

Engineering Serendipity

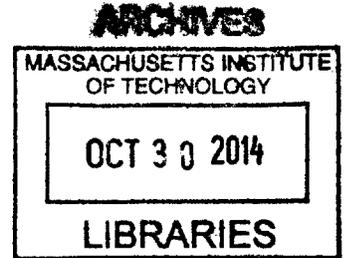
Terra Incognita And Other Strange Encounters With Global News

by

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SUBMITTED TO THE PROGRAM IN MEDIA ARTS AND SCIENCES, SCHOOL OF
ARCHITECTURE AND PLANNING, IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN MEDIA ARTS & SCIENCES
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SEPTEMBER 2014

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Submitted to the Program in Media Arts and Sciences, School of Architecture and Planning on August 8th, 2014, in Partial Fulfillment of the Requirements for the Degree of Master of Science in Media Arts & Sciences at the Massachusetts Institute of Technology

1 Abstract

There is a significant body of research that shows that people tend to congregate with others like them and favor information that confirms their existing views. With declining global news coverage and the rise of personalized news feeds and social media, there is concern that our forms of information consumption do not support encountering sufficient information about other cultures and places to make us effective citizens of the world. This thesis reviews these arguments and proposes a design intervention called "Terra Incognita: 1000 Cities of the World" to help address the geographic dimension of information diversity. Terra Incognita brings together aspects of serendipitous information discovery, personal informatics and "nudge" applications to provide users with multiple daily opportunities to explore faraway cities by reading global news recommendations. This study shows that while Terra Incognita did not shift user behavior in aggregate towards reading about more diverse places, it did make them curious about new places, prompted them to reflect and broadened their horizons. The final chapter offers guidance for designers who might aspire to create applications at the intersection of personal behavior change and news media.

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The following people have served as readers for this thesis. I am deeply grateful for their time and guidance.

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Acknowledgements

I am deeply indebted to Ethan Zuckerman for his inspiring work connecting citizens of the world across differences. My thesis readers – Sean Munson, Sarah Williams and Kevin Slavin - were essential for their creative guidance, detailed comments and statistical talents. My colleagues at the Center for Civic Media Erhardt Graeff, Alexis Hope, and Nathan Matias helped introduce me to some of those aforementioned thesis readers, offered suggestions and pointed out my own blind spots. Nihala Thanikkal helped research and refine our list of 1000 Cities. Matt Stempeck ran some of our crowdsourcing campaigns and brainstormed often with me. Fred D’Ignazio, Chunhua Zhang, and Amit Pathak sourced global recommendations. And my dear husband, Dave Raymond, love of my life, endured this process, entertained all manner of weird ideas, tested my prototypes and even edited this thesis document.

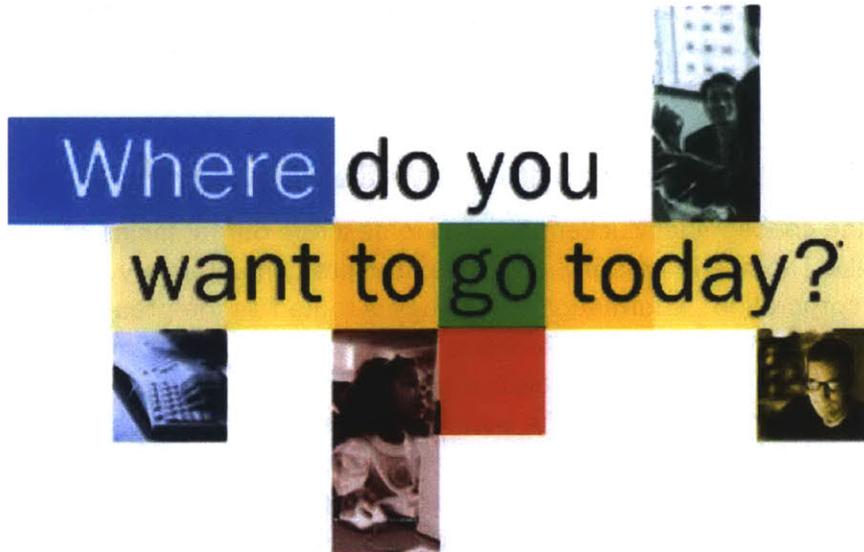
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2 Background and Context

2.1 Introduction

In the mid-1990's Microsoft launched their second global advertising campaign with the slogan "Where do you want to go today?"



Microsoft's 1994 advertising campaign. Image from <http://custom-sharepoint-training.com/wp-content/uploads/2012/02/MSwheretogo.jpg>

The World Wide Web was making its way into homes around the world and our hopes for its possibilities were new and untarnished. Browser wars, rising search engines, Hotmail, chat rooms, and snail-mailed AOL CDs heralded new ways of connecting with others across time and space. The web went from four web pages in 1991 to 10 million pages in 1999. Sherry Turkle wrote *Life on the Screen* which posited that identity in the age of the Internet was to be multiple, decentered and performative. John Perry Barlow penned *A Declaration of the Independence of Cyberspace*, a manifesto for an unregulated Internet and a new kind of citizen of the world, free from national boundaries. "The internet will create a community of informed, interacting, and tolerant world citizens", said the Republican politician Vern Ehlers in 1995. Wikipedia, the collective project to gather all of the world's knowledge in one place, was founded right after the turn of the century. People with Internet access could go anywhere, learn about anything, connect with anyone and, indeed, *be* anyone - free of geography, national borders, and even their bodies.

Ethan Zuckerman's research¹ and recently published book *Rewire: Digital Cosmopolitans in the*

¹ Ethan Zuckerman, "International Reporting in the Age of Participatory Media," *Daedalus* 139, no. 2 (April 1, 2010): 66–75, doi:10.1162/daed.2010.139.2.66; Ethan Zuckerman, "Meet the Bridgebloggers," *Public Choice* 134, no. 1–2

*Age of Connection*² examine the uneven playing field of today's digital mediascape and provides the conceptual underpinning of this thesis project. In *Rewire*, Zuckerman contrasts our fantasies of a seamlessly connected, globalized world with the realities of how we actually connect and engage with online information. The paradox of information is that the cost of transporting it around the globe is relatively nothing in comparison with transporting goods. And yet, it is easier to transport water from Fiji in giant shipping containers than it is to view a Fijian film or read about Fiji's corrupt military government in mainstream press publications. How is it, Zuckerman asks, that atoms - physical, material things - could be easier to move than bits - immaterial streams of information? The answer is that it is about attention and how we choose to use our attention in an information-rich world.

2.2 Imaginary Cosmopolitanism, Homophily and Selective Exposure

Imaginary cosmopolitanism is the concept that Zuckerman uses to describe our fantasies of interconnectedness. In books like Thomas Friedman's *Flatworld*³ and pretty much every commercial for a multinational corporation⁴, information technology is touted as the great equalizer, which will enable goods, services and people to flow unhindered across national borders, oceans and great distances. The cultural narrative of collapsing time and space through technology is not unique to our age. In 1997, the author Frances Cairncross, a senior editor at the Economist magazine, claimed that telecommunications technologies would erase geography, enable mobility for everyone, and connect children around the globe with better knowledge of each other. "Humanity may find that peace and prosperity are born from the death of distance."⁵ The artist Marcel Duchamp commented in the 1960s that geography was irrelevant⁶ and John Maynard Keynes commented in 1919 that the London inhabitant could order the products of "the whole earth" by telephone⁷ to cite but a few of hundreds of examples.

What *is* perhaps unique to our moment in time is the numbers of people that have access to globalizing communications technologies like the Internet and the WWW is higher than ever before in history. The Internet is truly, really, very awesome. Those of us who grew up in world without it should rightly marvel at the ease with which we can listen to the Kazakhstan national anthem⁸ or view citizen journalist accounts of Israeli strikes on Gaza⁹ or translate the phrase "I

(2008): 47–65, doi:10.1007/s11127-007-9200-y; Ethan Zuckerman, "Global Attention Profiles-A Working Paper: First Steps towards a Quantitative Approach to the Study of Media Attention," *Berkman Center Research Publication*, no. 2003–6 (2003), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=487943.

² Ethan Zuckerman, *Rewire: Digital Cosmopolitans in the Age of Connection*, 1 edition (New York: W. W. Norton & Company, 2013).

³ Thomas L. Friedman, *The World Is Flat: A Brief History of the Twenty-First Century* (New York: Farrar, Straus and Giroux, 2005).

⁴ "Cisco Commercial | Tomorrow Starts Here (:60) - YouTube," accessed July 14, 2014, <https://www.youtube.com/watch?v=BJSjbtGaVM>.

⁵ Frances Cairncross, *The Death of Distance: How the Communications Revolution Is Changing Our Lives*, Revised Edition edition (Boston: Harvard Business Review Press, 2001).

⁶ "Whitney Biennial 2006 :: Day for Night," accessed July 14, 2014, <https://whitney.org/www/2006biennial/overview.php>.

⁷ Zuckerman, *Rewire*.

⁸ "File:Kazakhstan National Anthem 2012.ogg - Wikimedia Commons," accessed August 5, 2014, http://commons.wikimedia.org/w/index.php?title=File%3AKazakhstan_National_Anthem_2012.ogg.

love you" into 80 languages¹⁰.

While those of us with Internet access can technically connect with almost anyone, anywhere, the imaginary part of the cosmopolitanism is that we don't. As researchers like Saskia Sassen have demonstrated, the economic and cultural effects of globalization are distributed unequally across the globe and unequally even within a single city¹¹. Zuckerman argues that the globalization of material goods is different from the globalization of people, which is also different from the globalization of information and culture. As he says, we must be careful not to conflate the neoliberal structures that allow for the relatively frictionless movement of thousands of tons of bottled water from Fiji to the US with any form of increased knowledge of the culture or politics of Fiji on the part of US citizens or vice versa. Another way to put this is that economic exchange is not the same as human exchange is not the same as cultural exchange.

One of the strongest forces working against us truly being citizens of a globalized digital world is our very human tendency towards homophily. In review of the existing literature on homophily, McPherson, Smith-Lovin and Clark define homophily in the following way:

*Homophily is the principle that a contact between similar people occurs at a higher rate than among dissimilar people. The pervasive fact of homophily means that cultural, behavioral, genetic, or material information that flows through networks will tend to be localized. Homophily implies that distance in terms of social characteristics translates into network distance, the number of relationships through which a piece of information must travel to connect two individuals. It also implies that any social entity that depends to a substantial degree on networks for its transmission will tend to be localized in social space and will obey certain fundamental dynamics as it interacts with other social entities in an ecology of social forms.*¹²

Put simply, homophily is our tendency to group ourselves with people like us. When we do that en masse (which is almost always), we create social groupings of like-minded individuals in which we are less likely to encounter new information from people not like us. Homophily in the offline world is so well documented by sociologists along characteristics ranging from race and class to occupation and education that McPherson, Smith-Lovin and Clark assert that it is a basic organizing principle of human societies and groups¹³. There might even be a genetic basis for homophily. In a recent paper, Christakis and Fowler show that people tend to befriend others

⁹ "How We Made the World Hear Gaza, as Citizen Journalists | The Electronic Intifada," accessed July 14, 2014, <http://electronicintifada.net/blogs/rana-baker/how-we-made-world-hear-gaza-citizen-journalists>.

¹⁰ "Google Translate," accessed July 14, 2014, <https://translate.google.com/?ie=UTF-8&hl=en&client=tw-ob#auto/bg/i/%20love%20you>.

¹¹ Saskia Sassen, *Globalization and Its Discontents*, 1st edition (New York: New Press, The, 1998).

¹² Miller McPherson, Lynn Smith-Lovin, and James M. Cook, "BIRDS OF A FEATHER: Homophily in Social Networks," *Annual Review of Sociology* 27 (August 2001): 415.

¹³ *Ibid.*, 416.

who are genetically as similar to them as their own family members¹⁴.

What are the implications of homophily for ideological segregation, global news and the Internet?

There is conflicting literature on whether the Internet segregates people into ideological echo chambers or provides more ways to connect them across personal differences and geographies. The majority of research on homophily and online information is related to the political dimension of information. Holt claims that the Internet has reinvigorated the public sphere by increasing people's exposure to political discussions¹⁵. And people in interviews say they seek out a greater variety of sources on the Internet and for the most part enjoy encountering those with different political views from them¹⁶. Research by Brundidge¹⁷ and Wojcieszak and Mutz¹⁸ maintains that the Internet's technical and social architecture facilitates inadvertent exposure to heterogeneous networks and differing political views. Even if people were not seeking political information, they find it in forums like Reddit that combine political and non-political conversations. A 2009 study by Pew Research on Social Isolation and New Technology found that people who use the Internet, have mobile phones and go on social networking sites like Facebook actually have more diverse discussion networks than those who do not¹⁹.

These assertions are contested by numerous other authors who investigate how our tendencies towards homophily lead us to choose online information that is agreeable to us as a way of avoiding cognitive dissonance. This phenomenon is known as *selective exposure*²⁰. According to selective exposure theory, people choose information that will not pressure them to conform or challenge their worldviews²¹. Numerous researchers have put forth the view following from this theory that the Internet produces echo chambers rather than connecting us with difference²²²³²⁴²⁵. Adamic and Glance found that political blogs self-segregate by primarily

¹⁴ Nicholas A. Christakis and James H. Fowler, "Friendship and Natural Selection," *Proceedings of the National Academy of Sciences*, 2014, doi:10.1073/pnas.1400825111.

¹⁵ Richard Holt, "Dialogue on the Internet Language, Civic Identity, and Computer-Mediated Communication," 2004, <http://public.eblib.com/EBLPublic/PublicView.do?ptilID=491936>.

¹⁶ Jennifer Stromer-Galley, "Diversity of Political Conversation on the Internet: Users' Perspectives," *Journal of Computer-Mediated Communication* 8, no. 3 (2003): 0–0, doi:10.1111/j.1083-6101.2003.tb00215.x.

¹⁷ Jennifer Brundidge, "Encountering 'Difference' in the Contemporary Public Sphere: The Contribution of the Internet to the Heterogeneity of Political Discussion Networks," *Journal of Communication* 60, no. 4 (2010): 680–700.

¹⁸ Magdalena E. Wojcieszak and Diana C. Mutz, "Online Groups and Political Discourse: Do Online Discussion Spaces Facilitate Exposure to Political Disagreement?," *Journal of Communication* 59, no. 1 (March 1, 2009): 40–56, doi:10.1111/j.1460-2466.2008.01403.x.

¹⁹ Keith Hampton, "Social Isolation and New Technology," *Pew Research Center's Internet & American Life Project*, November 4, 2009, <http://www.pewinternet.org/2009/11/04/social-isolation-and-new-technology/>.

²⁰ Paul F. Lazarsfeld, Robert K. Merton, and others, "Friendship as a Social Process: A Substantive and Methodological Analysis," *Freedom and Control in Modern Society* 18, no. 1 (1954): 18–66.

²¹ Leon Festinger, "A Theory of Social Comparison Processes," *Human Relations* 7, no. 2 (May 1954): 117.

²² Cass R. Sunstein, *Republic.com* (Princeton, N.J.: Princeton University Press, 2002).

²³ David Schkade, Cass R. Sunstein, and Reid Hastie, "What Happened on Deliberation Day?," *California Law Review* 95, no. 3 (2007): pp. 915–940.

²⁴ Beth Simone Noveck, "Paradoxical Partners: Electronic Communication and Electronic Democracy," *Democratization* 7, no. 1 (2000): 18–35, doi:10.1080/13510340008403643.

linking to each other in their blog rolls²⁶. And Bimber and Davis found that visitors to the Gore and Bush websites in 2000 were in agreement with the candidate whose site they visited²⁷. Moreover, there are results that show that just encountering people with views unlike your own can actually lead to reinforcing your viewpoint rather than entertaining the viewpoint of the other person²⁸, a phenomenon known as *confirmation bias*.

With the rise of social networking sites like Facebook and Twitter in the past decade, the landscape has become even more complex and the research on ideological segregation remains contradictory, with some studies even finding support for both echo chambers and information diffusion across political lines at the same time^{29 30}. Sometimes people mistakenly infer that their friends agree with them when they actually hold different beliefs³¹ and weak online ties seem able to offer up more diversity of beliefs but are also most susceptible to being cut off during political disagreements³². In a comprehensive study³³, Gentzkow and Schapiro found that online information consumption has a higher isolation index than offline media but that it is still lower than the isolation index of newspapers, which is itself way lower than the isolation index of off-line interactions. What this means is that we have a greater chance of encountering information online representing a different view than we do in physical life, largely because the degree of isolation that people exhibit in their offline interactions is very high.

But clearly the lines between online and offline interactions blur more and more everyday. Your family and friends in real life become the people who share news with you online. To the extent that the physical and the virtual worlds are collapsing into each other through social sharing sites, mobile phones and wearable devices, we might theoretically expect Gentzkow and Schapiro's isolation index for online media to only increase as online interactions more closely merge with offline interactions, which had the highest isolation index. But other work by Mutz³⁴ suggests that people's workplaces are a source of crosscutting exposure to difference. One

²⁵ William A. Galston, "If Political Fragmentation Is the Problem, Is the Internet the Solution," *The Civic Web: Online Politics and Democratic Values*, 2003, 35–44.

²⁶ Lada A. Adamic and Natalie Glance, "The Political Blogosphere and the 2004 U.S. Election: Divided They Blog," in *Proceedings of the 3rd International Workshop on Link Discovery*, LinkKDD '05 (New York, NY, USA: ACM, 2005), 36–43, doi:10.1145/1134271.1134277.

²⁷ Bruce Allen Bimber and Richard Davis, *Campaigning Online: The Internet in US Elections* (Oxford University Press, 2003).

²⁸ Cass R. Sunstein, *Infotopia: How Many Minds Produce Knowledge / Cass R. Sunstein* (Oxford ; New York : Oxford University Press, 2006., 2006).

²⁹ Danah M. Boyd and Nicole B. Ellison, "Social Network Sites: Definition, History, and Scholarship," *Journal of Computer-Mediated Communication* 13, no. 1 (October 1, 2007): 210–30, doi:10.1111/j.1083-6101.2007.00393.x.

³⁰ Haewoon Kwak et al., "What Is Twitter, a Social Network or a News Media?," in *Proceedings of the 19th International Conference on World Wide Web, WWW '10* (New York, NY, USA: ACM, 2010), 591–600, doi:10.1145/1772690.1772751.

³¹ Sharad Goel, Winter Mason, and Duncan J. Watts, "Real and Perceived Attitude Agreement in Social Networks," *Journal of Personality and Social Psychology* 99, no. 4 (2010): 611–21, doi:10.1037/a0020697.

³² Catherine Grevet, Loren G. Terveen, and Eric Gilbert, "Managing Political Differences in Social Media," in *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing, CSCW '14* (New York, NY, USA: ACM, 2014), 1400–1408, doi:10.1145/2531602.2531676.

³³ Matthew Gentzkow and Jesse M. Shapiro, *Ideological Segregation Online and Offline*, Working Paper (National Bureau of Economic Research, April 2010), <http://www.nber.org/papers/w15916>.

³⁴ Diana C. Mutz and Jeffery J. Mondak, "The Workplace as a Context for Cross-Cutting Political Discourse," *Journal of Politics* 68, no. 1 (February 1, 2006): 140–55, doi:10.1111/j.1468-2508.2006.00376.x.

thing that is definitively clear is that more people than ever before are finding more of their news through search engines and through their friends (prompting Zuckerman to title a chapter "When What We Know Is Whom We Know"). Information discovery systems based on social media and search have become extremely important for news media, at least in the US context. 44% of Americans report discovering news via social media and 51% find news through search engines and online news aggregators³⁵.

2.3 Global News, Cultural Difference and the Internet

The studies discussed above are all related to ideological segregation online due to political views. It begs the question of how global news and geography relate to homophily in relation to online media. Do people use the Internet to connect with faraway cultures, issues and places or are they satisfied with the idea that they *could* discover that information but don't? Implicit in this question is a deeper comparative question. Did we previously know more about foreign affairs and cultures from older forms of media? Is there some kind of cosmopolitan ideal of exposure to news about other places?

Global news may mean news about places other than one's home country or news produced in countries other than one's home country. There are aspects of global news to consider from the supply side of the equation (what foreign news is available to us) and the demand side (what kinds of decisions do people make about reading international news). Regarding the former, there is more international news available to someone with Internet access than ever before in history. Newspapermap.com³⁶ and onlinenewspapers.com³⁷ have links to over ten thousand international newspaper websites organized by country and language. Similarly, one can find hundreds of live broadcast streams from many countries on Squid TV³⁸. From there I can watch Argentine cooking shows, Indonesian newscasts and European soap operas. This highlights another potential problem – the news is both more available and more avoidable than ever before.

At the same time, a clear trend in the past thirty years is a reduction in the overall amount of foreign news coverage by mainstream media organizations in the US. Partially this is structural and financial. The American Journalism Review's census shows that twenty major news organizations facing financial pressure closed their foreign bureaus between 1998 and 2011. Others have seen a significant reduction in staff³⁹. News organizations have supplemented by relying on news wires like the Associated Press for international stories, but even so a separate study conducted by AJR found that the number of foreign news stories had shrunk by 53% over twenty-five years⁴⁰. Many local and regional newspapers have cancelled their Associated Press

³⁵ "Understanding the Participatory News Consumer | Pew Research Center's Internet & American Life Project," accessed July 15, 2014, <http://www.pewinternet.org/2010/03/01/understanding-the-participatory-news-consumer/>.

³⁶ "Newspaper Map," accessed July 15, 2014, <http://newspapermap.com/>.

³⁷ "Thousands of Online Newspapers on the Web : World Newspaper Directory : Listed on OnlineNewspapers.com," accessed July 15, 2014, <http://www.onlinenewspapers.com/>.

³⁸ "Squid TV," accessed August 6, 2014, <http://watch.squidtv.net/>.

³⁹ "American Journalism Review," accessed July 15, 2014, <http://ajrarchive.org/article.asp?id=4998>.

⁴⁰ Ibid.

subscriptions in order to focus precious resources on reporting local news rather than publishing foreign news from wire services⁴¹.

There have been similar reductions in broadcast television coverage of international news. In *All the News That's Fit to Sell*, James Hamilton shows how international news coverage prior to 1984 was linked to station license renewal⁴². Munson et al. review research on how broadcast media policy in the US mitigated the effects of selective exposure for the late 20th century; "a large portion of the news audience received these reasonably balanced broadcasts simply by leaving the television on after a favorite program, the so-called inadvertent audience"⁴³. Once that regulation was removed, news programs moved away from news about legislation and foreign affairs to focus more on "soft" news that garnered more attention from audiences and more advertising revenue. Alisa Miller, a journalism scholar and president of Public Radio International, estimates that international broadcast coverage dropped from 45% of total coverage in the mid-1970's to 10% today⁴⁴.

The changes in the availability of foreign news from mainstream media organizations have to do with the proliferating array of choices in the media landscape more generally. The supply side of the news influences consumer choice on the demand side. As Herbert Simon argued in his prescient 1966 essay, "A wealth of information creates a scarcity of attention"⁴⁵. In a world of hundreds of cable channels, free news dailies, and increasingly personalized websites and apps, how do people fulfill their information needs? Markus Prior argues convincingly that the current "high-choice media environment" leads a small group of people to consume more news and a large group of people to consume less news and more entertainment, leading to informational inequality⁴⁶. In *Rewire*, Zuckerman presents an analysis of Internet traffic that shows that over 93% of the site visits in the top ten nations in the world are to domestic sites. Said otherwise, "none of the top ten nations in the world looks at more than 7 percent international content in its fifty most popular news sites."⁴⁷ And Pew surveys show that Americans want more state and local news rather than international coverage⁴⁸.

In the decades of lower-choice media environments, we had guides in the form of newsroom editors who functioned as expert curators of the top issues of the day. The front page of the paper and the nightly news broadcast were limited in form, by which I mean constrained

⁴¹ "How One Newspaper Is Adjusting to Life without the Associated Press," accessed July 30, 2014, <http://www.niemanlab.org/2009/03/how-one-newspaper-is-adjusting-to-life-without-the-associated-press/>.

⁴² James Hamilton, *All the News That's Fit to Sell: How the Market Transforms Information into News* / James T. Hamilton (Princeton, N.J.: Princeton University Press, 2004., 2004).

⁴³ Sean A Munson, Stephanie Y Lee, and Paul Resnick, "Encouraging Reading of Diverse Political Viewpoints with a Browser Widget.," in *ICWSM*, 2013, 4.

⁴⁴ Zuckerman, *Rewire*, 59.

⁴⁵ Herbert A. Simon, "Designing Organizations for an Information-Rich World," in *The Economics of Communication and Information*, ed. Donald M. Lambertson (Elgar Reference Collection. International Library of Critical Writings in Economics, vol. 70., 1996), 187-202.

⁴⁶ Markus Prior, *Post-Broadcast Democracy: How Media Choice Increases Inequality in Political Involvement and Polarizes Elections* / Markus Prior, Cambridge Studies in Public Opinion and Political Psychology (New York: Cambridge University Press, 2007., 2007).

⁴⁷ Zuckerman, *Rewire*, 56.

⁴⁸ "Understanding the Participatory News Consumer | Pew Research Center's Internet & American Life Project."

spatially to a certain number of articles or temporally to a certain duration in time. By highlighting certain stories within these forms, editors guided public attention to them and wielded significant influence over public discourse.

But does having more “hard news” about foreign affairs served up by editors at mainstream news organizations actually mean that people knew more about other countries or were exposed to more cultural differences? As Samuel Popkin states, “The sexist connotations of ‘hard’ and ‘soft’ news reflect the Washington perspective of politicians and regulators (beltway oriented, mostly male) whose political interests were catered to before deregulation.”⁴⁹ If our interest is in connecting people across cultural differences and cultivating global citizenship, it begs the question, which global news is the right choice for that? Is it the stories about war, nation-states and multinational corporate mergers that we used to have on the front pages back in the bad old days? Or might that information be something else entirely?

These days, editors and other curators may still direct our attention, but so do numerous algorithms, personalized feeds, search engines, friends and recommendation systems. In the new media attention economy, the work of gatekeeping and agenda setting may or may not have been “democratized” but it is at the very least increasingly distributed across multiple platforms, people and algorithms. While prior incarnations of news editors may have seen the curatorial work they did as serving a public function, it is debatable to what degree the new agenda-setters (including one’s own self as a gatekeeper and selector of information) see their work as public service or having goals beyond individual satisfaction. Indeed, many of the technologies that most enable our informational selves (powerful search algorithms like Google, social sharing sites like Facebook and recommendation systems like Amazon) are the ones that can reinforce our homophily by giving us what we want, what our friends want, and what people like us want.

This is possibly an even bigger and more philosophical question: What is news media for? What could it be for? And for whom? While addressing the theoretical nature of this question is outside of the scope of this document, Terra Incognita is designed with the idea in mind that, among other applications and purposes that it serves, global news can serve to connect people across national and cultural borders, cultivate transnational sentiments of belonging, and help people emotionally and ethically reconcile the contradictory and uneven nature of the globalizing world and their place in it. Why? First, Americans are already deeply globally interconnected through everyday things like toothbrushes, tomatoes and cell phones that travel staggering distances to reach their homes. These are the “atoms” that Zuckerman speaks of, and yet we teeth-brushers know little about our implements’ origins and material histories. But by purchasing products we are implicated in the complex web of economic, historical and social relations of the globalized toothbrush (or T-shirt, as was the subject of an excellent story by Planet Money⁵⁰). Secondly, there are an increasing number of urgent issues ranging from climate change to arms control to women’s rights to inequality that either transcend the

⁴⁹ Samuel L. Popkin, “Changing Media, Changing Politics,” *Perspectives on Politics*, 2006.

⁵⁰ “Planet Money Makes A T-Shirt,” accessed August 4, 2014, <http://apps.npr.org/tshirt/#/title>.

boundaries of nation-states or that national governments have failed to address. Since the emergence of the Internet there have been reinvigorated public conversations around transnational forms of citizenship and civic engagement⁵¹. The emergence of transnational and "translocal"⁵² forms of belonging in combination with the information communication technologies that support their formation provide a potentially successful avenue to address complex, global issues that stagnate at the level of national and international institutions.

But what does transnational or post-nation-state citizenship look like? What does its civics curriculum look like? This question is beyond the scope of my thesis but requires further investigation and articulation, particularly if we want to build technologies to support its formation. At the very least, cultivating global citizens and transnational problem-solvers will require first engineering two things: a sense of connection to the larger world and the curiosity to explore it.

2.4 Engineering Serendipity

At the end of *Rewire*, Ethan Zuckerman calls for "engineering serendipity", an intriguing and poetic concept:

In the next ten years, I expect that tools that enable serendipity, that help us stumble on unexpected and helpful information, will become as important a utility as search engines and social networks are today. [...] There is vast work to be done in this space, whether it involves building tools that help readers and researchers see what they're missing or helping curators lead people into unfamiliar neighborhoods and weird parts of the Internet. Needed are both technological breakthroughs and new ways of approaching the problems of exploration and discovery. Better systems to visualize what we have already encountered are crucial, but so are tools that help us find translators and bridge figures who can contextualize what we are finding. Our first steps to designing for serendipity start with realizing that the ability to make novel connections is a new form of power.⁵³

For Zuckerman, engineering serendipity is one possible way to counteract our tendencies towards homophily and embrace a world that has already globalized in so many other ways. In this section, I want to briefly lay the groundwork for a common understanding of what serendipity might mean in relationship to information discovery and how we might go about engineering such a slippery, human thing.

Robert K. Merton with Elinor Barber wrote the key social history of the word "serendipity"⁵⁴, a neologism coined by British aristocrat Horace Walpole in 1754 in his letter to Horace Mann.

⁵¹ Saskia Sassen, "Towards Post-National and Denationalized Citizenship," *Handbook of Citizenship Studies*, 2002, 277–92.

⁵² Arjun Appadurai, *Modernity At Large: Cultural Dimensions of Globalization* (U of Minnesota Press, 1996).

⁵³ Zuckerman, *Rewire*, 245.

⁵⁴ Robert King Merton and Elinor G. Barber, *The Travels and Adventures of Serendipity: A Study in Sociological Semantics and the Sociology of Science / Robert K. Merton, Elinor Barber* (Princeton, N.J.: Princeton University Press, c2004., 2004).

While its common usage has the meaning "happy accident", Merton, Zuckerman and others point out that this definition neglects some crucial parts of the definition that make serendipity possible. Walpole was originally recounting the Persian fairy tale of the three princes of Serendip who were "always making discoveries, by accidents and sagacity, of things they were not in quest of"⁵⁵. The princes were turned out of their home kingdom by their father, the King, who instructed them to discover the customs and manners of every nation. The three fellows were rather like latter-day Sherlock Holmeses. By their powers of keen observation they were able to make uncanny discoveries that helped people, for example, find a lost camel led by a pregnant woman by piecing together shrewd observations such as footprints, chewed grass and spilled cargo. Merton extended this concept into the realm of science and detailed numerous scientific discoveries made by a combination of exploring, seeking and sagacity.

The parts of serendipity that have been neglected in common parlance have to do with the "sagacity" part and the idea that one might be able to prepare for serendipitous discovery. Merton notes that serendipity refers to "observing an unanticipated, anomalous and strategic datum which becomes the occasion for developing a new theory or for extending an existing theory."⁵⁶ By "strategic", he is referring to what the observer brings to the observation rather than the observation itself. Making a serendipitous discovery requires a "theoretically sensitized observer" (Merton) or a "prepared mind" (Louis Pasteur) that is open to new information and able to assimilate it.

But how would we go about designing for this particular happy meeting of prepared mind with fortuitous universe, particularly when we must design for a chance encounter that we cannot foresee in advance? Pek Van Andel, a philosopher of science, has a remarkable paper "Anatomy of Serendipity"⁵⁷ that extends Merton's research and explores the domains and appearances of serendipity. Notably, Van Andel compiles a list of seventeen "serendipity patterns" which detail ways that unsought findings have been made. These patterns include entries such as "analogy", "successful error", and "joke" among others. At the end of the paper, he briefly explores the idea of algorithmically generated serendipity and concludes that "pure serendipity is not amenable to generation by a computer"⁵⁸.

Andel's view might hold true if we were imagining that computation could only create abstracted representations of the world (rather like Plato's cave). If we looked at some of the experiments in recommender systems out of computer science and applied math we might be inclined to agree with him. Many of these systems define serendipity as something pleasing but unexpected⁵⁹ and focus on computational algorithms but not on engineering the social,

⁵⁵ Zuckerman, *Rewire*, 216.

⁵⁶ Merton and Barber, *The Travels and Adventures of Serendipity*.

⁵⁷ P Vanandel, "Anatomy of the Unsought Finding - Serendipity - Origin, History, Domains, Traditions, Appearances, Patterns and Programmability," *BRITISH JOURNAL FOR THE PHILOSOPHY OF SCIENCE* 45, no. 2 (June 1994): 631-48.

⁵⁸ *Ibid.*, 646.

⁵⁹ Zhibo Xiao et al., "Increasing Serendipity of Recommender System with Ranking Topic Model," *Applied Mathematics & Information Sciences* 8, no. 4 (July 2014): 2041-53, doi:10.12785/amis/080463.

emotional and aesthetic conditions in which a human might encounter and pay attention to such information. Which is to say that they attempt to produce happy accidents while ignoring how we might go about cultivating prepared minds. The problem is not just about giving people better data but about providing an environment in which they are more open to discovery.

There are approaches to borrow from the arts. Artists practicing in genres like relational aesthetics and social practice art have explored the difference between creating an object (delivering a piece of information) versus creating a situation (engineering an experience). There is a rich tradition of using chance methods for creativity and discovery in art history including Surrealist techniques like automatic writing⁶¹ and John Cage's chance operations⁶². The emerging tradition of experiential, non-representational art⁶³, consciously constructs theatrical situations in order to produce aesthetic experience. Perhaps information technology could co-conspire in a similar way with human situations to make the conditions right for serendipity?

Indeed, research in serendipity and information theory conducted by the SerenA research group has found that there are attitudes and habits of mind that can increase the likelihood of serendipitous discovery. These include (1) varying routines, (2) being observant, (3) making mental space, (4) relaxing boundaries, (5) drawing on previous experiences, (6) looking for patterns and (7) seizing opportunities⁶⁴. In another workshop, the team came up with a "Swiss Cheese Model" of serendipity that outlined the need for the right internal and external conditions such as lack of time pressure, an open mind, and implicit awareness of need/opportunity⁶⁵. Serendipity might occur if an experience is able to pass through layers of potential barriers (i.e. make it through the holes in the Swiss cheese).

Likewise, there is a growing literature in Library and Information Science on serendipity through everyday "information encountering"⁶⁶ rather than as a breakthrough scientific discovery. Research results from Ruben, Burquell and Quan-Hase suggest that there is an opportunity for technological intervention in the act of noticing⁶⁷. They studied serendipitous encounters through everyday information behaviors like browsing blogs and found that information systems can help users shift their attention to noticing information that might have previously been in the

⁶⁰ Mouzhi Ge, Carla Delgado-Battenfeld, and Dietmar Jannach, "Beyond Accuracy: Evaluating Recommender Systems by Coverage and Serendipity," in *Proceedings of the Fourth ACM Conference on Recommender Systems, RecSys '10* (New York, NY, USA: ACM, 2010), 257–60, doi:10.1145/1864708.1864761.

⁶¹ "Category:Surrealist Techniques - Wikipedia, the Free Encyclopedia," accessed July 15, 2014, http://en.wikipedia.org/wiki/Category:Surrealist_techniques.

⁶² Marjorie Perloff, *Radical Artifice: Writing Poetry in the Age of Media / Marjorie Perloff* (Chicago: University of Chicago Press, 1991., 1991), 20–28.

⁶³ Claire. Doherty, *Contemporary Art: From Studio to Situation* (London: Black Dog Pub., 2004).

