DIGITAL FACETS OF PLACE: FLICKR'S MAPPINGS OF

THE U.S.-MEXICO BORDERLANDS

by

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THESIS ABSTRACT

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Human social interactions imbue the world with meaning, transforming abstract spaces into lived places. Given the digital conduits of much modern social interaction, online narratives increasingly affect material places. Yet the emerging glut of online information demands new methods of investigating place narratives at multiple scales. Drawing on novel geographic visualizations of the quantitative and qualitative characteristics of photographs of the U.S.-Mexico borderlands posted on the website Flickr, this study shows that online portrayals are 1) highly uneven in terms of distribution, visibility, and content, 2) fundamentally influenced by "real-world" geographies, 3) often culturally reductive, and 4) made to appear unduly exhaustive by the naturalizing visual slant of the internet as a medium of communication. These processes stand to influence how places are constructed in the information age, especially given the presence of "digital divides" that work against internet access for much of the world's population.

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To Elizabeth, my wonderful wife and my best friend.

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CHAPTER I

INTRODUCTION

Humans imbue the world with meaning as they go about their lives, transforming "soulless" spaces into socially constructed places (Cosgrove 1984, Tuan 1977). Humanity's understandings and interactions with places are affected by how people speak about those locations—the social narratives they promote (see Smith 1993). Society teems with such descriptive place portrayals, which flow from a variety of sources: novels, conversations, travel brochures, films, landscape paintings, and maps all contribute to the cultural, political, and economic situations of the places they depict. The social meanings of places are always in flux, rather than fixed or monolithic; people continually imprint new interpretations onto places through their creation and embrace of different narratives. Some of these narratives leave deeper imprints than others, however, and places are always molded by power structures that promote certain understandings while marginalizing others (Mitchell 2002).

The potential power and reach of depictions of the world increased immensely with the explosion of communications technologies during the 20th century. The rise of the internet in particular enabled anyone with access to instantly tap into a vast store of place portrayals. More recently, participatory technologies have placed easy authorship of these portrayals into the hands of internet users themselves. The ubiquity of such online "mappings" marks a leap in the scope of how narratives about the world can be disseminated, which amplifies the changes such narratives can bring to the locations they describe. The distributed authorship of these mappings, however, creates inequity in the viewpoints they present. Despite popular interpretations that the internet is a sort of

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information democracy, the authorship and biases of online place narratives remain tied up with real-world geographies of power and social inequality.

Initial writings about the internet predicted that it might deterritorialize the world to the point of nullifying physical distance (e.g. Cairncross 1997). While these claims have been largely refuted (see Graham 1998, Wang et al. 2003, Mok et al. 2010, Capling and Nossal 2001), a tendency persists to characterize the internet as inherently egalitarian. In this view, open access to information enables a society that is unfettered by inequities found in the real world. Along similar lines, many popular and academic accounts continue to downplay the connections between online representations and physical places, or "cyberspace" and "real space" (Mummidi & Krumm 2008, Yanai and Bingyu 2010). [1] While some have worked to counter such ideas (such as Crutcher and Zook 2009 or Zook and Graham 2007), there remains a need for geographically informed research that uncovers the implications of issues surrounding the internet, online mappings, and the social construction of places, identities, and cultures. In hopes of contributing to such research, this thesis uses a case study of the United States-Mexico border to analyze the gaps and biases that pervade online portrayals of the world.

Conceptual Background

In recent years, new online technologies have enabled an unprecedented rise in the quantity and depth of geographic descriptions that are quickly accessible to many people. Increasingly, these portrayals are linked to points on the earth's surface: from

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[1] Some recent thinkers contend that a mutually exclusive conceptualization of real space and cyberspace is inadequate, arguing instead for more inclusive, overlapping understandings of the two (e.g., Crang et al. 2007).

encyclopedia articles to restaurant reviews, online representations are increasingly geolocated to a fraction of a degree of spatial precision. In recent years this "Geospatial Web" (or geoweb) of information tied to physical locations has seen astonishing growth beyond its early promotion by large companies such as Microsoft and Google (Helft 2007). The modern geoweb vastly expands the scope of how depictions of the world can affect the people and places portrayed. The popularity of the internet and its vital role enabling processes of globalization (see Amin 2002, Goldman 2004) additionally increases the influence of such online representations.

The density and apparent precision of digital annotations on the geoweb enables it to function as a system of shifting and multilayered mappings of the world. Maps have long played a metaphorical role in user's understandings of the internet as a whole (Gordon 2007), and visual maps are the default method of exploring many sites that feature geolocated information. This thesis draws on a range of writings both within the discipline of geography and beyond to assess how broader discourses surrounding human geography, the internet, and communication technologies relate to online mappings (such as Graham 2010, Shelton et al. 2013, Batty 1997, Graham 1998, Warf 2001).

In addition to their sheer breadth, online mappings gain influence from the fact that much of their content is crowdsourced, originating directly from users rather than trickling down from a central authority.[2] This decentralized authorship marks a qualitative change in how representations (portrayals; interpretations; narratives) can affect the places they portray. While recent scholarship has proven the productivity of

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[2] Although scholars such as Zook and Graham (2007) and Pariser (2011) have commented on the narrowing effects that the use of filtering and sorting algorithms by companies can have on ostensibly crowd-generated information.

cartographic understandings of the geoweb (see Crampton 2003, Pickles 2004, Dodge and Kitchin 2011), these approaches can also contribute to an understanding of how the geoweb works to socially construct and reconfigure places. The subfield of critical cartography in particular provides a perspective on issues of representation and power that is well suited to remedying shortcomings in how scholars understand overlaps between the real and the virtual.

This study builds on a critical cartography literature concerned with how visual representations affect the places they portray While cartography was long undertheorized in academic geography, many scholars have adopted a critical perspective on maps and cartography in recent decades (such as Harley 1989, Perkins 2003 & 2004, Pickles 2004, Wood and Fels 2008, Dodge et al. 2009). The lessons of critical cartographic approaches hold particular promise in relation to arguments surrounding representation and power in cultural geography (see Pearce 2008, Crampton 2003, Wilson 2011); this thesis serves as a link in the ongoing project of forging academic connections between these two subfields.[3]

Case Study

In an effort to expose the biases and gaps that pervade crowdsourced online mappings of the region, this thesis interrogates portrayals of the border between the United States and Mexico found on the photo-sharing website Flickr. Specifically, I apply techniques of cartographic visualization to examine the extent to which Flickr's

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[3] More broadly, cf. Cresswell's (2010) examination of emerging directions for cultural geography.

portrayals of the border exclude certain cultures and places. I argue that despite the real

promises of crowdsourced information for creating inclusive mappings of the world,[4]

often the geoweb entrenches majority narratives about the places it portrays while

marginalizing those that are already less visible.[5] This entrenchment is not inevitable, but

its patterns must be understood before steps can be taken to remedy it. To this end, I

examine the distribution, views, languages, descriptions, and content of Flickr

photographs to show that much of the optimism in relation to the inclusivity of online

mappings is premature. More precisely, my study reveals that due to "digital divides" in

online access and participation, non-English speaking, rural, or culturally "Mexican"

narratives and places tend to be marginalized in Flickr's online mappings, while English-

speaking, densely populated, or culturally "American" ones tend to be overrepresented.

The "borderlands" region surrounding the border between the United States and

Mexico provides an apt and socially relevant study area for researching the implications

of online mappings. The popular narrative of the borderlands has long been laden with

stereotypes and hyperbole in both countries (see Arreola 1996, Martínez 1994). Recent

flare-ups in long debates surrounding border security, immigration, and drug trafficking

have thrust the region to the fore of the public consciousness anew, lending greater

significance to the ways in which the region is portrayed and perceived (see Rosas 2006,

Ruvalcaba and Corona 2010, Archibold 2010, Thompson and Mazzetti 2011). Because

the lives of many individuals stand to be affected by how the borderlands change in the

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[4] And by extension often subversive mappings of the world, after Wood and Fels (2008).

[5] This supports Crutcher and Zook's (2009) claim that "alongside the means to empower, Web 2.0 mapping technologies also provide the mechanism by which divides can be (re)created" (533).

future, these factors lend social relevance to the study of online narratives of the borderlands, particularly those crowdsourced mappings found on sites such as Flickr.

Approach

The geoweb is an increasingly important part of how people construct their understandings of the world. As with any map, online accounts are uneven and biased—yet few scholars have examined how this is true, and with what implications. This thesis assesses geographical variations in the tone and depth of Flickr's mappings, with results that are broadly germane to policy and geographic literacy initiatives in the digital age, particularly given recent increases in the rhetorical power of border narratives in light of increased media attention to the region.

While a holistic approach to Flickr's mappings would be ideal, practical limitations dictate that this thesis examines only a small strip of the region that runs along the border itself. Specifically, I focus on a 30 kilometer swath that follows the border from the Gulf of Mexico to the Pacific Ocean. Within this area I pay particular attention to Flickr content in the densely populated urban areas of El Paso and Ciudad Juárez, Mexicali, and Tijuana area, under the assumption that these region provide windows into the complexity (if not the exact patterns) of mappings elsewhere along the border.

Flickr data provides a useful source of answers for questions of how online mappings selectively affect people and places along the border. The site is popular in both the U.S. and Mexico, and its focus on photography further naturalizes and lends an aura of authenticity to its mappings (see Sontag 1977, Lee 2010). More practically, the

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site is accessible in both English and Spanish, which diminishes the effects of language barriers that could otherwise divide the user base amongst smaller localized sites.

In order to obtain the raw data that produce the portrayals of the borderlands seen by Flickr's users, I wrote custom software that downloaded records of geolocated photographs in the region from Flickr's application programming interface (API). The use of "volunteered geographic information" (VGI) such as this has recently made waves in academic geography, with researchers paying particular attention to questions of data validity (see Goodchild 2007, Flanagin and Metzger 2008). While these are vital concerns, this thesis sidesteps such questions in that I interrogate Flickr's mappings *because* of their inherent gaps and biases rather than despite them, in hopes of understanding their broader implications.

I filtered the records from Flickr to remove anomalies (such as mass uploads by single users), and then coded the language(s) used in the textual descriptions that accompanied most photographs. I also applied more intensive methods of thematic analysis (after Boyatzis 1998) to content around Tijuana to tease out additional nuances in Flickr's mappings of that area.[6] Finally, I used several novel techniques of cartographic visualization to the scrubbed data in order to assess the spatial trends in the content and coverage of Flickr's mappings.

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[6] Given the scope of this project, thematic analysis provides a feasible way to investigate Flickr's detailed local mappings — although other, more intensive methods of visual analysis exist which would allow deeper readings (cf Rose 2001).

Outline

This thesis is structured around two nodes: a conceptual examination of the overlaps between cartography and online technologies and a case study of how these concepts apply to Flickr's representations of the U.S./Mexico borderlands. Chapter II delves into an interdisciplinary pool of literature to reveal how scholars have approached the influence of the internet and the geospatial web on places and how critical cartography provides a path towards understanding those interactions. Chapter III geographically and historically contextualizes the borderlands and details the methods I used to obtain, filter, analyze, and visualize Flickr data on the region. The findings of my case study are presented in Chapter IV, along with an assessment of their implications. In broad terms, this chapter explains that English-speaking narratives of American urban areas and parks are more prominent than Spanish narratives of rural or Mexican places in Flickr's mappings of the borderlands. My results suggest that the effect of the international border extends noticeably into cyberspace, that power structures which marginalize voices on the ground also suppress them online, and that the cultural identities of places on Flickr tend to be expressed as either-or binaries rather than nuanced amalgamations. Chapter V reconnects my case study to the concepts examined in Chapter II, emphasizing the relevance of my findings to social issues in the borderlands, and concludes the thesis with a discussion of limitations and fruitful avenues for future research.

Aims

       This thesis seeks to contribute to an understanding of how online information works with preexisting power structures to change places (see Warf 2001, Crutcher and Zook 2009, Graham 2011), how borders are perceptually and actually made in the digital age (see Newman and Paasi 1998, Elden 2011), and what alternatives may exist to utopian or ageographic accounts of how the internet is entwined with the physical world. There are benefits beyond scholarly novelty, however, to my cartographic approach to online accounts of the borderlands. The results of my analysis serve as an initial outline highlighting areas of interest for governments and organizations seeking to address spatial inequities in online access and representation in the border region. As such, I hope to draw attention and lend support to people who have thus far had little influence on how the wider world relates to their places.

CHAPTER II

LITERATURE REVIEW

Situated at the confluence of cultural geography, cartography, and technology, this thesis is conceptually informed by a wide range of literatures. This chapter highlights and draws connections between those writings that are especially relevant to my map-based approach to representations of place on the "geospatial web" (or geoweb). I first discuss broad ideas about the role of representations in the social construction of places before focusing specifically on online representations. I then narrow the discussion further to introduce the concept of the geospatial web. After surveying the literature that has dealt with the geoweb's representations of the world from a human geographic perspective thus far, I argue that the prominence of the geoweb creates a need for more research that engages with its sociocultural implications. Finally, I conclude this chapter with a short historical summary of critical cartography, which leads into my argument that critical cartographic approaches can usefully scrutinize the coverage and inclusivity of the geoweb's mappings of the world.

Representation, the Internet, and Social Constructions of Places

Towards the end of the 20th century, scholars renewed their efforts to account for the influence of representation in their ideas about how the world is imbued with human meaning and cultural resonance. Building on the ideas of philosophers such as Heidegger and Foucault (Gregory et al. 2011), "constructionist" positions hold that symbolic representations actively construct human understandings of their surroundings. Following this view, the signs and symbols that people use to communicate lead to shared cultural

ideas about what the world *is* (see Hall 2007). Cultural geographers have applied similar

perspectives to investigate how "places" are socially constructed from abstract and

meaningless "spaces" through communication and representation (see Tuan 1977,

Cosgrove and Jackson 1987). For example, Cosgrove (1984) examines the idea of

"landscape" as a representational form, emphasizing that "the way people see their world

is a vital clue to the way they understand that world and their relationships with it" (9).

