intelligence: American Geographers and Research and Analysis in the Office of Strategic Services 1941–1945." *Journal of Historical Geography* 32 (1): 149–68. <https://doi.org/10.1016/j.jhg.2005.06.001>.
- Bartz, B.S. 1970. "Experimental Use of Search Task in an Analysis of Type Legibility in Cartography." *Journal of Typographic Research* 4: 147–67.
- Beauvoir, Simone de. 1948. *The Ethics of Ambiguity*. Philosophical Library.
- Bleisch, Susanne, and Daria Hollenstein. 2018. "Exploratory Geovisualizations for Supporting the Qualitative Analysis and Synthesis of Place-Related Emotion Data." *Cartographic Perspectives* 91: 17.
- Block, Daniel R., Euan Hague, Winifred Curran, and Howard Rosing. 2017. "Measuring Community and University Impacts of Critical Civic Geography: Insights from

- Chicago.” *The Professional Geographer*, September, 1–7. <https://doi.org/10.1080/00330124.2017.1366777>.
- Board, C., and A. Buchanan. 1974. “Evaluating Thematic Maps—Current Trends in the United Kingdom.” *The Cartographic Journal* 11 (2): 124–29. <https://doi.org/10.1179/caj.1974.11.2.124>.
- Board, Christopher. 1978. “Map Reading Tasks Appropriate in Experimental Studies in Cartographic Communication.” *Canadian Cartographer* 15: 1–12.
- Boll-Bosse, Amber J., and Katherine B. Hankins. 2017. ““These Maps Talk for Us:’ Participatory Action Mapping as Civic Engagement Practice.” *The Professional Geographer*, September, 1–8. <https://doi.org/10.1080/00330124.2017.1366788>.
- Boschmann, E. Eric, and Emily Cubbon. 2013. “Sketch Maps and Qualitative GIS: Using Cartographies of Individual Spatial Narratives in Geographic Research.” *The Professional Geographer* 66 (2): 236–48. <https://doi.org/10.1080/00330124.2013.781490>.
- Breen, Jessica, Shannon Dosemagen, Jeffrey Warren, and Mathew Lippincott. 2015. “Mapping Grassroots: Geodata and the Structure of Community-Led Open Environmental Science.” *ACME* 13 (3): 849–73.
- Brown, Adrienne M. 2017. *Emergent Strategy: Shaping Change, Changing Worlds*.
- Brown, Greg. 2012. “An Empirical Evaluation of the Spatial Accuracy of Public Participation GIS (PPGIS) Data.” *Applied Geography* 34 (May): 289–94. <https://doi.org/10.1016/j.apgeog.2011.12.004>.
- Brügger, Annina, Kai-Florian Richter, and Sara Irina Fabrikant. 2019. “How Does Navigation System Behavior Influence Human Behavior?” *Cognitive Research: Principles and Implications* 4 (1). <https://doi.org/10.1186/s41235-019-0156-5>.
- Brydon-Miller, Mary. 2001. “Education, Research, and Action: Theory and Methods of Participatory Action Research.” In *From Subjects to Subjectivities: A Handbook of Interpretive and Participatory Methods*, edited by Deborah L. Tolman and Mary Brydon-Miller, 76–89. *Qualitative Studies in Psychology*. New York: New York University Press.
- Buckingham, Tanya. 2018. “A Noble Craft.” In *Atlas of Design, Volume Four*, edited by Alethea Steingisser, Caroline Rose, and Lauren Tierney. Madison, WI: North American Cartographic Information Society.
- Caquard, Sébastien, and William Cartwright. 2014. “Narrative Cartography: From Mapping Stories to the Narrative of Maps and Mapping.” *The Cartographic Journal* 51 (2): 101–6. <https://doi.org/10.1179/0008704114Z.000000000130>.

- Caquard, Sébastien, and Amy Griffin. 2019. "Mapping Emotional Cartography." *Cartographic Perspectives*, no. 91 (June). <https://doi.org/10.14714/CP91.1551>.
- Carr, Wilfred, and Stephen Kemmis. 1986. *Becoming Critical: Education, Knowledge, and Action Research*. London ; Philadelphia: Falmer Press.
- Castner, H.W. 1964. "The Role of Pattern in the Visual Perception of Graded Dot Area Symbols in Cartography." University of Wisconsin, Madison.
- . 1983. "Research Questions and Cartographic Design." In D.R.F. Taylor (Ed), *Graphic Communication and Design in Contemporary Cartography.*, 87–113. Chichester, UK: John Wiley & Sons.
- Chambers, Robert. 1994. "The Origins and Practice of Participatory Rural Appraisal." *World Development* 22 (7): 953–69. [https://doi.org/10.1016/0305-750X\(94\)90141-4](https://doi.org/10.1016/0305-750X(94)90141-4).
- Chang, K.T. 1977. "Visual Estimation of Graduated Circles." *Canadian Cartographer* 14: 130–38.
- Chappellet-Lanier, Tajha. 2017. "These Government Open Data Sets Have Been Taken down since Trump Took Office." Technical.Ly DC. February 15, 2017. <http://technical.ly/dc/2017/02/15/trump-open-data-taken-down/>.
- Clarke, D. 2003. "Are You Functionally Map Literate?" *Proceedings of the 21st International Cartographic Conference (ICC), Cartographic Renaissance*, , 7.
- Collier, David. 1993. "The Comparative Method." In *Political Science: The State of the Discipline II*, edited by Ada Finifter. Washington D.C.: American Political Science Association.
- Collins, Patricia Hill. 2002. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. Routledge Classics. New York: Routledge.
- Cope, Meghan. 2005. "Coding Qualitative Data." In *Qualitative Research Methods in Human Geography*, edited by Iain Hay. Oxford ; New York: Oxford University Press.
- Costanza-Chock, Sasha. 2018. "Design Justice: Towards an Intersectional Feminist Framework for Design Theory and Practice." In . <https://doi.org/10.21606/drs.2018.679>.
- . 2020. *Design Justice: Community-Led Practices to Build the Worlds We Need*. Information Policy. Cambridge, MA: The MIT Press.