⁶⁴ "Serendipity Salon Workshop at Future Everything. 21st March, 2013 | SerenA," accessed July 15, 2014, <http://www.serenA.ac.uk/2013/03/serendipity-salon-workshop-at-future-everything-21st-march-2013/>.

⁶⁵ Sean Burns Carol Smith, "The First International Workshop on Opportunistic Discovery of Information," text, accessed July 3, 2014, <http://www.informationr.net/ir/16-3/paper490.html>.

⁶⁶ Sanda Erdelez, "Information Encountering: An Exploration beyond Information Seeking," *iSchool Information Science and Technology - Dissertations*, January 1, 1995, http://surface.syr.edu/it_etd/38.

⁶⁷ Jacquelyn Burkell Victoria L. Rubin, "Facets of Serendipity in Everyday Chance Encounters: A Grounded Theory Approach to Blog Analysis," text, accessed July 3, 2014, <http://www.informationr.net/ir/16-3/paper488.html>.

background of their informational task at hand. In a digital environment, serendipity might need to come through these purposeful and directed shifts in focus. In 2004, Erdelez developed an "information encountering model" which describes how users switch from a foreground task to a background interest when they encounter information⁶⁸. Serendipity in a digital environment was the area of focus for Volume 16 of the *Information Research Journal*⁶⁹. While there are as-yet no clear-cut design guidelines for engineering serendipity in an everyday digital environment, there is significant work being done in this space.

3 Prior Work

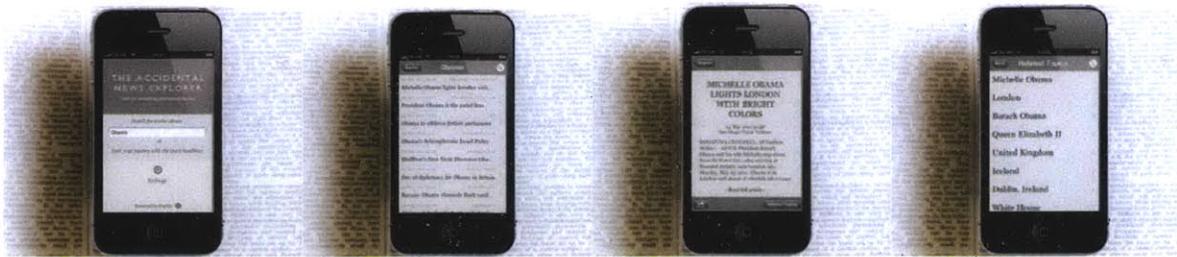
In the design of Terra Incognita, I am bringing together three fields of design and have divided this chapter on prior work accordingly. The first is comprised of the many experiments in serendipitous discovery and wandering that exist in relation to information discovery on the Internet. The second is the emerging field of personal informatics, which is comprised of technologies that help facilitate self-discovery and self-understanding. Finally, there is a body of work in persuasive technologies that seek to "nudge" people towards discovering and reading more diverse, more balanced, or at least less biased information. In this chapter I will discuss prior work in each of these categories and show how Terra Incognita is making a unique contribution by leveraging strategies of surprise and chance to shift users towards reading more geographically diverse news media.

3.1 Serendipitous Online Information Discovery

There is no shortage in the number of online news discovery tools on a variety of devices available today. These come from a variety of different sources, including artists, coders, newsrooms, start-up companies, and academic research. I have classified them into the categories of (1) Novel News Delivery: New ways of communicating news stories to readers through apps, aggregators and algorithms, (2) Conceptual Experiments: Projects that posit an alternate way to browse or search for information in order to make a point, (3) Wide Spectrum/Narrow Format: Information whose form of delivery is simple and regular (such as a daily email) but whose range of topics is much wider than usual, and (4) Serendipity Through Participatory Voices: Services that redistribute the responsibility of curation in order to introduce novelty and variation in online information systems.

⁶⁸ Sanda Erdelez, "Investigation of Information Encountering in the Controlled Research Environment," *Information Processing & Management* 40, no. 6 (November 2004): 1013–25, doi:10.1016/j.ipm.2004.02.002.

⁶⁹ "Information Research - Contents - Vol. 16 No. 3," accessed August 7, 2014, <http://www.informationr.net/ir/16-3/infres163.html>.



The *Accidental News Explorer* app uses search and topic browsing to encourage users wander through the news. Images from <http://accidentalnewsexplorer.com/>.

3.1.1 Novel News Delivery

There are numerous apps and sites that experiment with novel news delivery. First of all, we can look back to the pre-Internet ways of delivering the news. For example, in his response to Stan Alcorn's article "Why Audio Never Goes Viral"⁷⁰, Ethan Zuckerman posited that radio is potentially the most serendipitous medium because people are generally doing something else while listening and they do not have many other choices⁷¹. So, decreasing options for users to select information they know they want may actually increase the chances for serendipitous encounter.

And in an overloaded infosphere, news organizations are experimenting with apps that put a premium on brevity, context and tight curation like Yahoo! News Digest⁷² and NYT Now⁷³. The path to serendipity in this case is as it was previously - a professional editor, working with an algorithm, curates the most important things of the day for you. You might see articles about Neymar's back injury next to articles about the insurgency in Iraq. In this case, the professionals have the help of algorithms to surface and summarize content and multimedia to provide context but it's an interesting return to the model of media as shared experience; everyone sees the same thing. This even becomes a selling point. Yahoo News Digest's stated goal is "to make sure you're always in the know"⁷⁴, which implies that it might be socially important to be aware of the top news stories that others will be talking about. This is an overlooked feature of Nicolas Negroponte's famous "Daily Me" proposal. The personalized newspaper was only to be personalized on weekdays. On the weekends, it was to be titled the "Daily Us" and was imagined as unpersonalized content that would give readers common ground⁷⁵.

Other novel news delivery mechanisms are predicated on chance encounters like the Accidental

⁷⁰ "Why Audio Never Goes Viral," accessed August 7, 2014, <http://digg.com/originals/why-audio-never-goes-viral>.

⁷¹ "Audio Never Goes Viral'... and Maybe That's a Good Thing | ... My Heart's in Accra," accessed August 7, 2014, <http://www.ethanzuckerman.com/blog/2014/01/21/audio-never-goes-viral-and-maybe-thats-a-good-thing/>.

⁷² "Yahoo News Digest on the App Store on iTunes," accessed July 5, 2014, <https://itunes.apple.com/us/app/yahoo-news-digest/id784982356?mt=8>.

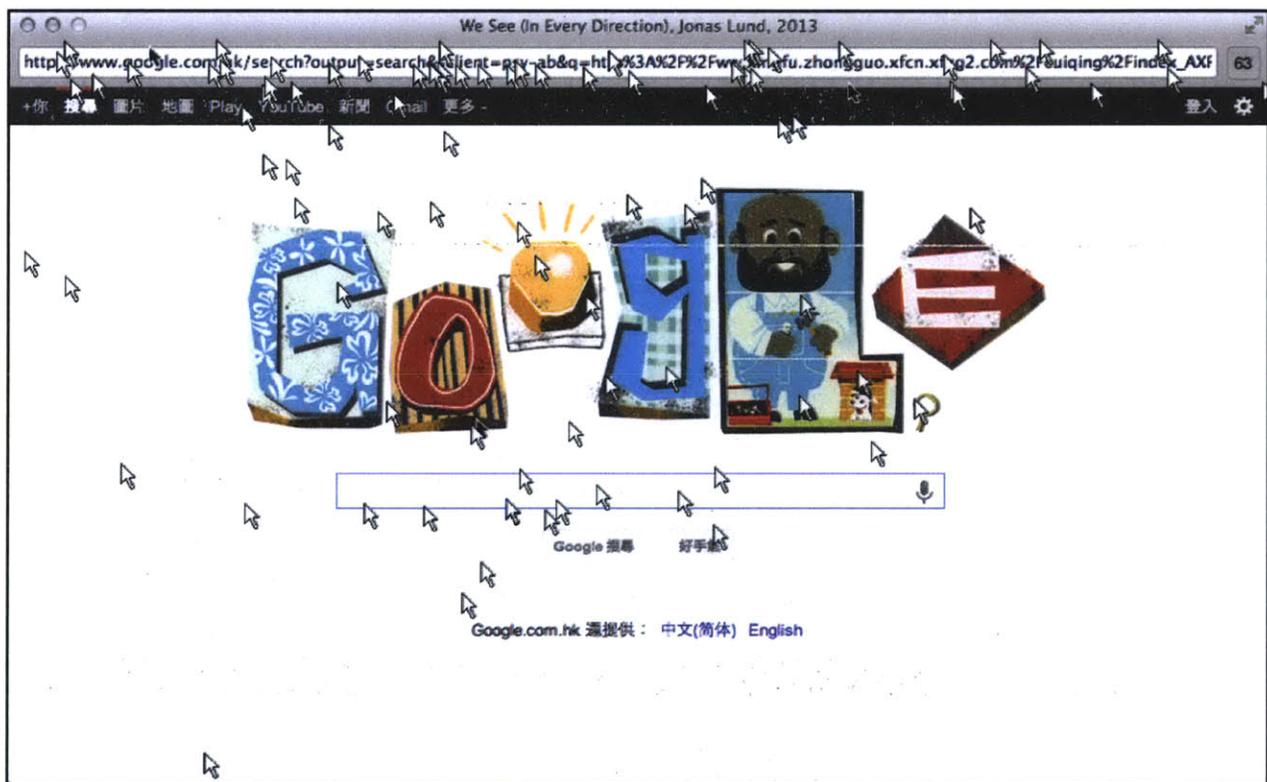
⁷³ "NYT Now from The New York Times," accessed August 7, 2014, <http://www.nytimes.com/subscriptions/Multiproduct/lp864JJ.html>.

⁷⁴ "Yahoo News Digest: Get In The Know In No Time," *Yahoo*, accessed July 30, 2014, <http://yahoo.tumblr.com/post/72587474725/yahoo-news-digest-get-in-the-know-in-no-time>.

⁷⁵ Nicholas Negroponte, *Being Digital*, 1 edition (New York: Vintage, 1996), 154.

News Explorer app⁷⁶, which uses a combination of search and topic browsing to lead the user to new destinations. Umano⁷⁷ is a mobile and tablet app that combines some personalization (tracking a user's past reads in the system) with the idea of listening to articles read aloud. Narrators from the community submit news articles they have read aloud which are then recommended to other users for listening. News aggregation apps like Feedly⁷⁸, Facebook Paper⁷⁹ and Flipboard⁸⁰ are pushing the visual dimension of news reading, providing a lush (but low-commitment, since you can always swipe to the next article) magazine-style interface to the news.

These novel news delivery mechanisms represent some interesting paths news innovators are taking towards capturing and retaining users' attention.



Jonas Lund, *We See In Every Direction* web browser, 2013

3.1.2 Conceptual Experiments

⁷⁶ "The Accidental News Explorer - a News Discovery App for iPhone," accessed July 5, 2014, <http://accidentalnewsexplorer.com/>.

⁷⁷ "Umano," accessed July 5, 2014, <https://umanoapp.com/>.

⁷⁸ "Feedly," *Wikipedia, the Free Encyclopedia*, August 6, 2014, <http://en.wikipedia.org/w/index.php?title=Feedly&oldid=616387684>.

⁷⁹ "Facebook Paper," *Wikipedia, the Free Encyclopedia*, July 9, 2014, http://en.wikipedia.org/w/index.php?title=Facebook_Paper&oldid=612581597.

⁸⁰ "Flipboard," *Wikipedia, the Free Encyclopedia*, August 6, 2014, <http://en.wikipedia.org/w/index.php?title=Flipboard&oldid=615248287>.

There are conceptual experiments that posit alternative ways to browse and search for information. In general, these experiments are not meant for widespread adoption but serve to make a point or suggest a different way of discovering information. For example, *We See in Every Direction*⁸¹ is a collaborative web browser by artist Jonas Lund that allows any number of users into a single browser window. You see potentially thousands of cursors at the same time and have to deal with many users negotiating which links to click on and what to type in the browser bar. Variations on this idea of simultaneous collective browsing have come out of the Boston Globe⁸² and New York Times⁸³ newsrooms. *News Intermix*⁸⁴, inspired by Zuckerman's book *Rewire*, is a browser extension that will periodically redirect your browser away from your most visited news sites and towards a set of 900 sites that are more global. If I have visited nytimes.com too much, *News Intermix* automatically redirects me to <http://www.kashmirnewz.com/>, a site run by five independent journalists that has English-language news stories about the disputed region of Kashmir. The redirection happens at a rate that the user decides, but even when you have chosen to be redirected it is quite surprising and unexpected in the moment. Other projects have a humorous take. *Automatic Browser*⁸⁵, a Chrome extension by artist Brian House, observes your web browsing and then eventually takes over your browser for you. It tells you to "Sit back and relax" while the extension goes to the sites you normally go to. And finally, there are numerous examples of alternate search sites like the glorious bananaslug.com⁸⁶, a "Long-Tail Search Engine" which adds a random word to your Google search, or *million short*⁸⁷ which removes the million most popular websites from your search results.

While most of these sites and tools are not meant for daily use, they serve the important purpose of pointing out overlooked aspects of the discovery of information in everyday life or reflecting on one's routines and habits. They lead us to provocative questions like "Why isn't our web more collaborative?" "What sites surface once we remove the most popular from our search results?", "Am I so predictable that an algorithm could do my browsing?" These experiments use chance, intervention and alternative algorithms to increase the likelihood that we will find information we are not seeking. They use lightness, surprise and humor to increase the likelihood that we will pay attention to it.

⁸¹ "Jonas Lund - We See In Every Direction, a Synchronized Browser," accessed July 3, 2014, <http://jonaslund.biz/works/we-see-in-every-direction/>.

⁸² "GlobeLab: SHIM," accessed July 5, 2014, <http://lab.bostonglobe.com/2011/04/shim.html>.

⁸³ "The New York Times' R&D Lab Is Building a Quantified-Self, Semantic-Analysis Tool to Track Web Browsing," *Nieman Journalism Lab*, accessed January 15, 2014, <http://www.niemanlab.org/2014/01/the-new-york-times-rd-lab-is-building-a-quantified-self-semantic-analysis-tool-to-track-web-browsing/>.

⁸⁴ "News Intermix | West Space Journal," accessed July 3, 2014, <http://westspacejournal.org.au/article/winter-2013/news-intermix/>.

⁸⁵ "Brian House | Automatic Browser," accessed July 3, 2014, http://brianhouse.net/works/automatic_browser/.

⁸⁶ "BananaSlug - Long Tail Search Engine," accessed July 3, 2014, <http://bananaslug.com/>.

⁸⁷ "MillionShort," accessed July 3, 2014, <http://millionshort.com/index.html>.



www.stumbleupon.com gives the user a large header bar at the top of the page where she can "stumble" to the next website.

3.1.3 Wide Spectrum/Narrow Format

Other approaches to serendipitous discovery standardize and simplify the form of information presentation while simultaneously widening the spectrum of topics that appear in that form in order to lower barriers to entry for encountering new topics. The website and social network StumbleUpon⁸⁸, for example, presents the user with a large black header bar across the top of the page. While the system chooses what website might appear below the header, the header bar and large red button standardize the experience and shift the user into clicking through websites ("stumbling") in an experience similar to a slide show. While the range of information the system offers you might be quite broad, the standardized header gives it a common format and an easy out to see if the next "find" is better. To curate its recommendations, the site combines user-specified topic preferences, collaborative filtering (thumbs-up and thumbs-down voting combined with machine learning) and social (following other SU users) curation. In 2007, StumbleUpon introduced the "StumbleThru" service whereby you can limit your stumbles to a particular domain. News sites you can stumble through include the BBC, the Financial Times, the New York Times and Yahoo! News.

LongReads is a website⁸⁹ and a hashtag (#longreads) where editors and readers share high-quality, long-form journalistic storytelling about any topic. The editors of the site curate the top five long reads each week and present them with their word count and expected reading time.

⁸⁸ "StumbleUpon," *Wikipedia, the Free Encyclopedia*, July 24, 2014, <http://en.wikipedia.org/w/index.php?title=StumbleUpon&oldid=616750541>.

⁸⁹ "Longreads: The Best Long-Form Stories on the Web," accessed July 4, 2014, <http://www.longreads.com/about/>.

This week's stories all clock in at more than ten minutes but range in topic from an in-depth portrait of the trapped Chilean miners to a tour of books authored by ex-lovers of rock stars.

Similarly, delanceyplace⁹⁰ and Alexis Madrigal's Five Intriguing Things⁹¹ are services that offer a narrow, standard experience in the format of a daily email. For the latter, Madrigal, who is the deputy editor of *The Atlantic*, curates a daily list of five interesting links which might be on any topic loosely related to science, technology and the future. A recent edition included a personal warning about image-recognition technologies, an essay on where your childhood memories go and an interview by the BBC with primatologist Frans de Waal.

These sites and services approach serendipity by widening the spectrum of relevant information. They are predicated on the idea that people want to see information that they are not seeking and use various curatorial strategies to locate their content. But they mitigate the risk of disorienting users with new information by narrowing the format of information presentation and, in cases like #longreads and Five Intriguing Things, maintain a focus on very high quality, human-curated information. In these cases the form of delivery – header bar with big red button, hashtag, or email – becomes standard and predictable for the user while the content varies across a very wide spectrum. The organizing feature of these services is the form of information presentation rather than the topical content of the information.



20 Day Stranger is an app by the Playful Systems group at the MIT Media Lab that connects you to an anonymous person's everyday life for 20 days. Image from 20daystranger.com.

3.1.4 Serendipity Through Participatory Voices

⁹⁰ "About Us | Eclectic Excerpts Delivered to Your Email Every Day from Editor Richard Vague | www.delanceyplace.com," accessed August 7, 2014, http://www.delanceyplace.com/dp_about.php.

⁹¹ "5 Intriguing Things by Alexis Madrigal," accessed August 4, 2014, <http://tinyletter.com/intriguingthings>.

Other services reconfigure or redistribute the responsibility of curation in order to introduce novelty and variation in online information systems. This is the logic behind the The Listserve⁹², an email lottery system and list created out of the Interactive Telecommunications program at NYU in 2012. The ListServe gives one person a day the opportunity to broadcast to the email list. If your email address gets chosen, you have three days to craft a message to 24,562⁹³ potential listeners. People send poems, recipes, simple greetings, project promotions and news items.

The government of Sweden took a similar approach with their official twitter account. In a program titled "Curators of Sweden"⁹⁴ launched in December 2011, the government began handing over the twitter handle @sweden to a different Swede each week. Someone else must nominate you and, if chosen, each citizen has seven days to tweet as Sweden. The idea behind the program is that individual voices would curate the web differently and collectively provide a portrait of Sweden "different to that usually obtained through traditional media."

Finally, there are more experimental projects like the mobile app 20 Day Stranger⁹⁵ (out of the Playful Systems group at the MIT Media Lab) that create chance connections between individuals that are not part of each other's social networks. When you download 20 Day Stranger you are connected to a stranger in a different location. It is not ChatRoulette⁹⁶ – you never know the stranger's name or speak to them directly. You do see what they do and how they move through their day based on the data points that they leave over GoogleMaps, Foursquare and Instagram.

In these applications and other experiments in participatory archives (61Fresh⁹⁷, 18 Days in Egypt⁹⁸), the potential for serendipitous encounter is heightened by the widened spectrum of voices participating in the conversation and through the structures of chance (lottery, stranger-matching) introduced by the systems. And in an increasingly corporatized web filled with brands and bots⁹⁹, each of these systems is also predicated on the idea of listening to the individual voices of "real people". Chance, participation and human voices are used hand-in-hand to drive desire, curiosity and encounters with new information.

3.2 Personal Informatics

For the second group of prior work, I will discuss several applications in the emerging field of personal informatics, which Li, Dey and Forlizzi define as systems that "help people collect

⁹² "The Listserve," accessed July 4, 2014, <http://thelistserve.com/>.

⁹³ The Listserve's number of subscribers as of July 4th, 2014

⁹⁴ "About - Curators of Sweden," accessed July 5, 2014, <http://curatorsofsweden.com/about/>.

⁹⁵ "20 Day Stranger," accessed July 4, 2014, <http://www.20daystranger.com/>.

⁹⁶ "Chatroulette," *Wikipedia, the Free Encyclopedia*, July 27, 2014,

<http://en.wikipedia.org/w/index.php?title=Chatroulette&oldid=618635573>.

⁹⁷ "61FRESH - About," accessed August 7, 2014, <http://61fresh.com/about.html>.

⁹⁸ "#18DaysInEgypt," *18DaysInEgypt.com*, accessed August 7, 2014, <http://beta.18daysinegypt.com/>.

⁹⁹ Alexis C. Madrigal, "Welcome to the Internet of Thingies: 61.5% of Web Traffic Is Not Human," *The Atlantic*, December 12, 2013, <http://www.theatlantic.com/technology/archive/2013/12/welcome-to-the-internet-of-thingies-615-of-web-traffic-is-not-human/282309/>.

personally relevant information for the purpose of self-reflection and gaining self-knowledge.”¹⁰⁰ Other terms used to describe such systems and the movement to use them include “quantified self”, “personal analytics” and “self-tracking”. People track many kinds of personal information such as physical activity, food, glucose levels or even sneezes. While there are a proliferation of apps and platforms that support collecting health and activity-related personal data, I will focus on applications that collect personal data about media consumption. While personal media data is widely available in the form of browser history, Twitter followers and Facebook friends, there are not many applications that help people systematically track aspects of their informational habits.

The screenshot shows the RescueTime dashboard in a Mozilla Firefox browser window. The dashboard displays a calendar for Jan 27 - Feb 02, 2008, and a summary of time spent (34h 28m total). Key features and annotations include:

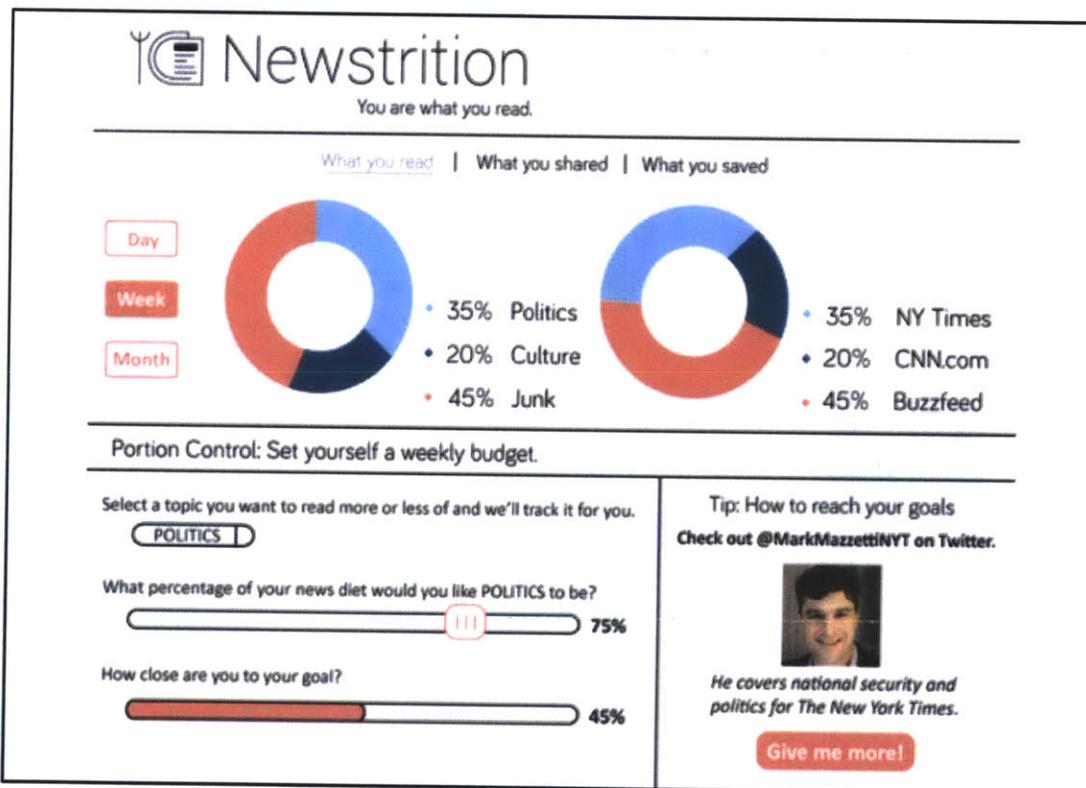
- Efficiency Score:** A horizontal bar chart showing an efficiency score of 1.49, compared to an average user score of 0.9. Annotation: "At-a-glance score of your efficiency compared to the entire userbase".
- Total Time Logged:** A section reporting "Yours: 1.49 over 34h 28m" vs "Avg. User: 0.9 over 23h 40m". Annotation: "Total time logged is reported here, sliceable by category or tag to give you a quick breakdown".
- Time Spent (34h 28m):** A stacked bar chart showing time spent by category (work, personal, Everything Else). Annotation: "You can set goals and track them with optional alerts via email or even SMS!".
- Your Goals:** A section for setting goals, such as "5h of work per weekday" and "< 1h of personal per weekday".
- Top Categories:** A bar chart showing the top categories of time spent, such as "Gmail (Gmail)", "News (Gmail)", and "Internet Productivity". Annotation: "RescueTime assigns categories to apps and sites to give a clear breakdown of activities".
- Top 10 Tags:** A bar chart showing the top 10 tags used for organizing data.
- Apps & Sites:** A bar chart showing the top apps and sites used, such as "mail.google.com" and "news.google.com". Annotation: "You can tag apps and sites to organize the data your way".
- Calendar Controls:** A calendar view at the top right. Annotation: "Easy calendar controls. View by day, week, month & more".
- Filtering:** A "Filter By:" section with options for "Work", "Work Days", and "Weekends". Annotation: "Filter the data you see for weekdays 9-5, just weekends, or build your own filters!".
- Long Tail:** A "Top 10" bar chart at the bottom showing the distribution of time spent across many apps and sites. Annotation: "See the 'long tail' of how you spend your time".

RescueTime, a personal time tracking software package. Image from <http://www.fredrkl.com/wp->

¹⁰⁰ Ian Li, Anind Dey, and Jodi Forlizzi, "A Stage-Based Model of Personal Informatics Systems," *Proceedings of the 28th International Conference: Human Factors in Computing Systems*, April 10, 2010, 557.

content/uploads/2013/09/rescuetime_dashboard.jpg.

RescueTime is one widely available consumer product for personal media tracking. A user can install RescueTime across multiple devices and it tracks the time she spends on particular websites, email, social media, and applications. It publishes detailed graphs and charts, which are oriented around productivity and efficiency. RescueTime will make its best guess at which apps and sites fit in which categories and whether those are productive or not for the end user. In the literature on personal informatics, this is called “objective monitoring.” The user can set goals and then view her progress at meeting those goals, which is referred to as “self-monitoring”. There is also an incentive dimension to the system in which the user sees her efficiency index as compared with other users in the system that provides a descriptive norm.



Newstrition is a prototype for a browser extension that tracks what you read, allows you to set topic goals and shows you your progress towards those goals. Image from <http://hackingjournalism.challengepost.com/submissions/24270-newstrition>.

While RescueTime is oriented around effective personal time management, there are several prototypes for applications specifically geared towards monitoring personal news consumption. Both Newstrition¹⁰¹ and Slimformation¹⁰² are browser extension widgets that use nutritional

¹⁰¹ "Newstrition," *Hacking Journalism*, accessed July 10, 2014, <http://hackingjournalism.challengepost.com/submissions/24270>.

¹⁰² "Slimformation," accessed July 10, 2014, <http://slimformation.knightlab.com/>.

metaphors and classify personal media consumption based on diversity of sources, reading level and topic (including a "junk" category in Newstrition). Both applications use the tagline "You are what you read." Like RescueTime, they promise to give readers insight into their behaviors, help them set reading goals for a "balanced diet" and show them visual feedback as users make progress towards their goals.

Since RescueTime is a consumer application and Newstrition and Slimformation are prototypes in development there is little data available to gauge who uses these applications and what the effects, if any, are on user populations. The latter two applications' incorporation of goal setting functionality also takes us closer to our third category of prior work, "Nudge" applications.

3.3 "Nudge" Applications

"Nudge" is a term from the eponymous book by Cass Sunstein and Richard Thaler¹⁰³. They coined the term to describe the ways in which choices can be subtly restructured to nudge people towards healthier, pro-social, or otherwise better behaviors. This body of work can be seen as related to "Persuasive Technology" – technology that is purposefully designed to influence the behaviors and attitudes of its users¹⁰⁴ – but also takes into account the role of policy. It uses methods of personal data collection and reflection from personal informatics along with techniques of goal setting and norm communication to nudge users to shift their behaviors in areas such as health, personal finance, electricity consumption, driving behavior, cooking and, increasingly, media consumption patterns. Some nudges and persuasive systems also rely extensively on people's cognitive biases.

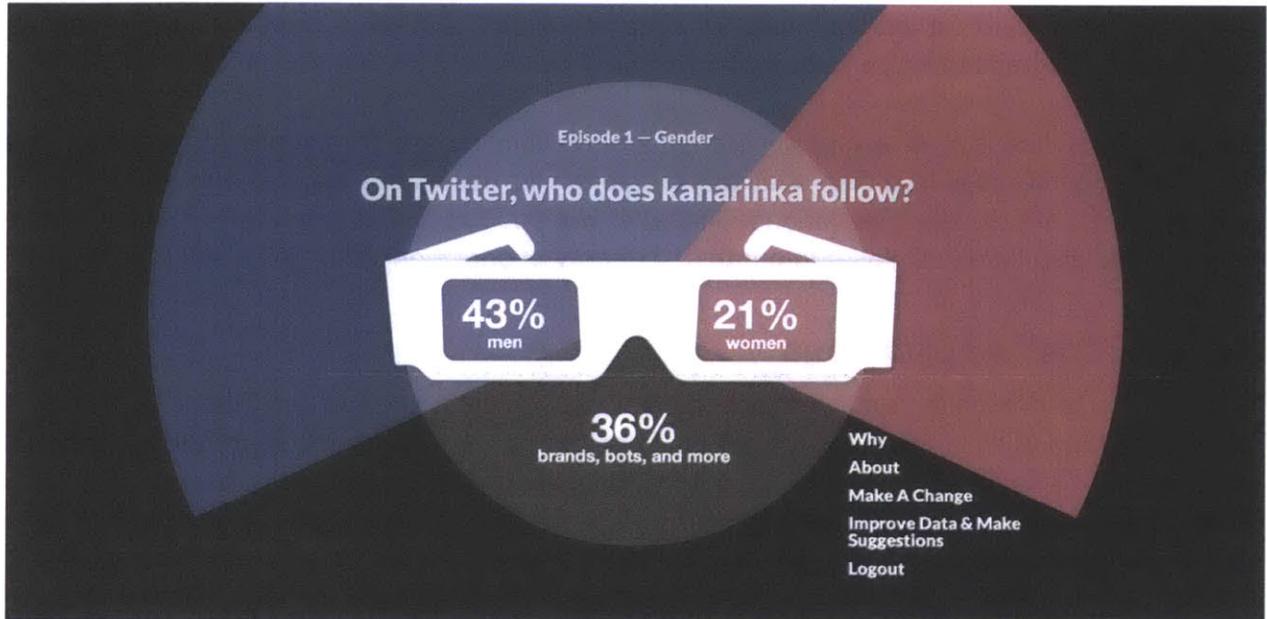
The technologies that focus on media are designed specifically to counteract perceived problems in individual news consumption such as selective exposure (reading only what we agree with from a political perspective), consuming too much "junk" media, becoming more conscious of privacy and spending too much time on social media and email. The aspiration from this field of technologies is that self-monitoring, visual feedback, intentional goal setting and communication of behavioral norms may help users counteract their in-the-moment preferences and consume more diverse information or otherwise focus their attention on what they believe matters. It could also be called "Personalizing Behavior Change Technologies" and was the focus of a recent workshop at the 2014 ACM CHI Conference on Human Factors in Computing Systems.

As with personal informatics, the majority of the applications are health related. However, there is a growing body of research in the area of personal behavior change technologies related to media consumption. These studies have looked at personal media consumption from the perspective of gender demographics, privacy practices and political orientation. They use the strategies of the personal informatics products (goal setting, self-monitoring and objective

¹⁰³ Richard H. Thaler and Cass R. Sunstein, *Nudge: Improving Decisions About Health, Wealth, and Happiness*, Revised & Expanded edition (New York: Penguin Books, 2009).

¹⁰⁴ B. J. Fogg, "Persuasive Technology: Using Computers to Change What We Think and Do," *Ubiquity* 2002, no. December (December 2002), doi:10.1145/764008.763957.

monitoring) and some of them additionally utilize recommendations as a way of drawing the user into new, more diverse, or less biased information.



FollowBias is an experiment to see if giving journalists visual feedback will lead to them taking action to balance out the gender of their sources. Image from followbias.com.

Nathan Matias, a Ph.D. candidate at the MIT Media Lab, has developed a number of visualizations, interventions and technologies¹⁰⁵ that are oriented around nudging the news industry towards gender equality. For example, his project FollowBias¹⁰⁶ is geared towards journalists. The experiment he is currently running tries to determine if showing journalists visual feedback about the gender breakdown of the people they follow on Twitter will help them make more equitable decisions when it comes to who they quote in news stories. In FollowBias, Matias consciously decided to use both objective monitoring (automatic classification of followers into gender categories) and a nudge towards greater gender equality in the form of recommendations of people you might find interesting from the less-represented gender. This research is currently in the stage of data analysis.

Other recent work has focused on the dimension of media privacy in personal decision-making. An experiment by Jeske, Coventry, Briggs and van Moorsel¹⁰⁷ showed that nudging users via color-coding helped them make better decisions about which mobile networks they joined. Sleeper and Leon study privacy in the context of social sharing in online networks. Their

¹⁰⁵ "Can Gender Metrics Make the News More Diverse?", Nathan Matias, 2013, http://www.youtube.com/watch?v=Rt9JLLMcmE&feature=youtube_gdata_player.

¹⁰⁶ "FollowBias," accessed July 10, 2014, <http://followbias.com/followbias/main>.

¹⁰⁷ "Nudging Whom How: IT Proficiency, Impulse Control and Secure Behavior - Personalizing Behavior Change TechnologiesCHI 2014 Workshop," accessed August 7, 2014, <http://personalizedchange.weebly.com/1/post/2014/03/nudging-whom-how-it-proficiency-impulse-control-and-secure-behavior.html>.

research shows that because of the great variation in privacy goals and personal contacts, personalized "privacy nudges" are a promising area of exploration for increasing individual privacy and decreasing the potential for regrettable sharing actions¹⁰⁸.

Simply the presenting alternatives sources can nudge behaviors. NewsCube¹⁰⁹ was a laboratory experiment that attempted to mitigate media bias by presenting the reader with multiple articles about a single event from differing viewpoints (or "aspects" as they termed it). Their experiment showed that people presented with articles with different framings explored more differing viewpoints than people who were presented with random articles and subsequently developed more balanced views of the events in question.



Balancer, a Chrome extension, helps people read more politically balanced news. Image from balancestudy.org.

Balancer is an attempt to mitigate news bias along a specific political dimension. Balancer is a Chrome browser extension that tracks a user's browser visits to domains that have been classified along an axis from liberal to conservative. It presents the user with visual feedback in the form of a man on a wire carrying a red and a blue bar chart. When the user has read roughly the same amount of liberal and conservative news, the man has a smiley face and is upright

¹⁰⁸ "Building Personalized 'Nudges' to Encourage Privacy Behaviors on Online Social Networks - Personalizing Behavior Change Technologies CHI 2014 Workshop," accessed August 7, 2014, <http://personalizedchange.weebly.com/1/post/2014/03/building-personalized-nudges-to-encourage-privacy-behaviors-on-online-social-networks.html>.