Scholars have made similar arguments about the role of various other forms of

representation in constructing places: cadastral infrastructures (Harvey 2009), tourism

postcards (Waitt and Head 2002), or trees in Latin American plazas (Bass 2005) can all

communicate meanings about a place that then influence conditions on the ground.[7]

While scholars debate to what extent places are entirely social constructions (see

Stedman 2003), verbal and non-verbal narratives alike indisputably affect the cultural,

economic, and political situation of places. Davis' (2005) framing of places as

"discursive-material formations" usefully underlines this fact — the production of place

knowledge through representation "legitimizes the performance of certain activities in

those places as well as directs the social practices that actively shape the landscape"

(610).[8] Given these observations, power over representation implies power over the place

portrayed. This is why, as Massey (1992) argues, "attempts at the stabilization of

meaning are constantly the site of social contest, battles over the power to label space-

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[7]The effects of time compound the intricacies of overlapping representations: Hoelscher and Alderman (2004) show how discourses about places persist through memory long after the representations that initially prompted them.

[8] For an empirical example relevant to this thesis, see Arreola's (1996) study of how certain images of Mexican border cities become fixed in North American consciousness.

time."[9] Smith (1993) states in relation to the cultural landscape that meanings "are held in place by power, and it is only by challenging a definition that we can discover where this power lies" (89), but his assertion has broader resonance in relation to other forms of representation (including maps). The ease with which depictions of places are transmitted using modern information and communication technologies (ICTs) emphasizes the benefits of examining place representations with Smith's statement in mind.

Representations of the world are frequently disseminated through various channels of communication. Such channels vary with history and geography, but the widespread adoption of telecommunications technologies in the 19th century for the first time conveyed information (including depictions of places) instantaneously across vast distances (see Gleick 2011). Although Hillis (1998) suggests that by the early 90s geographers had failed to deal with the impacts of these communications technologies, in recent years the rise of the internet has led to a renewed interest in how "spaces and places contain communications yet are also contained by communications" (Adams 2011, 1). The internet reconfigured connections between people and places that had often been relatively insulated from one another—yet it did so heterogeneously. Within geography, Graham's (1998) widely cited article asserted the necessity of "linked, relational conceptions of both new information and communications technologies and space and place" (181). Similarly, Brunn (1998) called for a focus on how those controlling the information technologies increasingly hold political power over spaces. Newman and

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[9] Extending this line of thought, Cosgrove and Domosh (1993) argue that the very act of geographical writing itself creates discourses that have the power to change the places described; thus, "what we should be asking is not what is the most 'authentic' way to communicate truth, but instead what is the best way to represent and communicate specific and conscious meaning" (36).

Paasi (1998) warned against popular theories that foresaw technology leading to a borderless world, while more recently Elden (2011) reiterated that "the 'borderless' world is, at best, profoundly uneven".[10] Such literature emphasizes that while new communications technologies have reconfigured connections between places, they build on "older" connections that remain relevant (Mok et al. 2010).

In addition to changing how places connect to one another, the wiring of ICTs into everyday life[11] for a vast number of people blurs the boundaries between online "cyberspaces" and physical places (see Brunn et al. 2004). This blurring is such that Crang et al. (2007) no longer finds a binary conception of the two academically useful, a sentiment echoed by Leander and McKim's (2003) assertion that binaries are simply a "holding place" on the way towards more nuanced understandings (213). Regardless, binary approaches continue to dominate the literature, and scholars have conceptualized overlaps between the real and virtual in various ways. Dodge and Kitchin (2005) undertake an abstract examination of the influence of computer code on human life, arguing that the two are "folded into each other, taking the form of coded practices" (178).[12] Others have shown how software algorithmically affects the world, leading to "software-sorted geographies" of uncertain equality (Graham 2005) in which economic profitability may be determined by something as simple as Google search rankings (Zook and Graham 2007). Coyne (2010) argues that the very experience of being in a place is

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[10] Nakamura (2000) argues that the common portrayal of the internet itself as a "borderless" realm of social exchange is a fallacy as well, and that differences are integrated into online culture only insofar as they mesh with normalized ideas about, for example, the exoticism of distant locations. (cf. Boler 2007).

[11] Or increasingly, the *un*-wiring: see, for example, Forlano's (2009) assessment of the influences of WiFi networks on physical space.

[12] See also Thrift and French (2002).

changed by digital connections, although Curry (1998) draws some limitations around technology's ability to represent and recreate visceral place-based experiences. Commenting more broadly on such debates, some caution against overly deterministic accounts of technology and society, arguing instead that each is always wrapped up in the other (see Bingham 1996**).**

Many scholars have also provided examples of how the internet modifies social and cultural interactions in the real world. For example, Alexander et al. (2010) demonstrate the role of the internet as a liberating technology to preserve Inuit culture, while Mitra (2005) highlights the ways in which internet access can empower immigrants with community-building tools that would otherwise be unavailable to them.[13] Mesch and Talmud (2010) offer a similar longitudinal case study, and unsurprisingly conclude that so-called "digital divides" in internet access influence how effectively the internet encourages community participation. More broadly, Warf and Grimes (1997) provide an overview of how the internet can be subversively used as a forum for "counterhegemonic discourses."

Recent developments in ICTs have solidified the connections between online representations and physical places, renewing discussions about the spatial implications of such connections in the spirit of earlier writings such as Batty (1997) or Adams (1998). In particular, the emergence of the so-called geospatial web of online data linked innately to physical locations has tightly lashed places to their online representations.

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[13] Although the authors fail to account for differences in access to or skill with information technologies amongst various immigrant subgroups.

The Geospatial Web

> "Today the power still lies in the hands of the map makers. The only difference is that we're all mapmakers now, which means geography has entered the complex free-for-all of the information age, where ever-more-sophisticated technology is better able to reflect the world's rich, chaotic complexity."
> (Ratliff 2007)

"Geospatial web" or "geoweb" are loosely defined terms that refer to the rapidly growing collection of innately geolocated online information. This information both strengthens and complicates connections between online representations and locations on the earth's surface. The geoweb enables representations to function as online "annotations" of specific locations: from a social constructionist view, the geoweb is increasingly an embedded part of the places it describes. In this sense, the geoweb extends Cohen's (2007) characterization of cyberspace in general "as both extension and evolution of everyday spatial practice — as a space neither separate from real space nor simply a continuation of it" (212-213). The binding of online representations with physical locations is abetted by the "crowdsourced" or "peer produced" origins of much of the information that makes up the geoweb. Crowdsourcing refers to the process by which online information is created by the combined efforts of millions of internet users, rather than emanating from a smaller circle of central authorities.[14] Through the collective effort of many contributors, the crowd creation of the geoweb (largely enacted through social media) creates "a new kind of atlas that is likely to be both richer and messier than any other" and molds the web into "a medium where maps will play a more central role" (Helft 2007).

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[14] The term is derived originally from "outsourcing" (Howe 2006). Wikipedia is one of the most prominent modern-day examples of a site authored through crowd collaboration.

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Scholars have begun to grapple with how crowdsourced information allows the geoweb to uniquely affect the places it represents, using various terms such as "neogeography" or "volunteered geographic information" (VGI) to describe different aspects of the phenomenon. As argued by Leszczynski (2011), "contrary to a model where [geographic information] is produced by cartographic experts and disseminated by them to passive end-users, VGI efforts represent a distinctly different regime". This regime seeks to create community-driven mappings of the world that would ostensibly seem to democratize knowledge production (Haklay et al. 2008). Yet, crowdsourcing introduces subjectivity to the geoweb even as it democratizes information production, ensuring that "the truths constructed are relative and useful for specific communities" and "accuracy is decided by consensus and pragmatic value" (Warf and Sui 2010, 205). From another perspective, despite the crowdsourced creation of the geoweb, the sites of such creation typically remain under the control of central authorities with the power to determine the visibility of representations (Pariser 2011). This process often occurs programmatically, and Zook and Graham (2007) argue that such automated determinations of what counts as relevant "DigiPlaces" can have real-world effects (see also Zook et al. 2011).

Compounding the embedded biases of crowdsourced mappings, the prominence of visual media has strong implications for how the geoweb affects material places. Generations of scholars have recognized the capacity of images to naturalize portrayals and obscure biases; respectively, Sontag (1977) and Berger (1973) had remarkable influences on ideas about the authority of photographs and the effects of different "ways of seeing" the world. More recently, Lee (2010) has demonstrated how online

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technologies extend these notions, arguing that as images "increasingly proliferate and provide unprecedented sources of created content in digital space, they become an integral part of people's spatial imagination" (273) (cf. Li et al. 2009). In a more overtly political analysis, Kennedy (2008) argues that the morphing "promiscuity" of digital images is part of what makes them so influential: "whatever the attempt to fix them as representation or evidence, images slip and slide and float in and out of contexts" (287). In combination with the peer production of a vast amount of information tied directly to physical locations, the prominence of visual images can work to naturalize the portrayals found on the geoweb.[15]

Other scholars have assessed the relevance of the geoweb in terms of privacy and surveillance issues; such concerns stem mainly from the sheer breadth and depth of geolocated information that is available online. Elwood and Leszczynski (2011) provide a review of such literature, arguing that the immediacy, detail, and deeply social nature of the geoweb constitutes no less than "a shift in the nature and scale of privacy as a social relation" (13). Zook et al. (2004) apply similar reasoning to the predicament of individual users of the geoweb, asserting that the "data shadows" cast by persons in the digital age have significant privacy implications.[16] These observations are even more relevant in light of Leszczynski's (2011) political economic critique of the role of corporate ownership of sites (and their accompanying crowdsourced data) on the geoweb. Similarly, Warf and Sui (2010) assert that "in a world in which powerful corporate and

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[15] Although see Phadke (2010) for a discussion of the limits of representations found on Google Earth that builds on Mitchell's (1992) ideas about the declining reliability of photographic images in the digital age.

[16] For one example of this process, see Girardin et al.'s (2008) exploration of the possibilities of locating tourists based on cellular network connections and georeferenced photographs.

state interests rely upon accurate geocoded data for often unsavory purposes of surveillance and control," the geoweb holds the potential to adversely affect the balance of power in relation to geographic knowledge (201). From a different perspective, Wilson (2011) uses a local case study to show that the very act of geocoding encourages subjects to classify the world in specific ways, leading to the "explicit coding of certain bodies and the implicit, non-coding of other bodies" (372). Finally, Stefanidis et al. (2011) demonstrates that, in contrast to information that users voluntarily provide to sites, "ambient" data placed on the geoweb by careless or unconcerned users presents special ethical dilemmas in relation to privacy.

Through the geoweb, online representations are increasingly able to affect the economic, political, and social situations of people and places. Although scholarly interest in the human implications of the geoweb is increasing, there remains a need for more research examining how the geoweb's mappings of the world function to materially affect places on the ground. Much of the research on the geoweb has ignored these human geographic implications, focusing instead on technical aspects of the phenomenon. The remainder of this section provides an overview of this literature and highlights those aspects that remain understudied.

Accounting for the Geoweb's Influence on Places

Early popular and academic writers often speculated about the global effects of the internet from technologically deterministic positions, variously predicting the "death of distance" (Cairncross 1997), a technological breakdown of society (Slouka 1995), or a globally integrated cyber-utopia (see Graham 2004). While at this point the most

exaggerated of such theses have been sharply refuted (Wang et al. 2003, Boler 2007),

questions persist as to the extent to which the geoweb in particular reconfigures the ways

that places connect to one another or affects the balance of equity in the world. Recent

scholarship has been more sobering than earlier writings, acknowledging that "the

Internet is neither inherently oppressive nor automatically emancipatory" (Warf and

Grimes 1997, 259) and "the way in which places and people become "wired" (or remain

"unwired") still depends upon historically layered patterns of financial constraint and

cultural and social variation" (Zook et al. 2004, 156). Although Kellerman and Paradiso

(2008) optimistically assert that the internet shifts the role of geographic location from

"destiny" to "opportunity," they neglect to engage with any issues of accessibility.

Capling and Nossal (2001), on the other hand, reiterate that rather than nullifying the

relevance of distance or geography, the internet has complicated the role of physical

places, especially for those without access due to the so-called "digital divide."

The digital divide is a concept that invokes the vast and persistent social (and

spatial) differences in access and use of information technologies, and is used to examine

what those differences mean with respect to the power of online information. Perkins and

Neumayer (2010) argue that patterns of internet adoption have been similar to those of

earlier communications technologies, indicating that the digital divide is a continuation of

broader historical processes. While some scholars fixate on the economic causes of gaps

in access (e.g. Guillen and Suarez 2005), others acknowledge the necessity for more

qualitative analyses of the digital divide (Van Dijk 2006) that take into account the

influence of factors such as location, skill, ethnicity, culture, or social status (e.g.