- Craig, Will, Trevor Harris, and Daniel Weiner. 1999. "Empowerment, Marginalization and Public Participation GIS." Report of Varenus Workshop: October 15-17, 1998. Santa Barbra, California.
- Craig, William J., and Sarah A. Elwood. 1998. "How and Why Community Groups Use Maps and Geographic Information." *Cartography and Geographic Information Systems* 25 (2): 95–104.
- Craig, William J, Trevor M Harris, and Daniel Weiner. 2002. "Community Participation and Geographic Information Systems." In *Community Participation and Geographic Information Systems*. London; New York: Taylor & Francis.  
<http://www.crcnetbase.com/isbn/9780203469484>.
- Crampton, Jeremy. 2001. "Maps as Social Constructions: Power, Communication and Visualization." *Progress in Human Geography* 25 (2): 235–52.  
<https://doi.org/10.1191/030913201678580494>.
- Crampton, Jeremy W. 2003. *The Political Mapping of Cyberspace*. Chicago: University of Chicago Press.
- . 2008. "Maps as Social Constructions: Power, Communication and Visualization." In *Reader in Critical Geographies*, edited by H Bauder and S Engel-Di Mauro, 691–710. Praxis (e)Press.  
<http://journals.sagepub.com/doi/10.1191/030913201678580494>.
- Crampton, Jeremy. 1994. "Cartography's Defining Moment: The Peters Projection Controversy, 1974-1990." *Cartographica: The International Journal for Geographic Information and Geovisualization* 31 (4): 16–32.
- Crampton, Jeremy. 2010. *Mapping: A Critical Introduction to Cartography and GIS*. Chichester, U.K.; Malden, MA: Wiley-Blackwell.
- Crampton, Jeremy, and Matthew W. Wilson. 2015. "Harley and Friday Harbor: A Conversation with John Pickles." *Cartographica: The International Journal for Geographic Information and Geovisualization* 50 (1): 28–36.  
<https://doi.org/10.3138/carto.50.1.06>.
- Crawford, Paul V. 1973. "The Perception of Graduated Squares as Cartographic Symbols." *The Cartographic Journal* 10 (2): 85–88.  
<https://doi.org/10.1179/caj.1973.10.2.85>.
- Cuff, D.J. 1973. "Color on Temperature Maps." *Cartographic Journal* 10: 17–20.
- Dalton, Bridget. 2015. "Charting Our Path with a Web Literacy Map." *The Reading Teacher* 68 (8): 604–8. <https://doi.org/10.1002/trtr.1369>.

- Dando, Christina E. 2018. *Women and Cartography in the Progressive Era. Studies in Historical Geography*. Abingdon, Oxon ; New York, NY: Routledge.
- Davidson, Christina. 2009. "Transcription: Imperatives for Qualitative Research." *International Journal of Qualitative Methods* 8 (2): 35–52.
- DeLucia, W.M. 1974. "The Map Interpretation Process: Its Observation and Analysis through the Technique of Eye Movement Recording." University of Washington, Seattle.
- Denil, Mark. 2011. "The Search for a Radical Cartography." *Cartographic Perspectives*, no. 68 (March): 7–28. <https://doi.org/10.14714/CP68.6>.
- Detroit Geographical Expedition and Institute. 1971. "The Geography of the Children of Detroit." Discussion Paper No. 3. *Field Notes: A Series Dedicated to the Human Exploration of Our Planet*. East Lansing, MI.
- D'Ignazio, Catherine, and Lauren F Klein. 2016. "Feminist Data Visualization." Workshop on Visualization for the Digital Humanities (VIS4DH), Baltimore. IEEE.
- Dobson, M.W. 1983. "Visual Information Processing and Cartographic Communications: The Utility of Redundant Stimulus Dimensions." In *Graphic Communication and Design in Contemporary Cartography*, edited by D.R.F. Taylor. Chichester, UK: John Wiley & Sons.
- Eckert, Max. 1921. *Die Kartenwissenschaft: Forschung Und Grundlagen Zu Einer Kartographie Als Wissenschaft* Volume 2. Vol. 2. 2 vols. Berlin and Leipzig: Walter De Gruyter and Co.
- Edney, Matthew H. 2011. "Cartography Without 'Progress': Reinterpreting the Nature and Historical Development of Map Making." In *Classics in Cartography*, edited by Martin Dodge, 305–29. Chichester, UK: John Wiley & Sons, Ltd. <https://doi.org/10.1002/9780470669488.ch18>.
- . 2019. *Cartography: The Ideal and Its History*. Chicago ; London: The University of Chicago Press.
- Ekman, Gosta, Ralf Lindman, and W. Willam-Olsson. 1961. "A Psychophysical Study of Cartographic Symbols." *Perceptual and Motor Skills* 13 (3): 355–68. <https://doi.org/10.2466/pms.1961.13.3.355>.
- Elwood, Sarah. 2006. "Critical Issues in Participatory GIS: Deconstructions, Reconstructions, and New Research Directions." *Transactions in GIS* 10 (5): 693–708.