¹⁰⁹ Souneil Park et al., "NewsCube: Delivering Multiple Aspects of News to Mitigate Media Bias," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '09 (New York, NY, USA: ACM, 2009), 443–52, doi:10.1145/1518701.1518772.

("balanced"). But when she has read disproportionately more of one kind of news, the man looks perturbed and appears about to tip over.

The Balancer study¹¹⁰ sought to determine whether individual characteristics like political preferences, demographics and personality attributes accounted for the political bias of a person's online news reading. They additionally wanted to see how successful the visual feedback of the man on the wire was, if at all, in nudging people towards more balanced reading. Munson et al. discuss their choice of the balancing man as the communication of a norm of behavior (balanced reading). Communication of behavioral norms has been shown to be shift behavior toward the norm when an individual deviates from the norm¹¹¹. Their results showed that while the majority of users did not shift their reading behavior, there was a small minority for whom the visual feedback had a significant effect. Neither political lean, gender, age, or personality attributes was predictive of who those individuals were.

Work in the field of supporting behavior change relies on strategies like intentional goal setting, self-monitoring, objective monitoring, nudges and recommendations. At the end of the Balancer paper, Munson et. al. outline a key question for this area of study - "Should a goal be presented and if so, should it be user-set, set by social information (what others do), or set by the system's designer?"¹¹² In a paper presented at the Personalizing Behavior Change Technologies workshop at CHI 2014 written by Nathan Matias, Elena Agapie, myself and Erhardt Graeff¹¹³ we built on this question and outlined a number of challenges to personal informatics work related to media and information diversity.

These include how we determine the norms for such systems. When we make the leap from nutrition to information, as Slimformation and Newstrition are trying to do, the way to arrive at the goals and norms that a system should be moving us towards are not so clear-cut. Is it "better" to read a balanced political agenda or to follow equal amounts of men and women? Better for whom as determined by whom? What is "junk"? Other challenges we outline in the paper include algorithmic exclusion, the risks to privacy of collecting a lot of personal media data in order to analyze user's reading, and questions about what scale of adoption of tools would be necessary to effect social change.

4 System Design and Goals

Terra Incognita: 1000 Cities of the World is a small but unique contribution to this field. My goal in designing it was to pique curiosity about remote locations, challenge stereotypes about other

¹¹⁰ Munson, Lee, and Resnick, "Encouraging Reading of Diverse Political Viewpoints with a Browser Widget."

¹¹¹ P. Wesley Schultz et al., "The Constructive, Destructive, and Reconstructive Power of Social Norms," *Psychological Science* 18, no. 5 (May 1, 2007): 429–34, doi:10.1111/j.1467-9280.2007.01917.x.

¹¹² Munson, Lee, and Resnick, "Encouraging Reading of Diverse Political Viewpoints with a Browser Widget.," 8.

¹¹³ "Challenges for Personal Behavior Change Research on Information Diversity - Personalizing Behavior Change Technologies CHI 2014 Workshop," accessed August 7, 2014, <http://personalizedchange.weebly.com/1/post/2014/03/challenges-for-personal-behavior-change-research-on-information-diversity.html>.

cultures, and broaden users' horizons about the larger world. It uses **serendipitous design strategies, visual metaphors of exploration, objective monitoring** of the geography of users' reading, and **nudges in the form of news recommendations** to help users discover global news about places that they normally do not read about. Terra Incognita seeks to point out news readers' blank spots – the places they do not normally read or think about and give them small, repeated opportunities to explore those places throughout their day. In *Chapters 4 and 5*, I detail how the system works, the design strategies I employed and how the study was designed.

My hope in the design phase was that Terra Incognita would prompt so much exploration of new places via global news that users would shift towards reading about a greater diversity of countries after using the tool. In *Chapter 6 – Findings*, I outline how that kind of aggregate shift in user behavior was not observed but many smaller, qualitative effects were recorded. These point towards future directions for research around media exposure, geography and citizenship that I outline in *Chapter 7 - Discussion*.

This chapter describes the Terra Incognita user experiences, the design strategies that have been put into play, and the design of the user study.

4.1 The User Experience

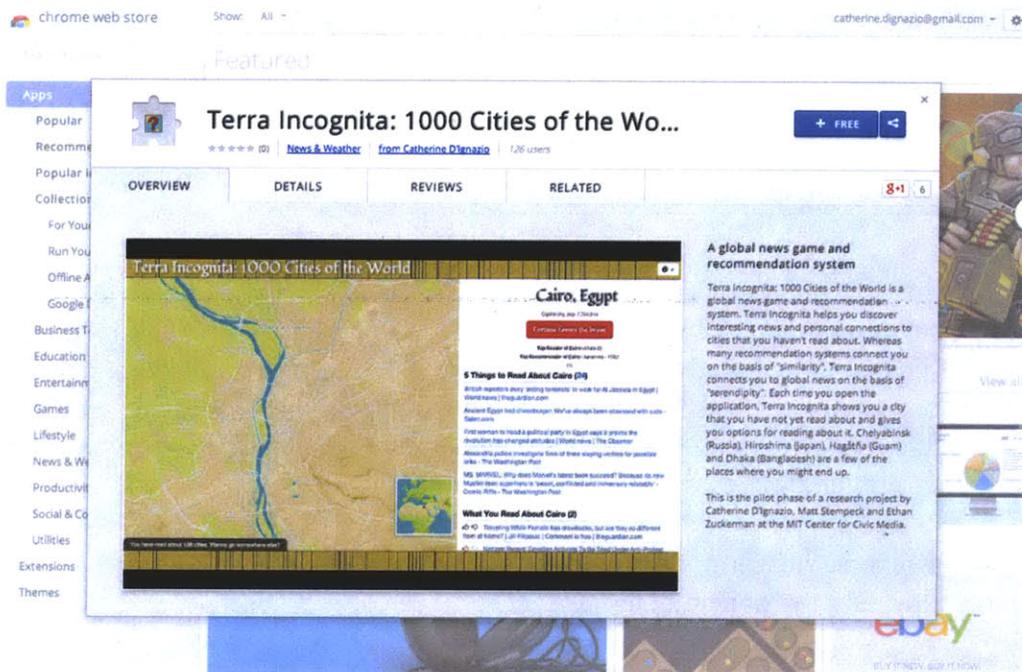
Borrowing from personal informatics applications, I wanted to use the geoparsing technology that I had been developing at the Center for Civic Media (see *Appendix 3 – Geoparsing News Articles*) to show users where they had not read about in the world. In order to create this kind of objective monitoring I needed to build an application that had both a user interface and access to the news articles that users had read. While I could have considered geolocating only articles users shared publicly on Twitter, or building a plugin to an existing news application or site, I decided that a browser extension would be the easiest way to integrate the user data and the user interface into one place.

Browser extensions are small pieces of software that run within the user's web browser. They are unique in that they can request access to a lot of personal data that web applications do not normally have access to. This data includes the person's browser history and their navigation around the WWW. Both the Firefox and Chrome browsers have robust APIs for building browser extensions. I chose Chrome simply because the documentation for their software was clearer and more robust.

4.1.1 Installation

The user experiences *Terra Incognita: 1000 Cities of the World* through the Chrome web browser because the software is an extension to Chrome. She installs the main software

package through the Chrome web store¹¹⁴.



Users install Terra Incognita from the Chrome Web Store

After installing the software and before using it for the first time, the user logs in to the website and signs the user consent form and the pre-study survey (see Appendices).

¹¹⁴ Catherine D'Ignazio, "Terra Incognita: 1000 Cities of the World," Chrome Web Store, accessed August 7, 2014, <https://chrome.google.com/webstore/detail/terra-incognita-1000-citi/hpiijgedgifmfegahhaoamckbliijh?hl=en&gl=US&authuser=1>.

Terra Incognita Dashboard

You are ready to launch Terra Incognita!

Open a new tab in your browser with Cmd-T or Ctrl-T.

User Study Consent Form

Thanks - You have signed the user study consent form. [Click here](#) to view and print the form.

Pre-Study Survey

Thanks - you completed the pre-study survey.

About Usernames

Your current username is kanarinka.

In Terra Incognita, your username is associated with how many articles you have read and recommended about a particular city [like this](#). Your username is displayed on city leaderboards with a count. Your username is not associated with any individual urls, i.e. users cannot see the individual news articles you have read about a place, only the number of articles you have read about a place. You can change your username at any time.

Change your username to:

Login/Logout

You are currently logged in to Terra Incognita with the email address kanarinka@gmail.com.

From <https://terra-incognita.co/login/>. See Appendix 5 for the pre-survey.

4.1.2 Usage

Once the user has installed the browser extension and logged in, they use Terra Incognita in two ways. The first is by simply using the Internet as they normally would. While they browse, Terra Incognita monitors the geography of their news reading in the background. The second way is through the Terra Incognita user interface. The user interface is fashioned as an intervention¹¹⁵ into the user's web browsing experience

4.1.2.1 Geography Monitoring

Terra Incognita monitors the geography of an individual user's browsing history. As a person browses the Internet by clicking on links or typing URLs, Terra Incognita detects each of these page loads and chooses whether to include that page as "news". To define "news", Terra Incognita uses both a blacklist of domains and a whitelist of domains. If the site is not on the blacklist and is on the whitelist, then it will be included as a news site. The blacklist excludes sites like Facebook, twitter, Google, and non-text files such as ".jpg" images (which Terra Incognita has no way of analyzing). The blacklist is meant for explicitly avoiding collecting un-

¹¹⁵ "intervention" is meant in the sense of Interventionist art practices. Artists who use interventionist strategies take everyday situations as the context of their work and then use surprise, humor, befuddlement and curiosity to shift audience perceptions.

analyzable files, users' email communications and social media history. The whitelist, on the other hand, specifies 28,670 sites, which are counted as "news" using a broad definition of news. The whitelist was compiled based on the sites that the MediaCloud project¹¹⁶ uses as sources for spidering and archiving.

If a URL is not on the blacklist and is on the whitelist, then it is sent to the Terra Incognita server for geographic analysis. The server retrieves the content of that URL, analyzes it for geographic "aboutness", and saves the results to the database (For details on this, see *Appendix 3: Geoparsing News Articles*). URLs with geographic aboutness include geographic information about the continent, UN region, state and city levels of geography. If the URL turns out to be "about" one or more of the 1000 cities on the Terra Incognita list, then the user gets credit for reading about that city.

4.1.2.2 User Interface

The way a user accesses the user interface of Terra Incognita is by opening a new tab in her Chrome browser. Instead of the usual blank screen or advertisement for Google services, she "lands" in a particular city from Terra Incognita's list of 1000 global cities. The city she sees is one that she has not previously read about.



A user encounters the Terra Incognita user interface by opening a new tab in her browser

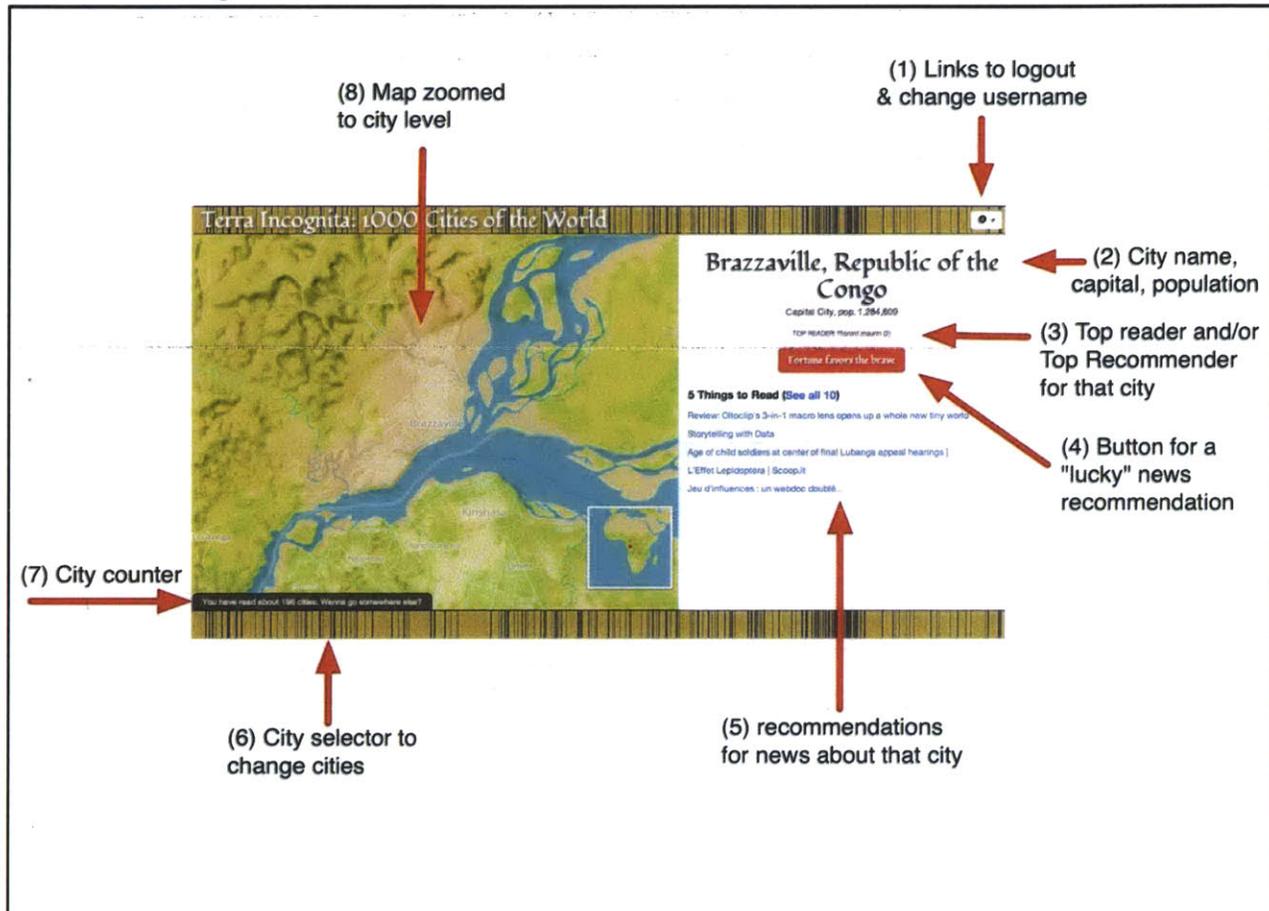
Terra Incognita does not prevent the user from typing in a new URL in the tab's navigation window. She can proceed to whatever task she was previously on track to complete by simply typing the URL. Rather, it is designed to entice her into engaging with news that she might not otherwise see at a moment when she is switching between tasks.

This is a design feature that was very intentional and is core to Terra Incognita's mission. I wanted to take a routine action like opening a new tab – something a web browser user does many times a day – and turn it into an opportunity to explore and deviate from her routine. Normally, the Chrome web browser either shows a blank screen, an ad for Google services or a user's most recently visited web pages in that location. Firefox actually used to sell this real

¹¹⁶ "Media Cloud | Tools for Online Media Analysis," accessed July 12, 2014, <http://mediacloud.org/>.

estate to advertisers and derive a significant revenue stream from this practice. Rather than showing the user where she had been, I wanted to give her an opportunity to think about a place that she has never seen and possibly never heard of. At the same time, many users are used to seeing "something" show up on the new tab page, so I reasoned that just as they ignored the ads for Gmail or their most recently visited sites, if they really did not want to explore then it would be easy to ignore Terra Incognita, too.

The user interface has eight main elements which I will describe according to their enumeration in the below diagram.



The eight aspects of the Terra Incognita user interface.

(1) Links to logout and change username: Links to the users' settings webpage on the server where they can login/logout and change their username. Users may want to login and out periodically based on whether they want Terra Incognita to be monitoring their geography at that time.

(2) City name, capital and population: Identifying information about the current city. Terra Incognita always shows the user a city they have not previously read about.

(3) Top reader and/or Top recommender: Highlights the user that has read or recommended the most articles about that city and notes how many articles they have read or recommended.

(4) Button for a "lucky" news recommendation: Equivalent to Google's "I'm feeling lucky" button. This will take the user to a serendipitous news recommendation about that city. The recommendation mines articles from bit.ly's Real Time API, articles read by Terra Incognita users and articles contributed manually as recommendations to make the decision as to where to send the user.

(5) Five recommendations for news about that city: If there are recommendations in the database about the selected city, this section will show five of them, randomly shuffled, with the option to show all of the recommendations.

(6) City selector to change cities: While Terra Incognita will always choose a new city, users can shift between all of the 1000 cities using the brown bar at the bottom of the screen. Each 50px high slice of this bar represents one city. If the slice is grey, the user has read about that city. If the slice is brown, the user has not read about that city.

(7) City counter: The text says, "You have visited 196 cities". As the user browses the web and/or clicks on news articles from Terra Incognita, this number increments. This counter also works with the city selector to indicate which city the user is interested in selecting.

(8) Map zoomed to city level: The main visual element of the user interface is a map zoomed to the city level.

4.1.3 Recommendations

One of the unexpected challenges of developing Terra Incognita was the surprising difficulty of finding interesting, reliable information about the top 1000 cities in the world. Our criteria for choosing the top 1000 cities are detailed in *Appendix 13*. In this discussion of Terra Incognita's recommendations we might return to *Chapter 2's* discussion of *Imaginary Cosmopolitanism* in which we feel that any information we might desire is just a single Google search or social network link away from us. If you remember, the "imaginary" part of the cosmopolitanism is that the information about remote geographies and other cultures is available to us but we do not actually make use of it. But in this case, finding interesting and engaging information about many of the cities in the top 1000 was extremely difficult. English-language information about a great number of mid-sized cities in the world, many in China and India, is simply not available. This challenge prompted Ethan Zuckerman to write a blog post titled "Imagining Wenzhou – How can we use the Internet to introduce readers to unfamiliar cities?"¹¹⁷

If you do not already have a relationship to a place, you have very little context for it, and you are landing in that place by means of a chance operation in your browser, what kind of information might draw you in and connect you to that place? Figuring out how to collect high-

¹¹⁷ "Imagining Wenzhou – How Can We Use the Internet to Introduce Readers to Unfamiliar Cities? | ... My Heart's in Accra," accessed July 16, 2014, <http://www.ethanzuckerman.com/blog/2014/03/21/imagining-wenzhou-how-can-we-use-the-internet-to-introduce-readers-to-unfamiliar-cities/>.

quality, stereotype-busting recommendations about the top 1000 cities in the world was no small problem. In designing Terra Incognita's news recommendation system I chose to follow criteria of multiplicity, quality, potential for reflection and prioritization of alternative voices. This is an area where further research, experimentation and evaluation are needed.

4.1.3.1 *User Generated Methods*

Many of the stories that Terra Incognita recommends in relation to a particular city ("5 Things to Read") come from mining and geolocating the browser history of other users in the system. When a user logs into the system, they upload up to 45 days of their browsing history depending on how many days of history they keep. Their browsing history is passed through a blacklist and whitelist and uploads to Terra Incognita only the news sites. Users also agree to share their browsing history over the course of the study. The Terra Incognita system geoparses those webpages as described in the last section and saves them to the database. Those URLs in conjunction with their geographic metadata become recommendations for other users in the system. So if Alice read an article about Jakarta, that article would likely show up as a recommendation for Bob.

The second user-generated method used for recommendations is the thumbs up or thumbs down voting system. If a user has read an article about a city, they have the ability to rate it. Anything down voted by a user will be automatically excluded as a recommendation for other users in the system. Anything up-voted by a user will be prioritized in the list of recommendations about that city presented to other users. This particular strategy failed because most users' interaction with Terra Incognita was seeing cities that they had *not* read about and you could only recommend articles for cities that you *had* read about. Most users were not aware of this functionality and it was not widely used. A better idea for mining user opinion might be to build a recommendation button into the browser extension that would prompt user feedback about a page that they were currently reading. I explore this further in *Chapter 7 - Discussion*.

A third user-generated method that we used had to do with mining the behavior of users of another system: *Instapaper*¹¹⁸. Instapaper is a service that synchronizes web articles you want to read across desktop and mobile devices so that you can read them later. We sought a way to seed the Terra Incognita system with high-quality stories about the cities in Terra Incognita but when doing a simple keyword search on places, you often end up on sites that list many places (such as the US Airlines Baggage Policy pages) but do not constitute interesting reading material. We turned to friends at Instapaper who provided us with a dataset of 7700 URLs that had been saved by multiple Instapaper users in the last several months whose content mentioned one of the cities in our list. The recommendations from Instapaper are prioritized in the system because we use the fact that they were saved previously by multiple users to read later on Instapaper as an indication of quality.

¹¹⁸ "Instapaper," *Wikipedia, the Free Encyclopedia*, July 13, 2014, <http://en.wikipedia.org/w/index.php?title=Instapaper&oldid=610685437>.

4.1.3.2 Human-Curated Recommendations

Before there was any browser history to harvest, we had a bootstrapping problem for identifying articles. We needed to present the user with some compelling recommendations but would not have a very large set to start out with. To seed the system with interesting recommendations about our 1000 cities, we made two attempts to do human curation of stories. In particular, these attempts were to try to round out the blind spots in the system. We had 7700 stories from Instapaper but those only covered roughly 20% of our 1000 cities.

The screenshot shows a web browser window with the URL <https://terra-incognita.co/1000cities>. The page content is a Google Form with the following text:

1000 Cities of the World - Help us represent yours!

We are collecting interesting, fun, weird information about the top 1000 cities of the world for a project called Terra Incognita that will help people explore new places. URLs could be to videos, photos, news or magazine articles, long reads or other.

Questions? Email Catherine (dignazio@mit.edu) or Matt (stempeck@gmail.com).

* Required

*Which city do you want to add a cool link about? **

*Link URL **

Share your email if you want to be a beta tester for Terra Incognita

Submit

Never submit passwords through Google Forms.

Powered by Google Forms

This content is neither created nor endorsed by Google.
[Report Abuse](#) - [Terms of Service](#) - [Additional Terms](#)

Web form to collect URLs about particular cities for a crowdsourcing campaign.

The first attempt at human curation was a crowdsourcing campaign run by Matt Stempeck and I where users could submit a URL about one of the cities for inclusion in Terra Incognita. After several weeks of running the campaign and trying to promote it to friends and through mailing lists at MIT, the Center for Civic Media and the Open Knowledge Foundation, we had collected 142 entries. This was useful, however the majority of the submissions were again for the top 20% of global cities that are well-recognized around the world. Wenzhou, China, and Solapur,

India, were still not on the list.

Represent Brasil

We're creating a news game that helps readers explore the world by reading about new places. We've made a list of the top 1,000 cities of the world, and many of these cities are Brazilian. BUT, most of the news we've found about Brazil is focused on only a couple of places, like Rio de Janeiro and São Paulo. Can you help us find English-language stories, media sources, or interesting articles about some of the other major cities in Brazil?

Share any links you'd like the world to see, whether they're videos, photos, news, or magazine articles - as long as they're about that place!

Obrigado,
Catherine (dignazio@mit.edu) and Matt (stempeck@gmail.com)

Share a link about Belém

Share a link about Belo Horizonte

Share a link about Brasília

Share a link about Campinas

Share a link about Colombo

Share a link about Contagem

Share a link about Curitiba

Share a link about Fortaleza

Share a link about Goiânia

Crowdsourcing campaign just about Brazil

In order to focus more on our geographic blind spots, we tried an experiment at targeting specific countries with a crowdsourcing campaign. We ran a crowdsourcing campaign specifically about Brazilian cities and tried to recruit our Brazilian friends and contacts to give us URLs related to these cities. In the prior campaign we had heard feedback that the city selector form element was too long and difficult to select the city. So on the web form for this country campaign we tried to make it easier for people to submit URLs about particular cities.

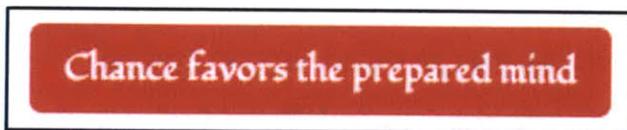
The Brazil campaign was not successful in terms of sourcing URLs. We had a number of interesting conversations over Facebook and email with our Brazilian contacts about the cities in question, and ended up revising our list of Brazilian cities, but we only collected three URL entries on the form. Some of the conversations we had with people reflected that they were not

entirely sure what kind of URLs and webpages we were seeking. This vagueness in perceived intent may be part of the reason that the crowdsourcing campaigns did not have a lot of success. Also, at that time the Terra Incognita tool was not ready for public use, so it was hard to show people how their recommendations might be used and made relevant to people in practice.

Instead of crowdsourcing, we then turned to the idea of appointing "Regional Curators" for certain parts of the world. We published a call for regional curators via the Global Voices¹¹⁹ network and the Center for Civic Media's blog¹²⁰ as well as reaching out to personal networks. We located three people who were interested in helping with this effort. Chunhua Zhang, a visiting researcher from China to MIT's Comparative Media Studies department, took on compiling English language URLs for all 190 Chinese cities. Amit Pathak, an educator from India, compiled 160 URLs for Indian cities. And Fred D'Ignazio, a writer and community garden leader from North Carolina (and my devoted father), compiled a number of URLs for the Caribbean and Brazil. Even with people on the case who had some embedded cultural knowledge of the places in question, we were unable to find interesting, relevant or sometimes any English language news for every single city. The news needed to be in English because our geoparsing technology currently only works on English language news. The majority of the mid-sized Chinese cities are represented in Terra Incognita by either Wikipedia articles or the official government English-language website which are of debatable quality and interest. And cities like Xiangcheng, Huizhou, and Datong have no English-language information that Chunhua could locate. This remains an interesting problem to pursue with more research.

4.1.3.3 Algorithmic Recommendations

Finally, since the human-curated recommendations and data sourced from Instapaper might be less relevant and current over time, I wanted a way in which new, high-quality and current news recommendations would be introduced into the system. Terra Incognita queries bit.ly's RealTime API¹²¹ for this purpose. The RealTime API is an experimental API that allows an application to query the most shared links being shared through the bit.ly service in near real-time.



Terra Incognita's red button

When users click on the red button in Terra Incognita, this triggers a call to the Real Time API the majority of the time (though it can occasionally pull a recommendation from the database as

¹¹⁹ "Global Voices · Citizen Media Stories from around the World," accessed July 16, 2014, <http://globalvoicesonline.org/>.

¹²⁰ "Realttime - a Bitly Labs Experiment," accessed July 16, 2014, <http://rt.ly/>.

¹²¹ Ibid.

well because it is based on weighted randomness). Terra Incognita searches the Real Time API for the name of the city in question as a keyword (and the country if the city's population is small). It pulls back a list of results and prioritizes the results with longer story lengths as a way of getting at higher quality reads. It also prioritizes content from Global Voices over other domains as a way of representing alternate voices to the regular mainstream media sources. You can review the code for this section here: https://github.com/c4fcm/Terra-Incognita/blob/master/www/recommendations_bitly.py

In my own subjective use of Terra Incognita, I have found the bit.ly API to be successful for delivering relevant articles for the top 20% of global cities who are likely to have trending content at any given time in the English-language online universe of bitly users. But, as with the other methods of sourcing information, the Real Time API is much worse at delivering high-quality information about the rest of the 1000 cities. It is also limited by the fact that there is not time to geoparse the article before giving it to the user, so many of the articles are not actually "about" the city in question but simply mention that place in passing. This leads to the idea that perhaps 1000 is simply too many cities. How would the challenges of this project been mitigated by shifting to 500, 200 or only 100 cities? I explore this possibility further in *Chapter 7 - Discussion*.

4.2 Design Strategies

The central design challenge of Terra Incognita is how to incentivize wandering over "what you want" in an everyday online situation. In Terra Incognita, I used a number of design strategies to try to facilitate serendipitous noticing and discovery of global news that the user is not seeking.

4.2.1 Intervention and Repetition: Rhythm of Attention

One of Terra Incognita's main features is that it operates as an intervention into a user's everyday browsing behavior, giving her many opportunities everyday to explore. When the user opens a new browser tab, Terra Incognita gives her news recommendations about a city she has never read about. This repetition is deliberate and was designed to function in a couple of ways. First, when a user opens new tab, it to shift into a new task, to an existing task by looking up new material, recording information, or communicating with others. It is a transition or a moment of micro-attention shifting where the user may be oriented towards a future action rather than focused on the task at hand. Thus, there is greater potential for interruption of her task and diversion into new information.

This choice contrasts with, say, sending someone a push notification every 5 minutes to explore a new city, or a once-a-day email with an invitation to explore. Each of these choices would have had its own affordances and potential limitations.

The repetition of showing a new city on every new tab also gives the user multiple opportunities for exploration. The design intent is that each new city is an invitation and a micro-learning experience even if the user only reads the city name and glances at the map. At the same time, the repetition of showing up on every new tab also makes the user interface experience

mundane. Potentially, the browser user would adapt to seeing Terra Incognita's repeated invitations. They might then feel safe, predictable and ignorable; something I would argue is a feature, not a bug (see the below section on *highlighting harmlessness*).

The risk of having chosen a repetitive, interventionist design strategy for diverting the user's attention is that users might feel like their browser is colonized by a foreign invader, that the repeated invitations to explore will induce guilt if the user does not feel like she can follow up on them or that they will even create behaviors to resist the browser extension. For example, I have noticed in myself the phenomenon of "New Tab Avoidance" so that I do not have to engage with Terra Incognita.

4.2.2 Prioritize Exploration over Personalization

Rather than compiling exhaustive and intrusive information on "who the user is" so that we can predict their tastes and exact state of mind at any given point in time, Terra Incognita positions all users as explorers of news about global cities. The title "Terra Incognita" comes from maps during the Age of Exploration. The use of zoomed-in maps as the key visual element on the page and the choice of display font were made to reinforce the metaphor of exploration. The way that Terra Incognita is personalized is that it monitors where you have read about in the world and shows you new cities that you have never read about. It also presents you with visual feedback in the form of the city count – the number of cities of the 1000 that you have read about.

This is not to say that some amount of personalization might not be helpful. At the moment, the risks of prioritizing exploration are that the scope of the information is very broad, only being organized by geography. Thus, the news recommendations that people see may not be perceived as interesting enough to click on. Indeed, the results in *Chapter 6 – Findings* bear out the notion that further personalization would have been useful for many of the users.

4.2.3 Highlight Harmlessness and Triviality: You Run No Risks That Threaten Who You Are

Getting lost is a concept that sounds romantic until you are actually lost and either terrified, baffled or bored. This is why wandering needs to be mitigated with a light touch. We must feel safe in order to generate new world-views and we must be open to and have time for new information in order to perceive it. This is where entertainment, humor and games are especially useful. Framing a new experience as potentially challenging to a person's previously held ideas ("In this Extremely Important Deliberative Online System you will encounter people with differing viewpoints") is very different from framing a new experience as extremely trivial ("This experience will be a fun and meaningless diversion from your Real Life and ultimately does not matter all that much").

I designed Terra Incognita with triviality in mind. It is a lightweight, mostly ignorable intervention. The stakes are low and thus the potential for disarming the viewer with new information is higher. Because of the rhythm of attention that it structures - opening with every new tab - it

becomes mundane and normalized into the everyday behavior of the user. This balance between novelty and normalization is very important. Could change possibly even occur without the user taking notice?

The risk of pursuing triviality and mundanity as desired features is, of course, that the user will completely ignore the application and deem its invitations to explore meaningless.

4.2.4 Visual & Spatial Seduction: Address User as Eyes and Body, Not Just a Disembodied Head

Those of us who work in civic media and software engineering can too often make the mistake of imagining end users as rational repositories of information, like walking databases that happen to have outer coverings of skin and hair. In civic media, this is the "raising awareness" strategy that goes something like, "If people only had better information about this problem then it would get fixed". In software engineering, it is the privileging of textual information over all other forms. In personal informatics, it can often be favoring statistical charts over other forms.

The screenshot shows the 'Terra Incognita: 1000 Cities of the World' interface. On the left is a large, detailed topographic map of Xiamen, China, showing its coastal location and surrounding terrain. On the right, the city profile for Xiamen, China is displayed, including its population (578,337), a top reader (peter.g.kavanagh), and a red button with the text 'Chance favors the prepared mind'. Below this are sections for '5 Things to Read' and 'What You Read', each with a list of links to related articles and government pages. At the bottom left of the map area, a small text box asks 'You have read about 202 cities. Wanna go somewhere else?'. The entire interface is framed by a decorative border of vertical lines.

Terra Incognita tries, within the limitations of the screen and browser (which are significant), to pique the user's curiosity with visual and spatial information. The key visual element of Terra Incognita is a large map on the left-hand side of the screen. English-speaking users browse left to right, so the map is most likely the first visual element apparent to them. The map is zoomed in so that city streets are visible. This is also a deliberate choice so as to position the user less

as a disembodied eye viewing a global, abstract map (which Donna Haraway calls the "God trick"¹²² and Michel DeCerteau calls the fiction of "the celestial eye"¹²³) and position her closer to the ground, giving her visual and spatial details about the architecture of cities that she may never otherwise experience. In the end, the choice of deploying visual and spatial information first is about anchoring the user's body closer to the concrete reality of the city than is possible with textual choices and news article titles.

The risks of pursuing a visual and spatial strategy are that people learn and process information differently and some may be drawn less to these dimensions of the experience. Additionally, maps are ultimately unsatisfying for communicating the lived experience of place. They may pique our curiosity but also serve to distance and abstract us from the richness and complexity of experience on the ground. Perhaps there are better ways – photographs, Google StreetView, satellite imagery – than maps to plunge the user into a new city.

4.2.5 Restrict Choice

Restricting choice is related to another one of BJ Fogg's principles of persuasive technology: *Reduction*. Reduction is a strategy to simplify a complex task to a single step. "The theory behind reduction technologies is that making a behavior easier to perform increases the benefit/cost ratio of the behavior. Increasing the perceived benefit/cost ratio increases a person's motivation to engage in the behavior more frequently¹²⁴."

Even when there are tens or hundreds of recommendations in the system about a particular city, Terra Incognita purposefully limits how many news stories the user sees to five and additionally provides one large red button to travel to a serendipitous news recommendation (à la the Google "I'm feeling lucky" button). While choice in software systems and in market economies is often and erroneously conflated with being more democratic, each new choice imposes the additional cognitive labor of discerning, comparing and choosing on the part of the user¹²⁵. As previously mentioned, sometimes restricting choice is the fastest pathway towards serendipitous information, as Ethan Zuckerman wrote about in his response to "Why Audio Never Goes Viral". Part of my design hypothesis is that overwhelming users with choices in a serendipitous system (where their participation is already precarious because their time is limited) makes it more likely they will determine that they will choose not to engage with the tool.

The risks of restricting choice in relation to news recommendations in Terra Incognita are that the five choices presented to the user will not include something interesting enough to click on. And five choices might even be too many! But restricting choice to only the big red button

¹²² "Objectivity (science) - Wikipedia, the Free Encyclopedia," accessed August 12, 2014, [http://en.wikipedia.org/wiki/Objectivity_\(science\)#Donna_Haraway.27s_.22situated_knowledges.22](http://en.wikipedia.org/wiki/Objectivity_(science)#Donna_Haraway.27s_.22situated_knowledges.22).

¹²³ Michel de Certeau, *The Practice of Everyday Life*, Reprint edition (University of California Press, 2011).

¹²⁴ B. J. Fogg, *Persuasive Technology: Using Computers to Change What We Think and Do*, 1 edition (Amsterdam ; Boston: Morgan Kaufmann, 2002), Chapter 3.