Hargittai 2002, Keniston 2004, Fuchs 2008, Howard et al. 2009). Geographers in

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particular have acknowledged the complex and overlapping sociospatial causes and consequences of inequalities in online representation (e.g. Warf 2001, Zook et al. 2004). Graham (2011) summarizes the arguments for a more nuanced spatial view of digital inequality:

> "The trope of a 'digital divide' should be pluralized, localized and grounded in more appropriate spatial frameworks. Because of the nature of virtual topologies, there can never be a singular divide. There is no singular floating cyberspace, in the sense that a person is either inside or outside, separated by a 'digital divide'. There are rather countless small (although often insurmountable) 'digital divides' preventing movement through the topologies of the Internet and limiting access to cyberspaces." (224)

Regardless of how they are conceptualized, digital divides affect the sociospatial consequences of the internet. Some recent articles have begun to account for how digital divides mediate the geoweb's mappings in particular. Dodge and Kitchin (2011) bluntly observe that "it remains unclear to what degree crowdsourcing is a form of democratic participation" (9). Crutcher and Zook (2009) offer an empirical check on this observation through their investigation of Google Earth's narratives of New Orleans after Hurricane Katrina. Agreeing that "the active participation in creating localized spatial information … holds tremendous potential for determining what is known about places," they conclude that the exclusion of certain groups online causes the geoweb's representations to "hide as much as they reveal" (533). Although other researchers have touched on similar topics (see Elwood 2010b), there remains a need for case studies that examine how digital divides affect the online authorship and representation of real places.

Despite the relevance of the geoweb as a mode of representation, studies that analyze the implications of the geoweb's mappings for physical places remain relatively rare; those mentioned in this section are among the few exceptions to this rule. The

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general failure of human geographers to connect cultural and social concerns with new technologies is not a recent development, but rather an outgrowth of the larger qualitative-quantitative divide that geography (as well as other disciplines) has grappled with for decades (see Snow 1959, Harrison et al. 2004). The geographic focus on Geographic Information Systems (GIS), and human geography more generally, have a particularly divisive history (see Schuurman 2000). Although the past decade or so has seen many admirable efforts to move beyond this division (e.g. Sui 2004, Elwood 2010a, Pavlovskaya 2006), it continues to hinder holistic understandings of emerging geospatial technologies. Researchers with no training in social science often fail to acknowledge the subjectivities of the geoweb's mappings of the world (e.g. Mummidi and Krumm 2008, Crandall et al. 2009), while social scientists with little understanding of geospatial technologies neglect fundamental aspects of their objects of study (e.g. Wall and Kirdnark 2012). What is needed are approaches that can contend with the vast amounts of information on the geoweb while maintaining an eye towards the consequences of that information in regards to representation, knowledge, and the social constructions of places. Such goals have prompted an increase in "hybrid geographies" (Sui and DeLyser 2012) that combine the insights of varied perspectives to study the human effects of new geospatial technologies, including the geoweb.

Crutcher and Zook's (2009) combination of technological and cultural geographic approaches in New Orleans offers a useful way to analyze how the geoweb constructs places. Conceptualizing online representations as "cyberscapes," Crutcher and Zook draw parallels between the geoweb's molding of places and Schein's (1997) conception of the cultural landscape as a material reflection of discourses: "cyberscapes are 'discourses

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materialized' albeit in virtual form"(Crutcher and Zook 2009, 532).[17] While the eminent

scholar of places Edward Relph (2007) has acknowledged the existence of sense of place

in the virtual realm, his approach emphasizes the *distinction* between real and virtual

places (cf. Wilken 2007). By contrast, Crutcher and Zook contend that "cyberspace

should be treated in much the same way as any other space of human interaction, i.e.,

constituted of multiple layers of history, relationships and geography" (2009, 526).[18]

Graham (2010) supports this contention, emphasizing that the geoweb holds "the power

to influence economic, cultural and political processes in the offline world by shaping

how place is perceived" (13).[19]

    While I do not directly draw on the idea of cyberscapes here, the concept suggests

the advantages of hybrid views of the geoweb, such as the critical cartographic

approaches that are central to this thesis. Interpreting the geoweb as an extension of the

landscape and analyzing the geoweb as a map are complementary perspectives that each

emphasize the power of discourse and representation. Critical cartography aims to

"consider for maps the effects of abstraction, uniformity, repeatability, and visuality in

shaping mental structures, and in imparting a sense of the places of the world" (Harley

1989, 13). This project is undertaken with the aims of interrogating "the disjunction

between those senses of place, and many alternative visions of what the world is, or what

it might be" (ibid.). Given these aims, and given the vast store of visual, geo-located

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[17] Cosgrove's (2006) observation of "landscape's capacity to smudge the binaries … of reality and representation, of symbol and referent" (31) lends support to this choice of parallel.

[18] For a more in-depth examination of the "cyberscape" concept see Graham and Zook (2011), which includes a discussion of the gaps in the global coverage of cyberscapes. See also Knott (2001) for an early anecdotal example of such ideas enacted through an art installation of "Worldwide Simultaneous Dance".

[19] Empirical studies that provide indirect support for an integrated view of material and virtual spaces include Madge and O'Connor (2005), Shelton et al. (2011), and Kelley (2011).

information on the geoweb, critical cartography offers one response to Elwood's (2010a)

observation that "the diversity of digital artifacts, forms of data, and social and political

practices that comprise the geoweb will require disciplinary and theoretical

ecumenicalism" (354). With that in mind, the remainder of this chapter presents a brief

history of critical cartographic thought, after which I draw on previous literature to show

that the geoweb can be usefully analyzed as a collection of mappings of the world.

Critical Cartography

> "The territory no longer precedes the map, nor survives it.
> Henceforth, it is the map that precedes the territory"
> (Baudrillard 1988).

While Baudrillard rhetorically used his oft-repeated cartographic metaphor to

explain broader ideas about how representations relate to reality, it nicely summarizes the

insights of critical cartography. Maps have always served specific interests, yet for many

decades cartography was seen merely as a practical tool for the communication of

geographic facts. Academic cartography's sensitivity to how maps privilege certain

discourses and representations to remake the world is a relatively recent development.

Crampton (2010) describes how cartographers during the mid 20th century built

on nascent information theories from computer science to develop a "map

communication model" (MCM) that conceptualized mapping as a process "in which

information was gathered, shaped by the cartographer, encoded in the map, decoded by

the viewer, and absorbed" (59). Proponents of this model saw maps as scientifically

objective reflections of the world that, with the unsavory exception of "propaganda

maps," held little capacity to be political (e.g. Board 1967, Koláčný 1969). Aided by

geography's quantitative revolution and research into cognitive cartography, for decades the MCM was the dominant way of conceptualizing maps (see Guelke 1977, Crampton 2001). This model began to fall out of favor by the 1980s, however, especially in the wake of the work of J.B. Harley. Harley questioned the objective nature of maps from a historical perspective in an attempt "to locate the presence of power—and its effects—in all map knowledge" (Harley 1989, 2). Although some have criticized Harley for his incomplete adoption of ideas from theorists such as Derrida and Foucault (see Crampton 2010), his later writings marked a shift towards critical approaches that was carried forward by other scholars of cartography after his death in the early 90s (e.g. Wood 1992, Edney 1993). Crampton (2001) characterizes this more critical cartography as an "epistemic break," which continues to offer "an opportunity for cartography to renew its relationship with critical human geography" (236).

Critical cartographers seek to uncover how maps affect the world by remaining sensitive to the subjectivity of the representations they contain. Rather than placing an ideal of maps as passive and factual depictions on a pedestal, critical cartographers pull maps down to the messier level of human experience, asking "who speaks for whom, about what, and with what authority" (Pickles 2004, 91). As argued by Crampton (2010), "for critical cartography, mapping is not just a reflection of reality, but the production of knowledge and therefore, truth" (46). More recently, some critical cartographers have moved beyond strictly representational understandings to view maps as being intrinsically caught up in the creation of social realities (see Kitchin 2010). Wood and Fels (2008) use the terminology of maps as "propositions" to argue this position, but

Crampton (2009) contends that such conceptions are simply an extension of the ideas of earlier cartographers and philosophers.

Given that the production of knowledge implies the presence of power (Foucault 1980), critical cartography points out that "cartographers manufacture power" (Harley 1989, 13) over the places they map. While the critical turn in cartography involved a greater focus on theoretical aspects of the discipline, many have also conducted empirical work in this vein. Historical examinations have fruitfully outlined the role of maps in constructing place in New Spain (Craib 2000), northwest North America (Oliver 2011), or along thirteenth-century pilgrimages routes (Gaudio 2000). Others have applied cartographic lenses to explore the role of maps in more recent political delineations of territory, such as Crampton's (2006) examination of geopolitical decisions in Europe after WWI or Winichakul's (1997) influential look at the development of Siam identity due in part to the mapping practices enacted there (cf. Krishna 1994, Culcasi 2006). Other scholars have shown how maps can channel power in the opposite direction, leading to "counter-mappings" that subvert dominant narratives (e.g. Peluso 1995, Brown and Knopp 2008, St. Martin 2009, Perkins and Dodge 2009). While most of these applied studies have focused on conventional maps, I argue that similar methods can be applied to representations that emerge from the recent glut of online geographic information. Specifically, conceptualizing the geoweb itself as a map[20] created by a vast number of authors enables scholars to leverage critical cartography's ability to analyze the role of representation and authorship in constructing the world.

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[20] Or as a dynamic agglomeration of map*pings,* using a processual rather than representational view after Kitchin and Dodge (2007).

The millions of subjective and geographically located portrayals online function as mappings that can be examined through a critical cartographic lens. Viewing the geoweb in this way builds on Pickles' (2004) assertion that spatial representations that may be unfamiliar to modern eyes still "count" as maps suitable for analysis (15), as well as providing a response to his declaration that "we need to ask again about the ways in which electronic information and mapping technologies are reconfiguring the contemporary world" (157). Ideas of maps are embedded in societal conceptions of cyberspace (see Gartner et al. 2007, Gordon 2007). Others have written about the effects of maps intentionally made by users as a mode of information production on the geoweb (Dodge and Kitchin 2011, Perkins and Dodge 2009, Helft 2007). Extending such research requires only a small stretch of scope—one that involves viewing the geoweb itself (or parts of it) as a sort of map, a largely visual collection of spatial representations that constructs particular understandings of the world, regardless of whether its users intentionally contribute to it with such a goal in mind.

Any representation of a place is always incomplete, particularly when one views the geoweb's mappings of the world in the shadow of the digital divide. While conventional maps ostensibly project "a single objective voice speaking onto space" (Dodge and Kitchin 2011, 13), the geoweb's mappings are crowdsourced and decentralized. While this decentralization can potentially enable a more nuanced view of the world, the geoweb's pattern of representation is not inherently equal. Studying the geoweb as a map allows scholars to understand how "alongside the means to empower, Web 2.0 mapping technologies also provide the mechanism by which divides can be (re)created" (Crutcher and Zook 2009, 533), illuminating paths towards more inclusive

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narratives. Crampton (2009) characterizes the move towards online distributed mapping as an "undisciplining" of cartography, in which representational power shifts out of the hands of elites and into those of the users themselves. I agree, but would argue that this shift does not lessen the need to critique how new mappings change the places they portray. Rather, the assumptions of equity surrounding online crowdsourced information and the naturalizing tendencies of visual images make a critical cartographic perspective especially germane to understanding how the geoweb can affect the places it represents.

For decades, scholars have sought to understand the deep geographic complexities of the borderlands between Mexico and the United States. Places are constructed by their representations, and this region is no different. Given the growing and naturalizing influences of representations on the geoweb, bringing cartographic approaches to bear on online mappings of the borderlands can help move scholarly understandings of the area into the information age. The remainder of this thesis analyzes the representations of the border created by users of the photo-sharing website Flickr in hopes of determining the extent to which those portrayals exclude certain people and places.

<center>**CHAPTER III**</center>

<center>**CASE STUDY: CONTEXT AND APPROACH**</center>

This chapter situates my case study in terms of geographic context, data sources, and methodologies. I first discuss my reasoning in choosing the U.S.-Mexico border for an investigation into online portrayals before providing a brief geographical and historical portrait of the borderlands. I then define the extent of my study area and rationalize my choices of El Paso/Ciudad Juárez, Mexicali, and Tijuana as sites for more intensive investigations into Flickr's mappings. In the final portion of the chapter I provide an in-depth explanation of my techniques for obtaining, processing, and visualizing data from Flickr.

Justification of Case Study

The border provides a convenient, useful, and timely case study for an examination of Flickr's mappings of the world. A foremost concern in choosing a study area was to find a region that was culturally varied enough to draw out any interesting gaps and biases in Flickr's representations. The border not only fits this criterion, but the region's cultural diversity is well documented by a robust range of literatures, which greatly aided my ability to contextualize my findings (e.g., Arreola 2002, Rippberger 2003, Romero 2008).

Also driving my choice of study area were the differences in internet access on each side of the border. Mexican border *municipios* have higher median incomes than the rest of Mexico, whereas the inverse is true of U.S. border counties. Nonetheless, incomes are higher in the United States than in Mexico along the border's entire length (see

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Anderson and Gerber 2008). These income inequalities manifest as digital divides between the two countries (see Curry and Kenney 2006)—divides that likely have significant repercussions for the authorship of online representations.

Finally, the borderlands have been the focus of much recent debates about issues such as immigration, violence, drug trafficking, and national security (e.g., Rice 2011, Thompson and Mazzetti 2011, Archibold 2010). Regardless of the arguments on either side, these debates make the border region a timely and relevant location for an examination of how the geoweb affects the world.

In addition to the considerations outlined above, there were several technical advantages to my focus on the borderlands. The border is relatively well represented on Flickr compared to other possible study areas. Examining the border additionally allowed me to use my knowledge of Spanish to assess patterns of language use. Finally (and somewhat trivially), the elongated shape of the border allowed me to employ some relatively unique visualization techniques to elucidate points that would have been more difficult to make if the study areas had been characterized by a different geographic configuration (for example, see Figure 7 on page 53).