- Elwood, Sarah, and Matthew Wilson. 2017. "Critical GIS Pedagogies beyond 'Week 10: Ethics.'" *International Journal of Geographical Information Science* 31 (10): 2098–2116. <https://doi.org/10.1080/13658816.2017.1334892>.
- Fabrikant, Sara I, Sidonie Christophe, Georgios Papastefanou, and Sara Lanini-Maggi. 2012. "Emotional Response to Map Design Aesthetics." <https://doi.org/10.5167/UZH-71701>.
- Field, Ken. 2020. "Twitter Comment," May 20, 2020.
- Field, Kenneth. 2014. "The Subjectivity of Cartographic Taste." In *Atlas of Design, Volume Two*, edited by Daniel Huffman, Samuel Matthews, and Martin Elmer, 1–4. Madison, WI: North American Cartographic Information Society.
- . 2106. "Comment on Cartographic Summit 2016." Andy Woodruff | Modern Cartography (blog). February 16, 2106. <http://andywoodruff.com/blog/cartographic-summit-2016/>.
- Fish, Carolyn. 2018. "The Cartography of Climate Change in United States Media." Dissertation, The Pennsylvania State University.
- . 2020. "Storytelling for Making Cartographic Design Decisions for Climate Change Communication in the United States." *Cartographica: The International Journal for Geographic Information and Geovisualization* 55 (2): 69–84. <https://doi.org/10.3138/cart-2019-0019>.
- Fish, Stanley Eugene. 1980. *Is There a Text in This Class? The Authority of Interpretive Communities*. Cambridge Mass.: Harvard Univ. Press.
- Flannery, James John. 1971. "The Relative Effectiveness of Some Common Graduated Point Symbols in the Presentation of Quantitative Data." *Cartographica: The International Journal for Geographic Information and Geovisualization* 8 (2): 96–109. <https://doi.org/10.3138/J647-1776-745H-3667>.
- Foucault, Michel. 1982. "The Subject and Power." *Critical Inquiry* 8 (4): 777–95.
- . 1995. *Discipline and Punish: The Birth of the Prison*. 2nd Vintage Books ed. New York: Vintage Books.
- Frederix, Lee. 2019. "Mapping as a Visual Arts Practice: Social Geographies of Contemporary Beirut." *International Journal of Cartography* 5 (2–3): 304–15. <https://doi.org/10.1080/23729333.2019.1614309>.
- Freeman, R. E. 1984. *Strategic Management: A Stakeholder Approach*. Boston: Pitman Publishing.

- Freire, Paulo. 1970. *Pedagogy of the Oppressed*. 11. printing. A Continuum Book. New York: The Seabury Press.
- GAP2. n.d. "GAP2 in Depth." *GAP: Connecting Science and Stakeholders Policy* (blog). <http://gap2.eu/gap2-in-depth/>.
- Garcia-Ramon, Maria Dolores, and Janice Monk. 2007. "Gender and Geography: World Views and Practices." *Belgeo*, no. 3 (September): 247–60. <https://doi.org/10.4000/belgeo.11162>.
- Gartner, Georg, David A. Bennett, and Takashi Morita. 2007. "Towards Ubiquitous Cartography." *Cartography and Geographic Information Science* 34 (4): 247–57. <https://doi.org/10.1559/152304007782382963>.
- GC Videography Fellows. 2014. "Gwendolyn Warren and Cindi Katz in Conversation." *The Videography Fellows Program at The Graduate Center, CUNY* (blog). 2014. <https://vimeo.com/111159306>.
- Gilmartin, Patricia P. 1980. "The Map Context as a Source of Perceptual Error in Graduated Circle Maps." University of Kansas.
- Glaser, Barney. 1965. "The Constant Comparative Method of Qualitative Analysis." *Social Problems* 12 (1965): 436–45.
- Glassman, Michael, and Gizem Erdem. 2014. "Participatory Action Research and Its Meanings: Vivencia, Praxis, Conscientization." *Adult Education Quarterly* 64 (3): 206–21. <https://doi.org/10.1177/0741713614523667>.
- Glassman, Michael, Gizem Erdem, and Mitchell Bartholomew. 2013. "Action Research and Its History as an Adult Education Movement for Social Change." *Adult Education Quarterly* 63 (3): 272–88. <https://doi.org/10.1177/0741713612471418>.
- Goodchild, Michael, David Mark, Max Egenhofer, and Karen Kemp. 1997. "Varenius: NCGIA's Project to Advance Geographic Information Science." UC Santa Barbara: National Center for Geographic Information and Analysis. <https://escholarship.org/uc/item/9jt506nw>.
- Griffin, Amy. 2020. "Trustworthy Maps." *Journal of Spatial Informaiton Science* 20: 5–19.
- Griffin, Amy, and Sara Fabrikant. 2012. "More Maps, More Users, More Devices Means More Cartographic Challenges." *The Cartographic Journal* 49 (4): 298–301. <https://doi.org/10.1179/0008704112Z.00000000049>.
- Griffin, Amy L., Travis White, Carolyn Fish, Beate Tomio, Haosheng Huang, Claudia Robbi Sluter, João Vitor Meza Bravo, et al. 2017. "Designing across Map Use



- Contexts: A Research Agenda.” *International Journal of Cartography* 3 (sup1): 90–114. <https://doi.org/10.1080/23729333.2017.1315988>.
- Hall, Budd, A Gillett, and R Tandon, eds. 1982. *Creating Knowledge: A Monopoly*. New Delhi, India.
- Haraway, Donna. 1988. “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective.” *Feminist Studies* 14 (3): 575. <https://doi.org/10.2307/3178066>.
- Haraway, Donna Jeanne. 2016. *Staying with the Trouble: Making Kin in the Chthulucene. Experimental Futures: Technological Lives, Scientific Arts, Anthropological Voices*. Durham: Duke University Press.
- Harding, Sandra G. 1986. *The Science Question in Feminism*. Ithaca: Cornell University Press.
- Harley, J. B. 1989. “Deconstructing the Map.” *Cartographica* 26 (2): 1–20.
- Harley, J.B. 1987. “The Map and the Development of the History of Cartography.” In *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, edited by J.B. Harley and David Woodward, 1:622. *The History of Cartography*. University of Chicago Press.
- Harris, Trevor, and Daniel Weiner. 1996. “GIS and Society: The Social Implications of How People, Space, and Environment Are Represented in GIS- Scientific Report for the Initiative 19 Specialist Meeting.” NCGIA Technical Reports. UC Santa Barbra.
- Harris, Trevor, Daniel Weiner, Timothy Warner, and Richard Levin. 1995. “Pursuing Social Goals Through Participatory GIS: Redressing South Africa’s Historical Political Ecology.” In *Ground Truth*, edited by John Pickles. New York NY: Guilford Press.
- Head, C. 1984. “The Map as Natural Language: A Paradigm for Understanding.” *Cartographica* 21 (1): 1–25.
- Heffernan, Michael, and Catherine Delano-Smith. 2014. “A Life in Maps: Leo Bagrow, *Imago Mundi*, and the History of Cartography in the Early Twentieth Century.” *Imago Mundi* 66 (sup1): 44–69.
- Hopkin, V.D., and R.M. Taylor. 1979. “Human Factors in the Design and Evaluation of Aviation Maps.” In *AGARDograph No. 225*, NATO Advisory Group for Aerospace Research and Development. Neuilly-Sur Seine, France.
- Huffman, Daniel. 2020. “Regrets.” *Something About Maps* (blog). May 19, 2020. <https://somethingaboutmaps.wordpress.com/2020/05/>.