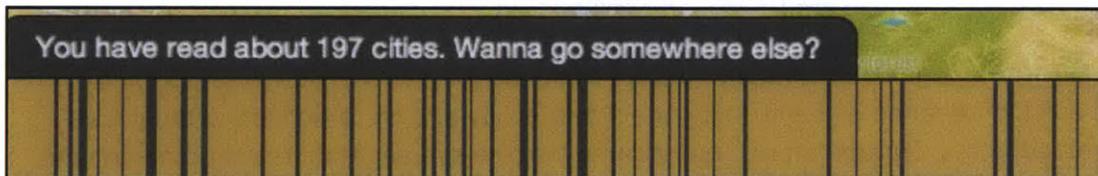
¹²⁵ "Transcript of 'The Paradox of Choice,'" accessed August 7, 2014, http://www.ted.com/talks/barry_schwartz_on_the_paradox_of_choice/transcript.

means that whatever it delivers better be pretty damn good (which Terra Incognita's recommendations are not yet) or you will quickly teach people that their effort is not worth it.

4.2.6 Favor Curiosity Over Guilt

Finally, I have been trying to carefully navigate the looming shadow of normative nudges over this field of work. Personal informatics and nudge applications use personal data collection, objective monitoring, goal setting and analytics to inform present action and persuade people to make “better” decisions. So the mobile app LoseIt!¹²⁶ helps people track their meals and meet daily calorie intake goals so they can reach a weight goal. Personal data can be combined with social data in applications like the FitBit¹²⁷ system where users compete with friends for how many steps they have taken that day.

As I discussed in *Chapter 3*, Newstrition and Slimformation have used this kind of tracking and goal setting in relationship to the news. Like their names suggest they are based around nutritional metaphors applied to news reading where some news is “good” and some news is “junk”. The concept of applying normative judgments to news reading feels intuitive since many of us do that already. And that strategy may resonate with some users who feel they spend too much time going down celebrity gossip rabbit holes. However, for the first iteration of Terra Incognita, I have purposefully avoided applying these kinds of nutritional metaphors to the user's personal geography of news reading, mainly because I am skeptical of the idea that reading about more cities is “better” and did not want the system to indirectly communicate that as a norm or a goal. I also did not want to shame or guilt the user into clicking on articles. The aspiration is to favor pleasure, curiosity and wandering over guilt, goal setting and obligation.



The only indication of your personal analytics comes through your city count, which increments as you read about more of the 1000 cities in Terra Incognita. The user who reads or recommends the most articles about a particular city is also recognized on that city's page. Both of these have lesser importance in the UI than the city maps and news stories. The interface is oriented towards the future (where you might go) rather than on the past (where you have been).

5 Experiment Design

¹²⁶ “Lose It! - Succeed at Weight Loss with Lose It!,” accessed August 7, 2014, <https://www.loseit.com/>.

¹²⁷ “Fitbit® Official Site: Flex, One and Zip Wireless Activity and Sleep Trackers,” accessed August 7, 2014, <http://www.fitbit.com/>.

The Terra Incognita experiment was designed to test the following research questions:

- Can a chance-based, visually seductive geographic news exploration experience prompt users to learn and read about more diverse geographies?
- Do users who come in with a higher degree of cosmopolitanism (as measured by the transnationality index) show more geographic diversity of news reading prior to installing Terra Incognita?
- For users whose geographic diversity of news reading does change, do factors such as gender, cosmopolitanism (as measured by the transnationality index), or professional stake in the news industry predict who will shift their behavior?

5.1.1 Subject Recruitment

A total of 188 users used Terra Incognita during the study period from May 1, 2015 - July 15, 2015. Users were recruited via a blog post and twitter posts from the Center for Civic Media's network of journalists, media researchers, and news innovators. They were also recruited from the mailing list Data Driven Journalism run by the Open Knowledge Foundation. I sought to recruit people who were 1) invested in the news either professionally or personally and see the news media as playing an important role in creating a democratic public sphere and 2) had an interest in news innovation and willingness to experiment with new technologies. Clearly, this is not an audience that is representative of the general public. By recruiting people who were invested heavily in news for personal or professional reasons, I hoped to get high-quality feedback about this first iteration of the tool and learn about future directions to make it useful to a broader public. See *Appendix 4* for copies of the recruitment email and posts.

5.1.2 Usage

Subjects used Terra Incognita for at least 30 days to be included in the study results. They signed up on a list in advance of Terra Incognita's availability and were notified when it was ready to download in the Chrome store. Users came into the system at different points in time. Around 50 installed it in the first week of May, people trickled in after that, and then we had another influx in early June, which continued through mid-June. 5-10 people a week are installing it at this moment in time and there are over 200 people total who have installed it.

I decided against using a randomized control group in the study due to a misunderstanding of its purpose. In retrospect I should have assigned incoming users to either a control group (wherein their browser history would be monitored but they would not see the UI) or a test group (full UI experience of Terra Incognita). This would have allowed me to test whether any aggregate effects we were seeing were related to people simply participating in the study and knowing that their geography was being monitored or from using Terra Incognita's user interface and recommendations.

5.1.3 Data Collection

The experiment collected a number of different types of data that included collecting browser

history, tracking user behavior and administering surveys about quantitative and qualitative aspects of user experience. These data are outlined in detail in *Appendix 1*.

The experiment was interested in both aggregate measures of the geographic diversity of users' reading as well as qualitative measures of users' awareness of the geographic aspects of their news reading and how seeing new cities made them feel.

5.1.4 Notes on Experimental Measurements

Measuring Geographic Diversity of news reading: In order to measure geographic diversity of news reading I use a measure from law and economics called the Herfindahl–Hirschman Index (HHI). HHI was designed to measure the amount of firm concentration in an industry and is used in planning efforts by the Department of Justice and the Federal Reserve to determine the potential effects of a merger on competition in a marketplace. HHI is calculated by summing the squares of the market shares of the 50 largest firms. If using whole percentages this results in a scale from 0 to 10000. A high HHI signifies a marketplace that is monopolistic (100% of the market is dominated by a single firm) and a low HHI signifies that there is lots of competition. The Department of Justice interprets HHI numbers in the following way:

- Unconcentrated Markets: HHI below 1500
- Moderately Concentrated Markets: HHI between 1500 and 2500
- Highly Concentrated Markets: HHI above 2500¹²⁸

To apply HHI to the geographic diversity of users' news reading I treat the countries that people read about as "firms" in the marketplace. I review 45 days of the user's browser history prior to installation of Terra Incognita to get a sense of the person's baseline HHI. I then calculate HHI for their news reading for the period after installing the extension (at least 30 days and up to 75 days).

Clearly there are some limitations to applying a measure of market concentration to the geographic distribution of countries in users' news reading. We cannot imagine that the way that the DOJ interprets these numbers will be immediately applicable to online news reading, however I provide those interpretations here as a guidepost.

Measuring Cosmopolitanism: As cosmopolitanism does not have a widely agreed upon definition, there is no accepted measure for an individual's level of cosmopolitanism. However, I was interested in whether there was a significant difference in individual news reading based on cross-cultural life experience and cross-cultural social ties. And additionally whether those with more cross-cultural experiences were likely to shift their news reading after using Terra Incognita.

In order to get at a rough measure of cosmopolitanism, I used a measurement called the

¹²⁸ "Horizontal Merger Guidelines (08/19/2010)," accessed July 13, 2014, <http://www.justice.gov/atr/public/guidelines/hmg-2010.html>.

"Transnationality Index" developed by Mau, Mewes and Zimmerman in their paper "Cosmopolitan Attitudes through Transnational Social Practices."¹²⁹ The transnationality index is a composite of the number of social ties the respondent has outside their country (30%), how many times a person has traveled abroad in the past 12 months (30%), and total time the respondent has lived abroad (40%). In their paper, Mau et. al. showed that transnational social practices were correlated with cosmopolitan attitudes. The transnationality index ranges from '0' to '10' where '0' indicates no transnational experience and '10' would be the highest possible transnational experience and social ties. Users of Terra Incognita responded to these questions in the Pre-Survey (see *Appendix 3*).

6 Findings

In this chapter I provide a high-level summary of results from the experiment as well as a detailed walk-through of my data analysis. While the majority of users reported that they had learned something new from Terra Incognita and reflected on the geography of their news reading because of it, the quantitative measure I was hoping to shift – the user's HHI as a measure of aggregate geographic diversity of news reading – did not change in any meaningful way from using the tool. Rather than shifting people's reading behaviors in aggregate, Terra Incognita piqued their curiosity and prompted them to reflect on the geography of their news reading in small doses throughout the day. These results point to the idea that the most successful part of Terra Incognita might have been the map popping up throughout the day as an invitation to explore rather than the actual destinations (recommendations) where people ended up. I extend this discussion of my findings in more detail in *Section 7 Discussion*.

6.1 Research Questions

Q1. Can a chance-based, visually seductive geographic news exploration experience prompt users to learn and read about more diverse geographies?

While Terra Incognita did not shift the aggregate diversity of users' reading (see Q3) it was a positive micro-learning and reflection experience for the majority of users. While the app may not have shifted user behavior in aggregate, the vast majority of users (87.5%) say that they learned about a new place from Terra Incognita. Most users clicked at least 5 recommendations and 43% shared a recommendation. Most of them (63%) think that Terra Incognita prompted them to reflect on the geography of their news reading. User felt it broadened their horizons, piqued their curiosity and helped some feel "more connected" to unknown places. "It was a constant reminder that there's a larger world than my screen." (*User 3*)

Q2. Do users who come in with a higher degree of cosmopolitanism (as measured by the

¹²⁹ Steffen Mau, Jan Mewes, and Ann Zimmermann, "Cosmopolitan Attitudes through Transnational Social Practices?," *Global Networks* 8, no. 1 (January 1, 2008): 1–24, doi:10.1111/j.1471-0374.2008.00183.x.

transnationality index) show more geographic diversity of news reading prior to installing Terra Incognita?

Cosmopolitan people have more geographically diverse reading habits than people with few transnational ties.

Entering the study with more transnational social ties was correlated with a lower pre-installation HHI (more diverse). For every point higher people scored on the transnational index, users' pre-installation HHI was 187 points lower, and simple a user's transnational index accounted for 16% of the variation in their HHI score.¹³⁰ ($R^2 = 0.16$ and $p\text{-value} = 0.00005816$). This finding confirms an intuitive assumption: people with global ties will read globally. This finding could be further explored and possibly leveraged in future research. Again, we are relying on a measure of transnational social ties as a proxy for cosmopolitanism as described in *Chapter 5*.

Other than cosmopolitanism, no other factors we analyzed correlated with pre-existing geographic diversity of reading habits.

We examined factors like gender, valuing global news reading, stated habits of global news reading, and whether global news was important to the user's profession. None of these correlated with higher or lower HHI entering the study.

Q3. For users whose geographic diversity of news reading does change, do factors such as gender, cosmopolitanism (as measured by the transnationality index), or professional stake in the news industry predict who will shift their behavior?

Terra Incognita did not shift users' aggregate reading habits in any discernible way. We measured the geographic diversity of users' news reading before and after using Terra Incognita. There were no meaningful patterns in how people shifted or who shifted their behavior after looking at statistical tests for correlation amongst HHI and gender, transnationality index, and attitudes and values towards global news reading. Exactly half of users shifted towards more diversity and half towards less diversity, which suggests that they were regressing to the mean. It visually appeared that users who came into the study with less diverse reading habits were more likely to shift their behavior towards more diversity but a regression analysis did not find this to be a significant relationship.

6.2 Secondary Findings

In addition to the main research questions that we were trying to answer, we also found several other interesting results regarding usage, recommendation quality and feature design.

Most people used the application for the entire study period. Around 45% dropped out quickly or did not use it at all.

After analyzing usage patterns, around 55% of those who installed the extension continued to use it throughout the study period. 12% never actually completed the login process. And 33%

¹³⁰ OLS regression model.

only used the extension for a day or two after installation. This seems like a high drop-off rate but it is hard to know without having general statistics about browser extension installation and usage rates. Were those who did not use it deterred by privacy concerns? By Chrome not being their primary browser? By the application opening in every new tab? The handful of users that responded to a survey about this were equally divided between privacy concerns and Chrome not being their primary browser.

Terra Incognita's recommendations left room for improvement.

On average, users rated Terra Incognita's recommendations a 3 out of 5 where 1 signified "bad" and 5 signified "good". 43% of users shared a recommendation from Terra Incognita at least once, a marker of quality. About half of users remembered encountering both "bad" and "good" recommendations. Users suggested that they would like to see less Wikipedia articles and more local news to represent unknown places. Users also reported technical problems with articles that were not actually "about" where they claimed. They requested more personalization to narrow down the recommendations to specific places or topics they cared about or needed to know for work purposes.

Terra Incognita had features that were misunderstood and/or underutilized.

Many users misunderstood the "city count" that displayed how many cities that had read about. They interpreted this to be tracking how many new tabs they had opened and thus mistrusted the count, particularly after the bug fix (detailed in *Chapter 7, Section 2*) modified the count for some users. Because Terra Incognita showed users cities they had not visited very few people encountered the functionality that let them recommend articles that they had previously read.

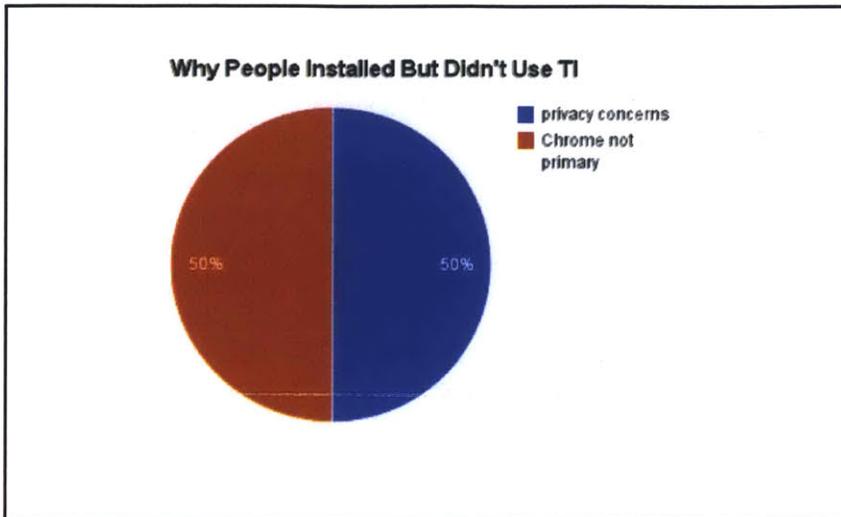
6.3 Exploratory Data Analysis

This section summarizes all of the exploratory analysis I conducted with users' browser history, metrics, and user surveys in order to establish the findings.

6.3.1 General Patterns of Usage

6.3.1.1 People Who Installed But Never Used the Tool

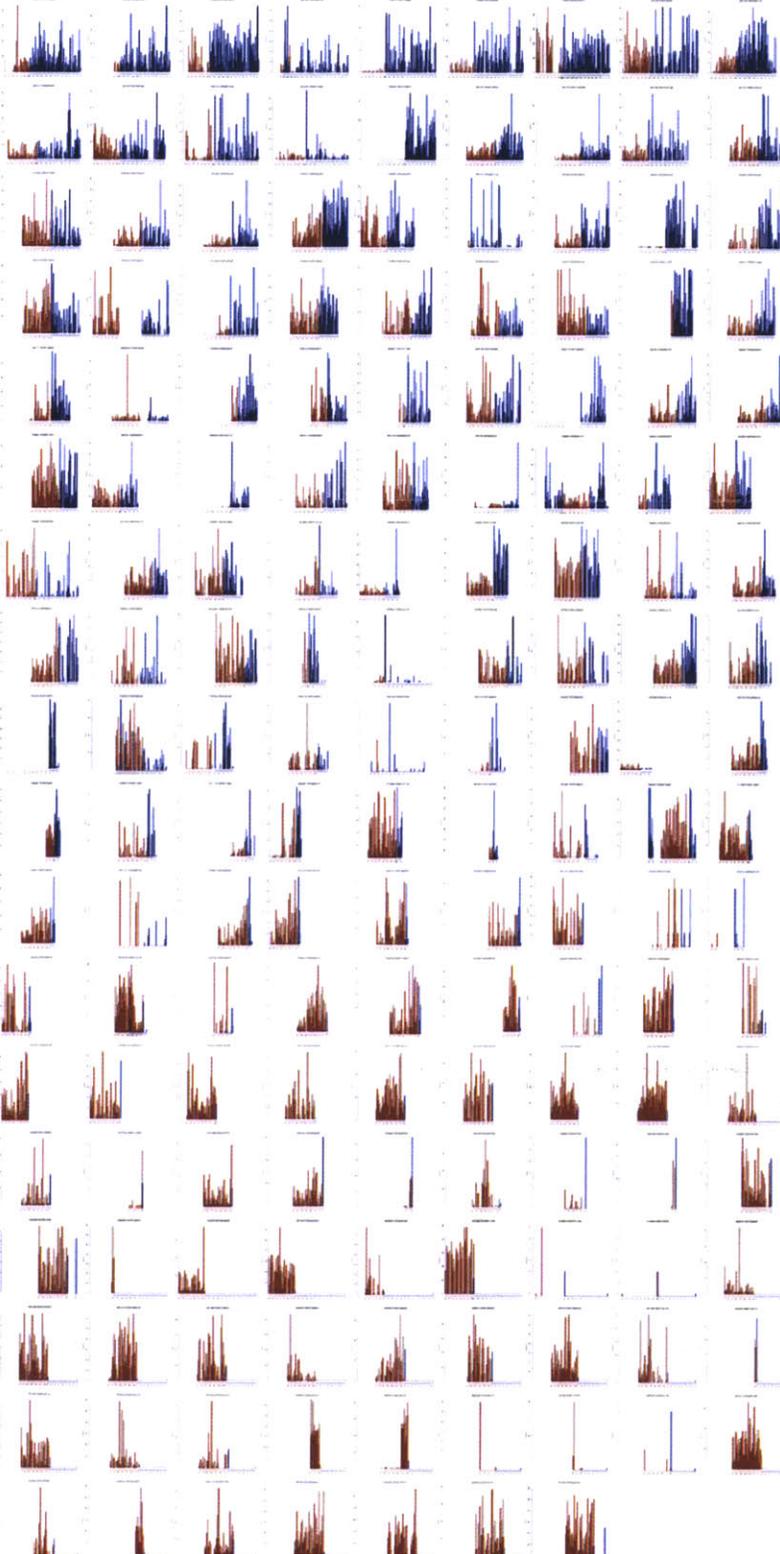
There were 25 people who installed Terra Incognita and set up a login but never used it. This is roughly 12% of the total user base. I polled these users about their reasons for not using the tool (see *Appendix 5*). While only four people responded to this survey, their responses were equally divided (50/50) between privacy concerns and Chrome not being their primary browser. The people who stated that Chrome was not their primary browser both wrote in that they would like to use Terra Incognita in the future either through another browser or if they come back to Chrome.



Four people out of 25 responded to the survey about why they installed but didn't use TI.

6.3.1.2 *People Who Quickly Decided It Wasn't for Them*

For users who did use Terra Incognita, one of the first things I did was to plot each user's pre- and post-installation browsing history by number of pages visited per day to get a sense of how much pre-installation browser history TI had collected and how much post-installation browsing they had done with the extension turned on.

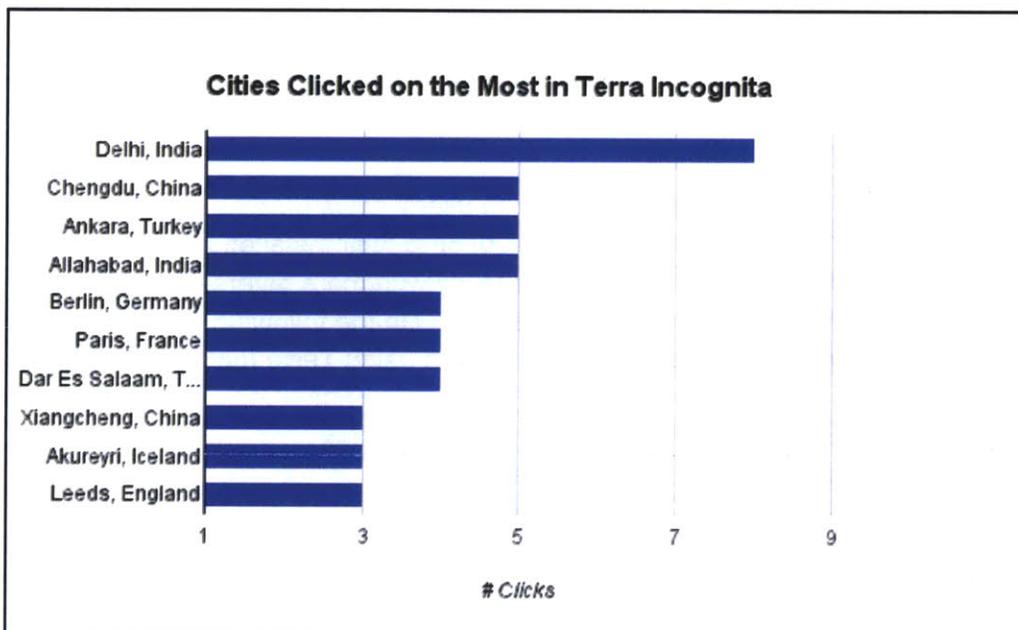


Histogram of individual users' frequency of browsing. The X axis is days and the Y axis is # of pages visited. **Red bars** are daily visits prior to TI installation and **Blue bars** are post-installation. The plots are ordered by the number of post installation days with browsing history from high to low. The last seven rows of the image suggest that there is a usage pattern of people using the Terra Incognita for only one day and then ceasing use, likely through disabling or uninstalling it.

This visualization of individual user behavior seems to suggest that the 61 people at the bottom (see the last seven rows of plots) used Terra Incognita for a very short period of time, as little as one day, and then ceased to use it either through disabling the extension or uninstalling it. This group represents around 36% of the 169 users who installed and used the extension. Without having general usage statistics on browser extensions, it's hard to know whether this is higher or lower than we might expect. It does suggest that around one third of the people who tried Terra Incognita either did not find it useful or interesting or had concerns about privacy and disabled it shortly thereafter.

6.3.1.3 Choosing to View Certain Cities

The top ten cities that people clicked on from the city selector bar at the bottom of the screen are depicted in the below chart.



Top 10 most chosen cities in Terra Incognita. While the primary way of reading about a city is by chance, users can click on the city selector at the bottom of the screen to choose a particular city.

While the main way of seeing the Terra Incognita screen about a city is it loading by chance when a user opens a new tab, users can also select a city from the bar at the bottom of the screen. Interestingly, of the top ten cities Terra Incognita users selected, one of them (Paris) is among the 10 most-visited cities in the world list and only one (Delhi) is in the 10-most populous cities in the world. One possible explanation for this is that Delhi was in the middle of the city selector bar, so perhaps it was one of the first cities people encountered on the bar that they had heard of.

6.3.1.4 Whose Data to Include in the Study

In order to see whose behavior Terra Incognita influenced, I needed to observe a minimum amount of time actually using the tool. We also needed a minimum amount of pre-installation

data in order to meaningfully compare between pre- and post-study behavior. After reviewing the above general usage data, I wrote a script to include in the study only the user data that met the following criteria:

- Not the creators: we excluded myself and Matt Stempeck
- Had been in the system for at least 5 days: At least 5 days had passed since first login date
- Had used TI for at least 5 days: At least 5 days of browser history post-installation and that history included at least 10 items
- Had at least 5 days of preinstallation browser history and that history included at least 10 individual URLs visited

The remainder of the data analysis is performed on the data that meets the above criteria. There are 92 users in the filtered group. In analyses where I am referencing data collected in the final post-study survey (see *Appendix 8*), the sample size is even smaller (40) because not everybody filled out the post-study survey. In analyses where I need to intersect those two sets of data to answer a question, the sample size is even smaller (27).

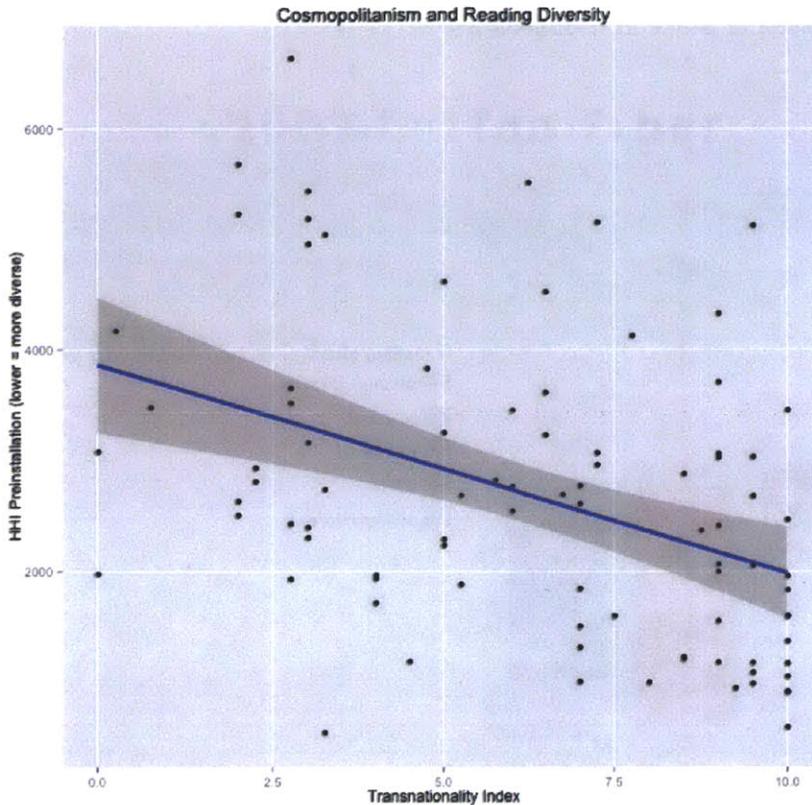
6.3.2 Prior to Terra Incognita Installation

I had a number of questions about the relationship between users' news reading and their gender, their cosmopolitanism, their values and their work prior to their installation of Terra Incognita. What factors might account for coming into the study with more diverse reading habits? Who already reads more diverse news? Who does not? Do the following factors correlate to greater diversity of geographic news reading prior to using Terra Incognita?

- People who have a higher Cosmopolitanism/Transnational Index
- People who have a professional stake in the news
- People who say they value and make time for news reading
- Gender

6.3.2.1 People Who Have a Higher Cosmopolitanism/Transnational Index

As detailed in *Chapter 5*, I use the Transnationality Index defined by Mau, Mewes and Zimmerman as a proxy for cosmopolitanism. I'm using the Herfindahl–Hirschman Index, an economic measure of competition in a marketplace, to measure the geographic diversity of users' news reading. Instead of "firms," I use countries in the world that a user has read about.



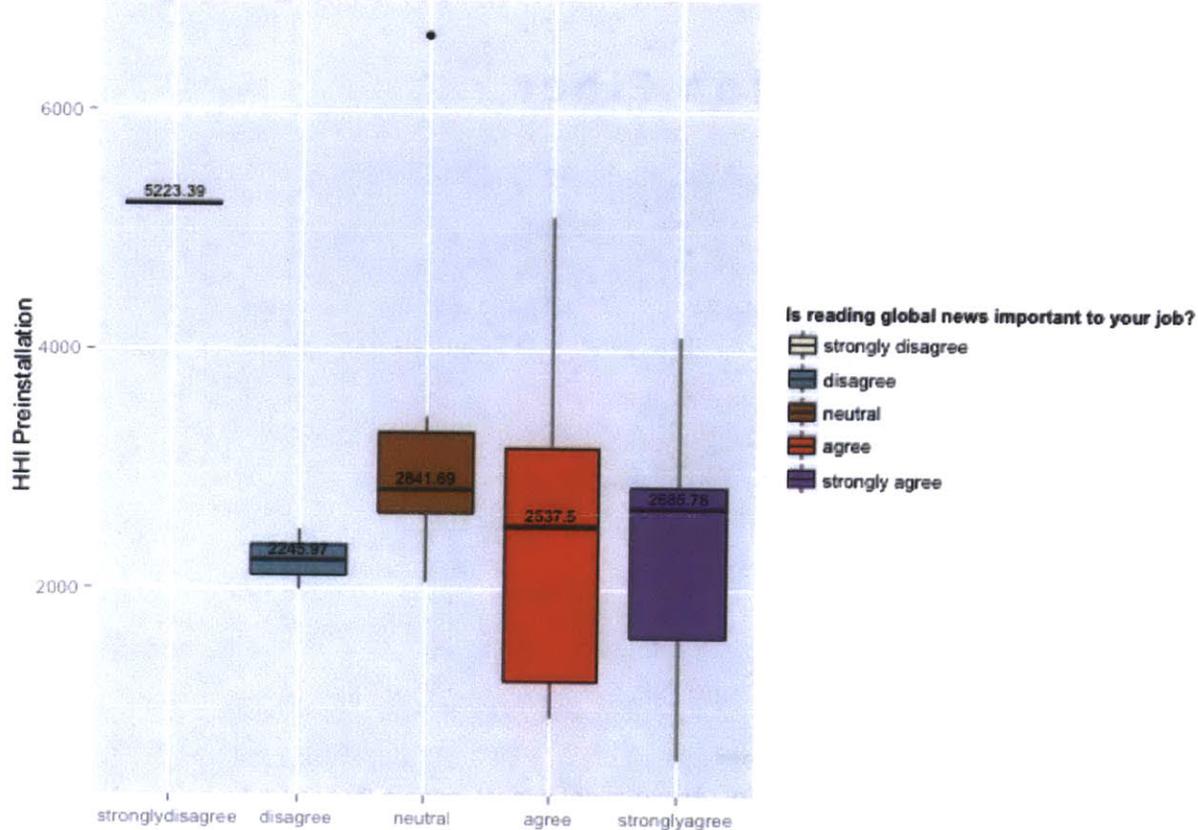
Cosmopolitanism and Reading Diversity. As we might expect, people that score higher on the transnationality index read about a greater geographic diversity of places. This chart shows the relationship between HHI prior to installing Terra Incognita and how people scored on the Transnationality Index.

As we might expect, people who score higher on the transnationality index read about a significantly greater geographic diversity of places. A one higher point increase in a user's transnationality index translates corresponds to approximately an approximately 187 point lower HHI. A user's transnationality index accounts for 16% of the variance in HHI ($R^2=0.16$ and $p\text{-value}= 0.00005816$). Having transnational ties is a good predictor of reading diversity. This is an interesting finding and possibly might be leveraged in future research.

6.3.2.2 People Who Have a Professional Stake in the News

I hypothesized that people whose work involves reading global news in some way would prioritize it and enter the study with higher diversity. A boxplot of user responses in the post-survey appeared to support this conclusion, but a regression analysis does not support it, possibly limited by the small number of participants who responded to the survey and who had sufficient pre-installation history.

Reading Diversity and Professional Stake in Global News



In this case, the data is limited because we the question was asked this question in the post-survey so the sample size is smaller (n=27). The "strongly disagree" category only had one data point and the "disagree" category had only two so those categories are not very meaningful for comparison. We can see that the median HHI for people who are neutral on the question (2841.69) is higher than those who either agree that global news is important (2537.5) or strongly agree that global news is important to their work (2685.78). This would indicate that people who have a professional stake in global news reading tend to read more diverse news.

The regression analysis on this data, however, found no significant relationship. The sample size is quite small, however, and this study should be investigated among a larger, more representative sample before drawing any conclusions one way or the other.

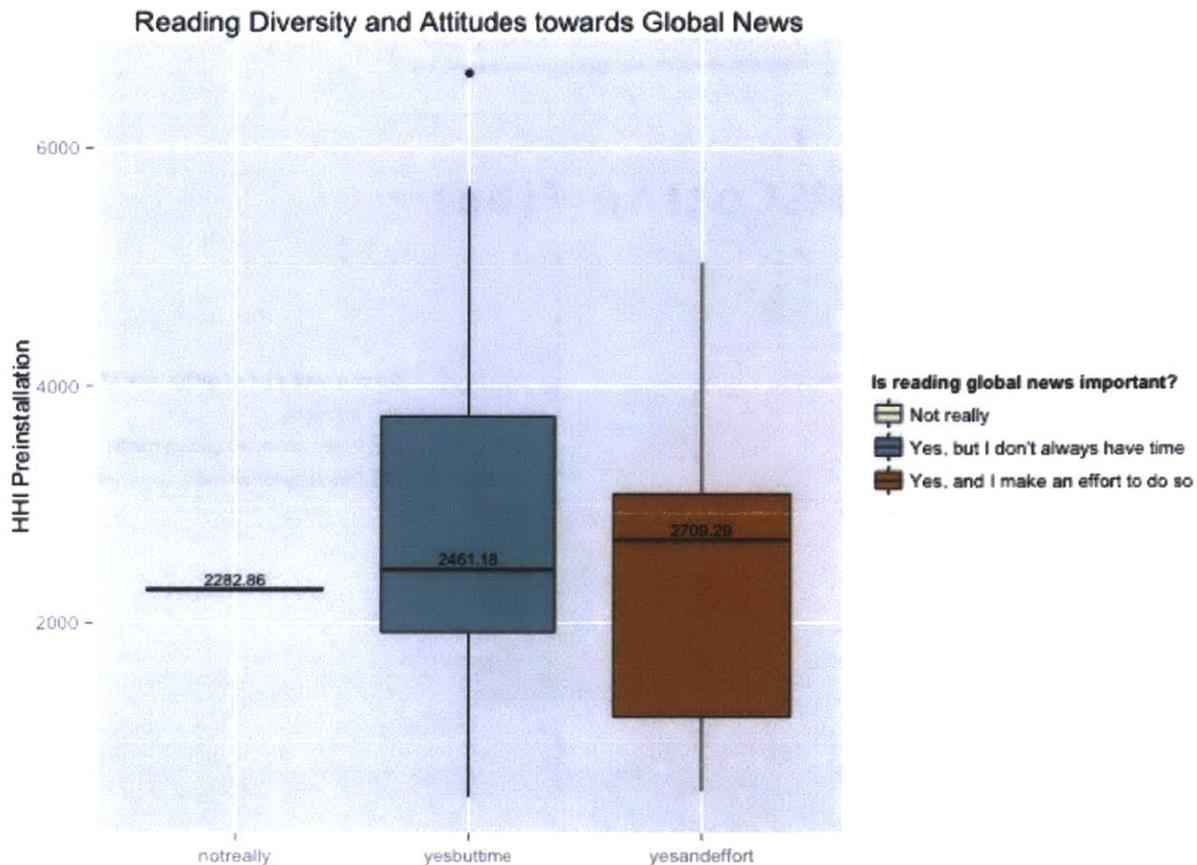
6.3.2.3 People Who Say They Value and Make Time for News Reading

I also hypothesized that people who state that they value and make time for global news reading would enter the study with greater geographic diversity. I asked about how people valued and made time for global news in two ways: "Which sentence best describes your weekly news reading experience?" and "Do you think reading news about countries other than your own is important?"



When asked to describe their weekly news reading experience, people who state that they regularly follow many countries predictably have the highest median levels of diversity (lowest HHI) at 2330.57.

An surprising and counterintuitive finding is that people who say that they follow news about the countries in the headlines at any given time appear to have less diverse reading habits than those who say that they do not follow much global news. There are several possible explanations for this finding, including: 1) HHI might not be a reliable measurement the diversity of online news reading, 2) People who follow global news might do so via tablets, mobile devices, print newspapers, or other places that Terra Incognita cannot monitor, or 3) People's perceptions of the diversity of their global news reading differ from the actual diversity of their reading as measured by HHI, or 4) People may prioritize global news but do so for a geographically narrow slice of the "global." Future studies may investigate the reason for this surprising result.