Vignette of the Borderlands

"There is, to begin with, the problem of how to define the border…"
(Ruiz 1990, 68)

Scholars continue to debate the conceptual and geographical meaning of the term "borderlands;" some question whether it is even appropriate or useful to frame the region in such a way (see Figure 1 for an overview map of the area). Herrera (2001), for

example, asserts that the border "is not a stable entity with just one meaning, but rather is a variety of entities in constant change and with multiple meanings" (153).

Figure 1. General map of the U.S.-Mexico borderlands

Volumes have been written about the vast social, cultural, and economic complexities of the U.S.-Mexico borderlands.[21] Given the constraints of this thesis, here I offer only a short vignette of the region in order to contextualize my investigation into Flickr's mappings. I pay special attention to how the border's history of shifting political control, its relatively peripheral location in relation to both parent countries, and its patterns of economic integration have created a region of deep cultural ambivalence and complexity.

Around the early 1600s, Spanish soldiers and missionaries began pushing northwards from New Spain (present day Mexico) to colonize the area of the modern borderlands. Indigenous inhabitants of the region were typically subjugated under a racist

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[21] For a smattering of the variety written about the region, note Arreola's (2002) examination of southern Texas as a unique "Tejano" cultural province, Gómez' (2007) analysis of "Mexican American" as a racial category along the border, and Ruvalcaba and Corona's (2010) examination of how media representations portray gendered violence along the border.

Spanish caste system based on *limpieza de sangre* (purity of blood).[22] The region was under Spanish control until Mexican independence in 1821, a few decades after which the Mexican-American War reconfigured political control in the region.[23] After the war, Mexico and the U.S. signed the Treaty of Guadalupe Hidalgo, which roughly established the modern-day boundary between the two countries.

Relationships between the United States and Mexico stabilized during the late 1800s under the rule of Mexican dictator Porfirio Díaz. With the exception of a period of disarray in the wake of Díaz's fall from power during the Mexican Revolution of 1910, during much of the 20th century the borderlands were influenced by increasing economic integration between the United States and Mexico. Such economic trends augmented the region's relevance in relation to both countries, although the border remained largely a peripheral location. Tourism from the United States into many Mexican cities also increased from the early 20th century onwards, piling new layers onto the border's already complex sociocultural landscape. Despite the increased levels of cultural and economic exchange, Martínez (1994) contends that some issues emerged during this period that remain relevant to the modern borderlands, particularly those surrounding drug trafficking and immigration.

Economic integration continued into the 20th century, particularly with developments that took advantage of cheap Mexican labor, such as the 1942 Bracero

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[22] Gutiérrez (1986) summarizes some of the legal categories recognized under Spain's *casta* system: "A mix between a Spaniard and an Indian produced a *mestizo*; a Spaniard and a *mestizo* produced a *castizo*; a Spaniard and a Black begat a *mulato*, and so on" (83).

[23] Although Reséndez (1999) cautions against oversimplifying assumptions that at this point "the northern frontier provinces were unproblematically a part of Mexico, as if national identity had emerged full-blown right after Mexico gained independence from Spain" (670).

Program that brought Mexican workers into the U.S. agricultural industry[24] and the emergence of industrial *maquiladora* plants in many border cities. Immigration to the border from elsewhere in Mexico caused many urban areas to balloon in size, and layered yet more cultural complexity onto the region. A century of economic integration between the U.S. and Mexico in the region was formalized at the end of the 20th century, with the passage of the North American Free Trade Agreement (see Mize and Swords 2010).

The borderland's history of economic integration and geographies of cultural subjugation and exchange has created a region that varies immensely along its length (see Arreola 2010, Zartman 2010). Additionally, the recent "hardening" of the border in response to concerns about drug trafficking, violence, and national security has led to further change in the region (see Andreas 2003, Archibold 2010). Adding to this complexity is the wide range of representations of the borderlands promoted in American popular culture (see Arreola 1996, Kofoed 2009, Ruvalcaba and Corona 2010). Given that narratives construct the places they describe, the prevalence of these varied conceptions have undoubtedly shaped the modern border. Such processes may be seen as precursors to my examination of how the representations on the geoweb affect the region.

Extent of the Study Area

The borderlands are not a geographically discrete region; if questioned, every scholar and inhabitant of the area would likely provide a unique subjective definition. As codified by the 1983 La Paz Agreement between the United States and Mexico, the

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[24] Along with the subsequent forced deportation of over a million Mexican workers under the auspices of so-called "Operation Wetback" in 1954 (Mize and Swords 2010, 25).

formal extent of the region is 100 kilometers on either side of the international boundary. This delineation is essentially arbitrary, however, and did not substantially inform the definition of my study area. Instead, my study area encompassed the portions of both countries that lie within 15 kilometers of the border (see Figure 2). While this area is in some ways as capricious as the La Paz Agreement's bureaucratic definition of the borderlands, I settled on this extent as a compromise between capturing some amount of north to south variation while keeping the total number of Flickr photos in the area at an analytically manageable level.

Figure 2. Study area

In addition to my broad study area, I also selected three urban areas along the border to examine in more detail. While my selections were largely influenced by the coverage of Flickr's representations, I also aimed for contextual diversity in my selections.

My first local study site was El Paso and Ciudad Juárez. Located respectively in the states of Texas and Chihuahua near the midpoint of the border, these two cities together comprise one of the largest urban agglomerations in the study area. Additionally,

the recent development of vast disparities in safety between the cities means that the area could be uniquely informative in regards to online representations.[25]

Second, I examined the area around Mexicali in more detail. Located about 160 kilometers from the Pacific Ocean in the Mexican state of Baja California, I chose this area simply because initial assessments revealed that it held the only large agglomeration of photographs on the Mexican side of the border with no U.S. counterpart.

Finally, I examined a portion of Tijuana, Baja California, and the nearby U.S. town of San Ysidro (technically within the San Diego city limits). I chose this area because it was well covered by photos on Flickr and included a large and well-documented tourist district centered on the city's Avenida Revolución, or Revolution Avenue.[26]

Methodology

Researchers continue to explore new directions even as they struggle to keep scholarly pace with the continuing boom in crowdsourced information on the geoweb (see Zheng et al. 2010). Scholars have used such data to investigate subjects as unlikely as environmental monitoring (Connors et al. 2011) and disaster relief (Zook et al. 2010) in recent years. In this spirit, I apply a critical cartographic perspective to a small portion

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[25] Reporter Damien Cave (2011) writes that "by some estimates, El Paso is now the safest big city in the United States; Ciudad Juárez is among the most dangerous in the world".

[26] This draw is undeniably spurred on by the city's longstanding (and at times well-nurtured) reputation as a haven for debauchery in American popular thought (see Arreola 1993).

of the geoweb in this thesis to examine how it might help to change and construct places along the U.S.-Mexican border.

I obtained all of the empirical data for my examination of online mappings of the border from Flickr during late 2011 and early 2012. Flickr is a global online community based on the sharing of digital photographs. Although there are no precise estimates of the number of photos uploaded thus far by users of the site, in August 2011 the Flickr company blog reported that the number exceeded 6 billion photographs (Kremerskothen 2011). According to the internet ranking company Alexa (at alexa.com), as of May 2012 Flickr was the 47th most visited site on the internet by users in the United States, and the 34th most visited by users in Mexico. Although Alexa's rankings are imprecise, they nevertheless underline that Flickr is a very popular site in both countries. The relative popularity of Flickr in both Mexico and the United States makes it an attractive source of data for my examination of how the geoweb maps the borderlands between the two countries.[27] Additionally, given the immediacy and persuasive capacity of visual representations, Flickr's orientation towards photographic images makes the site an apt subject for investigations into how the geoweb reconfigures places through representation and narrative.

Flickr users can attach various contextual information to the photos they upload to the site, including descriptions, titles, and tags (or keywords). Since August 2006 Flickr has also allowed users to attach geographic information to their photos, whether automatically through the use of a camera equipped with GPS or manually at the point of

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[27]Although it is worth noting that I am *not* attempting to draw comparisons between the two countries in terms of quantities of visits to sent to the site.

uploading. One day after the launch of this so-called "geotagging" feature, Flickr reported that over one million photos had been marked with spatial information (Butterfield 2006). By early 2009 this figure had surpassed 100 million (Revdancatt 2009).

As with most sites on the geoweb that are built on crowdsourced information, the geographic information Flickr's users attach to their photos is of uncertain and variable spatial accuracy (see Goodchild 2007, Flanagin and Metzger 2008). For many questions related to the geoweb, this uncertainty would undermine the viability of Flickr's geotagged photos as a data source. Given that the purpose of this thesis is to examine the place narratives created by Flickr's mappings of the borderlands, however, the objective geographic accuracy of the data involved is effectively irrelevant. While this accuracy is an interesting and important issue to address, my interest here lies in the subjectivities that emerge from Flickr's mappings.

Data Acquisition

I obtained data regarding Flickr's mappings of my study area from the site's freely accessible application programming interface (API). Flickr's API provides a structured way for computer programs to query the site's extensive database of information regarding its photos and users. I wrote custom software using the Processing programming language to download metadata for geotagged photos within 15 kilometers of the border. More specifically, I used the API's "flickr.photos.search" method to

retrieve records relating to photographs in my study area uploaded between the beginning

of 2008 and the end of 2010.[28] Table 1 dissects an example API query.

Table 1. Elements of an example query to Flickr's API

http://api.flickr.com/services/rest/	*Base URL for Flickr API*
?method=flickr.photos.search	*Begins the photo search function*
&api_key=abc123	*Validates user's API key for authentication*
&format=rest	*Specifies the format for the query*
&has_geo=1	*Searches only within geotagged photos*
&per_page=500	*Returns 500 records per page*
&content_type=1	*Limits search to photographic content*
&media=photos	*Filters out video content*
&accuracy=13	*Limits search in regards to spatial precision*
&sort=date-posted-desc	*Sorts results by date posted*
&bbox=-112.50,28.04,-103.58,32.80	*Searches only within a specific geographic area*
&extras=[…]	*Specifies additional information to be returned*

The mechanics of Flickr's API dictated that I geographically narrow my search

using a series of mosaicked bounding boxes that encompassed the length of the border.

After downloading metadata for over 90,000 photos within these boxes I discarded those

that were not within my study area. I additionally discarded records geotagged with less

than roughly city-scale specificity. When any Flickr photo is geotagged manually, the

user clicks on an interactive map of the world to specify where the image was taken.

Flickr then attaches a specificity rating to each resulting record based on how far users

zoomed into the map before clicking their desired location. Although photos placed very

generally are indeed part of Flickr's mappings, I chose to discard such records to

maintain a greater level of spatial subtlety during my analyses.

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[28] I chose this date range in consideration of timeliness and because 2008 was largely the year in which Flickr's collection of geotagged photos truly began to expand rapidly.

I did not initially download any photographs from Flickr's API, but rather acquired metadata records in Javascript Object Notation format that I converted to spreadsheet form with custom software. In total, I ended up with around 9,700 records, each containing various metadata relating to a photo geotagged in my study area. Specifically, the relevant metadata I retrieved for each photo included an image link, geographic coordinates, spatial specificity, dates uploaded and taken, views received by the photo, title, and the content of any accompanying keywords or descriptive text. Based on these records, I later used a custom computer program to download 624 actual photographs to serve as data for an intensive thematic analysis of Flickr's mappings of the Tijuana area.

After downloading records relating to each photo near the border, I conducted some additional filtering of the data. I collapsed the records for images uploaded en masse by individual users into single occurrences. Flickr's geotagging system allows users to upload and geotag photos in very large batches. This ability often results in users uploading photos to the site that are duplicates in terms of their metadata, placed at precisely the same geographic location and tagged with the same title and descriptive text. While these duplicates are a large part of Flickr's mappings of the borderlands, I chose to collapse such photos into a single record in hopes of maintaining a clear view of the more general trends in Flickr's mappings. The records lost through filtering the data in this manner reflect the vast number of photos that users often place in the same location. While this is a seemingly dramatic reduction in the total number of data points, discarding duplicate records provides a clearer perspective on Flickr's mappings of the border.

Analytical Approaches

I took a two-pronged approach to my analysis of Flickr's mappings of the borderlands. I first analyzed broad patterns of photo distribution, views, and languages used for titles and descriptions. I then conducted a more specific examination of coverage in the urban areas of El Paso and Ciudad Juárez, Mexicali, and Tijuana. In Tijuana I additionally investigated the thematic content of Flickr's representations. I chose to combine extensive and intensive approaches in a single project in hopes of mediating some of the shortcomings of each approach (as summarized by Cloke et al. 1991, 154).[29] An extensive focus alone would risk fallacious assumptions that large-scale generalizations reflect micro-scale variations in Flickr's mappings of the border. Conversely, if I were to focus only on one small case study I could lose sight of important contextual information and risk drawing conclusions that do not necessarily apply elsewhere along the border. In light of these concerns, I sought a balanced approach combining generalized and largely quantitative assessments of broad patterns with a more qualitative examination of Flickr's mappings of downtown Tijuana.

I relied primarily on techniques of visualization and visual interpretation to analyze data for both the extensive and intensive portions of my study. Scholars have long characterized geography as a visual discipline (see Sui 2000, Rose 2003, Driver 2003), and maps in particular have a long history of scholarly use as visual tools for the interpretation of spatial patterns. The emergence of more powerful geographic information and design software in recent years has expanded the capacity for visual

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[29] Additionally, my multiscalar approach reflects the fact that users often create and interact with the site's mappings at various scales through an interactive, zoomable online map.

techniques to reveal spatial patterns in ever-expanding sets of data. Yet, Perkins (2004) observed that even within the critical cartographic tradition researchers "usually employ *words* to extol the virtues of socially informed critiques of mappings, leaving to other people the messy and contingent process of creating mapping as visualizations" (381). I seek to remedy this situation by leveraging novel visualization techniques to analyze and explain the patterns created by the myriad data points that constitute Flickr's mappings of the border.