- Huffman, Nikolas, Clifford Wood, and C. Peter Keller, eds. 1996. "You Can't Get Here from There: Reconstructing the Relevancy of Design in Postmodernism." In *Cartographic Design: Theoretical and Practical Perspectives*, 35–54. International Western Geographical Series. Chichester ; New York: Wiley.
- International Cartographic Association. 2014. "Mission." International Cartographic Association Association Cartographique Internationale (blog). July 2, 2014. <https://icaci.org/mission/>.
- Johnson, Jay T, Renee Pualani Louis, and Albertus Hadi Pramono. 2006. "Facing the Future: Encouraging Critical Cartographic Literacies In Indigenous Communities." *Facing the Future* 4 (1): 19.
- Johnston, Ron, Richard Harris, Kelvyn Jones, David Manley, Wenfei Winnie Wang, and Levi Wolf. 2019. "Quantitative Methods I: The World We Have Lost – or Where We Started From." *Progress in Human Geography* 43 (6): 1133–42. <https://doi.org/10.1177/0309132518774967>.
- Jung, Jin-Kyu. 2009. "Computer-Aided Qualitative GIS: A Software-Level Integration of Qualitative Research and GIS." In *Qualitative GIS: A Mixed Methods Approach*, edited by Meghan Cope and Sarah Elwood, 1st ed. Thousand Oaks, CA: Sage.
- Kaplan, David H., and Jennifer E. Mapes. 2016. "Where Are the Women? Accounting for Discrepancies in Female Doctorates in U.S. Geography." *The Professional Geographer* 68 (3): 427–35. <https://doi.org/10.1080/00330124.2015.1102030>.
- Kelly, Meghan, and Amber Bosse. n.d. "Pressing Pause, 'Doing' Feminist Mapping." *ACME: An International Journal for Critical Geographies*, under review.
- Kemmis, Stephen, and Robin McTaggart. 1988. *The Action Research Planner*. Melbourne: Deaking University Press.
- Kent, Alexander. 2014. "A Professional Less Ordinary? Reflections on the Life, Death, and Resurrection of Cartography." *SoC Bulletin* 48.
- . 2017. "Trust Me, I'm a Cartographer: Post-Truth and the Problem of Acritical Cartography." *The Cartographic Journal* 54 (3): 193–95. <https://doi.org/10.1080/00087041.2017.1376489>.
- Kent, Alexander J, and Anja Hopfstock. n.d. "How Topographic Maps Affect: Experiencing Washington, DC through the Maps of the 'Other.'" *Cartographic Perspectives*, 15.
- Kent, Alexander James, and Anja Hopfstock. 2018. "How Topographic Maps Affect: Experiencing Washington, DC through the Maps of the 'Other.'" *Cartographic Perspectives*, no. 91. <https://doi.org/10.14714/CP91.1459>.

- Khan, Candy, and Donna Chovanec. 2010. "Is Participatory Action Research Relevant in the Canadian Workplace?" *Journal of Contemporary Issues in Education* 5 (1). <https://doi.org/10.20355/C5PK58>.
- Kim, Annette Miae. 2015. *Sidewalk City: Remapping Public Space in Ho Chi Minh City*. Chicago ; London: The University of Chicago Press.
- King, Geoff. 1996. *Mapping Reality: An Exploration of Cultural Cartographies*. New York: St. Martin's Press.
- Kitchin, Rob, Justin Gleeson, and Martin Dodge. 2013. "Unfolding Mapping Practices: A New Epistemology for Cartography." *Transactions of the Institute of British Geographers* 38 (3): 480–96. <https://doi.org/10.1111/j.1475-5661.2012.00540.x>.
- Knight, David M. 1986. *The Age of Science: The Scientific World-View in the Nineteenth Century*. Oxford, OX, UK ; New York, NY, USA: B. Blackwell.
- Knigge, LaDona, and Meghan Cope. 2006. "Grounded Visualization: Integrating the Analysis of Qualitative and Quantitative Data through Grounded Theory and Visualization." *Environment and Planning A* 38 (11): 2021–37. <https://doi.org/10.1068/a37327>.
- Knigge, LaDona G. 2017. "Grounded Theory." In *International Encyclopedia of Geography: People, the Earth, Environment and Technology*, edited by Douglas Richardson, Noel
- Knoppke-Wetzel, Vanessa. 2014. "How Technological Changes Aesthetically Defined Pre-1900s Maps: A Stylistic Look at Woodblock, Copperplate, and Lithograph Print Maps." Master's Thesis, Madison, WI: University of Wisconsin, Madison.
- . 2018. (A Woman's) Cartographic Perspective. 2018 NACIS Annual Meeting. <https://www.youtube.com/watch?v=EhjBcCtWoBw&t=2023s>.
- Kobayashi, Audrey. 2003. "GPC Ten Years On: Is Self-Reflexivity Enough?" *Gender, Place & Culture* 10 (4): 345–49. <https://doi.org/10.1080/0966369032000153313>.
- Koc, Hakan, and Selcuk Besir Demir. 2014. "Developing Valid and Reliable Map Literacy Scale." *Review of International Geographical Education Online* 4 (2).
- Koláččný, A. 1969. "Cartographic Information – A Fundamental Concept And Term In Modern Cartography." *Cartographica: The International Journal for Geographic Information and Geovisualization* 14 (1): 39–45. <https://doi.org/10.3138/N587-4H37-2875-L16J>.
- Kollektiv Oranotango+. 2018. "This Is Not an Atlas: A Global Collection of Counter-Cartographies." *Sozial- Und Kulturgeographie*, volume 26. Bielefeld: Transcript Verlag.