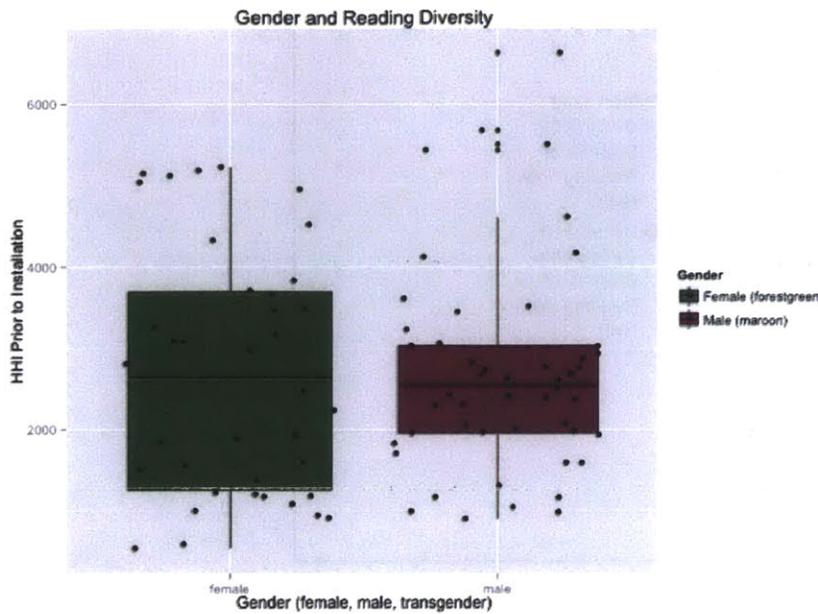


Similarly, when trying to assess whether attitudes like valuing global news reading have an impact on the geographic diversity of users' news reading, the findings are also somewhat counter-intuitive. People who responded that it is important and they make an effort to follow global news actually had lower diversity rankings (a higher mean HHI of 2709.29) than people who responded that they value global news but they do not always have time to read it (a lower mean HHI of 2461.18); only one person answered that reading global news was not important. A regression analysis, however, does not support this relationship.

If future studies were to support this discrepancy, it might indicate that people's self-reported values and behaviors may represent aspirations and perceived behavior, but not their behavior. There is also a wide variety of variation in what it means to "make time for global news reading" and to "follow countries in the headlines". It is also possible that the HHI measure of online reading behavior is systematically biased in the ways discussed above.

6.3.2.4 Gender

I hypothesized that gender would not be correlated with diversity of news reading. Visual analysis and a regression analysis support this hypothesis.



6.3.3 Post Terra Incognita Installation

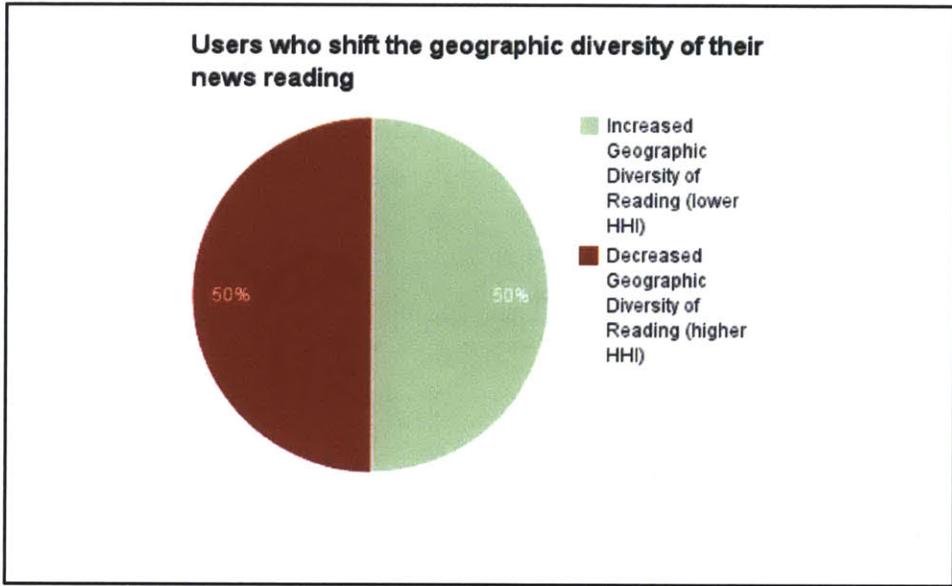
What are the effects of using Terra Incognita on the geographic diversity of users' reading habits? Does Terra Incognita affect reading diversity? For what percentage of users and by how much?

A related set of questions revolved around who changes their behavior? Are the following factors (same as in previous section) correlated with those who change their browsing?

- People who have a higher Cosmopolitanism/Transnational Index
- People who have a professional stake in the news
- People who say they value and make time for news reading
- Gender

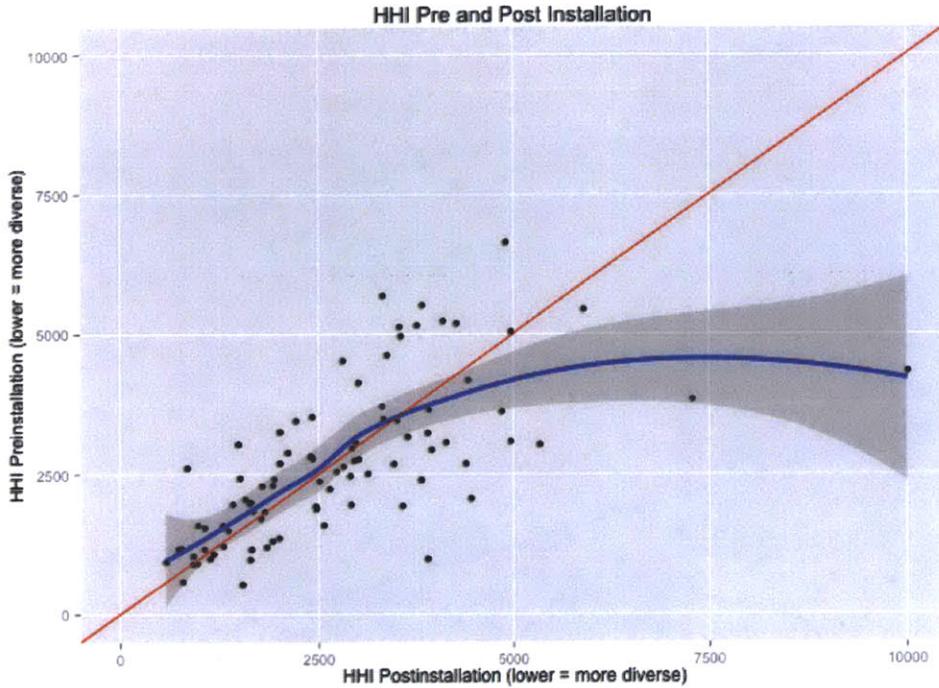
6.3.3.1 Shifts in Reading Diversity

As described in *Chapter 4, Section 4.3.3 Notes on Experimental Measurements*, I use the Herfindahl-Hirschman Index ("HHI") of market concentration to compute geographic diversity of reading behavior. In this case, I treat the countries that people read about as "firms" in the marketplace.



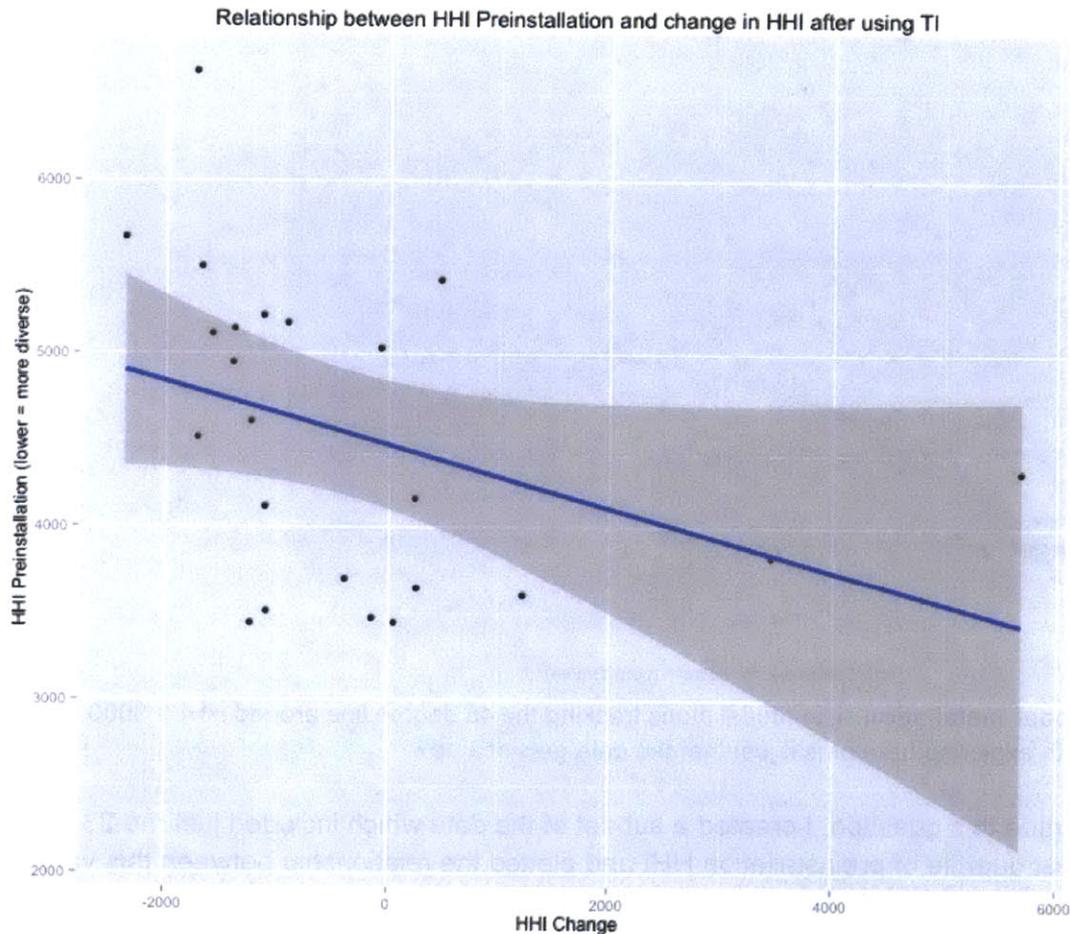
Half up, half down. Exactly 50% of users increase the geographic diversity of their news reading and 50% do not.

Exactly 50% of users increased the geographic diversity of their reading after installing Terra Incognita. This also means that 50% of users decreased the geographic diversity of their reading. This initial finding seems to indicate that Terra Incognita did not have much of an effect on the geographic diversity of users' reading and that users were simply regressing to the mean, i.e. reading more at one time and less at another time. However, when I plotted pre-and post-installation (see below figure), this seemed like perhaps it was worth exploring whether there were greater HHI shifts for users who entered the study with higher initial HHI (i.e. lower geographic diversity of news reading).



HHI pre- and post-installation. The model stops tracking the 45 degree line around HHI = 3000. Is there something worth exploring here or is it just that the data gets sparse?

In order to pursue this question, I created a subset of the data which included just the 23 users with the highest quartile of preinstallation HHI and plotted the relationship between this variable and how much change in HHI they exhibited over the course of the study.



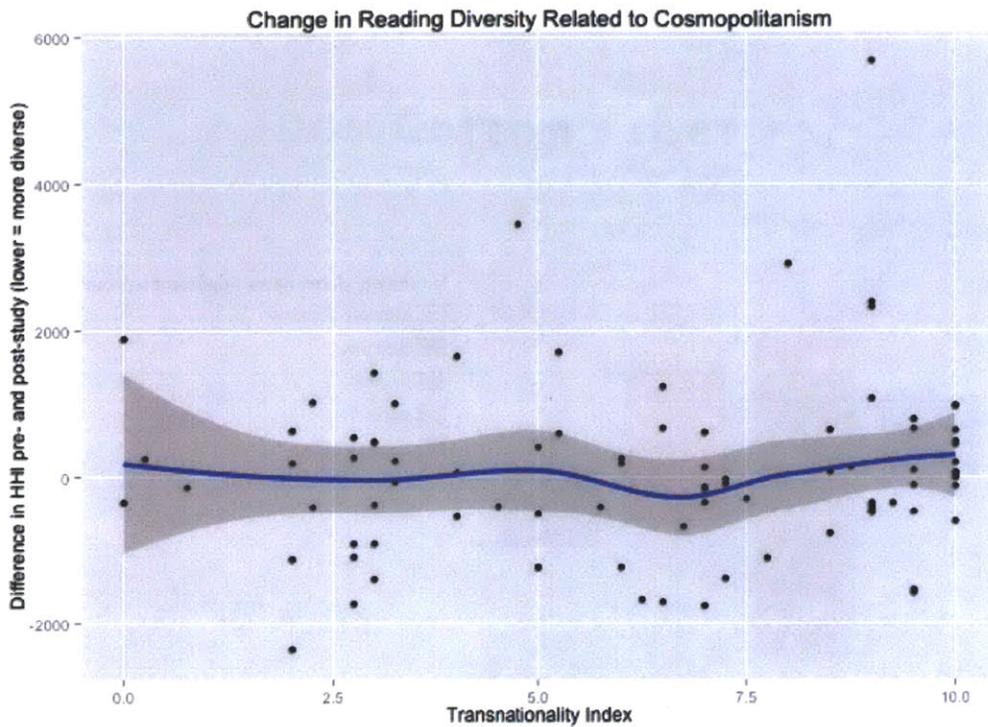
Plotting a linear model to only a subset of the original data set: users with high preinstallation HHI values (who came in with lower geographic diversity).

This plot looks like it might be encouraging so I conducted a regression analysis. This found nothing conclusive. The p-value was a marginally significant 0.079 ($F=3.397$), suggesting that there was only an 8% chance of the relationship being just pure noise. R^2 was only 0.1, which means that even if there were a relationship between these two variables, the preinstallation HHI only accounted for about 10% of the variation in the HHI change. This also might just suggest that people who read less diversely in the month prior to using Terra Incognita were on a natural swing back in the other direction, i.e. regressing to the mean rather than showing any kind of change from using the application. While the evidence is not strong enough to make any claims, this might be an avenue to pursue in further research.

6.3.3.2 *Who Changes Their Behavior?*

We started exploring this in the prior section looking at users who entered the study with less geographically diverse reading habits. Are there other categories of people who displayed a behavior shift over the course of the study? If so, what factors correlate with that shift? Our analysis identified no group of users who shifted their HHI in response to using Terra Incognita and being in the study.

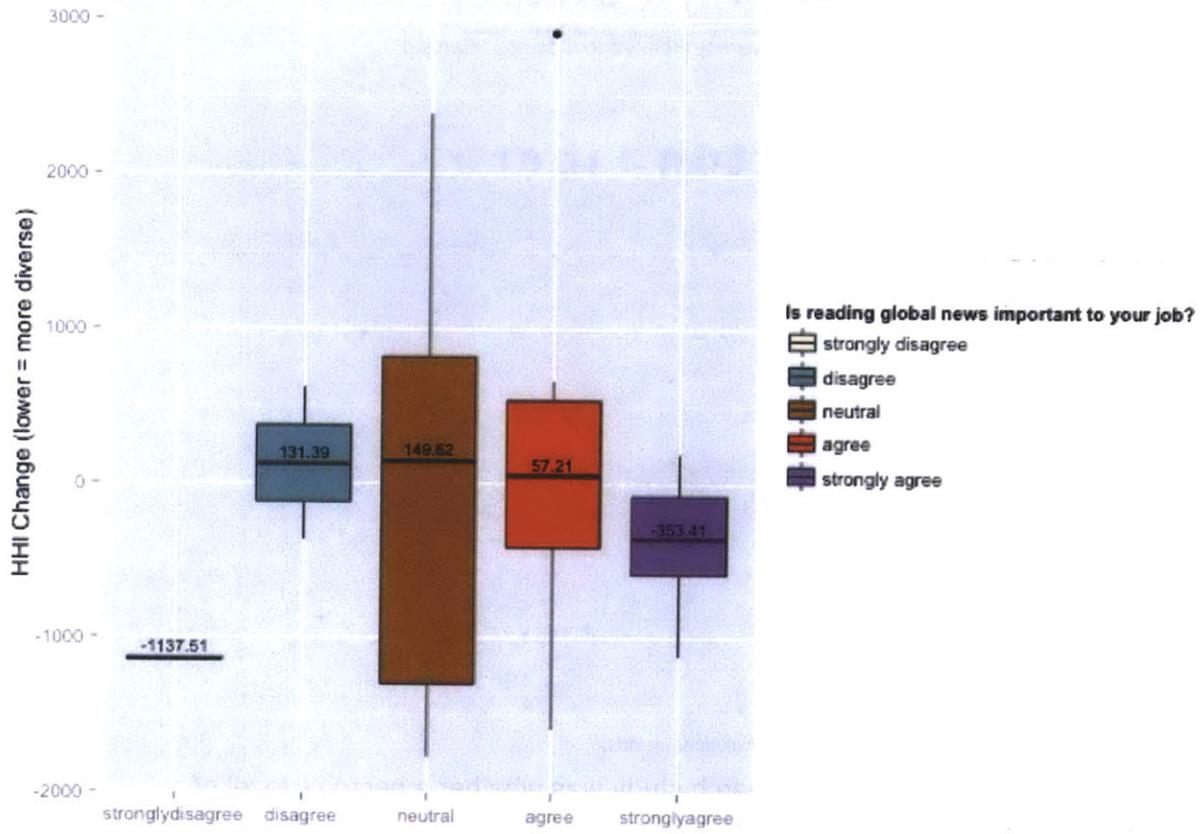
6.3.3.2.1 People Who Have a Higher Cosmopolitan/Transnational Index



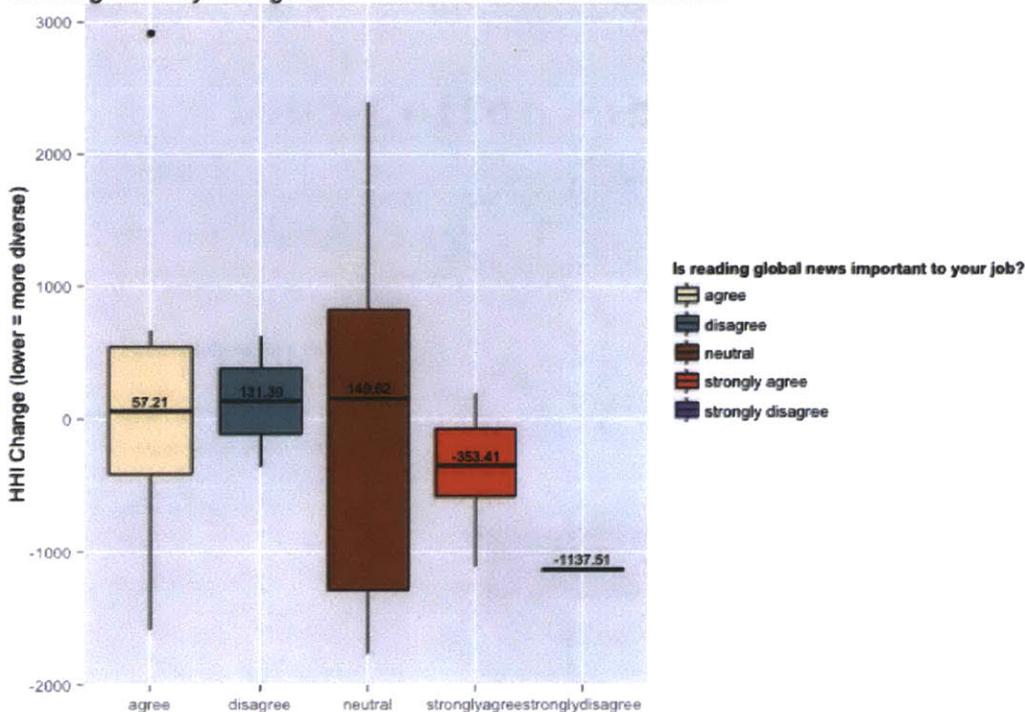
One of the core questions of the research study was whether a person's level of cosmopolitanism (here indicated via the transnationality index) would affect how much their behavior shifted during the study. While the prior section showed that pre-installation geographic reading diversity correlated with the transnationality index, here we see that there is no relationship between how much someone's behavior shifted and how they scored on the transnationality index. Regression analysis bears this out; cosmopolitanism does not have a significant correlation with the amount that someone shifts his or her reading behavior after using Terra Incognita.

6.3.3.2.2 People Who Have a Professional Stake in the News

Reading Diversity Change and Professional Stake in Global News



Reading Diversity Change and Professional Stake in Global News

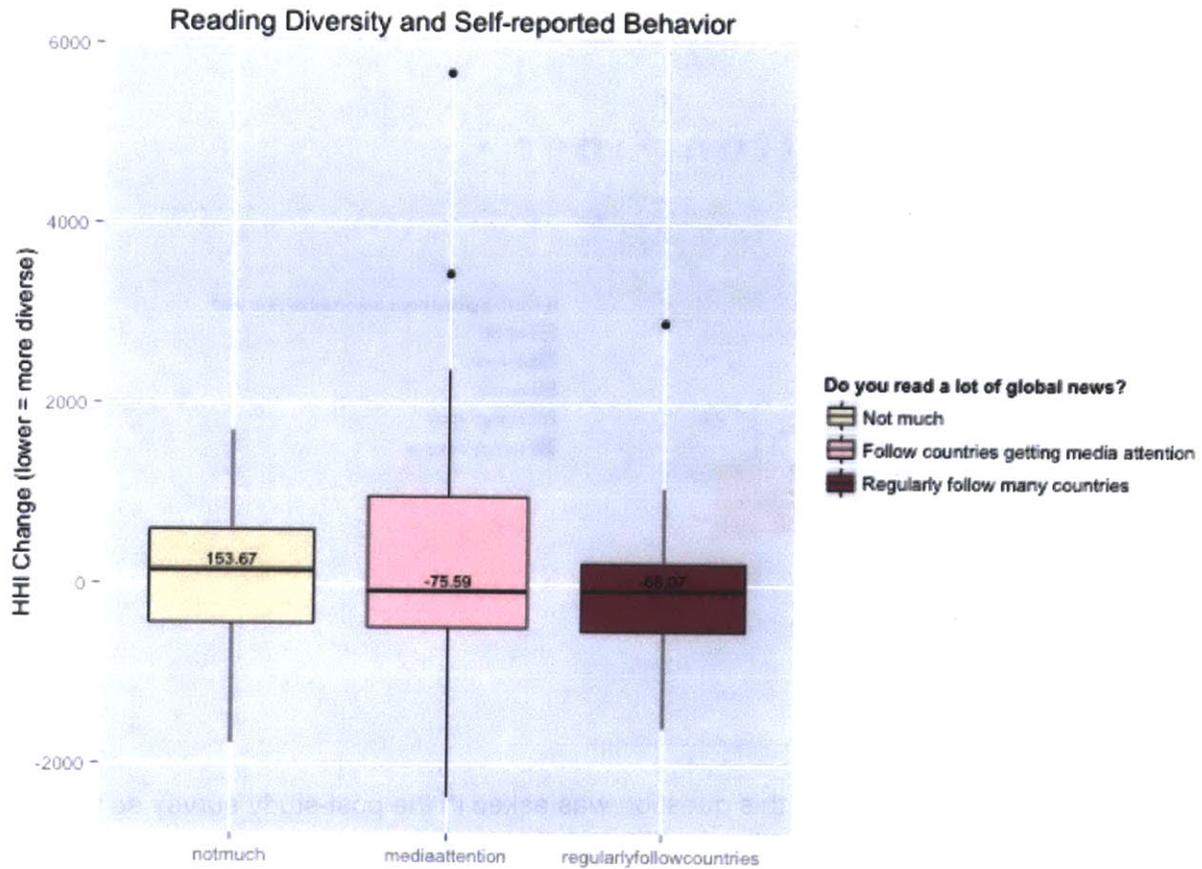


As I described in the prior section, this question was asked in the post-study survey so the number of respondents is much smaller ($n=27$) and the "strongly disagree" category only represents one data point so we cannot infer much from that category.

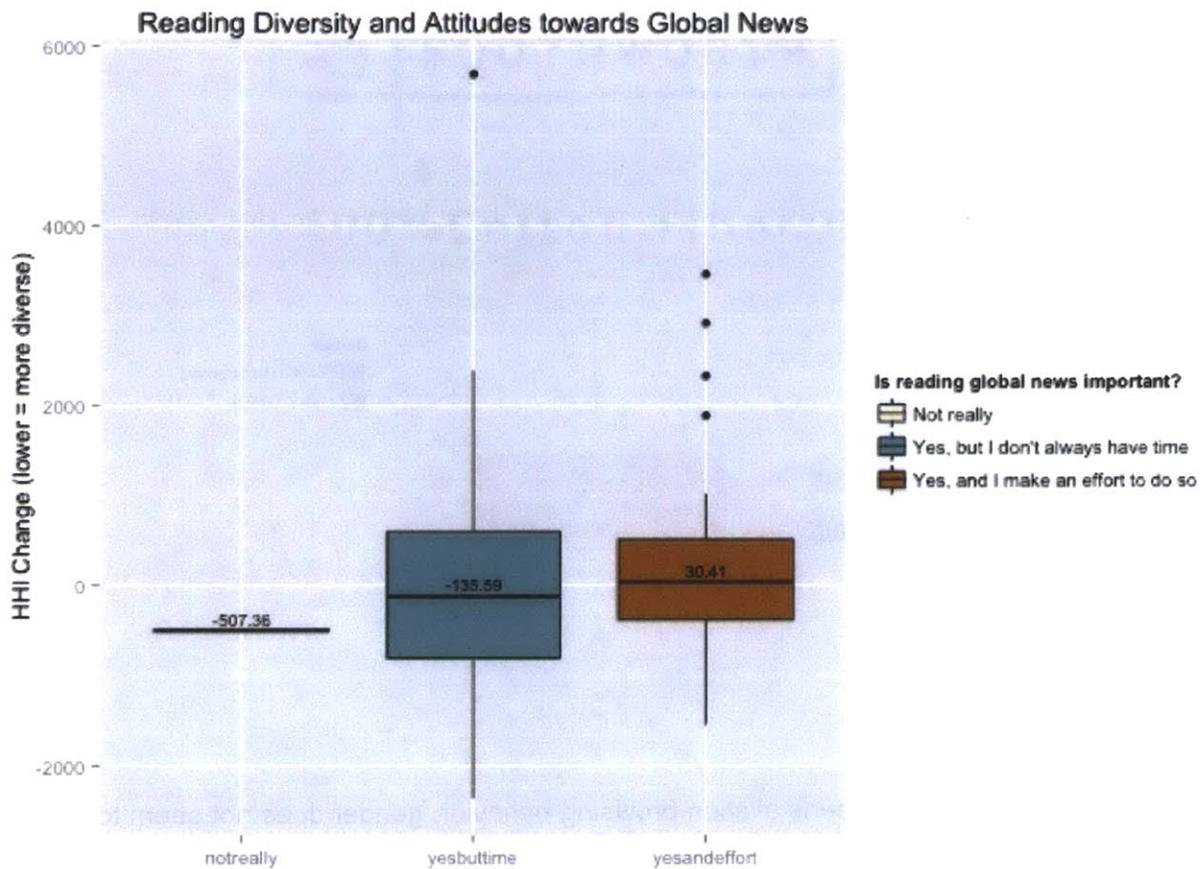
From the boxplot, it might appear that those who strongly agreed that reading global news was important to their work had a greater shift towards more diversity (-353.41 in HHI) whereas other groups showed lesser amounts of change (less than 150 HHI). However, a regression analysis did not support this finding: people who have a professional stake in the news did not show any resulting news reading shift after using Terra Incognita.

6.3.3.2.3 People Who Say They Value And Make Time for the News

Do the self-reported behaviors and attitudes around global news reading correlate with shifts in geographic diversity of news reading? It seems that how much people state they read, value and make time for global news does not correlate with how much they shift behavior while using Terra Incognita.

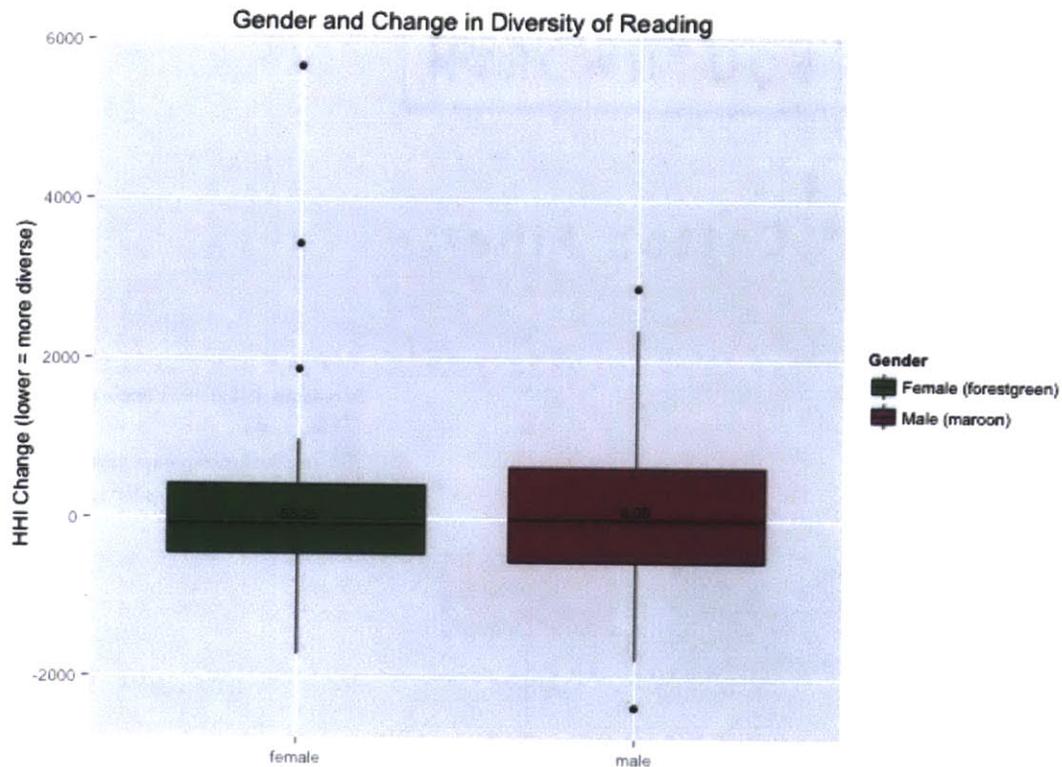


Shifts in users' geographic diversity of reading based on how they characterize their weekly news reading are very small and likely not indicative of any relationship between these factors. Regression analysis bears this out.



Similarly, whether or not people say they make time for Global News does not appear to have a significant impact on predicting how their reading behavior changes after using Terra Incognita. Regression analysis bears this out.

6.3.3.2.4 Gender

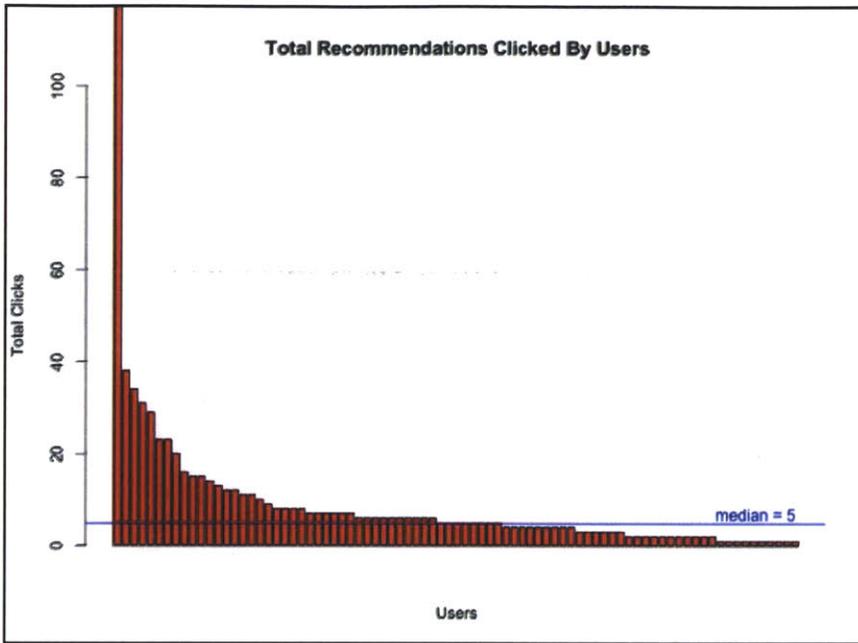


As with the findings around pre-installation browsing behavior, gender does not seem to be a significant factor in how much people change their reading behavior after installing Terra Incognita. Regression analysis bears this out.

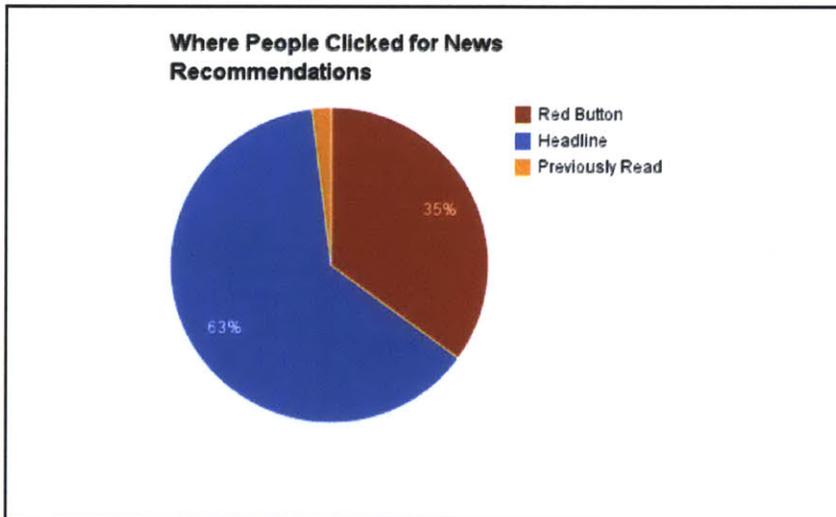
6.3.4 Evaluation of Recommendations

6.3.4.1 Interaction with Recommendations

In terms of overall engagement with Terra Incognita's recommendations, 90.2% of users clicked on a recommendation in Terra Incognita and 79.3% of users clicked on more than one during the post-installation period. At the high end, one user who clicked 287 recommendations.

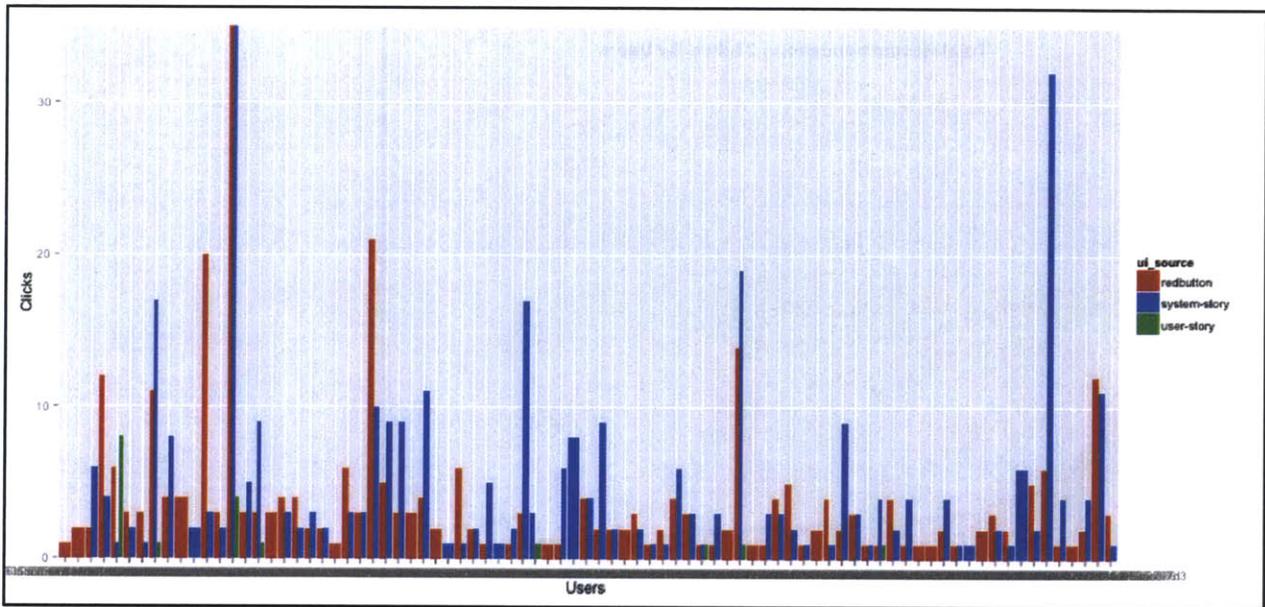


Recommendations plotted by user. One user clicked on TI recommendations 287 times but the rest of the users ranged between 0-40 clicks, with a median of 5 clicks per user.