My interpretive application of maps and visualization techniques is particularly appropriate given my effort to show how the geoweb itself acts as a varied and dynamic site for new mappings of the world. In this sense, the visual methods I apply are a response to Elwood's (2011) suggestions that "'the visual' is central both to the geoweb itself *and* to our efforts to use these new forms of information in research" and that scholars must "retain and thoughtfully engage with the multiple meanings of visualization that are part of geography" (6).[30]

The remainder of this chapter details the techniques I used to analyze the various data I acquired from the Flickr API. For my generalized, extensive analyses I first examined broad patterns in the distribution of photos (or lack thereof) along the border. In addition to this basic assessment, I also analyzed patterns in the number of views each photo received on the site. This undertaking provided a deeper understanding of spatial variations in the "prominence" of Flickr's map from the perspective of internet users. Understanding patterns in the online attention garnered by different parts of the geoweb's

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[30] See also Knigge and Cope 2006.

mappings illuminates the influence that such mappings potentially hold over the places they portray.[31] In addition to distribution and views, I also analyzed the languages used in the text accompanying many photos in hopes of shedding light on which cultural groups may be excluded from Flickr's mappings. Along similar lines, I also conducted an in-depth thematic analysis of the actual content of photographs in a portion of Tijuana, Mexico.

Extensive Analyses

In an effort to gain an initial overview of the coverage and depth of Flickr's mappings of the border, I analyzed the data in terms of geographic location and the number of times each photo had been viewed on the site. Assessing the coverage of Flickr's mappings across my study area is an obvious first step towards evaluating the impacts that such narratives have on places along the border. Gaps in the coverage of Flickr's mappings indicate places that are ignored by the site's users (or at least ignored by those who geolocate their photographs). Understanding such gaps could provide insights into how digital divides manifest on the geoweb or into the likelihood that a particular type of place will be well-represented online.

My analysis of photo locations was relatively straightforward. I imported a spreadsheet containing latitude and longitude locations for every photographic record in my study area into ESRI's ArcGIS software, where I used the "Add XY Data" function to visually plot the location of each photograph. I eventually exported this data into Adobe

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[31] Although beyond the scope of this thesis, Flickr uses a proprietary "interestingness" algorithm to rank search results that likely influences the visibility of representations of the borderlands. I am unaware of any research thus far examining these "algorithmic distortions" of place narratives on Flickr.

Illustrator to produce more nuanced visual assessments. To gain a sense of how the density of Flickr's mappings compare to other variables in the borderlands, I also compared Flickr data with other freely available geographic data, such as the Landscan ambient population database created by Oak Ridge National Laboratory.

For some assessments I additionally generalized photo distribution data into adjacent "bins" evenly spaced at regular intervals every 50 kilometers along each side of the border (See Figure 3).

Figure 3. Generalization zones within the study area

This approach allowed a generalized comparison of disparate variables such as population and photo distribution, but preserved the ability to discern cross-border international variations as well. My creation of these generalization cells involved producing Thiessen polygons based on points placed at even intervals along the border and then trimming away the portions of those polygons that were outside of my study area.[32] This approach sidesteps disadvantages associated with more common methods of generalizations based on political units. Due to the meandering shape of the border, however, a disadvantage of my approach is that the generalization cells I created were not

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[32] Invented by A. H. Thiessen in 1911, this is an algorithmic approach to defining a mesh that efficiently divides a collection of points into a set of exclusive polygons (Brassel and Reif 1979).

of equal size. I dampened the effects of size differences by normalizing photo data based on the area or population of each cell.

In addition to plotting raw photo locations, I also visualized variations in the number of views that each photo received from Flickr visitors. While location provides one measure of the coverage of Flickr's mappings, views are relevant because they demonstrate the amount of influence that specific photographs have on the combined narrative of Flickr's mappings. For example, a hypothetical town could conceivably be mapped by photographs every 10 feet, yet if no visitors to Flickr ever actually encountered those photos then the town would effectively have no presence in Flickr's mappings.

I used ArcGIS to visualize how the distribution of photos related to the amount of views they received from visitors to the site. In addition to plotting photos at their locations using proportional symbols, I also took advantage of the shape of my study area to analyze views along its length in the form of a modified sort of bar chart. To accomplish this I used ArcGIS' "Snap" tool to reposition each photo location to the nearest location along the border. I then symbolized views as bars of varying length, which I exported to Adobe Illustrator for final tweaking and arrangement. The final result was a map that highlighted those locations along the border that tended to be the most viewed portions of Flickr's mappings, as well as those locations that visitors tended to ignore (see Figure 7 in Chapter 4).

While the distribution and views of photos respectively provided information about the coverage and influence of Flickr's mappings, the final portion of my extensive investigation examined the languages used for the text accompanying many photos on the

site. When Flickr users upload a photograph, they have the option of attaching textual information to their image. While many of Flickr's photos do not include such descriptions, the linguistic content of those that do impart particular narrative tones. Tuan (1991) has commented on the influence of language in constructing places in general, while others have outlined the contentious role of language on the border more specifically (e.g. Nocon 1995, Hidalgo 1995, Zentella 2009). Additionally, language is an especially relevant variable to examine in relation to how Flickr maps the borderlands given the compartmentalizing tendency of language on the internet as a whole.[33]

I used five categories to classify the text accompanying every photograph in my study area: No discernible language content, English, Spanish, Both languages, and Other. I chose these categories after a cursory examination confirmed that languages besides English and Spanish were rarely used in descriptions of Flickr photos of the borderlands. Most records additionally included keywords relating to the photos. These tags, however, are not as immediately visible as photo descriptions and titles to users of Flickr's site. Additionally, only the creator of a photograph can change descriptions and titles, while tags involve a community effort to label everyone's photos with short, descriptive terms. Given these two considerations, I did not take tags into account in my coding of languages used in each photograph, instead focusing only on titles and descriptive text. My familiarity with Spanish aided my assessments, but the process was at times imprecise due to the ambiguities inherent in classifying language use. Rather than risk inaccurate classifications, I attempted to err on the side of marking ambiguous

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[33] Zuckerman (2008) argues that this tendency may hold the potential to "fulfill some of the predictions put forth by those who see the Internet acting as an echo-chamber for like-minded voices".

records as having no specifically discernible language. I additionally ignored all proper

names in my assessment, such as "Rio Grande" or "Big Bend National Park". Any

records containing only proper names were also judged to have no discernible linguistic

content. Table 2 provides some representative examples of the choices I made in coding

textual information for linguistic content.

Table 2. Examples of typical linguistic coding choices

Title	Description	Language content
antes que desaparesca	esto es de lo poco que queda en el valle de mexicali	Spanish
2010-11_Anza-Borrego_064	Dos Cabezas Road	None (proper nouns ignored)
near Colonia Veinte de Noviembre Baja California Mexico	Having the awesomest Mexican Buffet brunch.	English (proper nouns ignored)
El Sueño De Una Mejor Día	I shot this in a small village outside the city of Tecate Mexico while working as a volunteer on a house building project sponsored by a (…)	English and Spanish

I applied various cartographic approaches to analyze Flickr's linguistic content

along the border. Of these, the approach that I felt most effectively revealed geographic

patterns in this variable involved aggregating language data based on the same 50-

kilometer intervals I used to analyze aspects of photo distribution. This aggregation

allowed me to more easily compare language use on each side of the border and along its

length with variations in other extensive variables, allowing me to tease out interesting

patterns in the data.

My broad-scale examination of language use reveals general patterns in how

cultures and groups are excluded from Flickr's mappings. Focusing these same concerns

onto a smaller geographic area, my intensive analysis of Flickr's photos of selected urban

areas along the border emphasizes the value of integrating local cases with more general approaches.

Intensive Analyses

For the intensive section of my analysis I focused on portions of the urban areas of El Paso and Ciudad Juárez, Mexicali, and Tijuana. In each of these locations I analyzed the distribution, visibility, and linguistic content of Flickr's representations in a manner similar to my extensive examinations. The change in scale, however, allowed me to employ more nuanced visualization techniques that made it possible to show all three variables on a single map of each urban area. This approach revealed detailed local variations in Flickr's mappings with a single view.

For Tijuana, in addition to analyzing basic aspects of Flickr's representations I also undertook a brief analysis of the thematic content that was present in images of this area. After downloading images of the 624 photos in Tijuana, I selected 250 at random to code for thematic content in hopes of gaining some understanding of how micro-scale variation in Flickr's mappings connected with my extensive observations. I chose my sample size of 250 as a compromise between feasibility and depth of the investigation.

Instead of developing thematic categories without referencing the images themselves, I developed my codes inductively after an initial assessment of photographic content in the area. I found this method more appropriate than deductive approaches given that my goal was to discover interesting themes and directions for future research rather than to test hypotheses about the content I expected to find (see Patton 2002). Nonetheless, the categories I chose were also informed by background research on

Tijuana as well as my specific concerns in regards to Flickr's mappings of places along the border.

Rather than developing categories that were both exhaustive and mutually exclusive as Rose (2001) argues is necessary in traditional approaches to content analysis, I aimed to develop interpretive and investigative categories that could be used to make some initial sense of the range of themes present in Flickr's micro-scale mappings of Tijuana.[34] I drew from studies such as Aitken and Wingate's (1993) "leitmotif analysis" and Boyatzis' (1998) "thematic analysis" to develop broad categories that pared down the information contained in each photograph. [35] In total, I coded photographs into 20 content categories, grouped into general broad themes. Table 3 summarizes these categories, leaving out those that were too uncommon to warrant interest.

Table 3. Summary of codes used for thematic analyses

Built Environment	People
Commercial Activity	Individuals
Bar, club or restaurant	Groups
Pharmacy or medicine	
Outdoor market	Social
Retail shopping	Food
References to the border	Alcohol
Art or Architecture	Music or dancing
Photos of iconic landmarks	
Macro shots of city or streets	References to nationalism
	Linguistic content (within images)
"Natural" setting	

[34] Indeed, Ziller's (1990) assertion that photographs are "infinitely describable" (42) implies that the search for exhaustive categories for content analysis is inherently untenable.

[35] My approach to thematic analysis has strong parallels with various "autophotographic" studies (e.g., Aitken and Wingate 1993), in which researchers request photographs from subjects themselves. To my knowledge, these similarities between autophotographic methods and analyses of photographic data culled from the public accounts of Flickr users have not been explored until now.

In applying my coding scheme, I placed photos into categories only when warranted by what I judged to be the primary focus of each image. For example, photos were only placed into the fundamentally contentious "natural settings" category if they focused almost exclusively on nature or a conspicuous absence of built elements. I took this approach in an effort to identify the essential messages communicated by each photograph, to the extent that such identification was possible. Given more time and resources, a more suitable alternative would have been to distinguish between gradations in magnitude for several of my themes.

As with any such analysis, in the course of my coding of visual content important themes were inevitably left out, ignored, or distorted. Thematic analysis is a reflexive and subjective process, and one constraint of my approach is that I have not assessed the subjectivity of my results through corroboration with other researchers. On the other hand, the strength of my approach lies in its ability to engage with the meanings embedded within each image. Given the dearth of intensive research on the nature of the geoweb's mappings, I suggest that despite the shortcomings of my analysis of the themes of Flickr's mappings around Tijuana, the approach adopted here represents a valuable move towards deeper understandings of how places are represented on and changed by the geoweb.[36]

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[36]Additionally, in relation to the border in general Arreola (1993) has commented that Tijuana developed similarly to many other border towns in the area—thus, an intensive investigation of the area could provide hints as to the nature of mappings in similar places along the border.

CHAPTER IV

RESULTS AND DISCUSSION

In this chapter I present the results of my investigation into Flickr's mappings of the border and discuss the implications of these results for the places that are portrayed (or missing). This chapter is structured around two geographic scales: the border as a whole and three specific urban areas along its length.[37]

Photographic Cartographies of the Borderlands

Distribution and Gaps

The distribution and density of Flickr's mappings of the borderlands generally followed foreseeable patterns, but there were some surprising results. In total, after filtering my data I counted 9,972 photos that depicted certain portions of the border. Despite this large number of photographs, their distribution was rather irregular. Figure 4 illustrates how the distribution of Flickr's representations correlated to major geographic features along the border.

Figure 4. Distribution of photographs across the study area

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[37] No such small subsets can ever be representative of the enormous variation found along the length of the border. Rather, I conduct these local examinations in hopes of revealing details that may provide promising directions for more in-depth investigations.

In most locations, Flickr's coverage mirrored population densities, with urban areas more densely mapped than rural areas. Several large swaths were missing almost completely from Flickr's representations, including the Sonoran Desert, western portions of the states of Chihuahua/New Mexico, and long stretches on either side of Big Bend National Park in Texas. Figure 5 highlights the zones of the border in which I found 10 or fewer photos.

Figure 5. Areas with less than 10 photos per kilometer on average

The absence of representation in many rural places on Flickr essentially makes such locations *terra incognita* for the site's users. As an influential part of the geoweb, the invisibility of such areas on Flickr entrenches fallacies of an online-offline binary in users' conceptions of the world. The immediacy of Flickr's visual representations could additionally encourage assumptions that if a place cannot be seen on the site then it is not worth seeing at all. Assuming that familiarity is a vital part of caring about a place, gaps in Flickr's mappings could foster ignorance about rural areas. This is especially relevant in light of the rural-urban framing of many recent debates about immigration in the borderlands.