- Kraak, Menno-Jan. 2016. "Cartographers Gain Outside Perspective." Esri Newsroom (blog). Summer 2016. <https://www.esri.com/about/newsroom/arcnews/cartographers-gain-outside-perspective/>.
- Kraak, Menno-Jan, and Sara Irina Fabrikant. 2017. "Of Maps, Cartography and the Geography of the International Cartographic Association." *International Journal of Cartography* 3 (sup1): 9–31. <https://doi.org/10.1080/23729333.2017.1288535>.
- Kraak, Menno-Jan, Barend Köbben, and Yanlin Tong. 2014. "Integrated Time and Distance Line Cartogram: A Schematic Approach to Understand the Narrative of Movements." *Cartographic Perspectives* 0 (77): 7–16. <https://doi.org/10.14714/CP77.1234>.
- Krygier, John. 2003. "Welcome." In 2003 Annual Meeting Program, 1. Jacksonville, FL: North American Cartographic Information Society.
- Krygier, John, and Deborah Carter Peoples. 2003. "Geographic Information Literacy and the World Wide Web." In *Maps and the Internet*, 17–33. Elsevier. <https://doi.org/10.1016/B978-008044201-3/50004-9>.
- Kwan, Mei-Po. 2002. "Is GIS for Women? Reflections on the Critical Discourse in the 1990s." *Gender, Place & Culture* 9 (3): 271–79. <https://doi.org/10.1080/0966369022000003888>.
- Latour, Bruno. 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, Mass: Harvard Univ. Press.
- Lewin, K. 1948. "Action Research and Minority Problems." In *Resolving Social Conflicts*, edited by G.W. Lewin. New York: Harper and Row.
- Lobben, Amy, Megen E. Brittell, and Nicholas A. Perdue. 2015. "Inclusive Cartographic Design: Overcoming Ocular-Centric Cartographies." In *Cartography - Maps Connecting the World*, edited by Claudia Robbi Sluter, Carla Bernadete Madureira Cruz, and Paulo Márcio Leal de Menezes, 89–98. *Lecture Notes in Geoinformation and Cartography*. Cham: Springer International Publishing. [https://doi.org/10.1007/978-3-319-17738-0\\_7](https://doi.org/10.1007/978-3-319-17738-0_7).
- Lobben, Amy, P William Limpisathian, and Megan Lawrence. 2019. "Representations of Place in the Human Brain." <https://doi.org/10.13140/RG.2.2.11222.40004>.
- Lucchesi, Annita Hetoevéhotkhe'e. 2018. "'Indians Don't Make Maps': Indigenous Cartographic Traditions and Innovations." *American Indian Culture and Research Journal* 42 (3): 11–26. <https://doi.org/10.17953/aicrj.42.3.lucchesi>.
- "Map History: ICHC." 2017. *International Conferences on the History of Cartography*. 2017. <http://www.maphistory.info/ichcintro.html>.

- Marshall, Alan. n.d. "A Critique of the Development of Quantitative Methodologies in Human Geography," 10.
- Marshall, Allen. 2006. "A Critique of the Development of Quantitative Methodologies in Human Geography." *Radical Statistics*.  
<https://www.radstats.org.uk/no092/marshall92.pdf>.
- McLafferty, Sara L. 2002. "Mapping Women's Worlds: Knowledge, Power and the Bounds of GIS." *Gender, Place & Culture* 9 (3): 263–69.  
<https://doi.org/10.1080/0966369022000003879>.
- McTaggart, Robin. 1991. "Principles for Participatory Action Research." *Adult Education Quarterly* 41 (3): 168–87.  
<https://doi.org/10.1177/0001848191041003003>.
- Meihoefer, H.J. 1973. "The Visual Perception of the Circle in Thematic Maps: Experimental Results." *Canadian Cartographer* 10 (1): 63–84.
- Monk, Janice. 2004. "Women, Gender, and the Histories of American Geography." *Annals of the Association of American Geographers* 94 (1): 1–22.  
<https://doi.org/10.1111/j.1467-8306.2004.09401001.x>.
- Monk, Janice, and Susan Hanson. 1982. "On Not Excluding Half of the Human in Human Geography." *The Professional Geographer* 34 (1): 11–23.  
<https://doi.org/10.1111/j.0033-0124.1982.00011.x>.
- Monmonier, Mark S. 1991. *How to Lie with Maps*. Chicago: University of Chicago Press.
- Montello, Daniel R. 2002. "Cognitive Map design Research in the Twentieth Century: Theoretical and Empirical Approaches." *Cartography and Geographic Information Science* 29 (3): 283–304.
- Morrison, Joel. 1978. "Towards a Functional Definition of the Science of Cartography with Emphasis on Map Reading." *The American Cartographer* 5 (2): 97–1000.
- Morrison, Toni. 1979. *The Bluest Eye*. London: Chatto [and] Windus.
- Mott, Carrie, and Daniel Cockayne. 2017. "Citation Matters: Mobilizing the Politics of Citation toward a Practice of 'Conscientious Engagement.'" *Gender, Place & Culture* 24 (7): 954–73. <https://doi.org/10.1080/0966369X.2017.1339022>.
- Mott, Carrie, and Susan M. Roberts. 2014. "Not Everyone Has (the) Balls: Urban Exploration and the Persistence of Masculinist Geography: Not Everyone Has (the) Balls." *Antipode* 46 (1): 229–45. <https://doi.org/10.1111/anti.12033>.