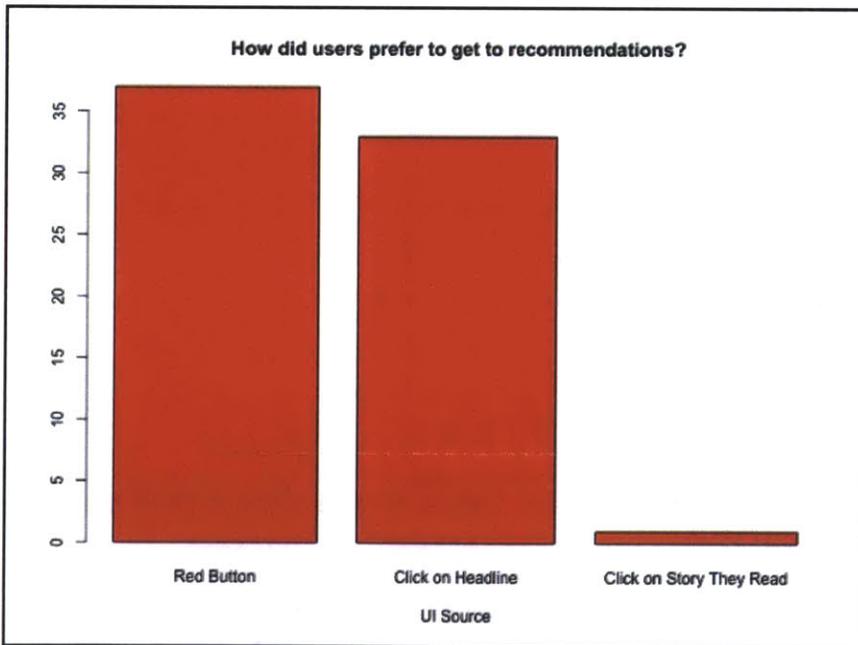
Where people clicked for news recommendations. Overall there were more clicks on news headlines (63%) than clicks on the large red button (35%).

While in general there were more clicks on news headlines versus the "I'm feeling lucky" button, this result was slightly skewed by the person who had clicked more than 280 times in the system. When broken down by individual users, 77% of users demonstrated preferences for either the red button or the news headlines.



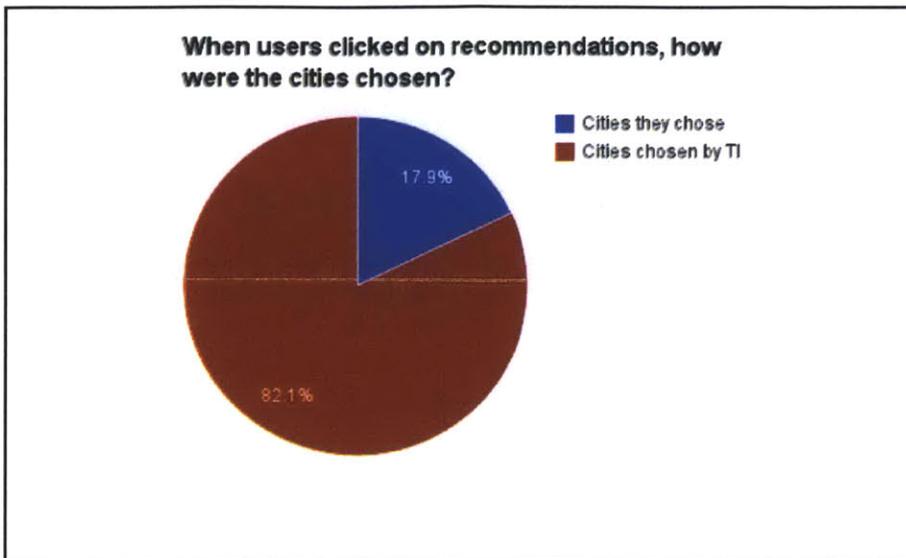
Source of Recommendation Clicks by Individual User.

The majority of users (66%) tried out accessing recommendations by more than just one means (Red Button & Headline, for example). 77% showed a preference for clicking either the Red Button or the Headline to go to a recommendation.



Which UI element did users click to get to recommendations? Slightly more users preferred using the "I'm feeling lucky" red button.

While there were more overall clicks in the system on recommendations from headlines, grouped clicks by user shows that slightly more users favored clicking on the red button as their preferred way to access a news recommendation from Terra Incognita.

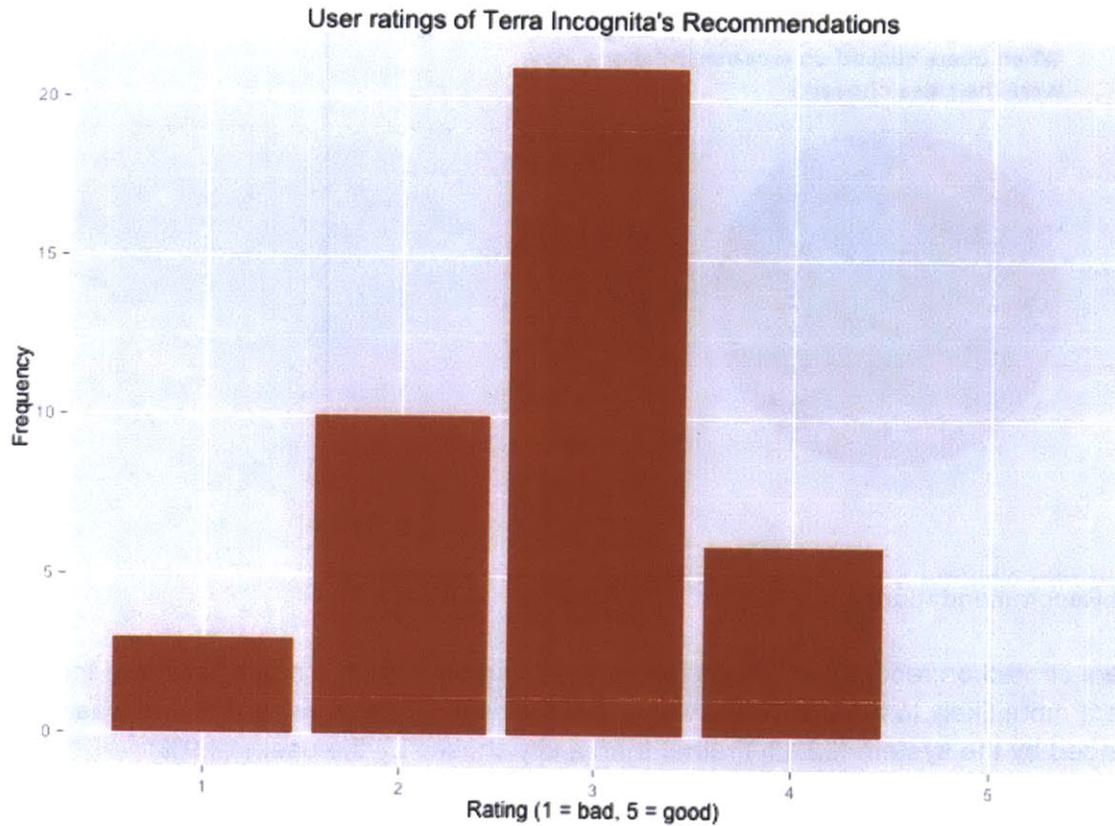


Cities and Recommendations.

When users clicked on recommendations from the red button or from a news headline, the stories were more likely to be associated with a city the user did not know about that was recommended by the system (82.1%) rather than a city chosen by the user (17.9%).

6.3.4.2 Evaluation of Recommendations

What did users think of Terra Incognita's recommendations? The data in the following section comes from the post-survey so it has a smaller sample size (n=40).



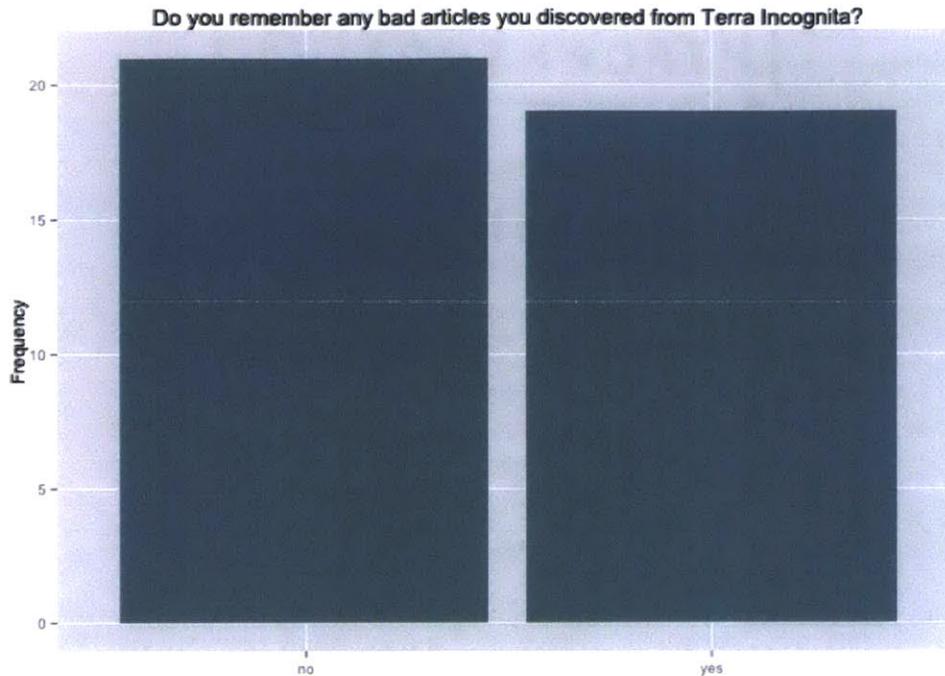
Asked to rate recommendations on a scale of 1 (bad) to 5 (good), the mean user rating of Terra Incognita's recommended news articles was 2.8 (median: 3).

Did you ever share a recommendation you learned about through Terra Incognita?

At least once	11
More than once	6
Never	23

Terra Incognita did not track shares but this can indicate quality. In the final survey, 43% of users reported sharing a Terra Incognita recommendation at least once.

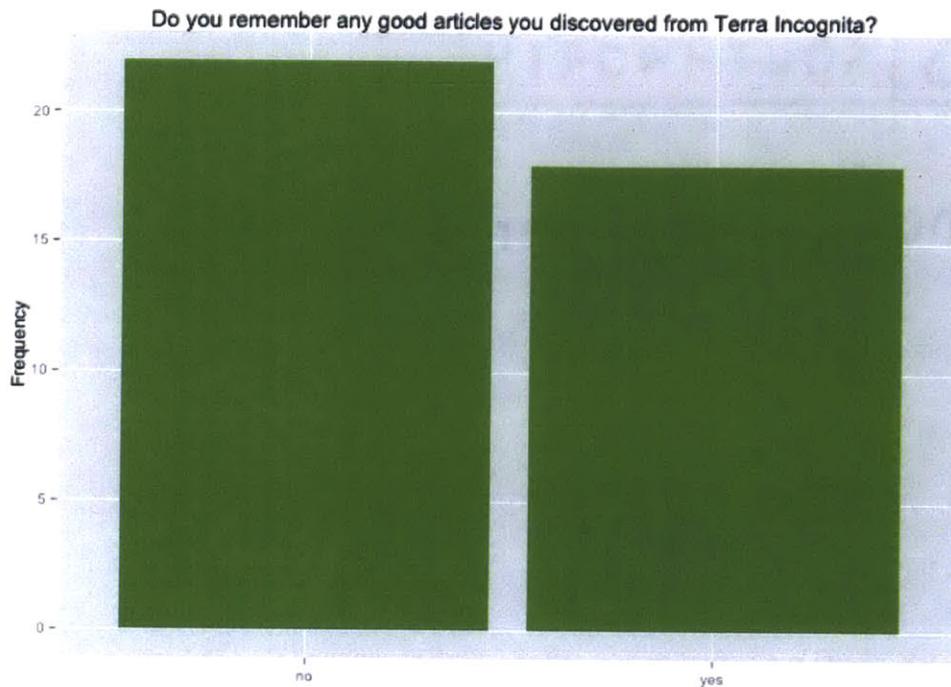
In the following questions I was interested in gauging how memorable different "bad" or "good" recommendations were.



21 of 40 respondents, roughly half, remembered a "bad" article that Terra Incognita had recommended them. By "bad," I had assumed people meant the article had low-quality writing or geographically was not related to the city they had expected.

However, in the optional field to explain more about the bad articles, four of the seven people who provided more information mentioned they felt that there were too many Wikipedia articles. As one user said, "There's a lot of Wikipedia. Not necessarily bad, but I would have liked to see more coverage by English-language foreign papers." Three respondents mentioned geographic errors where the software had located an article to a place that it wasn't actually about. And finally, there were two comments that had more positive sentiment, "Mostly on target, I think." and "There were a few [bad articles] initially but I haven't noticed as many lately."

Similarly, I sought to know whether people remembered discovering any particularly "good" articles from Terra Incognita.



Slightly more than half of respondents (55%) said they did not remember a particularly good article that they had discovered through Terra Incognita. Of those who did, three respondents provided further detail on what piqued their interest. User 73 said, "I really enjoyed an article about the female biker gangs in Marrakech." User 8 mentioned that she remember the articles about "a few cities in China, one on expat life in some Asian city". And User 98 was particularly enthusiastic about the recommendations discovered by clicking on the red button:

I loved the "Fortune favors the bold" articles. Whenever I had the time to surf for something new on the Internet I just clicked on this button and read about a new city with interest. Although the amount of work I had during this research didn't allow me plenty of time to explore much.

A final question in the post-study survey asked people how they would improve Terra Incognita's recommendations. This garnered some extremely useful information, with 85% of respondents giving detailed suggestions. In *Appendix 9*, I have included a table of people's responses and how I coded them.

Users' suggestions for improvement centered around six areas. Some responses fell into more than one category.

1. *Wikipedia Problem (4) & Better Local News (5)*: Almost a quarter of the respondents felt that Terra Incognita's recommendations could be improved by incorporating more local news recommendations, and excluding Wikipedia articles and government websites (which I assume is referring to the numerous government websites we have about Chinese cities). User 13 suggested automated translation as a way to incorporate more

- local news sources. User 16 mentioned how there were numerous cities without any recommendations. User 47 noted that many of the news sources were US-centric.
2. *Technical concerns* (9): This group primarily suggested improvements to the geolocation technology so that there would be fewer recommendations that claimed to be "about" the city in question but turned out only to have a single reference to that place. User 22 mentioned that TI loaded very slowly and User 100 mentioned that the system never worked for her.
 3. *Personalization/Targeting/Curating* (7): Seven respondents mentioned strategies of tighter editing, user curation or algorithmic personalization to more directly target information to the end user. These users felt that TI's offerings needed to be more tailored to be of interest to them. For example, User 78 said, "Many of the recommendations were soft travel articles that aren't relevant to my concerns."
 4. *UX suggestions* (6): Two users wanted to see more user feedback in the form of maps of places visited or a weekly summary of countries you have visited. Others simply stated that they would like a better or "more exciting" UX. And User 45 mentioned that she did not like the fact that Terra Incognita appeared in every tab.
 5. *Social* (3): Three people mentioned that they would like to integrate Terra Incognita with social media either to see what their friends are reading or to be able to more easily share what they are reading.

6.3.5 Evaluation of Game Mechanisms

The gaming aspects of Terra Incognita included the city count (the idea of "collecting" cities) and the Top Reader and Top Recommender designations, which served as call-outs to the people who had read or recommended the most articles about a particular city.

Several questions in the final survey attempted to assess whether these game-like mechanisms served as incentives for people to read more geographically diverse news and/or whether people even noticed them.



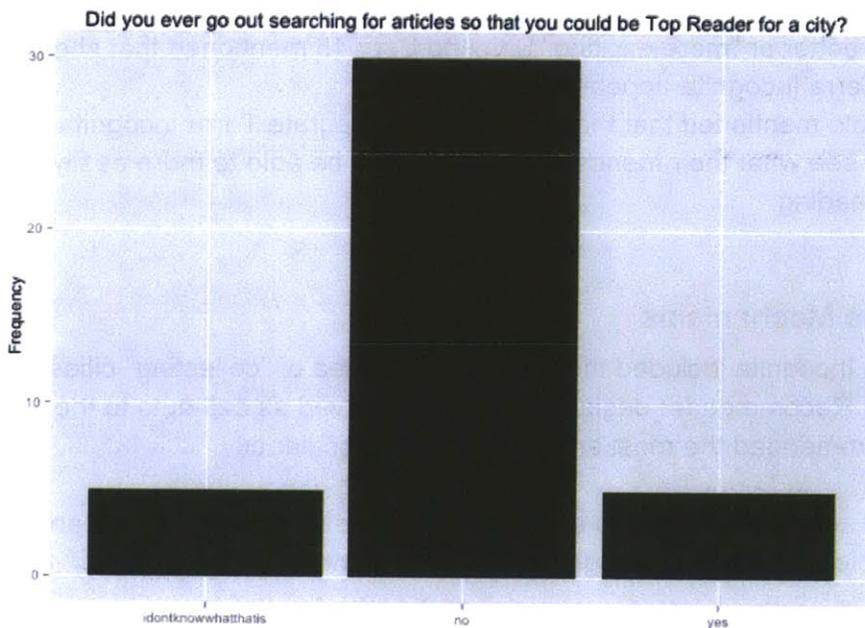
Top reader or recommender. If the user had read or recommended the most articles about a particular city then her name was listed underneath the city's name.

Were you ever a top reader or recommender for a city?

I don't know	13
Yes	13
No	14

For example, almost a third (13) of 40 respondents to the question, "Were you ever a top reader or recommender for a city?" stated that they did not know what that meant; this suggests that this was not an area that they had noticed in the interface. Around a third each knew that they had or had not been a top reader or recommender.

I was also interested to know whether people had consciously sought out geographic information in order to affect these rankings or increase their city count. This would represent a shift in user behavior attributed to these specific incentive systems.



In the case of the "Top Reader" designation, five of the respondents (12.5%) had gone searching for article specifically so that they could attain that status. While that is a small overall percentage of users, it is interesting that the designation was meaningful enough to a small percentage of people to directly seek out information outside the Terra Incognita interface.

Did you ever go out searching for articles in order to increment your city count?

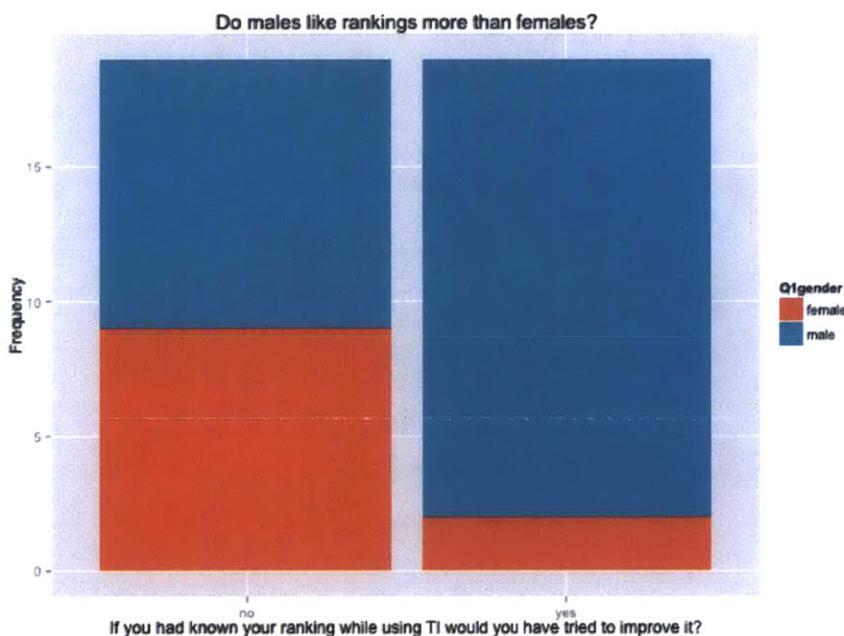
I don't know what that is	4
Yes	9
No	27

An even higher number of users (23%) said that they had searched for information about particular cities to increment their city count. This is far from the majority, which suggests that not all users are motivated by rankings and counts. Nevertheless, if the count motivates even a small portion of users to seek out further information with no detriment to others, this feature

likely merits inclusion. I think these individual shifts in behavior produced by a simple feedback mechanism like a count are extremely interesting.

The final survey showed users where they ranked individually (see *Appendix 8* for how this question looked to a survey respondent) in relation to other users and asked them whether they would have tried to improve their ranking if they had known their individual rank while using the system.

Surprisingly (to me), exactly half of respondents (20 out of 40) said that they would have tried to improve their ranking had they known it while using Terra Incognita. This suggests that social and competitive mechanisms like rankings might be a productive avenue to evaluate for incentivizing users to explore global news.



However, those groupings are not equally balanced by gender. Game researcher Jane McGonigal asserts that males may be more inclined to competitive ranking systems than females¹³¹ and this question bears out that finding.

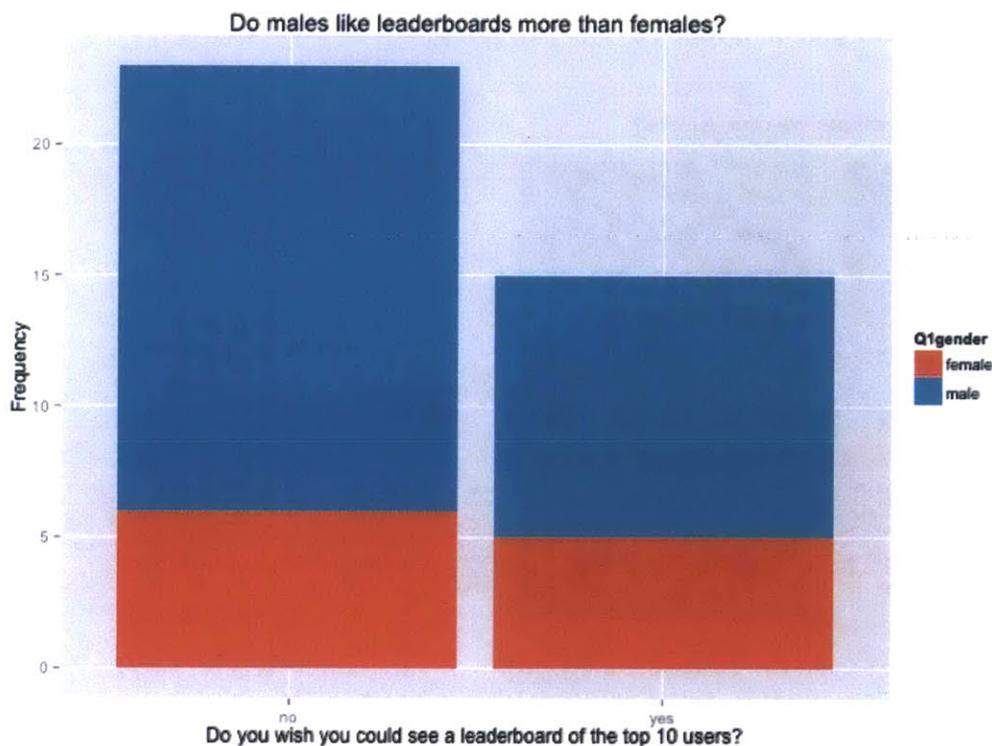
For Terra Incognita, it looks like many more males (18) than females (2) state that they would have tried to improve their standing based on their ranking while the "no's" are more gender balanced. This is somewhat skewed by the fact that fewer females responded to the post-survey; nevertheless only 16% of female respondents felt that knowing their ranking would have prompted them to improve it, compared to the 62% of male respondents who said it would.

¹³¹ "Sirlin.Net - Blog - An Evening with Jane McGonigal," accessed July 23, 2014, <http://www.sirlin.net/blog/2012/2/1/an-evening-with-jane-mcgonigal.html>.

Do you wish you could see a leaderboard with the top 10 users in the system?

Yes	16
No	24

The final question I asked was another hypothetical question about gaming mechanisms. Did users wish they could see a leaderboard for the whole system? In this case, 40% responded that they did wish to see one and 60% responded that they would not. While 40% is again not a majority, it suggests that more users in the system would be motivated by a leaderboard than I had anticipated. Were more of these users male, as in the case of the rankings?



The results around leaderboards seem less unevenly distributed according to gender than the preference for rankings. When asked if they would like to see a leaderboard of the top 10 users in the system, women were fairly equally distributed between yes and no while men were decidedly more skewed to the "no" side of the equation.

6.3.5.1 Users Explain Their Rankings

I also asked a more open-ended question to learn more about users thoughts about rankings and other game mechanisms in Terra Incognita. After showing the user her ranking (#x out of y users in the system), I asked her to explain that ranking and her total count of cities that she had visited.

The feedback in this section was quite varied as you can see in *Appendix 10*. Though I did code it into several categories, these categories do not encompass all of the variation in users'

responses. These were the trends that I identified:

1. **Users conflated opening a new tab with Terra Incognita incrementing their city count (6):** It was clear from the responses of six people that they believed that their city count incremented every time they open a new Tab in their browser. This is not how Terra Incognita works; rather it analyzes the content of the news articles that they browse and derives cities that the articles are focused on from that content. This indicates a lack of user understanding of how the application was working behind the scenes and how future iterations should be clearer about rankings, counts and metrics.
2. **Surprise at a higher or lower ranking than expected (6):** Numerous users expressed surprise that their ranking was higher or lower than they would have expected. For example, "I'm really happily shocked, I assumed I'd be way lower." (User 99) and "I open a lot of windows in order to search, but rarely have time to dig into the stories as I'm looking for something specific. Am surprised that the city count isn't higher." (User 78)
3. **Lack of time to explore (4):** Several people made reference to not having time to explore even if they might want to do so. User 45 said, "Although I was fascinated by the proposition, I have very limited time. Therefore chose not to explore as much as I might have liked."
4. **Critical of New-Tab Intervention (2):** A lack of time, or inopportune timing, was mentioned twice from a critical perspective in conjunction with the time and place of Terra Incognita's UI intervention in the New-Tab. Said User 58, "Ctrl + T is usually when I'm busy wanting to open / search for something so don't always have the time to read about a new city;"
5. **Claim not to be motivated by ranking (4):** Four users claimed that they were not motivated by the rankings for various reasons including that they liked reading but not for the sake of numbers, they were not participating because of any competitive aspect, and that they did not have a goal but preferred to explore when time permitted. For these users, a slow or self-paced information discovery strategy seems to have been important. User 93 said she wanted to be able to read "at ease" and that "I just don't feel like reading about 10 cities in one day would make sense. I need time to think about what I read."
6. **Prefer to read on mobile device (2):** Two users stated that they do most of their reading on their mobile devices, which is why their rankings were lower.
7. **Chrome not primary browser (2):** Two users stated that Chrome was not their primary browser, which is why their rankings were lower.

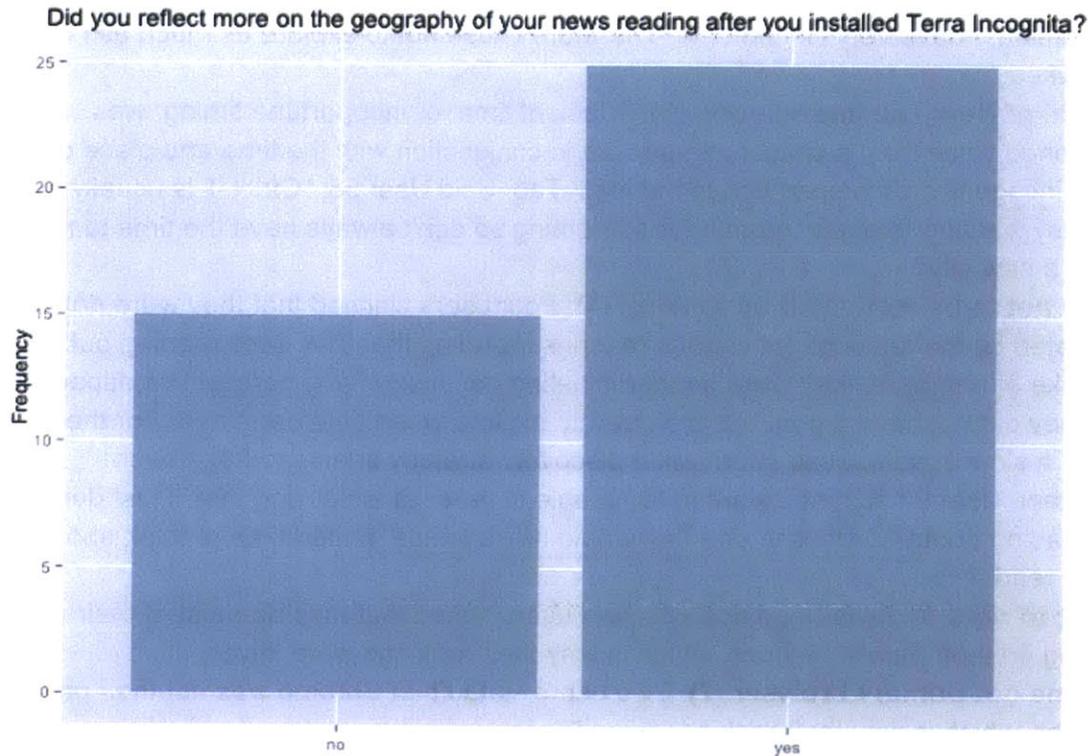
6.3.6 Learning and Reflection

Many of the design strategies outlined in *Chapter 4, Section 2 - Design Strategies* were oriented around piquing curiosity and making the situation right for learning and exposure to new places and ideas. In the post-survey, I asked several questions related to users' self-assessment of the learning and reflection that Terra Incognita did or did not promote.

The vast majority (87.5%) of users felt they *had* learned something about a new place from using Terra Incognita. Only five people said that they did not learn anything about a new place.

In an optional field to explain their answer, survey respondents noted that just using the application and seeing a new city appear was often eye opening for them. For example User 98 said "Yes, quite a lot. For example, I didn't know there was a place on earth called Micronesia." User 103 stated that they had never heard of Atafu, Tokelau. User 15 stated that she was surprised at the number of cities with large populations that she had never heard of. User 20 responded that, "Simply browsing the scroll at the bottom of the page, even if I didn't click on most of the cities, heightened my awareness of how many locales (specifically Asian ones) I know very little about." One of the primary functions, then, of the serendipitous user interface might have simply been to increase enlarge users' the scope of what people are awareness of what they do not know.

In regards to reflection, the results are slightly more mixed. 63% of respondents said that Terra Incognita prompted them to reflect more on the geography of their news reading.



In an optional field to explain how Terra Incognita did or did not prompt reflection, users offered many interesting perspectives. For example, User 20 noted that seeing Terra Incognita on every new tab made her reflect on her reading and possibly on how she was also being watched, "It certainly made me aware, every time I opened a new tab, of where I was headed-- which was ordinarily not to read global news! I felt that panoptical presence immediately." User 98 noted that it prompted her to think about how little she reads global news in the course of her everyday life, "Before installing Terra Incognita, I didn't care how much of news I covered about different geographies of the world. Installing Terra Incognita made me think how little do I read about

places other than those where I live or the news that directly affects my work or my life otherwise." Two users noted that it helped them think about their biases and the overall geographic scope of their news reading. And User 41 echoed some of the users from the learning question on how Terra Incognita made her aware of how many places in the world she had never heard of: "It was eye-opening and amusing. First, I was shocked at how many 1mill+ cities I'd never heard of. But there were smaller, 5,000 people cities it was fun to read about."

6.3.7 Overall Feelings and Experience

At the end of the post-study survey, I provided two more open-ended questions to gather feedback on how Terra Incognita made users feel and whether they had any further comments or suggestions to contribute. Through these questions I hoped to gain insight into any unanticipated emotions and reactions produced by the tool.

In particular, I was curious whether Terra Incognita made users feel guilty for not reading more, nagged to do something they did not want to, curious about new places, frustrated at having their attention diverted, proud to have learned about a new place or possibly many other emotions.

The responses to this question were rich and varied (see *Appendix 11* for all of them including how I categorized them). They roughly break down into the following categories, which I will describe in more detail. One response could be counted in multiple categories.

1. **Broadened Horizons (14) & More connected (3):** A significant portion of the users mentioned that Terra Incognita made them feel that they were broadening their horizons, "It was a constant reminder that there's a larger world than my screen..." (User 3). This could create a positive feeling in users, "that I was learning about the world" (User 41) or "exploring new worlds" (User 93) but others mentioned that while it broadened their horizons it also made them feel they "...know very little about the world and I make very little effort to know more about it." (User 98) A related feeling mentioned by three respondents was feeling "connected". One user mentioned feeling connected to the other users in the system, another connected to a global activism community and another to the world, generally. As User 78 states, "Made me feel more connected, even if I rarely read stories." Perhaps Terra Incognita helped users feel like they were engaging with a larger world in a small, low-impact way even if they did not read the recommendations?
2. **More curious (7):** Many users also mentioned that it inspired curiosity and interest on their part. User 47 wrote, "I found myself wondering about parts of the world (China!!) that I don't usually think of in much depth."
3. **Not curious (2) & Critical (4):** A third significant group of users responded more critically. Two mentioned specifically that it did not make them curious or intrigued enough to either click on recommendations or change their behavior in another way. A couple other users were critical of Terra Incognita's new-tab intervention, "opening a new tab is usually a moment when I have an immediate task, so it's not the best time to browse" (User 8). And one user felt that the city count inhibited exploration, "To be

honest, the meaningless count of cities that I'd supposedly 'read about' was more demotivating than anything" (User 80)

4. **Happy (2):** Two users mentioned that they felt positive emotions like happiness. "Surprised and joyful" was one such response from User 13.
5. **Nagging/Stressed (2):** Only two users mentioned that they felt guilty or nagged by Terra Incognita. For example, "haha, a little embarrassed/stressed. Like it was nagging me." (User 99). Another user wrote that even though she deeply values global news reading, "the site produced a feeling of nagging guilt, but not much motivation." (User 20)
6. **Confused/Unsure (4):** Four users were unsure of how they felt, either because they did not completely understand Terra Incognita or because they did not connect with the question.

The final post-study survey question asked users, "Do you have other feedback, desired features or suggestions about any aspect of the experience?" I intended this to ask an open-ended qualitative question to capture any additional frustrations or ideas from users. Although the question was optional, twenty-one people wrote long, helpful responses, which you can see in *Appendix 12*. Here is a summary of their responses grouped into categories. Because of the broad question, people commented about many different aspects of the experience. As before, one response may fall into multiple categories.

Recommendations

1. **More personalization (5):** Five users mentioned that they would like more personalization either through topic mapping or setting preferences for certain geographies. Some felt this would help give them incentive to click and others felt this would help them learn what they needed for their work. User 2 mentioned personalized articles could "make a case for why I should read them." It is worth asking whether the scope of Terra Incognita's information is possibly wider than is relevant for many potential users.
2. **Better recommendations (3):** Three users reiterated the need for better recommendations. Two mentioned erroneous places they had ended up due to poor geocoding.