Big Bend National Park in Texas was more photographed than several dense urban areas along the border, making it a notable exception to the rule that photo

densities match population densities. This exception also held true for smaller natural reserves, such as the Organ Pipe Cactus National Monument or the Coronado National Forest. Such patterns are visible in Figure 6, which maps the relationship between photo density and population density along the border

Figure 6. Quantity of representations per 1,000 people

The density of photographs in areas set aside for natural preservation suggest the influence that longstanding western ideals of scenic beauty have on which locations are covered by Flickr's mappings.[38] In short, "scenic" natural areas tend to be more densely represented, whereas rural, inaccessible, and unattractive areas are often left off the map completely. This might seem like a trite observation, but there are consequences if depth of representation on the geoweb depends on aesthetic judgments. For example, Flickr's marginalization of places that have an "aesthetic of the unspectacular" (Benediktsson 2007, 208) could affect conservation efforts directed at remote locations.

I also found differences in the distribution of Flickr photos on the United States and Mexican sides of the border. Flickr's mappings of the Mexican side of the border tended to be sparser than those on the U.S. side at all population densities. This disparity

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[38] See Bunce (1994) for an account of Anglo-American landscape ideals regarding the "countryside".

was especially apparent between the large city pairs that punctuate the border landscape. Cities in the United States typically had a greater presence on Flickr compared to their Mexican counterparts, despite Mexican cities often having much greater populations.

On the Mexican side of the border, Tijuana was the only large urban area to approach the photo densities of nearby areas in the United States.[39] Along the rest of the border, large Mexican urban areas such as Heroica Nogales, Ciudad Juarez, Nuevo Laredo, Reynosa, and Matamoros were all mapped by far fewer photos than nearby U.S. cities. East of Tijuana, Mexicali was the sole case of a Mexican city having a higher density of representations than the corresponding U.S. city of Calexico.[40]

The lack of photographs in many of Mexico's urban areas suggests the effects of digital divides on patterns of representation on Flickr. Vast income disparities exist between the United States and Mexico along most of the border's length; it is unsurprising that such differences would manifest themselves through the extent of online representations. Local variations in the patterns of Flickr's urban mappings additionally suggest that the inability of individuals without internet access to represent their specific places online is not "made up for" by representations created by those who *do* have internet access. Instead, as with Flickr's mappings of rural places, areas with low levels of internet access are often simply unrepresented online. The visual nature of Flickr's representations leaves the impression for users that there is simply more "worth seeing" on the American side of the border.

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[39] The San Diego-Tijuana region was also overall the most well represented region in Flickr's mappings of the border.

[40] See the intensive analysis section of this chapter for a more detailed examination of Mexicali's representations on Flickr.

Visibility

Measuring the quantity of views that photos receive from visitors to Flickr provides a different perspective on the visibility of places in Flickr's mappings. If assessments of gaps and distribution in the previous section chart the *coverage* of Flickr's photos, views provide an imperfect measure of spatial variations in the *influence* of different photos on social constructions of the places portrayed.

General mappings of view counts at first seemed to echo patterns of distribution. Figure 7 comprehensively illustrates the quantity of views that photos received on each side of the border, showing that urban locations and Big Bend had many photos with view counts far above the norm. In this figure, each transparent bar "growing" from the border represents a single photograph: the length of each bar corresponds to the views photos received, whereas the darker regions represent areas that were very densely mapped on Flickr.
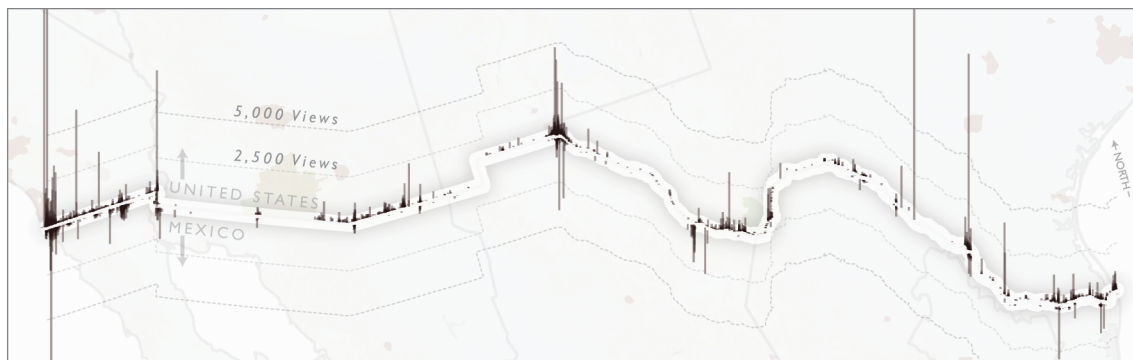
Figure 7. View counts for photos in the study area

However, initial assessments of Figure 7 mask a more interesting story about photo views. Although the most visible photos in the U.S. had more views than their

Mexican counterparts, and while the United States was more visible in absolute terms due to the higher U.S. total photo count, a different pattern emerged from the median views of photos in each country. Seen from this perspective, on a per-image basis the median view count of Mexican photos was 60% higher than those in the United States, as can be seen in Table 4.

Table 4. Average photo views by country

Country	Photos	Median	Total
		Views	
Mexico	2,093	34	209,788
United States	7,709	21	575,343

These figures indicate that individual photos in Mexico tend to garner more attention on average: the visibility of Flickr's mappings of an area does not necessarily relate directly to the number of photos taken there. Given that the majority of Flickr's users are from the United States, this is an interesting finding in that it may suggest the utility of the geoweb for encouraging interactions with unfamiliar places. More research is necessary to determine if Mexican locations receive more views because of their relative unfamiliarity to many Flickr users, or if this result might simply be a function of similar attention being paid to a smaller total number of photos. If the former is the case, it suggests that mappings of unfamiliar locations on the geoweb may hold more sway in changing conceptions about places than do mappings of more ostensibly mundane locales.

While I have thus far assumed that views are a good measure of the relative visibility of Flickr's mappings of different areas, this assumption may not necessarily be the case. I found several instances, for example, of very high aggregate view counts in

areas mapped by very few photos. Under the circumstances, it is reasonable to ask whether a single photo viewed 100,000 times is comparable to 10,000 photos with 10 views each. The view counts would be equivalent in both cases, yet a single photo holds the capacity to present a more cohesive narrative about the place it portrays.

The views received by photos are affected by many factors; aesthetic judgments, Flickr's ranking algorithms, and links from other websites can all increase an image's exposure. Accounting for such factors is beyond the scope of this thesis, but there is almost certainly no one objective measure of visibility for mappings on the geoweb. Rather, just as there are many digital divides, there are likely many understandings of how visible a place is, and how that visibility can change the place in question.

While examinations of distribution and views provide a structural look at the geoweb's representations of the world, an analysis of the languages used to "caption" photos on Flickr reveals the cultural content of such mappings. Thus far I have analyzed where attention is focused in Flickr's portrayals of the border. I now begin to touch on the complex question of what meanings are contained in those portrayals.

Linguistic Content

My examination of linguistic variations in the text attached to photos revealed some interesting patterns. In total, English was far more common than Spanish, with over three

times as many photo captions written in English. Table 5 summarizes by country the number of photos annotated in each language category.[41]

Table 5. Number of photos by language (percent of total)

Language	U.S.	Mexico
English	3,617 *(47%)*	443 *(21%)*
Spanish	145 *(2%)*	554 *(25%)*
Both	66	88 *(4%)*
Other	9	3
Total with language content	7,709	2,093
Total without language content	*3,872*	*1,005*

Just as with the coverage and views, a distinct north-south divide exists in the languages of Flickr's mappings. Of those borderland images that had readily identifiable linguistic content, about 4% of photos in the United States used Spanish, compared to 51% of photos in Mexico. These remarkable cross-border differences in language use are more pronounced than expected given the cultural hybridity of the borderlands. Much of the border is a culturally ambivalent region with a mixing of ethnic, linguistic, and national characteristics. Although the cultural makeup of the borderlands is by no means homogeneous from east to west, the linguistic patterns of Flickr's mappings paint the picture of a border that is sharply divided into Spanish and English-speaking areas, especially in the western stretches of the study area. This binary is apparent in Figure 8, which maps language data while accounting for the views of each photo. In this map, red lines represent photos with English content attached, blue lines represent those with

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[41] Although I found many photos with no identifiable linguistic content, there were no discernible geographic patterns in their distribution, so I do not discuss them here. The same is true for photos described using both English and Spanish and for those using other languages.

descriptions in Spanish, and areas with a mixture of both languages appear as dark purple.


Figure 8. View counts for photos with linguistic content

While the causes of the linguistic division are too complex to examine in detail here, previous scholarship illuminates some of the factors that might affect such patterns. One possibility is that, in the absence of other cultural markers, Flickr users might be more likely to use specific linguistic indicators of identity in their representations. The use of English on the internet has declined since its early role as a digital *lingua franca* (see Zuckerman 2008), but it remains very prominent online. Scholars have highlighted that internet users often latch onto language as a conspicuous way to assert identity online (e.g. Warschauer 2000); a similar process could influence patterns of language use on Flickr as well.

Another possibility is that intra-country connections may combine with the relative difficulty of crossing the border to cause users posting photos of the border to use the majority language of the rest of the country or online social community (see Zentella 2009). This is an interesting possibility in that it would be an example of overlaps

between an online social network and the cultural influences of political geography affecting places through the tones of discourse presented in online mappings.

The distinct north-south divisions in language use at a broad scale persist in closer examinations of urban areas. Figure 9 provides an example of this divide, showing a medium-scale view of the distinct variations in language use across San Diego and Tijuana.
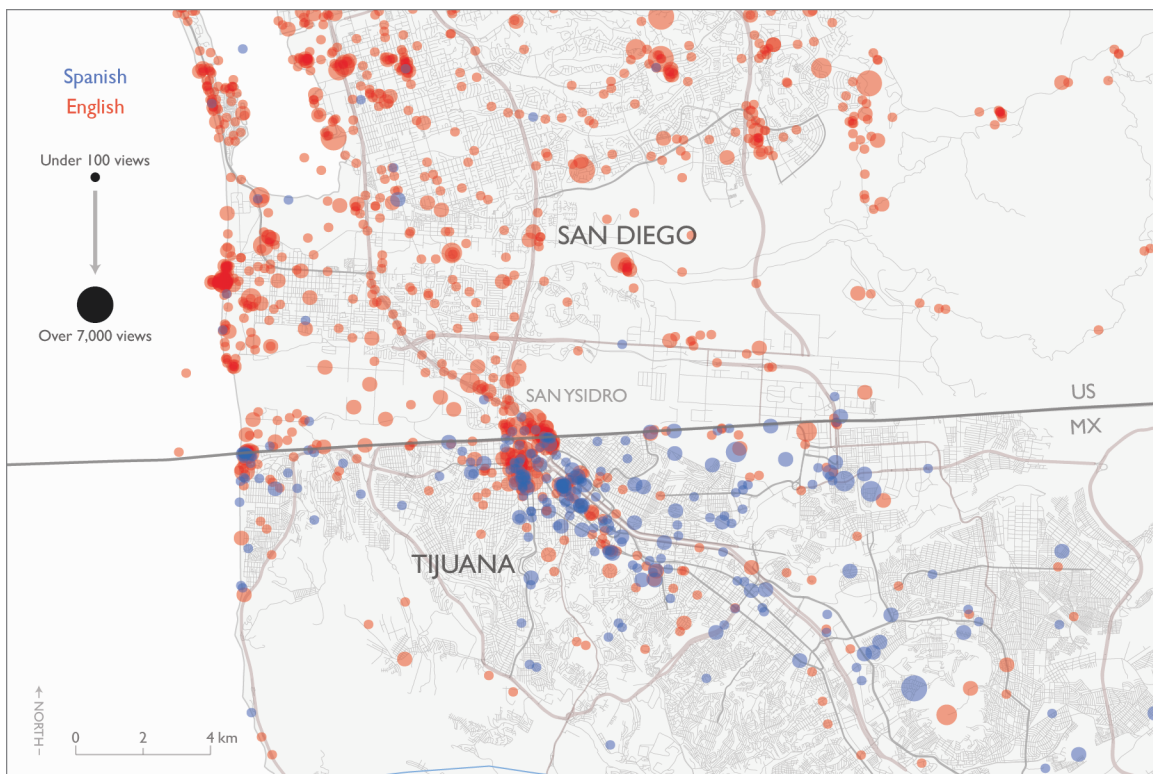
Figure 9. Language use and view counts of photos of the San Diego -Tijuana region

The remaining portion of this chapter looks at variations in the distribution, views, and linguistic content of mappings at a local scale for three bi-national city pairs: El Paso and Ciudad Juarez, Mexicali and Calexico, and San Diego and Tijuana. I conclude with an examination of actual photographic content in a sample of photos in a small part of

Tijuana. I undertake this exploratory look at how Flickr's photo mappings are manifest at the local scale in hopes of uncovering the sorts of details that can be missed by more general analyses.

Local Investigations of El Paso/Ciudad Juárez, Mexicali, and Tijuana

Overall, the micro-scale patterns of mappings in border cities echoed general patterns I found across the border as a whole. There were distinct differences, however. For example, Spanish was generally more common on the Mexican side in my extensive analyses, but in some places during the local analysis I found definite geographical patterns to the distribution of languages.