- Muehlenhaus, Ian. 2012. "If Looks Could Kill: The Impact of Different Rhetorical Styles on Persuasive Geocommunication." *The Cartographic Journal* 49 (4): 361–75. <https://doi.org/10.1179/1743277412Y.0000000032>.
- Mukherjee, Falguni. 2015. "Public Participatory GIS: History, Literature Review and Sustainability of PPGIS." *Geography Compass* 9 (7): 384–94. <https://doi.org/10.1111/gec3.12223>.
- Murphy, Christian E. 2019. "Designing the Imagery on Image Maps – How Far Can We Take It?" *International Journal of Cartography* 5 (2–3): 316–31. <https://doi.org/10.1080/23729333.2019.1613074>.
- NACIS. n.d. "About." *The Atlas of Design: A Gallery of Beautiful and Inspiring Maps from Around the World* (blog). <https://atlasofdesign.org/>.
- NACIS. n.d. "The Atlas of Design: A Gallery of Beautiful and Inspiring Maps from Around the World." *The Atlas of Design* (blog). Accessed October 20, 2020. <https://atlasofdesign.org/>.
- NACIS Atlas of Design. n.d. "Project Update: Judging Begins." *NACIS Atlas of Design* (blog). <https://atlasofdesign.org/2012/04/03/hello-world/>.
- National Center for Geographic Information and Analysis. n.d. "NCGIA Overview." <http://www.ncgia.ucsb.edu/>.
- National Center for Geographic Information and Analysis, Trevor. 1994. "NCGIA Annual Report, Year 5." *NCGIA Closing Reports on Research Initiatives and Projects*. UC Santa Barbra. <https://escholarship.org/uc/item/377571md>.
- . 1997. "NCGIA Annual Report, Year 8." *NCGIA Closing Reports on Research Initiatives and Projects*. UC Santa Barbra. <https://escholarship.org/uc/item/4vw1t2vb>.
- Nelson, John, Alethea Steingisser, Caroline Rose, and Lauren Tierney, eds. 2018. "Eastern Pacific Ring of Fire." In *Atlas of Design, Volume Four*. Madison, WI: North American Cartographic Information Society.
- North American Cartographic Information Society. n.d. "Home." Accessed October 20, 2020. <https://nacis.org/>.
- Olmedo, Élise, and Mathilde Christmann. 2018. "Perform the Map: Using Map-Score Experiences to Write and Reenact Places." *Cartographic Perspectives* 91: 18.
- Olson, J.M. 1979. "Cognitive Cartographic Experimentation." *The Canadian Cartographer* 16: 34–44.

- . 1981. “Spectrally Encoded Two-Variable Maps.” *Annals of the Association of American Geographers* 71 (259–76).
- Openshaw, S. 1991. “A View on the GIS Crisis in Geography, or, Using GIS to Put Humpty-Dumpty Back Together Again.” *Environment and Planning A: Economy and Space* 23 (5): 621–28. <https://doi.org/10.1068/a230621>.
- Pánek, Jiří. 2016. “From Mental Maps to GeoParticipation.” *The Cartographic Journal* 53 (4): 300–307. <https://doi.org/10.1080/00087041.2016.1243862>.
- Pánek, Jiří. 2018. “Emotional Maps: Participatory Crowdsourcing of Citizens’ Perceptions of Their Urban Environment.” *Cartographic Perspectives* 0 (91). <https://doi.org/10.14714/CP91.1419>.
- Parker, Cheryl, and Robert Pascual. 2002. “A Voice That Could Not Be Ignored: Community GIS and Gentrification Battles in San Francisco.” In *Community Participation and Geographic Information Systems*, edited by William J Craig, Trevor M Harris, and Daniel Weiner. London; New York: Taylor & Francis. <http://www.crcnetbase.com/isbn/9780203469484>.
- Pavlovskaya, Marianna E. 2002. “Mapping Urban Change and Changing GIS: Other Views of Economic Restructuring.” *Gender, Place & Culture* 9 (3): 281–89. <https://doi.org/10.1080/0966369022000003897>.
- Peet, Richard. 1998. *Modern Geographical Thought*. Oxford ; Malden, MA: Blackwell Publishers.
- Peluso, Nancy Lee. 1995. “Whose Woods Are These? Counter Mapping Forest Territories in Kalimantan, Indonesia.” *Antipode* 27 (4): 393–406.
- Phillips, R.J., and L. Noyes. 1977. “Search for Names in Two City Street Maps.” *Applied Ergonomics* 8: 73–77.
- Pickles, John. 1991. “Geography, GIS, and Surveillant Society.” *Papers and Proceedings of Applied Geography Conferences* 14: 80–91.
- . 1995. *Ground Truth: The Social Implications of Geographic Information Systems*. 1 edition. New York: The Guilford Press.
- . 2004. *A History of Spaces: Cartographic Reason, Mapping, and the Geo-Coded World*. London; New York: Routledge.
- Pingel, Thomas J, and Victor R Schinazi. 2014. “The Relationship Between Scale and Strategy in Search-Based Wayfinding.” *Cartographic Perspectives* 0 (77): 33–45. <https://doi.org/10.14714/CP77.1232>.