When & Where

1. **Critical of new tab (3):** Three users felt the new tab display of Terra Incognita was not the right time and place for exploring. User 11 said, "I almost never had time for the interrupt at that point." Another user suggested a once-a-day interruption more akin to a daily email summary.
2. **Integrate with other news apps/sites (4):** Several users mentioned they would like to see TI integrated with other news apps where users are accustomed to reading news, including Instapaper, Twitter, Feedly, Google homepage, and email services. One user suggested that TI could re-order her Feedly feeds by geography.

UX

1. **Map Zoom (4):** Four people mentioned that they were frustrated by the lack of zoom capabilities on the map. Zoom may have been particularly necessary for helping users situate a city on the world or for exploring it more closely.

2. **Better/different gamification (2):** Two users mentioned that the current game-like features were not enough for them to feel motivated. User 50 suggested making the leaderboards more visible "with more funky and cool design" and another felt that the gamification should be more social.
3. **Include more geographic information (weather, etc.) (4):** Several people mentioned they would like to see more and different information about the city that TI shows them. Suggestions included current weather, geotagged pictures, statistics, trending hashtags or Google searches.
4. **More user feedback (2):** Two people said they would like to see more feedback about their own behavior through features like a heat map or a map of cities with pins on ones about which they had read.
5. **Other UX:** Users had general comments about the UX. User 5 wanted to see "more playful interactions" with the interface. Another thought the city selector bar was not intuitive. Two people mentioned that they liked the map and that they would like to see more mapping and visual elements.

Who

1. **More social (3):** Three users noted that they would like to see TI more integrated with the behavior of other users, particularly ones in their network. As User 50 said, "Reading is fun when you can share and discuss with people."
2. **Diversity of user base (1):** User 50 also commented that she would like to see greater diversity in users in the system such that the top readers and recommenders about a city would be "locals" rather than "foreigners".

Technical (5): Five people mentioned technical aspects that could be improved. Three of these had to do with the app loading slowly in their new tab and two had to do with erroneous geocoding for recommendations.

7 Discussion

As detailed in *Chapter 6 - Findings*, the most successful part of Terra Incognita might have been the regular experience of viewing a map of an unfamiliar city and the possibility of clicking on news recommendations about that place. As User 20 said, "Simply browsing the scroll at the bottom of the page, even if I didn't click on most of the cities, heightened my awareness of how many locales (specifically Asian ones) I know very little about." Terra Incognita helped point out users' geographic blind spots and broaden their horizons but it did not change the overall geographic diversity of users' online news reading. In this chapter I explore potential reasons and offer reflections on the findings of the study to other designers who are interested in building personal informatics applications that seek to change behavior around media consumption and personal information habits.

7.1 Design Guidance

7.1.1 What is success? Set modest goals for measuring behavior shifts initially

and focus on qualitative feedback.

In retrospect, expecting users to change their aggregate reading habits towards more geographic diversity based on a short period of using a new tool was overly ambitious. As Klasnja, Consolvo, & Pratt detail in their paper "How to Evaluate Technologies for Health Behavior Change in HCI Research", behavior change in the health domain is a long-term and complex process. A shift in one's behavior requires logistical planning and entails social consequences (forgoing a "pizza night" tradition at home, for example, has consequences beyond just a food choice). It is reasonable to think that the news and media domain would be no less complex than physical health. Moreover, even if users had demonstrated a shift in the geographic diversity of their reading, we would have had further questions as to how long the effect lasted.

Why did users' aggregate reading patterns not increase in diversity during their use of Terra Incognita? The qualitative feedback from the Terra Incognita study points to avenues to explore.

7.1.2 Find the right time and place for exploring new information.

BJ Fogg calls this "kairos" – the opportune moment to persuade¹³². Several users pointed out that they do not read as much news in their browser as they do on mobile devices or in apps like Instapaper, Feedly and Google Reader. Others pointed out that when they open a new tab in their browser, they usually have a task in mind or are pressed for time and do not have time to explore. As User 3 said, "...it encouraged me to explore when I wasn't in that mindset, but wasn't there when I was maybe more open to exploring. I found myself wanting it to re-write/reorder my Feedly feed or Google News home page."

Finding the right time and place for offering new places to explore while being sensitive to users' time and attention constraints is extremely important. But will productive distraction into information users were not seeking always seem inopportune? It may be a matter of catching users at times and places when they are relaxed enough or bored enough to try something new. It may also require building on habits and patterns of use in existing news applications to integrate in valuable ways with users' long-term news reading and motivations. Future experimentation into the right time and places for intervention is necessary.

7.1.3 Find the right information. Set the scope of information narrowly at first to experiment with what that means.

Terra Incognita was predicated on exploring 1000 cities of the world. One of the key challenges to the project, as detailed in *Chapter 4*, was finding quality (or, in some cases, any) recommended articles about those places. We experimented with a number of methods of sourcing information, including user-generated content, crowdsourced campaigns, regional curators, algorithms and APIs. Still, our "coverage" of the top 1000 cities had many more recommendations about the cities in the top 20% than those in the lower 80%.

¹³² Fogg, "Persuasive Technology," December 2002, 3.

Including many cities in the initial prototype was not necessarily the wrong choice. Many users remarked that they learned about a new place and that they were impressed with the number of cities with large populations that they had never heard of. However, the challenge of having to provide a wide breadth of information meant that we did not have time to experiment more with exactly what kind of information was most successful at introducing users to new places. How would the project have changed if the number of cities were 500, 200 or even just 10 new places? In retrospect, being able to compile the high-quality recommendations we aspired to provide for just 10 or so cities might have been a useful narrowing lens on the project.

Narrow the information challenge. If there were fewer cities we could have experimented more with the question – what is the most effective kind of information to create encounters between people and new places? At the end of his blog post on "Imagining Wenzhou", Zuckerman speculates that the magazine format – longer form writing with more background and contextual information – might be the best way to draw readers into learning about new places and issues¹³³. This sounds like a sound place to begin.

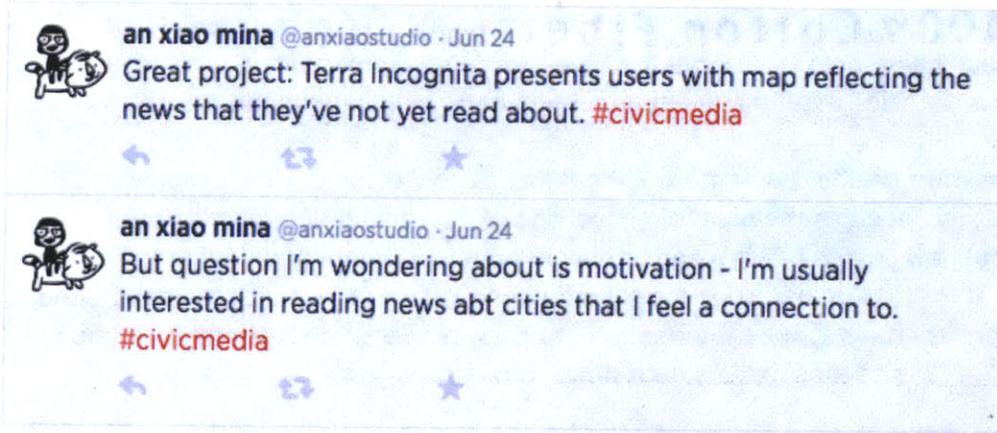
Use culture and “weirdness” as connecting points. Zuckerman’s idea is somewhat borne out by the couple articles that readers noted as “good” in the exit survey. Both were highly visual, longer form articles about cultural aspects of life in Marrakesh (photos of female biker gangs) and Kuala Lumpur (an account of expat life). Two other “good finds” mentioned to me directly in email communications were about hip-hop culture in Mali and an account of the “Door to Hell” natural gas field in Kazakhstan. None of these cases are news in the sense of up-to-the-minute accounts of happenings in that country. Rather, most are focused on cultural phenomena that are familiar and fashionable to English speakers (hip-hop, biker gangs) mapped onto an unfamiliar place. The photos of female biker gangs were shot by a Moroccan fashion photographer and used the seductive visual language of Vogue magazine. The ladies look amazing, exotic and super-hip. The “Door to Hell” article might fall into the category of odd or idiosyncratic miscellanea.

Look for more alternative, possibly local sources. There is evidence that users want context about place but not just any context will do. Users disliked Wikipedia, a main reference site for contextualizing people, places and things, as a source of recommendations. User 19 echoed the sentiment of others, “...every time I opened a new link and saw a Wikipedia article or a government site I lost interest in viewing.” This might be because Terra Incognita was framed in its promotional materials as a way to explore “global news”. A number of users articulated the desire for more news recommendations from local sites, even if they required translation from another language. “I was getting a lot of articles from US news sources - could this be broadened?” (User 26)

Or narrow the scope of recommendations through personalization. Numerous users articulated that they would like to be able to set some topic preferences for Terra Incognita’s

¹³³ “Imagining Wenzhou – How Can We Use the Internet to Introduce Readers to Unfamiliar Cities? | ... My Heart’s in Accra.”

articles. As User 33 stated, “Many of the recommendations were soft travel articles that aren't relevant to my concerns.” Say a user reads many sports articles; Terra Incognita might prioritize cricket articles when presenting Dhaka. Likewise, other users felt that they would like to limit the geographic scope of Terra Incognita to places that they already followed or felt a connection to.



Excerpt from Twitter conversation between @ethanz, @kanarinka and @anxiaostudio. June 24, 2014.

Though there was no question specifically about personalization on the survey, more than a quarter of users said that they would like to have information more tailored to their interests. This leads me to think that personalization is something users have come to expect from their news services. Crafting the right balance of personalization and novelty is an important avenue for further exploration.

7.1.4 Narrow the theory of change and target audience. Use motivational mechanisms for them specifically.

In the case of this exploratory design study, the target audience was news and civic media professionals who have a high level of education, cosmopolitanism and engagement in global news already. Part of this was simply for a gut check at this preliminary stage – would the people who already value global news find such a tool helpful and effective for their own use? From the qualitative data I think the answer is yes, but from the quantitative data the diversity of users' reading did not increase.

In retrospect, an intervention like Terra Incognita might be more interesting to deploy to a different audience. For example, one interesting next step might be to use it in an educational context (classroom or after-school setting) for youth to cultivate digital, transnational forms of citizenship and reflection. In this case the goal would be to build a technology that could build cultural bridges between the everyday lives of older teens and college students and geographically (but perhaps not culturally or economically) remote locations.

Proceeding from a narrower target audience would help answer the outstanding questions around which game mechanisms (leaderboards, rankings) and which kinds of social interaction are more successful at motivating which users in which contexts.

7.1.5 Make sure user feedback and metrics are transparent and trustworthy

Unfortunately many users misunderstood the “city count” in Terra Incognita. According to many users it was a count of how many tabs they had opened, although UI labeled it as how many cities they had read about. It was the latter, but because users did not have any explanation of the geoparsing technology or how it credited a user with reading a city, this was unclear. This introduced user mistrust of the metrics, which was then exacerbated by a bug fix I outline in 7.2. In the future, any metrics displayed to the user need to be crystal clear about how they are calculated and how the user’s behavior affects them.

7.2 Unanticipated results from an overzealous bug fix?



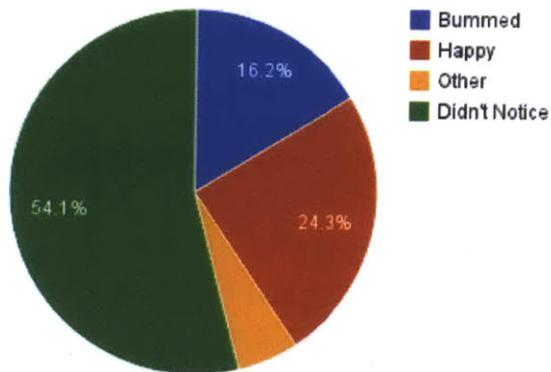
City count from Terra Incognita.

In mid-June, while the user study was underway, I became aware of a bug in the part of the user interface that shows the users how many cities they have read about. I found out about it because a colleague who was participating in the study showed me that he had read about more than 1000 cities according to the UI. Terra Incognita was showing the count for *any* cities the user had read about, not the count for the subset of Terra Incognita's 1000 cities.

Without thinking about it too much, I quickly went in and fixed the bug and deployed the fix. Certain people's counts were not highly affected but others were. My colleague, for example, saw his count drop from over 1000 to 300. If the number was something users were paying attention to and they saw it drop by a large fraction, then this could be potentially very disheartening and cause some unintended consequences for the study.

In order to try to assess whether users noticed the change and whether it caused users negative emotions, I sent out a question about it with the Mid-Study Technical Feedback survey (see *Appendix 6*).

How did the city count update make you feel?



Out of 37 people who responded to the survey, six marked that they were "bummed" because they now had fewer cities. Nine responded that they were happy that they got to explore more cities and the majority, twenty, responded that they had not noticed the change. Since the majority of the respondents stated that they had not noticed the change and because the city count is one small part of the whole experience of the tool, I proceeded as previously planned with study (rather than starting over again or discarding results related to city count). This was a good lesson in remembering to wear both my developer hat and my researcher hat, instead of just plunging into bug-fixing mode.

7.3 Assessment of Design Strategies

In this final section, I return to my original design strategies and assess whether they were effective.

- **Intervention and Repetition:** The feedback on Terra Incognita's moment of intervention – in a user's new tab – was mixed. On the one hand, it provided the repeated, small reminder of the "world beyond the screen" and introduced people to new places they had never heard about even when they did not click. However, a small number of users felt strongly that the moment when they open a new tab is not the moment that they want to explore and/or is not the moment when they want to read news.
- **Prioritize Exploration over Personalization:** In the feedback about the recommendations, many users requested more personalization to narrow the scope of Terra Incognita's recommendations. After reviewing Paul Resnick's work and, in particular, his presentation defending personalizing technologies¹³⁴ I came to the conclusion that I have been viewing personalization in a simplistic way and that there are ways to go about personalization that do not have to be about surveilling and extracting

¹³⁴ Paul Resnick, "Personalized Filters Yes; Bubbles No," *Paul Resnick's Occasional Musings*, accessed July 30, 2014, <http://presnick.wordpress.com/2011/07/17/personalized-filters-yes-bubbles-no/>.

information from individuals for the benefit of a corporation. As Resnick mentions, there are strategies like algorithmic transparency and perspective-taking that can mitigate the “black box” effect of personalizing technologies. In the future, thoughtful non-exploitative personalization could be a productive avenue to explore. User 16 states, “I wasn’t sure the logic of how Terra Incognita was feeding me information. In some ways, I like that as it seems less creepy and sort of random. Though, I like the idea that a feature could be that it more explicitly learns your reading habits and responds to those.”

- **Highlight Harmlessness and Triviality:** Terra Incognita was a mostly lightweight intervention and the stakes were low. Many people reported positive feelings resulting from their use. However it was not completely harmless for all users. One user remarked that the idea of finding out that he was not as well read as he thought was threatening to him. Other users stated that Terra Incognita showed them their blind spots with the implication that learning about one’s blind spots can be discomforting. For example, User 27 said, “I think this experiment made me feel I know very little about the world and I make very little effort to know more about it. It encouraged me to find the time to explore more.” Perhaps this is a place where a smaller number of cities would have been helpful. For example, if people saw a city that they had never heard of only once in ten new tabs, would that have validated their image of themselves as worldly but also provided a new micro-learning experience? I remain interested in designing experiences that are perceived as harmless and trivial so that people can feel unthreatened, curious to explore and therefore possibly more open to new experiences.
- **Visual and Spatial Seduction:** Terra Incognita’s interface received some compliments (“the interface is beautiful” said one user informally). And other users, like User 18, remarked specifically how the visual and map features of Terra Incognita led them to explore, “I like opening my browser and seeing different cities with stories about each. Just seeing the cities visually made me think about more diverse places more.” These comments lead me to conclude that this strategy was mostly successful with a few caveats around the features of the UX. Many users remarked that they would like to be able to zoom the map, a feature I had taken out while trying to declutter the UI. Others suggested they would have liked even more visual information (Google StreetView, Flickr pictures). And finally, the city selector bar in the UI was a non-standard UI element for navigating cities that, while attractive, was not entirely transparent to the user and was not easy to use in my opinion. The user comments and evidence leads me to conclude that this strategy is sound with some tweaking to detail-level features and UX.
- **Restrict Choice:** It is hard to assess whether this strategy was successful as I did not specifically ask a question about the number of choices presented to the user, nor did I test people with different numbers of recommendations. I do not believe I have enough information to say whether showing the user up to five recommendations about a city was “not enough”, “just right” or “too much”. One interesting result from the study is that people slightly preferred finding recommendations via Terra Incognita’s big red button, which would seem to suggest that those who did visit recommendations sought to minimize their choice on what they were clicking on, or were at least enticed by the ideals of exploration.
- **Favor Curiosity over Guilt:** Users described Terra Incognita as doing more to make

them feel curious than to feeling guilty. Seven users remarked independently that the application made them feel more curious while only two commented that they felt “nagged.”

7.4 Future Directions

I see several possible future directions for Terra Incognita after testing this first prototype. In general, I would like to move away from collecting users’ browsing history, situate Terra Incognita with a specific target audience such as youth and/or journalists, and more intentionally use Terra Incognita in scaffolded learning activities to promote cross-cultural connections and discoveries and foster transnational forms of citizenship, responsibility and belonging.

Terra Incognita could also be conceived as an entirely new system. For example, as a set of **Geolocated Twitter Feeds Curated by Humans and Algorithms**. This direction is building off (1) the user feedback around integrating geography specific news with people’s existing news reading habits and platforms and (2) user feedback around personalization; supporting users to choose which cities they receive information about. In this case, Terra Incognita might cease to be a browser extension but instead become a collection of Twitter accounts named **@ParisIncognita**, **@KievIncognita**, **@AtafulIncognita** and so on. If pursuing this idea, it would be important to scale back the number of cities to begin with so that we might focus on honing the service’s offerings. This service might be targeted towards journalists to discover different, local, cultural or other news about particular cities and/or towards youth in a classroom setting to complete assignments around global information discovery. The service could support participatory sourcing of links about the city/geography via other Twitter users tweeting **@** the accounts and through users installing the browser extension (see below). If the set of **@Incognita** Twitter accounts were connected to a large media source, such as the Media Cloud database or an on-going feed of Instapaper data, it would relatively easily be able to algorithmically source geographically specific news. Then, these news items would be filtered through a human curator for quality and to ensure they fulfill the information goals of the system.

The service would have specific information goals. The kind of information provided by these Twitter feeds would be focused in several areas, as informed by the preliminary results collected from the Terra Incognita study. (1) Cultural connections – Cultural information (like Malian hip-hop) that can help bridge English speakers to other places. (2) Alternative Perspective – local news, blogs or information written by citizen journalists or sites like Global Voices that represent events differently from mainstream news, (3) Trending News – A small selection of breaking or trending news from mainstream news publications and (4) Oddities – Weird, cool, exceptionally visual or otherwise idiosyncratic information that distinguishes the place from others.

If this idea took shape, the way that the **Terra Incognita browser extension** might be involved would be as a user-generated recommendation plugin that users who support the “**@Incognita**” mission install in their browsers. If the user has spent a certain amount of time on a page, and that page resolves to a particular geography, the user would get prompted to add the URL to the

@Incognita feed for that city. The user-generated recommendations could be linked to the user's Twitter account (so if I submit a link to the **@KievIncognita** feed then it shows up as being from **@kanarinka** and I "get credit" for the find). One could even consider gamifying or making social that aspect of the system so that users could see who has submitted the most links about particular cities and get "credit" in other forms like points or badges. The exact mechanics of this would need some experimentation.

The supporting **Terra Incognita** website could help retain and support some of the more **serendipitous aspects of information discovery**. The website could showcase the **@Incognita** Twitter feeds supplemented by maps and other visual information. Users could explore the different cities and follow their feeds from the website. Users might also be able to pick from certain "agendas". For example, if they want to learn more about Africa they could, in one click, follow all of accounts from African cities in the system. Responding to user feedback about personalization, you could imagine an additional **My Terra Incognita** feature where users could upload their browser history and receive maps and personalized recommendations for where in the world to follow based on their own blind spots. These could use various and potentially humorous strategies to give users recommendations. For example, the system could recommend the exact inverse of your current reading habits, create a reading agenda based on the origin of products you have purchased from Amazon.com (to connect your bits and atoms), use your existing transnational ties to connect you to places that you already care about, or analyze your current location and, if you are landlocked, recommend you read only about islands.

Finally, the revised **Terra Incognita** system should narrow the theory of change and the target audience as outlined in Section 7.1.4. While the system could remain available for anyone on the Internet to use, the revised system would have two specific target audiences. 1) **Journalists** who would use the system to source information about places they need to know about and (2) **youth and journalism students**. For the latter, **usage of the platform would be scaffolded by learning activities to participate with the Terra Incognita system as curators and reporters**. This could be a potentially powerful way to enable cross-cultural connections and foster transnational forms of citizenship, responsibility and belonging. This is an area that would need experimentation and further research on my part. For example, one avenue might be to create a college course for undergraduate journalism students in which they are responsible for reporting on a specific location or region of the world by curating the **@Incognita** Twitter feeds combined with more traditional methods of journalistic information discovery like background research, cultivating on the ground connections and interviewing people. This kind of educational opportunity might cultivate media literacy and new media reporting skills while at the same time building transnational social ties. It could be combined with readings and reflection assignments around transnational forms of citizenship and belonging. For me, this remains one of the areas in which further reading and research around transnational citizenship would help me understand how to best structure educational activities and social support structures around usage of the **Terra Incognita** platform.

8 Appendices

8.1 Appendix 1: Data Collection

The application gathered the following data. All users consented to be in the study via a User Consent form that was approved by MIT's Committee on the Use of Humans as Experimental Subjects (COUHES).

1. **Browser History:** The Terra Incognita system collected users' browser history starting 45 days prior to installation of the extension and up until the end date of the study. The system does not collect all URLs that a person visits. Each URL first passes through a blacklist and then through a whitelist of sites. If the domain of the URL is not on the blacklist but is on the whitelist, then Terra Incognita will create a record of that URL in the database. The blacklist included all Google and Gmail sites, common email provider sites, Facebook, Twitter, and different non-textual file types like JPG and GIF. In this way, we hoped to avoid collecting URLs for people's personal emails and social media posts. The whitelist included a list of 28,691 sites that the MediaCloud¹³⁵ project spiders each day. This list contains many English-language mainstream news sites as well as many blogs and citizen journalist sites.

Browser history collection prior to using the extension was limited for people who had recently cleared their caches or for people for whom Chrome was not their primary browser. Their results were excluded from the study.

2. **User Surveys:**
 - 2.1. **Presurvey:** *All users.* Prior to using the extension, users filled out a presurvey that asked them demographic questions and questions about their social relations in order to determine an existing "transnationality index" for each user¹³⁶ which research has shown to correlate to cosmopolitan attitudes. See *Appendix 5*.
 - 2.2. **Technical Midpoint survey:** *All users.* This survey, sent midway through the study, asked for technical feedback about the tool and polled users on whether they had noticed a change in their city count (due to an overzealous bug fix on my part). See *Appendix 6*.
 - 2.3. **Users Who Never Used Terra Incognita:** *Only users who had set up an account but never used the tool.* This short survey inquired why people decided not to use Terra Incognita. See *Appendix 7*.
 - 2.4. **Final Survey:** *Users with at least 30 days using the system by July 15th, 2015.* The final survey asked questions about interactions, learning & reflection, rankings, recommendations and overall feedback on the experience. See *Appendix 8* for full text.
3. **Usage metrics:** In order to see how the application was being used, I built a number of

¹³⁵ "Media Cloud | Tools for Online Media Analysis."

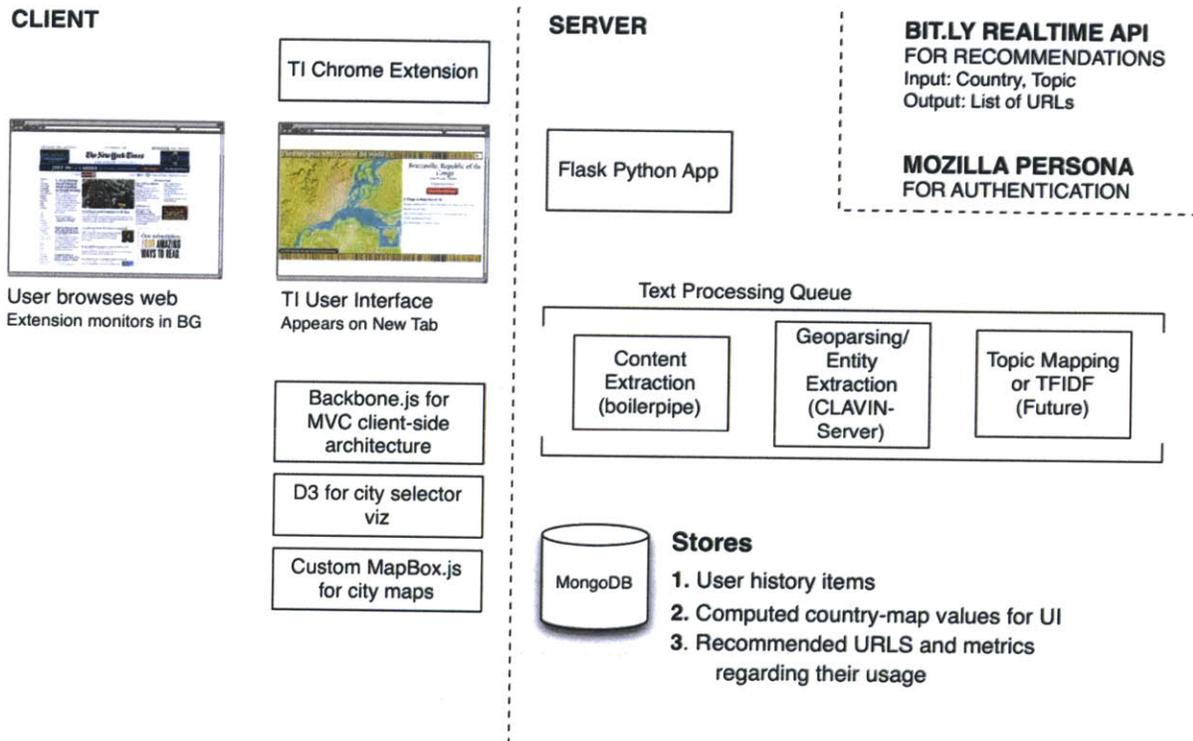
¹³⁶ Mau, Mewes, and Zimmermann, "Cosmopolitan Attitudes through Transnational Social Practices?"

logging metrics into the application itself.

- 3.1. **Red button clicks:** When users clicked on the red button to request a serendipitous recommendation, the application logged that click and the city it was in relation to. The application also noted whether the current city was a random city or a city the user had selected themselves.
- 3.2. **Recommendation clicks:** When users clicked on news headline recommendations, the application logged that click and the city it was in relation to. The application also noted whether the current city was a random city or a city the user had selected.
- 3.3. **"What You Read" clicks:** When users clicked on news headline that they had already read, the application logged that click and the city it was in relation to. The application also noted whether the current city was a random city or a city the user had selected.
- 3.4. **City clicks:** When users clicked on the city selector bar at the bottom of the screen to change cities, that behavior was noted.
- 3.5. **Thumbs Up/Thumbs Down:** If a user rated something they had read as thumbs up or thumbs down the system logged that behavior.

8.2 Appendix 2: Technical Architecture of Terra Incognita

TERRA INCOGNITA - System Architecture



Technical Architecture of Terra Incognita.

There are two main components of the Terra Incognita system: A client-side browser extension for the Chrome browser and a server-side web application and database. Additionally there are services that the application interfaces with on the client side (MapBox.js for custom maps) and server side (Bitly RT for recommendations, Mozilla Persona for password-less authentication).

On the client side, the Chrome extension is written using Model-View-Controller patterning with Backbone.js. The popular library D3.js is used to create the city selector visualization (the bar at the bottom of the screen which shows the user which cities they have visited and allows them to switch to a new city). The browser extension pulls in city maps using MapBox.js and custom-designed, hosted map tiles on MapBox.com.

On the server side, the bulk of the processing is a Python Flask web application. This serves as the main traffic director to direct queries to the MongoDB database, to external services and to the text processing queue. Python Flask is a lightweight web framework and HTTP server that is perfect for prototyping applications and iterating quickly. It is also a standard framework in-house at the Center for Civic Media and I wanted to choose something that could easily be supported and maintained at the Center. You can run Python Flask in a production environment

using a WSGI container and a more robust HTTP server like Apache. This is what I have done for the Terra Incognita production environment at <https://terra-incognita.co>.

The MongoDB database stores user info, URLs a user has visited along with their corresponding geography, recommendations from the system, and metrics about clicks and interaction with the system. MongoDB is a NoSQL database, which stores documents as JSON objects. I chose MongoDB because I needed flexibility in iterating the data model, because the documents I'm working with are primarily text-based, because the services I'm interfacing with all return JSON documents, and because there is an easy interface with python through the pymongo library.

External services I used include the Bitly RealTime API for recommendations (the exact workings of which will be discussed more in detail in the following section around design strategies) and Mozilla Persona for password-less user authentication. The choice of Mozilla Persona was both for ease of use - to try to avoid users having to create yet another password on another site - and for privacy reasons. Terra Incognita was already collecting so much of their personal information, I chose not to try to use a Google or Facebook Login so as to avoid the perception that I was trying to access even more sensitive data. In the end, Mozilla Persona is not quite as widely adopted as I had hoped and the user on-boarding process could have been smoother in this regard.

Finally, the text processing queue is the code that takes a URL, downloads the content, extracts the meaningful text from the rest of the page, geoparses the text, and stores the results in the database. The text processing queue is using Boilerpipe for content extraction and CLIFF for geoparsing. Boilerpipe is an open source Java-based library for content extraction. Rahul Bhargava and I wrote a small Servlet wrapper around Boilerpipe and deployed it as a service on our in-house servers. I will discuss CLIFF at length in the next section.

8.3 Appendix 3: Geoparsing News Articles



Cliff Clavin is the clear winner in Geoparsing technology

I have spent the last two years at the Center for Civic Media developing technology to geoparse news articles. Geoparsing is the process of taking unstructured text like a news story; extracting the places from it (entity extraction) and figuring out which places in the world they correspond to (geographic disambiguation). There is an excellent paper by Kalev H. Leetaru¹³⁷ that explains this process in detail.

There are a number of existing services and products out there that do geoparsing. In prior research, I compiled a list of all of the geoparsing tools I could find. These included corporate services like Yahoo's Placespotter, research projects like the Edinburgh parser, and open source software projects like CLAVIN. It also included a number of other products like GeoDict that don't go the whole distance. They might do entity extraction but not geographic disambiguation, for example.

At the Center for Civic Media we were interested in geoparsing at scale for our MediaCloud database. MediaCloud is a project that spiders 27,000 RSS feeds from news sources every day to create a massive archive of online news. We needed a tool with the following characteristics:

¹³⁷ Kalev H. Leetaru, "Fulltext Geocoding Versus Spatial Metadata for Large Text Archives: Towards a Geographically Enriched Wikipedia," *D-Lib Magazine* 18, no. 9/10 (September 2012), doi:10.1045/september2012-leetaru.

1. **Accurate:** We would need to assess the tools on their accuracy in comparison with manually entered geodata.
2. **Free (as in beer and as in speech):** Since we need to geolocate news at scale and for research purposes we wouldn't be able to afford a service like Yahoo's PlaceSpotter which runs \$8.00/1000 queries. We are also committed to building MediaCloud in a way that others can reproduce our work so we needed something that wouldn't be hidden away in a corporate black box.
3. **Open source and modifiable:** We wanted to be able to integrate geoparsing into our toolchain for Media Cloud articles and to be able to tune it as necessary to more accurately geolocate text from news articles.
4. **Runs locally:** We would prefer a standalone technology to an API that runs over the network to save time and computing power.

From this list, I worked with Berkman affiliate Luisa Beck to choose three technologies to evaluate:

1. **Yahoo PlaceSpotter:** Along with MetaCarta's Geotagger, this is known as an industry standard and enterprise solution in this space. Although it is too expensive to be a viable option for us, we decided to evaluate PlaceSpotter to see what kind of results we could reasonably expect from geoparsing news articles.
2. **OpenCalais:** OpenCalais takes unstructured text and turns it into structured content: named entities, places, products, and companies. It is free (or mostly free) and runs as a web service.
3. **CLAVIN:** Named after Cliff Clavin of Cheers fame, CLAVIN is a geoparser written in Java based on Stanford's well-regarded NER parser (for entity extraction) and the geonames.org gazetteer of over 8 million world place names. CLAVIN is free and open source.

I wrote about our geoparsing evaluation methodology and results in detail on the Center for Civic Media's blog, which I am preparing for publication with Rahul Bhargava and Luisa Beck. We evaluated the technologies against a hand-coded set of articles from three media sources. We evaluated each technology for *Recall* (accuracy at extracting place mentions from unstructured text), *Precision* (% of place mentions that were relevant, i.e. not false positives), *Accuracy of Geographic Disambiguation*, and *Focus* (how often did the frequency of place mentions correspond to the country the article was "about" as determined by a human being).

Focus was a measure that we used from Amitay et al's paper on Web-a-Where¹³⁸ and subsequent research¹³⁹. These technologies all have limitations when compared with a human.

¹³⁸ Einat Amitay et al., "Web-a-Where: Geotagging Web Content," in *Proceedings of the 27th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, SIGIR '04 (New York, NY, USA: ACM, 2004), 273–80, doi:10.1145/1008992.1009040.

¹³⁹ Michael D. Lieberman et al., "STEWARD: Architecture of a Spatio-Textual Search Engine," in *Proceedings of the 15th Annual ACM International Symposium on Advances in Geographic Information Systems*, GIS '07 (New York, NY, USA: ACM, 2007), 25:1–25:8, doi:10.1145/1341012.1341045; Álvaro Zubizarreta et al., "A Georeferencing

They pick up place mentions, disambiguate them to one place on the globe, and give us a latitude and longitude, but they don't actually tell us what place an article or text is "about". It is the latter that we were actually interested in at the resolution of a single news story so we needed a way to measure both the technologies' performance and our ability to get to "aboutness" through a list of place mentions.

The high level results are as follows:

GEOPARSING AVERAGES					
	RECALL: Accuracy at picking up place mentions from unstructured text	PRECISION: % relevant place mentions	Accuracy at Disambiguating places	ABOUTNESS: Frequency of place mention corresponds to "real country"	F1 measure
Yahoo Placespotter	69.50%	87.70%	96.27%	69.02%	0.78
OpenCalais	53.03%	96.78%	90.28%	59.57%	0.69
CLAVIN	63.78%	94.25%	89.91%	75.30%	0.76

Yahoo Placespotter is the best at Recall and Disambiguation and overall F1 measure. CLAVIN is the best at precision and aboutness. OpenCalais' performance was noticeably lower than both on most measures. Yahoo is expensive and CLAVIN is free.

These results meant that CLAVIN with its low cost of "free" was the clear winner. We chose to use CLAVIN. Rahul Bhargava rewrote its disambiguation strategy to tune it for news articles and our success in determining *Focus* at the country level went from 75.3% to 85% on our hand-coded data set. I modified CLAVIN to return *Focus* geodata for different levels of geography, including countries, states and cities. We wrapped CLAVIN with our adjustments into a package we called CLIFF (also in honor of the *Cheers!* hero) and deployed it as a service on our in-house servers. CLIFF ingests a single news story as unstructured text and returns (1) raw place mentions, (2) the cities, states and countries that the text is "about", and (3) the people that are mentioned in the article.