El Paso and Ciudad Juárez

In the areas abutting the border in El Paso and Ciudad Juárez, photos were largely confined to distinct clusters. Figure 10 on the following page maps the distribution, views, and language used for photos from this area.
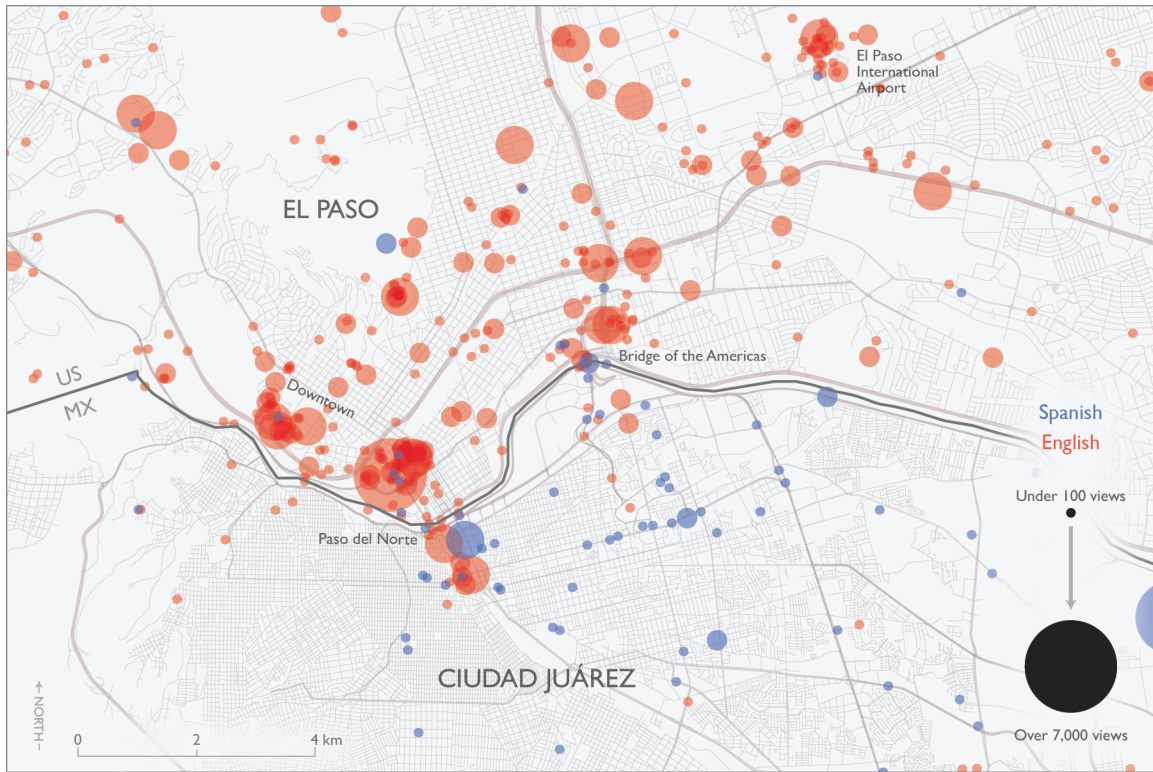
Figure 10. Flickr's mappings of El Paso and Ciudad Juárez

The coverage of Flickr's mappings was denser in El Paso, especially downtown and near El Paso International Airport. There were also smaller clusters at the Paso del Norte and Bridge of the Americas border crossings. Aside from these crossings, Juárez was more sparsely represented than El Paso, despite being twice the size of the U.S. city.[42] Some small clusters in Juárez were largely described using English; otherwise most other photos of Juárez used Spanish or had no identifiable linguistic information. The most viewed photos in this area were of downtown El Paso. Other than the area near the Paso del Norte border crossing, few photos in Juárez had many views at all.

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[42] The Mexican Instituto Nacional de Estadística y Geografía (INEGI) placed the 2010 population of Ciudad Juárez at 1,332,131; according to the U.S. Census Bureau the population of El Paso was 649,121. All following population estimates come from these sources.

Mexicali, Calexico, and El Centro

Over 500 miles to the west, the population difference between Mexicali and Calexico is much greater than between El Paso and Ciudad Juárez. The Californian city of Calexico has only 4% of the population of Mexicali, which has almost a million inhabitants.[43] This population difference was reflected in the density of Flickr's mappings of the area: even taking into account the nearby city of El Centro, Mexicali is one of the only urban areas in the study area with a greater presence on Flickr than nearby places in the U.S. Figure 11 maps the patterns of photos in this area.
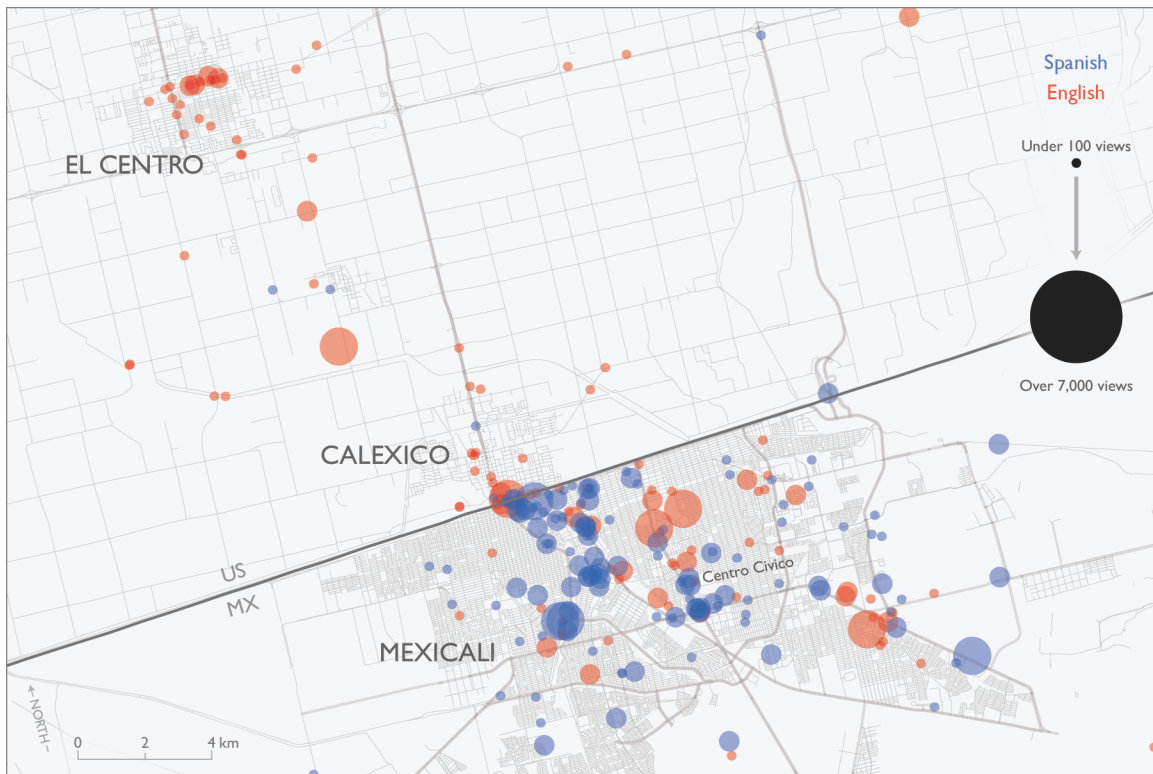
**Figure 11.** Flickr's mappings of Mexicali, Calexico, and El Centro

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[43] In 2010 Mexicali had around 936,826 inhabitants; Calexico had 38,572, and the nearby city of El Centro, CA had 42,598.

Mexicali's mappings were much denser than those of Calexico or El Centro, of which there were few photos besides a small cluster near the border. Mexicali's photos were relatively evenly distributed, although I noted clusters along primary transportation routes and near the city's *Centro Civico*. Photos in Mexicali also tended to be more viewed than those of Calexico or El Centro, with online attention also reflecting the city's larger size. In addition to being more evenly covered by Flickr photos than nearby American cities, Mexicali had a large proportion of photos with Spanish annotations. In fact, the city was unique in that it was home to the largest grouping of Spanish photos along the entire border. Closer examination showed that the English photos that *were* present in Mexicali seemed to be widely distributed throughout the city, rather than being localized around the border or tourist districts as in other Mexican urban areas. As with most American cities, Calexico and El Centro were almost entirely represented through English-language photos.

Tijuana and San Ysidro

Even farther west, I focused on Tijuana and San Diego at the San Ysidro border crossing, one of the busiest international crossings in the world. Given the prominence of issues surrounding representation in this thesis, Tijuana's reputation in the public imagination makes it an especially interesting local case study (see Arreola 1993). Figure 12 shows the views and linguistic content of photos in this area; later in this section I analyze some aspects of the thematic content of Flickr's mappings here as well.
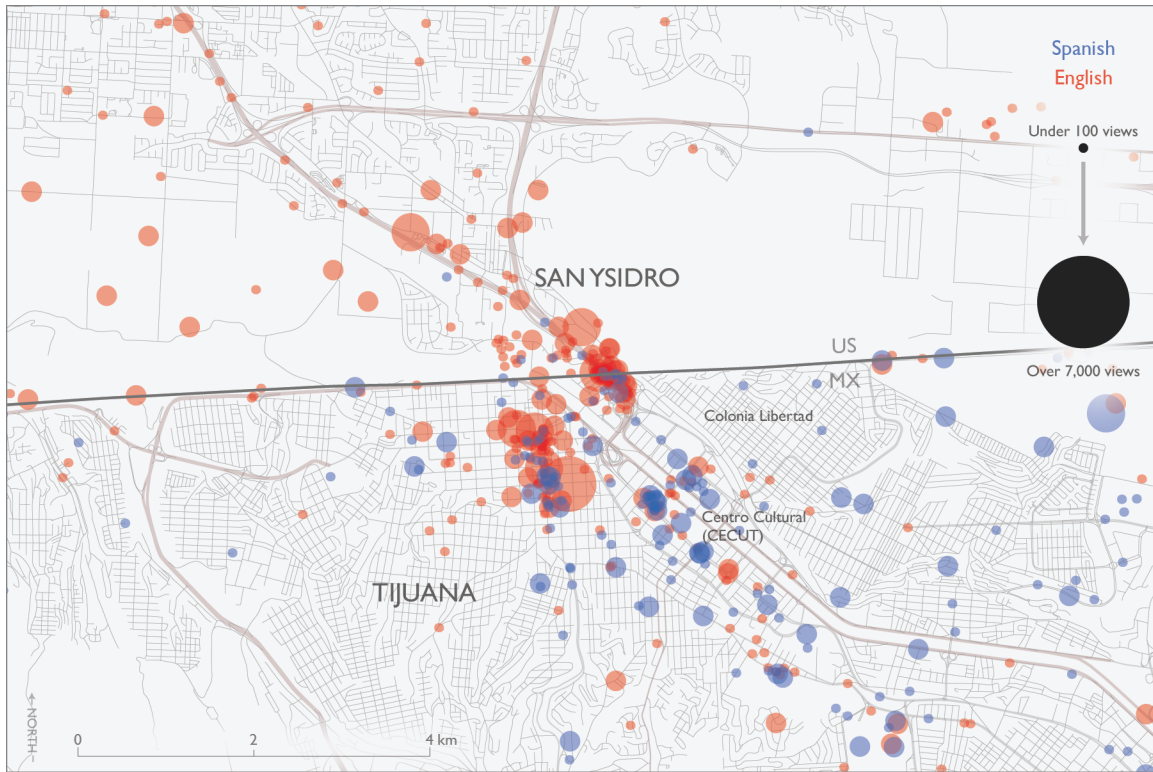
Figure 12. Flickr's mappings of Tijuana and San Ysidro

Figure 12 illustrates that Tijuana tended to be much more photographed than the area on the American side of the border. This imbalance was likely due to San Ysidro's relatively small population and the nearby presence of large swaths of undeveloped land. It is interesting to note, however, that almost all of the photos in San Ysidro had descriptions written in English, despite its high percentage of Spanish-speaking residents (Hernandez 2011). This observation would indicate that either the residents of the area did not author Flickr's representations of their places, or they simply chose to use English over Spanish in the photos they created. Each of these scenarios would have interesting repercussions in relation to the continual development of social conceptions of San Ysidro as a distinct place.

Photos in Tijuana were clustered around two primary nodes: the border crossing and Tijuana's primary tourist district, Avenida Revolución. Large swaths of residential areas had virtually no representation online, such as the neighborhood of Colonia Libertad in the western side of the local study area. The most widely viewed photographs were also near the tourist district, where English use dominated, although with some exceptions. While English use persisted throughout Tijuana, photos with Spanish descriptions were comparatively more frequent outside the Avenida Revolución area. The prominence of English in tourist areas and its frequency compared to other border cities can likely be attributed to Tijuana's popularity as a tourist location for U.S. citizens.

Another small cluster of photos focused on an area near the Tijuana Cultural Center (CECUT), which was founded in 1982 by the Mexican government to serve as a locus of Mexican culture in the area. Although these photos did not receive as many views as those of the border crossing or the Avenida Revolución, this cluster was interesting because most of the photos of this institution, which is ostensibly at the heart of Mexican identity in Tijuana, were described using Spanish rather than English. This linguistic preference suggests that Flickr's representations of the location may be influenced by connections to Mexico as a whole. Figure 13 shows a typical image of CECUT on Flickr.

Figure 13. Flickr photograph of the Centro Cultural Tijuana (CECUT) from Flickr user "Uncut" (http://www.flickr.com/people/uncut/).

In terms of the basic indicators examined thus far, the cross-border divisions I observed in the extensive section of this chapter were also present at the local scale in parts of Tijuana, Mexicali, and Juárez. Due to Tijuana's prominent reputation and its relatively dense coverage on Flickr, I also analyzed thematic content that emerged from photographs of that area. While this thematic analysis was exploratory rather than rigorously deductive, the remainder of this chapter presents some of the more interesting relationships between such content and views, locations, and language use in Flickr's mappings of Tijuana. I then conclude the chapter with a short discussion of the overlaps between my extensive and intensive examinations of the borderlands.