- Poiker, Tom. 1993. "Geogr. Info and Society - a Workshop," April 16, 1993. [tinyurl.com/623eb2](http://tinyurl.com/623eb2).
- Retchless, David P. 2014. "Sea Level Rise Maps: How Individual Differences Complicate the Cartographic Communication of an Uncertain Climate Change Hazard." *Cartographic Perspectives* 0 (77): 17–32. <https://doi.org/10.14714/CP77.1235>.
- Robinson, Arthur Howard. 1952. *The Look of Maps: An Examination of Cartographic Design*. 1st ed. Madison, WI: University of Wisconsin Press.
- Rose, Gillian. 1997. "Spatialities of 'Community', Power and Change: The Imagined Geographies of Community Arts Projects." *Cultural Studies* 11 (1): 1–16. <https://doi.org/10.1080/09502389700490011>.
- Rose-Redwood, Reuben, Natchee Blu Barnd, Annita Hetoevèhotohke'e Lucchesi, Sharon Dias, and Wil Patrick. 2020. "Decolonizing the Map: Recentring Indigenous Mappings." *Cartographica: The International Journal for Geographic Information and Geovisualization* 55 (3): 151–62. <https://doi.org/10.3138/cart.53.3.intro>.
- Roth, Robert E., David Hart, Rashauna Mead, and Chloë Quinn. 2016. "Wireframing for Interactive & Web-Based Geographic Visualization: Designing the NOAA Lake Level Viewer." *Cartography and Geographic Information Science*, May 1–20. <https://doi.org/10.1080/15230406.2016.1171166>.
- Roth, Robert Emmett. 2011. "Interacting with Maps: The Science and Practice of Cartographic Interaction." The Pennsylvania State University.
- Saldanha, Arun. 2007. *Psychedelic White: Goa Trance and the Viscosity of Race*. Minneapolis: University of Minnesota Press.
- Schroeder, Paul. 1996. "Criteria for the Design of GIS/2." meeting for NCGIA Initiative 19: GIS and Society Summer 1996.
- Shannon, Jerry, Katherine B. Hankins, Taylor Shelton, Amber J. Bosse, Dorris Scott, Daniel Block, Heather Fischer, et al. 2020. "Community Geography: Toward a Disciplinary Framework." *Progress in Human Geography*, October, 030913252096146. <https://doi.org/10.1177/0309132520961468>.
- Schurr, Carolin, Martin Müller, and Nadja Imhof. 2020. "Who Makes Geographical Knowledge? The Gender of Geography's Gatekeepers." *The Professional Geographer* 72 (3): 317–31. <https://doi.org/10.1080/00330124.2020.1744169>.
- Schuurman, Nadine. 2000. "Trouble in the Heartland: GIS and Its Critics in the 1990s." *Progress in Human Geography* 24 (4): 569–590.



- . 2002. “Women and Technology in Geography: A Cyborg Manifesto for GIS.” *The Canadian Geographer* 46 (3): 258–65.
- . 2004. *GIS: A Short Introduction*. Short Introductions to Geography. Malden, MA: Blackwell Pub.
- Schuurman, Nadine, and Geraldine Pratt. 2002. “Care of the Subject: Feminism and Critiques of GIS.” *Gender, Place & Culture* 9 (3): 291–99. <https://doi.org/10.1080/0966369022000003905>.
- Secor, Anna. 2010. “Social Surveys, Interviews, and Focus Groups.” In *Research Methods in Geography: A Critical Introduction*, edited by Basil Gomez and John Paul Jones. Critical Introductions to Geography. Chichester, West Sussex, U.K. ; Malden, MA: Wiley-Blackwell.
- Shannon, Claude Elwood, and Warren Weaver. 1949. *The Mathematical Theory of Communication*. Urbana: University of Illinois Press.
- Sheppard, Eric. 1995. “GIS and Society: Towards a Research Agenda.” *Cartography and Geographic Information Science* 22 (1): 5–16. <https://doi.org/10.1559/152304095782540555>.
- Shortbridge, B.G. 1979. “Map Read Discrimination of Lettering Size.” *The American Cartographer* 6: 13–20.
- Sieber, Renee. 2006. “Public Participation Geographic Information Systems: A Literature Review and Framework.” *Annals of the Association of American Geographers* 96 (3): 491–507.
- Sims, Douglas. 2001. “A Short History and a Bibliography of Papers.” *The International Conferences on the History of Cartography*. 2001. <http://www.explokart.eu/ichc/>.
- Smith, Neil. 1992. “History and Philosophy of Geography: Real Wars, Theory Wars.” *Progress in Human Geography* 16 (2): 257–71. <https://doi.org/10.1177/030913259201600208>.
- “Sovereign Bodies Institute.” 2019. <https://www.sovereign-bodies.org/>.
- Sparke, Matthew. 1998. “A Map That Roared and an Original Atlas: Canada, Cartography, and the Narration of Nation.” *Annals of the Association of American Geographers* 88 (3): 463–95. <https://doi.org/10.1111/0004-5608.00109>.
- Speake, Janet, and Stephen Axon. 2012. “‘I Never Use ‘Maps’ Anymore’: Engaging with Sat Nav Technologies and the Implications for Cartographic Literacy and Spatial Awareness.” *The Cartographic Journal* 49 (4): 326–36. <https://doi.org/10.1179/1743277412Y.00000000021>.

- Stanford Libraries. n.d. "History." Office of Strategic Service Maps (blog). <https://exhibits.stanford.edu/oss-maps/about/history>.
- Subcomandante Marcos. 2000. "Zapatista Army of National Liberation Statement on Kosovo War." *Left Curve* 24 (22).
- Swantz, M. 1982. "Research as Education for Development: A Tanzanian Case." In *Creating Knowledge: A Monopoly*, edited by Budd Hall, A Gillett, and R Tandon. New Delhi, India.
- Taylor, P.J. 1990. "GKS." *Political Geography Quarterly* 3: 211–12.
- The University of Chicago Press. n.d. "The History of Cartography." *The History of Cartography* (blog). <https://press.uchicago.edu/books/HOC/index.html>.
- Turdukulov, Ulanbek, Andres Oswaldo Calderon Romero, Otto Huisman, and Vasilios Retsios. 2014. "Visual Mining of Moving Flock Patterns in Large Spatio-Temporal Data Sets Using a Frequent Pattern Approach." *International Journal of Geographical Information Science* 28 (10): 2013–29. <https://doi.org/10.1080/13658816.2014.889834>.
- Tyner, Judith. 2015. "Persuasive Cartography." In *History of Cartography, Volume Six: Cartography in the Twentieth Century*, edited by Mark Monmonier. Chicago: University of Chicago Press.
- . 2016. "Mapping Women: Scholarship on Women in the History of Cartography." *Terrae Incognitae* 48 (1): 7–14. <https://doi.org/10.1080/00822884.2016.1147250>.
- Tyner, Judith A. 2005. "Elements of Cartography: Tracing Fifty Years of Academic Cartography." *Cartographic Perspectives* 51: 4–13.
- unnamed white man. 2010. *Rethinking the Power of Maps*. The Guilford Press.
- unnamed white man and John Fels. 2008. "The Natures of Maps: Cartographic Constructions of the Natural World." *Cartographica: The International Journal for Geographic Information and Geovisualization* 43 (3): 189–202. <https://doi.org/10.3138/carto.43.3.189>.
- Verplanke, Jeroen, Michael K. McCall, Claudia Uberhuaga, Giacomo Rambaldi, and Muki Haklay. 2016. "A Shared Perspective for PGIS and VGI." *The Cartographic Journal* 53 (4): 308–17. <https://doi.org/10.1080/00087041.2016.1227552>.
- Wallace, Timothy, and Daniel Huffman. 2014. "An Argument for Beauty." In *Atlas of Design, Volume One*, edited by Timothy Wallace and Daniel Huffman, 1–3. Madison, WI: North American Cartographic Information Society.

- Warren, Gwendolyn C., Cindi Katz, and Nik Heynen. 2019. "Myths, Cults, Memories, and Revisions in Radical Geographic History: Revisiting the Detroit Geographical Expedition and Institute." In *Spatial Histories of Radical Geography*, edited by Trevor J. Barnes and Eric Sheppard, 59–85. Chichester, UK: John Wiley & Sons, Ltd. <https://doi.org/10.1002/9781119404781.ch2>.
- "What is Imago Mundi?" 2017. *Imago Mundi: The International Journal for the History of Cartography*. 2017. <http://www.maphistory.info/imgen.html>.
- Wilson, Matthew W. 2012. "Location-Based Services, Conspicuous Mobility, and the Location-Aware Future." *Geoforum* 43 (6): 1266–75. <https://doi.org/10.1016/j.geoforum.2012.03.014>.
- . 2017. *New Lines: Critical GIS and the Trouble of the Map*. Minneapolis: University of Minnesota Press.
- WRAL News. 1996. "Professor Admits Molesting Boy." WRAL News. Local News (blog). April 20, 1996. <https://www.wral.com/news/local/story/147861/>.
- Wolter, J. 1975. "The Emerging Discipline of Cartography." Ph.D. Dissertation, Ann Arbor, MI: University of Michigan.
- Woodruff, Andy. 2016. "Cartographic Summit 2016." Andy Woodruff | Modern Cartography (blog). February 12, 2016. <http://andywoodruff.com/blog/cartographic-summit-2016/>.

# AMBER J. BOSSE

---

Department of Geography  
University of Kentucky  
orcid.org/0000-0002-5206-4466

## EDUCATION

**M.S. Geosciences, Georgia State University** 2013-2015  
Thesis: "Cartography for Communities: An Examination of Participatory Action Mapping"  
Advisor: Dr. Katherine B. Hankins

**B.S. Geography, University of North Dakota, *Summa Cum Laude*** 2009-2013  
Emphasis: Urban Planning and Community Development  
Advisor: Dr. Devon Hanson

## PROFESSIONAL PUBLICATIONS

### REFEREED ARTICLES

Boll-Bosse, Amber J., and Katherine B. Hankins. 2017. "These Maps Talk for Us:"  
Participatory Action Mapping as Civic Engagement Practice. *The Professional Geographer* 70 (2):  
1–8. <https://doi.org/10.1080/00330124.2017.1366788>.

Shannon, Jerry, Katherine Hankins, Taylor Shelton, Amber J. Bosse, Dorris Scott, Daniel  
Block, Heather Fischer, LaToya Eaves, Jin-Kyu Jung, Jonnell Robinson, Patricia Solis, Hamil  
Pearsall, Aileen Nicolas. 2020 "Community Geography: Toward a Disciplinary Framework"  
*Progress in Human Geography* <https://doi.org/10.1177/0309132520961468>

Barrett, Emily and Amber J. Bosse. Dependent on collaboration?: Examining power and  
precarity in Community Geography. To be included in special issue: Engagement and Action  
in Community Geography (edited by Jerry Shannon, Timothy Hawthorne, Kate Mariner,  
and Hannah Torres) for *GeoJournal*

Fischer, Heather, Daniel Block, Amber J. Bosse, Tim Hawthorne, Jin-Kyu Jung, Hamil  
Pearsall, Amanda Rees, and Jerry Shannon. "Doing Community Geography" to *GeoJournal*  
special issue on Community Geography

Bosse, Amber J. Participatory Cartography. *The Geographic Information Science & Technology Body  
of Knowledge*. Invited by editor Robert E. Roth

Kelly, Meghan and Amber J. Bosse. Pressing Pause. Accepted for submission to special issue  
on Doing Critical GIS (edited by Dillon Mahmoudi and Taylor Shelton) for *ACME: An  
International E-Journal for Critical Geographies*

### BOOK REVIEW

Bosse, Amber J. 2018. "After the Map: Cartography, Navigation, and the Transformation of Territory in the Twentieth Century by William Rankin." *Southeastern Geographer* 58 (1): 136–38. <https://doi.org/10.1353/sgo.2018.0009>.

## **SCHOLASTIC AND PROFESSIONAL HONORS**

- 2019. Applied Geography Specialty Group Project Development Award
- 2018. Cartographic and Geographic Information Society Doctoral Scholarship
- 2018. Nominated for University of Kentucky College of Arts and Sciences Outstanding Teaching Award
- 2017. Young Professionals Scholarship, International Cartographic Association
- 2016. The Jennifer Fluri and Amy Trauger Student Essay and Creative Works Competition, Penn State Supporting Women in Geography
- 2016. Master's Student Paper Award, AAG Qualitative Methods Specialty Group
- 2016. Master's Student Paper Award, AAG Political Geography Specialty Group
- 2015. Outstanding Geography Graduate Student, GSU Department of Geography

## **PROFESSIONAL POSITIONS HELD**

- 2016-2019 GIS Consultant, *Georgia Department of Transportation*
- 2014-2015 Student Innovation Fellow, *CURVE, Georgia State University*
- 2014 Geography Intern, *National Geographic Society, Washington DC*
- 2013-2014 Graduate Research Assistant, *Atlanta Community Mapping and Research Center, Georgia State University Geosciences*
- 2013-2014 Graduate Research Assistant, *Viz Wall, Petit Science Center, Georgia State University IS&T*