65

One of the themes that I searched for in photos of Tijuana was the presence or absence of people. While the distribution of these photos was not very different from more general patterns, there were some interesting regularities in photos of individuals or groups of people (see Figure 14).
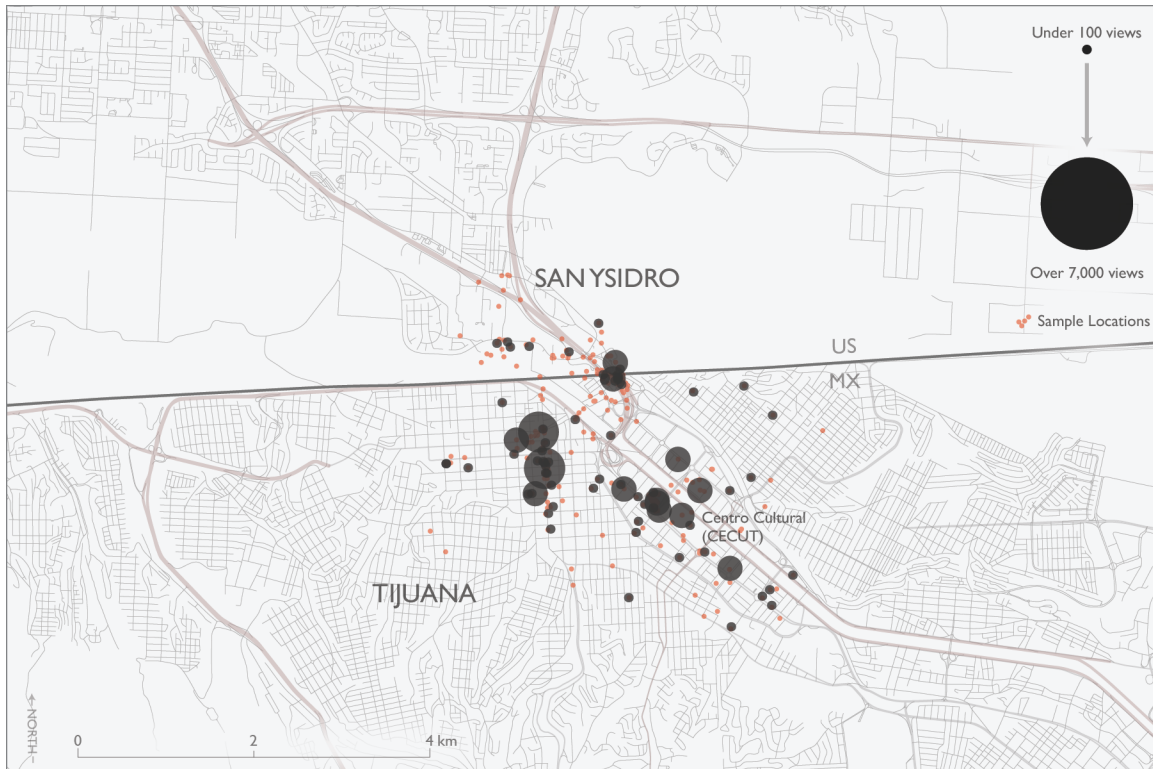
Figure 14. Distribution of photos of people in Tijuana

Images of individuals seemed to be more common in parts of Avenida Revolución. Anecdotally, some of these images appeared to be self-portraits, but many showed locals going about their lives as "authentic *Tijuanenses*". There are likely connections between this phenomenon and writings on visual aspects of cultural tourism such as those undertaken by Larsen (2006). In contrast to the cluster of photos of individuals in the tourist district, there appeared to be more group photos near CECUT. In

terms of content, several of these showed group portraits along with CECUT's distinct

spherical architectural style. This is interesting since, while the building would seem to

be a draw for American and Mexican tourists alike, as mentioned earlier in this section

English photos of the location were conspicuously rare.

In addition to examining the languages used in descriptions and titles

accompanying photos, I also looked for linguistic content present *within* photos of the

Tijuana area. While the results were generally mundane, one interesting pattern was that

while English dominated textual descriptions of photos around Avenida Revolución, the

area had a high concentration of Spanish in terms of *visual* content. This was largely due

to photos focusing on street signs such as the one shown in Figure 15.

Figure 15. Typical photograph with Spanish content along Avenida Revolución from
Flickr user "Psicoloco" (http://www.flickr.com/people/psicoloco/)

I also examined images of the area for representations of commercial activity. While most overarching patterns were not informative enough to warrant discussion, I noted several photos of pharmacies selling prescription medication (again, often near Avenida Revolución). Often with garish signs advertising in English, the repetition of such specific elements of Tijuana's landscape indicates that clichéd American conceptions of the city likely hold some sway over the content of Flickr's mappings of the area.[44]

The distributions of some thematic elements were interesting only in very general terms. References to the border or to U.S. and Mexican nationality, for example, were almost completely absent everywhere other than at the border crossing itself. Similarly, photos framing wide-angle shots of the city or its streets were mostly present only at the border crossing and near Avenida Revolución—places where the authors of Flickr's representations are more inclined to show panoramic views.

Photos focusing on nature rather than the built environment were rare. Although the explanation likely lies in the largely urban character of most of Tijuana, it is interesting that there were few photos of the undeveloped, "natural" region north of the border, to the east of San Ysidro. This absence may relate back to more general observations that there was a glut of photos around Big Bend but very few in more mundane rural areas.

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[44] This does not appear to be the complete story, however, as images relating to alcohol were conspicuous in their absence even in the tourist district, with its reputation for debauchery (cf. Girvin 1994).

Connections Between Extensive and Intensive Analyses

In sum, there are some general patterns in Flickr's mappings of the borderlands that were also visible in local examinations. I observed consistent linguistic differences in representations of the two countries, but local influences in the three urban areas I examined affected the detailed extent and geographies of such patterns. Another fairly consistent pattern of note was the general absence of representations of many rural areas. In addition, local examinations showed that Flickr's mappings rarely included "mundane" residential areas, especially in Mexican cities. Finally, while the U.S. side of the border tended to be better represented on the whole, I observed the possibility that population densities and tourism sometimes counteract this pattern at the local scale, as in the case of Mexicali and Tijuana's Avenida Revolución. In the final chapter of this thesis I consider the broader implications of these results for geographic scholarship and issues surrounding the roles that online representations increasingly play in constructing places and affecting lives.

CHAPTER V

CONCLUSION

This thesis has focused attention on one small portion of the geospatial web in an effort to advance understandings of how online representations shape the world. To the casual observer, the sheer quantity of geolocated photographs on Flickr might suggest that the site is globally comprehensive. My findings, however, reveal the extent to which these appearances are inaccurate; the mappings of the U.S.-Mexico border made by Flickr's users are irregular in terms of content, visibility, and coverage. This patchiness is relevant because the internet is an increasingly important medium through which place-changing narratives are communicated. My findings also provide insight into the changing ways in which places are constructed in the information age—a vital need at a time when online narratives are increasingly shaping how the world is thought about and understood.

This concluding chapter discusses the broader implications of my findings, both in relation to places in the borderlands and to wider academic scholarship. I additionally address some shortcomings and highlight promising paths for future research.

Academic Contributions

The case study presented here offers three lessons that are particularly relevant to subsequent research on how the geoweb reciprocally affects the material world. At the heart of the study are three findings: 1) that the presence of an international boundary fundamentally affects Flickr's representations of the borderlands, 2) that Flickr's representations tend to present an essentialized vision of the study area, and 3)

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that the presence or absence of different narratives on Flickr are especially important due to the form of Flickr's portrayals.

The findings of my study highlight that the world remains far from "borderless." I found that the distribution and content of photos varied remarkably between U.S. and Mexican sides of the border. Despite the spatial diversity of the borderlands, these differences were present along most of the border's length, and I observed the same patterns in each of my local case studies. The instantaneity and reach of the internet can outwardly seem to attenuate geographic influences, yet my findings emphasize that the geoweb's mappings are often far from homogenous. Instead, the distribution and content of online representations are deeply affected by real-world geographic constraints, such as the presence of an international boundary. Scholars moving forward with studies of the geoweb and the internet in general should keep this point in mind; it is vital that such research maintains an eye towards geographic influences, rather than succumbing to the allure of ageographic conceptualizations of cyberspace.

In addition to the influence of the border, my cartographic interpretation of the distribution of Flickr's geolocated photos revealed a culturally reductive vision of the borderlands. For example, if Flickr's photos mirrored the cultural ambivalence of the border one would expect to see frequent intermingled uses of English and Spanish in the same location, as well as a respectable number of bilingual descriptions. Instead, the languages used to describe photos generally followed broad strokes of linguistic binaries. My examination of thematic content in Tijuana revealed similar patterns; the mappings created by Flickr's users fail to capture the border's cultural intricacies.

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Given that geographic narratives inevitably affect the places they portray, the representations found on Flickr promote a polarizing version of the border rather than one that acknowledges and values cultural diversity. This is not due to malevolent plotting by any individual, but rather is likely a result of digital divides and the limitations of the internet as a symbolic medium. Regardless of the causes, however, the world stands to be deeply affected if online place portrayals in general tend to be as culturally reductive as Flickr's mappings of the border. It is important for future research to question the extent and consequences of such tendencies.

My study's final broad contribution relates to the form of place portrayals on the geoweb. Taken by itself, my finding that some places are absent from Flickr's cartographic narratives of the borderlands is seemingly banal. Such absences, however, are masked and made to seem more natural by the visual nature of Flickr's representations. The geoweb as a whole is not as focused on visual representation as Flickr. Nonetheless, the internet is a visual and interactive medium. As such, narratives that are placed online can often be more persuasive than traditional media. It is important that future researchers question the extent to which the absence of voices online could go unnoticed due to basic structural aspects of online communication.

Future Directions for Research on the U.S.-Mexico Borderlands

Every study of the sort undertaken here has limitations, and this study is no exception. Logistical limitations barred the inclusion of any fieldwork in this study, yet it is important to keep in mind Arreola's (2010) warning in relation to the border, that

> Too often we seem overly equipped with data but without much context for how those data fit the larger story of a place. As geographers, we combat this

simplification by continuing to go into the field, to visit, observe, ask questions and seriously contemplate the evidence on the ground, not simply that information available in an archive or online (345).

This admonition relates to three issues in particular that worked against the development of deeper understanding of how online representations influence the border in this study—issues that would benefit from more in-depth investigation going forward.

First, there is a need for research into how inhabitants in the borderlands relate to online representations of their places. Qualitative investigations into how locals interact with and are influenced by online representations are needed in order to solidify some of the more speculative aspects of my study.

Second, future efforts could productively be aimed at assessing how geolocated representations of the borderlands on Flickr actually affect the geographic perceptions of users of the site. This study necessarily makes some speculative assumptions as to the ways in which representations of the border may influence viewers. Again, qualitative interviews and surveys of internet users would help specify how the geoweb actually works to change people's conceptions of distant locations.

Finally, in this study I was unable to substantively account for how digital divides relate to the authorship of online representations. Authorship is undoubtedly influenced by varied processes in different locations along the border, so understanding the effects of digital divides would require a particular sensitivity to geographic context. Comprehending how digital divides operate at local scales is vital if accounts of the borderlands are to ever fully explain why certain groups lack voices in online narratives.

The Relevance of Visual Methodologies

A primary aim of this study has been to integrate ideas from both cultural geography and cartography, particularly through a sustained focus on geographic visualization. Integrative research methods are increasingly necessary in academia, both within geography and beyond. Despite the vast amounts of information it contains, the geoweb is dwarfed in size by the aggregate amounts of data produced on a daily basis by new information technologies. The concept of "big data" has recently become widely popular; the term refers to sets of information so large as to demand fundamental shifts in the methods needed to apprehend them (see Torrens 2010, Lohr 2012). While researchers have largely used quantitative methods to grapple with such data thus far, such purely numerical approaches are inapt for many studies regarding human culture and behavior. Visual techniques offer a way to assess general patterns in ballooning sets of information without sacrificing attention to relevant details.[45] There is a need for greater academic recognition of visualization as a legitimate analytical method. Yet, despite geography's background as a visual discipline (Sui 2000), Wheeler (1998) observed that the quantity of maps in geographic journals has declined consistently in preceding decades. By maintaining a focus on cartographic visualization in this thesis, I hope to contribute to the continued development and relevance of visual approaches in geography.

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[45] This seems an especially desirable trait given recent debates over whether scale is even a useful concept, particularly for human geography (see Marston et al. 2005).

Concluding Remarks

The blurring of distinctions between the material world and the digital realm will undoubtedly continue as new technologies more fundamentally weave instant exchange of information into everyday life. With this wiring of the world, online narratives will likely play increasingly crucial roles in the construction of places. The global reach of such narratives enables internet users to gain a sense of distant places with unprecedented ease. Such links hold the potential to enrich people's understandings of the world and foster empathetic connections to distant locations and cultures. Yet, the vision of a world in which all of humanity basks in a liberating ocean of information is clearly unrealistic. Instead, geographies of information and technology are as irregular as any others, and the wiring of the world proceeds piecemeal.

The uneven patterns of internet access and use mean that online representations are often authored by a select few individuals. The trend toward both widely visible representations that cover the globe and polarized divisions between those with and without access to digital information serves to marginalize populations and entrench inequalities.

If human cultures are increasingly entangled with information technology, then the accelerating speed of technological change demands dynamism in scholarly conceptions of the social spheres. For geography in particular, keeping pace with such developments requires tactics that reconcile ways of thinking that have been distinct at the best of times and openly antagonistic at the worst. It is my hope that this thesis offers a small step towards such a goal.

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