CLIFF is the underpinning technology of Terra Incognita because it makes geography "focus" detection of browser history and news recommendations possible.

8.4 Appendix 4: Recruiting Subjects to the Study

Multistage Method for Locating Geographic Context in Web Search," in *Proceedings of the 17th ACM Conference on Information and Knowledge Management*, CIKM '08 (New York, NY, USA: ACM, 2008), 1485–86, doi:10.1145/1458082.1458347.



CATHERINE D'IGNAZIO
Research Assistant

Catherine D'Ignazio is the person behind that really cute baby. She is an artist, software developer and educator and occasionally goes by the name of kanarinka. She is the Director of the Institute for Infinitely Small Things, an interventionist performance troupe, and former Director of the Experimental Geography Research Cluster at RISD's Digital+Media MFA program. She taught in the Comparative Media Studies program at MIT in 2009 & 2012. Her artwork has been exhibited at the ICA Boston, Eyebeam, and MASSMoCA, and has won awards from the Tanne Foundation and

TERRA INCOGNITA: CALL FOR PARTICIPATION IN OUR PILOT STUDY

Submitted by kanarinka on April 3, 2014 - 8:32pm



I've been working with Ethan Zuckerman and Matt Stempeck on an alpha version of *Terra Incognita: 1000 Cities of the World*, a news game and recommendation system designed to help you discover relevant, fun, weird, interesting or stereotype-busting information about 1000 global cities. We are getting veeeeery close to an alpha version and now we need users!

Can you help us with our first user study?

[Sign up here](#) to participate in our user study on the system. Participants in the study get an advance look at Terra Incognita and the opportunity to play a significant role in shaping its development.

g+1 0 Tweet 15 Like 10

Blog post recruiting people to participate in the user study. From <http://civic.mit.edu/blog/kanarinka/terra-incognita-call-for-participation-in-our-pilot-study>

Beta test Terra Incognita

Inbox x



 Catherine D'Ignazio <dignazio@mit.edu>

Jun 2



to List ▾

Hello all -

I'd like to invite you to help us beta test "Terra Incognita: 1000 Cities of the World", a global news game and recommendation system created at the MIT Center for Civic Media. Terra Incognita recommends you news about world cities that you don't otherwise read about.

To participate, you need to install the Terra Incognita Chrome browser extension from the store:

<http://bit.ly/RGYdj7>

And then use the Chrome browser to browse the Internet as you normally would for 30 days. You will have to fill out a couple of forms on the way to accessing the application since this is part of our beta user study.

Happy exploring,
Catherine D'Ignazio, Matt Stempeck and Ethan Zuckerman
MIT Center for Civic Media

PS: Contact Us

To report bugs, suggest features or ask questions, please email Catherine at dignazio@mit.edu. I want to hear from you so please don't hesitate to get in touch.

PPS: Data Collection

Our data collection policy is spelled out in detail in the user consent agreement. The short version is that Terra Incognita collects the urls from your news browsing history and uses that to see which cities you have read about. We define news as anything that MediaCloud collects which is this list of sites - <https://terra-incognita.co/data/whitelist.txt>. Terra Incognita does not have anything to do with your email, your Facebook, your Twitter, your Google docs, your etherpads or other personal information. You may opt-out of Terra Incognita at any time and take your data with you.

Email recruiting members of the data-driven-journalism@lists.okfn.org and civicmedia-researchers@mit.edu lists to participate in the Terra Incognita user study.

8.5 Appendix 5: Pre-Study Survey

Terra Incognita Short Pre-Study Survey

Contact Catherine D'Ignazio (<mailto:dignazio@mit.edu>) with questions

What gender best describes you?

- Female
- Male
- Transgender

What is your country of origin?

Do you think your country of origin is represented fairly in news media?

- Mostly yes
- Mostly no

What is your profession?

Which sentence best describes your language experience?

- I have never studied or spoken a foreign language.
- I have studied or have some basic ability in a foreign language.
- I speak more than one language fluently.

Which sentence best describes your weekly newsreading experience?

- I don't read much global news.
- I read about other countries that are getting media attention (e.g. Ukraine).
- I keep up with particular countries or regions on a regular basis whether or not they are in the headlines.

Do you think reading news about countries other than your own is important?

- Not really.
- Yes, but I don't always have time for it.
- Yes, and I make a concerted effort to do so.

How many of your family members that you correspond with frequently live in a different country from you?

- 0
- 1
- 2
- 3
- 4 or more

How many friends do you correspond with frequently who are from your current country of residence but who are living abroad? (e.g. if you live in the US, how many friends are from the US but living in foreign countries?)

- 0
- 1
- 2
- 3
- 4 or more

How many friends do you correspond with frequently who are from countries other than your current country of residence? (e.g. if you live in the US, how many friends do you have who are from other countries?)

- 0
- 1
- 2
- 3
- 4 or more

In the last year, how many times did you travel to a country other than your current country of residence?

- 0

- 1
- 2
- 3 or more

How much total time have you spent living abroad?

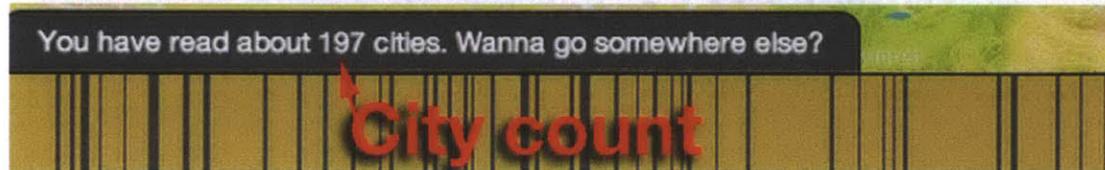
- None
- 3-12 months
- More than 12 months

Submit

8.6 Appendix 6: Mid-study Technical Feedback & Bug

Terra Incognita Technical Survey

We recently fixed a bug that was showing the incorrect number of cities in the bottom bar of Terra Incognita. For some users, this meant that their count of visited cities decreased.



1. How do you feel about the city count update?

- I did not notice if my city count changed
- I am bummed because I now have fewer cities
- I am happy that I get to explore more cities
- Other:

2. Please describe any technical problems you have encountered with using Terra Incognita.

Never submit passwords through Google Forms.

8.7 Appendix 7: Exit Survey for users who did not use the system

Terra Incognita Feedback

We noticed that you set up an account in Terra Incognita but did not use it. Could you take a second and tell us why?

* Required

What prevented you from using Terra Incognita after you installed it? *

Check all that apply

- Privacy Concerns
- I didn't want to fill out the survey & consent forms
- Chrome is not my primary browser
- I was confused
- Other:

Any other feedback? (optional)

Never submit passwords through Google Forms.

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 Google Forms

This content is neither created nor endorsed by Google.
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8.8 Appendix 8: Final Survey

Terra Incognita Post-Study Survey

Thank you so much for your participation in our research at the MIT Center for Civic Media. Please complete this short final survey for research purposes and then you may return to using Terra Incognita as before. Contact Catherine D'Ignazio (<mailto:dignazio@mit.edu>) with questions

Estimated time to complete: 5-8 minutes.

About You

Was Chrome your primary browser before installing Terra Incognita?

Yes No

Was Chrome your primary browser after installing Terra Incognita?

Yes No

Reading global news is important to my work.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Interactions

How would you rate Terra Incognita's news recommendations (1=bad, 5=good)?

1 (*bad*) 2 3 4 5 (*good*)

Were you ever a Top Reader or Top Recommender for any city?

Yes No I don't know

Did you ever go out searching for articles about a city so that you could become a Top Reader or Top Recommender for it?

Yes No I don't know what that means

Did you ever go out searching for articles about a city in order to increment your city count?

Yes No I don't know what that means

Did you ever share an article that you learned about through Terra Incognita?

More than once At least once Never

Learning & Reflection

Did you reflect more on the geography of your news reading after you installed Terra Incognita?

Yes No

Explain (optional)

Do you feel that you learned something about a new place from using Terra Incognita?

Yes No

Explain (optional)

News Recommendations

Do you remember any particularly bad or irrelevant articles that you discovered from Terra Incognita?

Yes No

Explain (optional)

Do you remember any particularly good articles that you discovered from Terra Incognita?

Yes No

Explain (optional)

What would make Terra Incognita's news recommendations better?

Your Rankings

#4 218 cities You are currently ranked #4 out of 188 total users of Terra Incognita for reading about 218 cities. If you had known that while you were using it, would you have tried to improve your standing?

Yes No

How do you explain your ranking #4 and your city count 218 cities ? Why aren't they higher or lower?

Do you wish you could see a leaderboard with the top 10 users in the system?

Yes No

Overall

How did Terra Incognita make you feel?

Do you have other feedback, desired features or suggestions about any aspect of the experience?

Could Catherine D'Ignazio contact you via email to do a short, post-study interview over phone or Skype?

Yes No thanks

Submit

8.9 Appendix 9: User Suggestions for Improving Recommendations

User Response

a lot of them were general background on a place, not news.

I'm not sure.

Connection to a social network to see what others in my network are reading from around the world.

Improved entity extraction.

A way to target it (see overall ideas/recs below)

some clever algorithm?... no, actually it might work best if you can use google translate to translate from the more popular local news sources in local languages into English, that might reflect more in a matter of fact way what local news is like

I think it just needs *really* good recommendations - every time I open a new link and saw a wikipedia article or a government site I lost interest in viewing.

tied to social media...

no wikipedia entries, news coming directly from that city.

A little more editing. IN some of the more 'lesser-known' places, a wikipedia article about that place was all Terra Incognita could muster up. Wikipedia has its strengths, but this is not one of them.

I do recall that sometimes, at first glance, headlines wouldn't match the geographical locations they were purportedly about. Potentially there was a link in the article text, which I would wonder about- but not intensely enough to actually click. Being able to read a graf rather than (or in addition to) a headline on the preview page might help with this, though I know that could be tough to implement.

Better UX.

if there was some way of insuring that they were obviously tied to the places in question.

Many cities seem to have no recommendations.

I tried exploring once or twice and wasn't able to come up with any relevant articles. It seems to work well when it's suggesting places, but maybe not as well when you go searching? Overall, I think it's an interesting project and I think it helped me to become more informed. Sometimes the articles loaded too slowly and I needed to do a task so couldn't wait. Might be interesting as a popup or widget rather than a homepage?

a bit more information beyond the headline

Some suggestions (e.g. snippets) below

I'll try to explain with an example. I work in the development sector and I'm always hunting for useful developments and news from across the world related to Education. I think Terra Incognita would do better for me by keeping my search interests in mind and recommending more news related to that from different nations of the world. I understand that may confine me within my interest areas but to avoid that maybe a separate section could be made available with areas of interest and other general interesting news from across the world.

asdasd

manually tagging news articles, then trying to learn automatically what type of news works best

Category

wikipedia

social

technical

personalization/targeting/curation

better local news

wikipedia

social

wikipedia

wikipedia, personalization/targeting/curation

technical

UX

technical

better local news

technical

UX

personalization/targeting/curation

personalization/targeting/curation

Carefully growing the userbase, once it grows use an acceleration based algorithm to prioritize like reddit.	personalization/targeting/curation
Better recommendations. It was definitely hit or miss.	technical
Several times the links were totally irrelevant.	
I was getting a lot of articles from US news sources - could this be broadened?	better local news
Not better, more fun.	social
Collaborate and find sources that are deemed relevant in their context.	better local news
more user friendly and cooler and exciting design...	UX
More users = add human feedback to help curate results	personalization/targeting/curation
Sometimes the articles weren't about the city, so they seemed quite random.	technical
I think that a weekly summary of top places you visited would be nice.	UX
the system WORKING would have been good	
Many of the recommended articles didn't seem like news, or news relevant to that city. For example, some headlines recommended at Madrid, Spain are "Forget The Wisdom of Crowds; Neurobiologists Reveal The Wisdom Of The Confident MIT Technology", "General Manager - Madrid at Uber Technologies in Madrid, Spain - Job LinkedIn", and "Occupy movement - Wikipedia, the free encyclopedia" – The MIT one doesn't seem like it is location specific, but landed there for some algorithmic reason, the LinkedIn one is a job posting, and I don't generally regard Wikipedia as news.	technical
Other cities sometimes gave me no recommendations at all, possibly because of language barrier issues with their local newspapers.	technical
Map showing areas you have already read, which areas you've read the most, which areas you haven't read about. Breakdown by ethnicity/religion/socioeconomic status	UX
I would prefer to have Terra Incognita available but not the head of every tab you open	UX
Filter some commercial news.	
News recommendations need to be curated, or allow users to set preferences for interest. Many of the recommendations were soft travel articles that aren't relevant to my concerns. A good number of recommendations are also not actually about the place, but just mention in passing.	better local news
Perhaps more such research	personalization/targeting/curation, technical

8.10 Appendix 10: Users Explain Their Rankings

How do you explain your rankings and your city count?	Category
I read a lot, but didn't strive to read a whole lot of the sake of reading a lot.	claimed not to be motivated by ranking
My ranking seems to reflect my curiosity about the world. I'm curious about it, but not very, very curious.	
I stopped using my laptop two weeks ago where TI was installed so I haven't accrued more to achieve #1. Damn!	Chrome not primary
I read pretty widely though and a lot of Wikipedia rabbit holes that can open up geography pretty quickly.	

I think my son's wikipedia browsing increased my count I open myriad new tabs over course of each day. TerraIncognita fired up with each new tab opened. Yet I rarely looked at it, at least not after the first few days. I guess maybe that's because I have been reading a lot, from different sources... perhaps I could do better at it if I read more news from Mid-East and Africa... I'm really happily shocked, I assumed I'd be way lower.... I read a lot online, especially about internet culture around the world... rankings are just loading spinny things!

conflate city count with opening new tabs

surprise at high rank

bug

Taking over my browser is an interesting, but imperfect, method to increase my city count. Oftentime I open a browser because I need go somewhere specific, and even if the article looked very interesting, I was forced to skip it and come back later. However, I never did come back later because I was placed on a different city.

lack of time
critical of new tab

I'm surprised that I ranked relatively high, because I didn't avail myself of Terra Incognita enough— I feel like I downloaded it at an especially busy time (and a time during which I was working on a USA-focused project at work.) But I imagine my ranking was not horrendous because I read a fair amount of news about the African continent. I like that the program is self-focused— that it doesn't compel the sorts of qualitative or quantitative comparisons between users that are so integral to sites like Facebook (the bane of users, but also what keeps them hooked.) That said, a leaderboard could be an interesting way to invite users to an awareness of different modes of reading news without compelling an entirely competitive site experience.

surprise at high rank

I was an IR student. I follow a lot of IR people on Twitter. I get daily IR newspapers. I read a lot of international news. But I'm not as much of a junkie as I used to be.

I have a curious mind and a deep thirst for information...

No ideal Guess I open tons and tons of tabs.

conflate city count with opening new tabs
surprise at high rank
claimed not to be motivated by ranking

I wasn't really into it for the competitive aspect. I just wanted to gain some access to stories and ideas that I might not find on my own.

the bug reset my ranking, but who cares?

technical
Chrome not primary

Chrome is not my main browser and I only installed it for this study. I had planned to use it for my news reading but it was really hard to break my habits. In the end, I only used it ~5 times for this study.

I read the news like I normally would. If it puts me in that ranking then it seems to be true.

claimed not to be motivated by ranking

asdsd

Because I have too many browser tabs open naturally :) Besides everyday use, I have browsed to places that I have lived in around the world and terra gives me a low friction way to share relevant things I read anyway. I started later than others.

conflate city count with opening new tabs

I think Terra Incognita counted cities even when I opened a new browser window for a moment, before moving on. Not sure that should count.

conflate city count with opening new tabs

I didn't have a goal, I was just reading recommended news when it was possible. I am curious, I just didn't

claimed not to be motivated by ranking

have the time to explore. And I don't believe I would make strong efforts to improve my ranking. My goal would be to learn a bit from a place I don't know, one venue at a time. At ease. I just don't feel like reading about 10 cities in one day would make sense. I need time to think about what I read.

I am a bit surprised that my ranking is that high. I myself made a couple of times the effort to use and read and find an article in a certain city. The rest of my use is just that I open my browser and new tabs at work a lot so I get to see some article titles per city, but I didn't really click to read. If you can make it to count when you actually click and read those article, it will probably show way different ranking.

News recommendations weren't always interesting; Ctrl + T is usually when I'm busy wanting to open / search for something so don't always have the time to read about a new city; perhaps some embedded content might have been nice / less clicking needed?

I don't know why my ranking is 46. I never used it

I think this reflects my normal news reading habits. I really didn't spend a lot of time reading news while this study was going on. Also, I'm a blacksmith in my day job and tend to read news on my phone. Did this link to the chrome browser in my phone?

Got logged out of the system at some point and didn't log back in. Do much reading via reddit on mobile. Although I was fascinated by the proposition, I have very limited time. Therefore chose not to explore as much as I might have liked.

Because I don't use Chrome all the time.

I open a lot of windows in order to search, but rarely have time to dig into the stories as I'm looking for something specific. Am surprised that the city count isn't higher.

I haven't "read about" 84 cities. I have read about 2. I have just opened 84 tabs and moved away from the Terra Incognita page as it's barely finished loading. Wow!

asdasd

I am being asked this before using the software

conflate city count with opening new tabs
surprise at high rank

lack of time
critical of new tab

confused
did not use
prefer mobile
lack of time

prefer mobile

lack of time

Chrome not primary
lack of time
surprise at low rank

conflate city count with opening new tabs

surprise at high rank

did not use

8.11 Appendix 11: How did Terra Incognita make you feel?

How did Terra Incognita make you feel?

It was a somewhat strange experience. I appreciated having it there and having the maps. Sometimes I'd think "oh, that's where X" is – but it still didn't entice me to click for whatever reason. (see comments below for some thought)

It was a constant remind that there's a larger world than my screen, or the world that's represented on my screen.

Like I was doing something proactive to broaden my horizons. I also felt like a cheater for some of the articles that seemed to count for cities from my browser history. I'm kind of a geography buff and go to lots of list websites which push the numbers up.

It gave me an interesting screen for my blank tab, which was sort of like a screen saver. But unfortunately, opening a new tab is usually a moment when I

Category

Not curious

Broadened horizons

Broadened horizons

Critical

have an immediate task, so it's not the best time to browse.
That there are a lot of places in the world to learn about/see and most of those are not places your typical American knows about.
surprised and joyful
hhaha, a little embarrassed/stressed. Like it was nagging me. I think if the recommended articles were superb that feeling would go away.

Broadened horizons

Happy
Nagging/Stressed

unsure
Interested.

Confused/Unsure
More curious
Nagging/Stressed

Guilt can be a powerful motivator. In this case, the site produced a feeling of nagging guilt, but not much motivation. That, of course, was on me-- I needed to forge more mental links between this platform to read more global news and the reasons why, in theory, I value that kind of reading so much. If those kinds of links were present on the platform itself--through highlighted high-quality foreign news coverage--that would be a boon, but, I am guessing, far beyond the scope of the project.

Confused/Unsure
Not curious

Unfortunately, I never really understood it. I knew it was keeping track of articles I was reading by geo and that there was some vague social component. But I didn't find it particularly useful, and certainly not useful enough to change my behavior to use it.

Confused/Unsure

I found it intriguing but I am still not sure of the nature of the beast....is it supposed to be like a game?

Broadened Horizons

I definitely felt more informed and possibly insightful about countries and areas that I didn't know much (or anything) about before. I wasn't sure the logic of how Terra Incognita was feeding me information. In some ways, I like that as it seems less creepy and sort of random. Though, I like the idea that a feature could be that it more explicitly learns your reading habits and responds to those.
more aware of the world

Broadened Horizons
More curious
Broadened Horizons

Interested, curious

IT was a new way of experiencing the world around me. It seemed like a good place to go and read something interesting which was read by or recommended by other users. I mostly used this feature of "Fortune favors the bold" in my spare time. I think this experiment made me feel I know very little about the world and I make very little effort to know more about it. it encouraged me to find the time to explore more.

more curious

More Curious
Broadened Horizons
More connected
Broadened Horizons

Connected with the userbase like a fledgling Reddit and a bit cosmopolitan

That I was learning about the world. Also, it was fun to "compete", if that's the word.

More Curious

I found myself wondering about parts of the world (China!!) that I don't usually think of in much depth.

Engaged.

More Curious
Broadened Horizons
Broadened Horizons

Exploring new worlds .

I enjoyed learning geography and cities that I haven't been reminded soon, sort of to take me out of the everyday routine for my reading

Happy. Curious. My friends and colleagues were also curious when they saw it :)

More curious
Happy
Broadened Horizons
Technical
Broadened Horizons
More connected

I enjoyed it. I loved seeing glimpse of various places.
irritated since i never got it to work

I think this is a really cool tool. I first heard about it through Ethan Zuckerman's closing keynote at the Build Peace conference, and I was very excited to try it out. I know there's huge biases in the news I read specifically because most of it comes from the Washington Post, The Guardian, BBC, or the New York Times. They're just the by-lines I reach for because I know what to expect. However, the more I can challenge those biases, and the more local perspectives I can get, I feel the better informed I can be as a citizen and an activist. I felt a bit more confident approaching news even just armed with the knowledge that I had a tool that /might/ make it easier for me to find alternate perspectives.

Broadened Horizons

I like opening my browser and seeing different cities with stories about each.
Just seeing the cities visually made me think about more diverse places more

often. When I'd open my browser looking for something to read, there were many times that I'd read a couple articles that started with a TI suggestion. No connection with this question. Interested.
 Love the graphics and maps, and the sense of serendipity, and pulled in some useful info about places. Made me feel more connected, even if I rarely read stories.
 To be honest, the meaningless count of cities that I'd supposedly "read about" was more demotivating than anything.
 A bit awkward with the homepage displaying everytime

Confused/Unsure
 More curious
 Broadened Horizons
 More connected
 Critical
 Critical

8.12 Appendix 12: Any other feedback, desired features or suggestions?

Anything else?
 It would help if the articles were topically matched to me, or otherwise made a bit of a case for why I should read them.

Category
 More personalization
 Critical of new tab
 Integrate with other news apps/sites

The new tab dynamic was interesting, but maybe not a great match too – I often open a new tab to execute a task, then, once the task is done, I navigate away to something social or procrastationary. So this was odd because it encouraged me to explore when I wasn't in that mindset, but wasn't there when I was maybe more open to exploring. I found myself wanting it to re-write/reorder my Feedly feed or Google News home page.

Definitely want more playful interactions with the interface and other users. I would like to be able to zoom in and out of regions and get a sense of my geographic breadth and multiple levels too.
 For better or worse, I really didn't think much about TI's goals/purpose while it was installed. I don't feel like I read about many of the cities so not sure the high ranking reflects deeper knowledge. I do have a need to know about what's going on around world (though a slice of what's going on) for project I work on with the Greenpeace Mobilisation Lab. TI or something similar could be very useful for helping uncover the info I need if it could be configured/seeded with keywords somehow (an idea).

UX
 Map zoom
 More social
 More personalization

it would be great if it can send me some tasks to finish everyday...

More personalization

I thought the map would feature more prominently. Showing a heat map of where I've read (and haven't) would be really compelling to me.

More user feedback

no

Perhaps a method to get back to where you want to go, or a save to Instapaper sort of thing. It's beyond the scope of what you want to do, but could you ask people their preferences for regions, story types, etc.

More personalization
 Integrate with other news apps/sites

This is such a cool project and I hope to see how it evolves.

I think that its downfall was trying to change user behavior by interrupting them as they went to a new

Critical of new tab
 Integrate with other news apps/sites

tab. I almost never had time for the interrupt at that point. I also, to be frank, often totally forgot that the point was to give me news recommendations. I get news recommendations primarily from Twitter and email services. It would have taken a lot to change that behavior.

In addition to the name of the city and its population, would be interesting to have another information item in common that can be easily read at a glance when opening a new tab.
a cue to let me know I could zoom in and out and move the focal point of the map;

regarding the following question: depends on availability.

The spectroscope at the bottom could maybe color-code the continent. I really like the idea of this bar code but it is not very intuitive.

The Things to Read might benefit from bigger snippets. Often it is not clear whether one will read a news article or Wikipedia article or something else. Maybe just showing the first content sentence from the page (if possible) could already work as a snippet.

For some reason, for Saint Helier, Jersey the Things to Read contained only xkcd links.

It wasn't clear to me where the Fortune favors the bold (I'm feeling lucky) button takes me. Some pages were not obviously related to any city (e.g. https://en.wikipedia.org/wiki/Howard_Zinn) and some might be considered inappropriate (e.g. this add for escorts in Bangalore http://freeadsinfo.com/personals/women-looking-for-men/high-profile-call-girls-college-girls-in-bangalore-9902341292-escorts_114688#.U7-UZ_mSxvQ). Of course, the page about escort girls in Bangalore is also interesting from a research point of view (re exploitation of women) but I wasn't sure why it took me there.

Would it be possible to show a map of the cities one has read about? E.g. in our apartment we have a scratch map of the world. Initially, all the countries are covered and you can only see the shapes of the continents. But then you can scratch the map (when you travel there) to reveal what is underneath.

Include more geographic info (weather, etc)

Map zoom

UX

Include more geographic info (weather, etc)

Better recommendations

More user feedback

More social

Technical

Would it be possible to bring in social media content such as geo-tagged pictures for the cities? That would give it a more "personal" experience and maybe show some insights into lives from that city.

Other random things (just thinking out loud) to show could be the weather report for the city or the first paragraph from the Wikipedia page about the city.

Bumping into "Atafu, Tokelau" was fun! Pop 524. Especially here a link to a Wikipedia article about the location or more background would have been interesting. (Just to save me copy-pasting the name to Google.)

I wasn't very comfortable with the map feature. One can't zoom-in or zoom-out. It was hard to point at a specific location of interest through the map in order to get some news recommendation for that place. I think if I could do that it would have been a better experience for me.

asdasd

I would like to continue using it :)

Welcome to meet up in Cambridge, I'm at CIC. Keep up the good work. You may already do this or it might be too domestic too early, but it might be useful to help surface history items using something like https://en.wikipedia.org/wiki/List_of_Metropolitan_Statistical_Areas metropolitan areas to broaden inclusion, at least in the US. I can't think of low hanging ways to do it, but since people launch tabs without thinking, it'd be nice to make TI almost as fast as a blank page.

I love maps, and I loved seeing a map of the city, but there was no way to zoom out and see the broader geography. That would be a nice feature.

The regular gamification context should apply to how individual users interact in relation to each other.

I think that the driving motivation for people to join will not be ranking. Maybe you can try with another gamification feature - such as badges, for example. At least the way it is presented currently I didn't feel excited to compete with other people, actually i just saw one top reader in a city, but i didnt see where is my ranking compared for it. Actually I couldnt find the list of the 1000 cities - I was looking for it in the settings for example, because i wanted to add another city in which I am interested to read about. So if you want to stick with rankings per city you need to add my rank to be much more visible with a bit more funky and cool design who is the top reader and where i am... if I have friends using it, it will be great to see where are they standing too. Reading is fun when you can share and discuss with people.

Another note is that I usually see a foreigner to be the

Map zoom

Include more geographic info (weather, etc)
Technical - slow

UX
Map zoom

Better/different gamification

More social
Better/different gamification
Cultivate diversity of user base

top reader for a Chinese city. Probably it is now because you are conducting testing mainly among your network of contacts, but I do think it will be way nicer and interesting when it is real people from those local cities.

Better recommendations, current weather (in that city), current trending hashtags, poverty rate / other statistics, most searched for term, compare cities, etc.

Better Recommendations
Include more geographic info (weather, etc)

loved the combination of tiny, local news sites and big corporates.

fix technical issues

I was kind of bummed that I've been really busy this past month and haven't had much ability to just explore Terra Incognita. I found that out of the 1000 cities, there were so many that didn't seem to have any relevant links what-so-ever. I think that's a combination of my personal bias and the limitations of the software, but it definitely impacted how often I used the tool.

Technical
Technical - Slow
Better Recommendations
Integrate with other news apps/sites

I also found that when Terra Incognita acts as my new-tab page, it dramatically slows down the opening of new tabs. That was frustrating for me, since I open new tabs a lot while I'm using my browser. At times I thought I might uninstall it, but recently, my personal desire for the options in news reading that Terra Incognita presented outweighed my personal desires for efficient workspace.

I know nothing about software design, so I'm going to make some comments about what I think would be cool, but have no understanding of what it would take to implement – I think it could be cool to have Terra Incognita more integrated with the browsing experience, and possibly point out that you're reading about a particular city or issue from a given perspective, and attempt to offer relevant or similar articles from different cities in other countries. It could include ranking information almost on a live basis – the only reason I said I don't care to see the leaderboard is because I don't know what I would do with that information. I know who some other users of this are, and there's no way I'll ever match their news consumption.

Anyway, thanks so much for building this! I think it's really cool, and I wish I had the time/energy to use it more than I have.

I'd love more mapping and visual elements. It's fun to have articles suggested, but I'd love to know where I'm choosing to read about. There's an element of choice when one is presented with a new city. Sometimes I choose to click, and sometimes I don't. I'd like to know what I'm choosing to click on and unearth my own biases so I can grow from that knowledge.

UX
More personalization

Figure out a way to make the option more subtle:
perhaps user could set a once a day option.
If I'd felt like it was actually measuring me doing
something worthwhile, I'd have been more motivated to
interact with it. As it is, I still don't know what the
"fortune favours the brave" button does &€" is it even a
button? I don't know. Mostly the plugin just makes
opening a new tab slower. :(

Critical of New Tab

Technical - Slow

8.13 Appendix 13: Terra Incognita's 1000 Cities

We chose the top 1000 cities based on the following logic which attempted to represent each country fairly but also account for where the world's population lives:

1. Choose the capital of every country
2. Choose the second most populous city in that country, unless the population of the city was under 5000 people.
3. Then choose cities in order of their population but cap the number of cities for each country to correspond to the ratio of world population accounted for by that country. For example, China could only account for a max of 190 cities in Terra Incognita because China currently accounts for 19% of world population¹⁴⁰.

The cities in Terra Incognita are:

Countries A-H

Kandahār, Afghanistan
Kabul, Afghanistan
Mariehamn, Åland
Tirana, Albania
Durrës, Albania
Oran, Algeria
Algiers, Algeria
Pago Pago, American Samoa
Andorra la Vella, Andorra
Luanda, Angola
Cabinda, Angola
The Valley, Anguilla
Saint John's, Antigua and Barbuda
San Miguel de Tucumán, Argentina
Rosario, Argentina
Mendoza, Argentina
Mar del Plata, Argentina
La Plata, Argentina
Córdoba, Argentina
Buenos Aires, Argentina
Yerevan, Armenia
Gyumri, Armenia

Countries I-R

Reykjavík, Iceland
Akureyri, Iceland
Vishākhapatnam, India
Vijayawāda, India
Vārānasi, India
Vadodara, India
Thāne, India
Thāne, India
Sūrat, India
Srinagar, India
Solāpur, India
Salem, India
Ranchi, India
Rājkot, India
Raipur, India
Pune, India
Pimpri-Chinchwad, India
Patna, India
Nashik, India
Nagpur, India
Mumbai, India
Morādābād, India

Countries S-Z

Gustavia, Saint Barthélemy
Jamestown, Saint Helena
Basseterre, Saint Kitts and Nevis
Bisée, Saint Lucia
Rambaud, Saint Martin
Marigot, Saint Martin
Saint-Pierre, Saint Pierre and
Miquelon
Kingstown, Saint Vincent and the
Grenadines
Apia, Samoa
San Marino, San Marino
São Tomé, São Tomé and Príncipe
Ta'if, Saudi Arabia
Riyadh, Saudi Arabia
Medina, Saudi Arabia
Mecca, Saudi Arabia
Jeddah, Saudi Arabia
Dammam, Saudi Arabia
Thiès Nones, Senegal
Dakar, Senegal
Novi Sad, Serbia

¹⁴⁰ "List of Countries by Population - Wikipedia, the Free Encyclopedia," accessed July 13, 2014, http://en.wikipedia.org/wiki/List_of_countries_by_population.

Oranjestad, Aruba
Sydney, Australia
Perth, Australia
Melbourne, Australia
Canberra, Australia
Brisbane, Australia
Adelaide, Australia
Vienna, Austria
Graz, Austria
Sumqayıt, Azerbaijan
Mingelchaur, Azerbaijan
Ganja, Azerbaijan
Baku, Azerbaijan
Nassau, Bahamas
Manama, Bahrain
Ar Rifā', Bahrain
Tungi, Bangladesh
Sylhet, Bangladesh
Rājshāhi, Bangladesh
Nārāyanganj, Bangladesh
Khulna, Bangladesh
Dhaka, Bangladesh
Comilla, Bangladesh
Chittagong, Bangladesh
Bogra, Bangladesh
Barisāl, Bangladesh
Bridgetown, Barbados
Minsk, Belarus
Gomel, Belarus
Brussels, Belgium
Antwerpen, Belgium
San Ignacio, Belize
Belmopan, Belize
Belize City, Belize
Porto-Novo, Benin
Parakou, Benin
Cotonou, Benin
Hamilton, Bermuda
Thimphu, Bhutan
Phuntsholing, Bhutan
Santa Cruz de la Sierra, Bolivia
La Paz, Bolivia
La Paz, Bolivia
Alto Porvenir, Bolivia
Sarajevo, Bosnia and Herzegovina
Banja Luka, Bosnia and Herzegovina
Gaborone, Botswana
Francistown, Botswana
Teresina, Brazil
São Paulo, Brazil
São Luís, Brazil
São Gonçalo, Brazil
São Bernardo do Campo, Brazil

Meerut, India
Madurai, India
Ludhiāna, India
Lucknow, India
Kota, India
Kolkata, India
Cochin, India
Kānpur, India
Kalyān, India
Jodhpur, India
Jamshedpur, India
Jalandhar, India
Jaipur, India
Jabalpur, India
Indore, India
Hyderabad, India
Hāora, India
Gwalior, India
Guwahati, India
Ghāziābād, India
Farīdābād, India
Dhanbād, India
Delhi, India
Coimbatore, India
Chennai, India
Chandigarh, India
Bhopal, India
Bangalore, India
Aurangabad, India
Amritsar, India
Allahābād, India
Ahmedabad, India
Āgra, India
Tangerang, Indonesia
Surabaya, Indonesia
South Tangerang, Indonesia
Semarang, Indonesia
Palembang, Indonesia
Medan, Indonesia
Jakarta, Indonesia
Depok, Indonesia
Bekasi, Indonesia
Bandung, Indonesia
Makassar, Indonesia
Orūmīyeh, Iran
Tehrān, Iran
Tabrīz, Iran
Shiraz, Iran
Qom, Iran
Mashhad, Iran
Kermānshāh, Iran
Karaj, Iran
Isfahan, Iran
Ahvaz, Iran

Belgrade, Serbia
Victoria, Seychelles
Freetown, Sierra Leone
Bo, Sierra Leone
Singapore, Singapore
Philipsburg, Sint Maarten
Košice, Slovakia
Bratislava, Slovakia
Maribor, Slovenia
Ljubljana, Slovenia
Honiara, Solomon Islands
Mogadishu, Somalia
Hargeysa, Somalia
Bosaso, Somalia
Soweto, South Africa
Pretoria, South Africa
Port Elizabeth, South Africa
Johannesburg, South Africa
Durban, South Africa
Cape Town, South Africa
Bloemfontein, South Africa
Grytviken, South Georgia and the South Sandwich Islands
Yongin, South Korea
Ulsan, South Korea
Suwon-si, South Korea
Seoul, South Korea
Seongnam-si, South Korea
Jeonju, South Korea
Incheon, South Korea
Gwangju, South Korea
Goyang-si, South Korea
Daejeon, South Korea
Daegu, South Korea
Cheongju-si, South Korea
Busan, South Korea
Bucheon-si, South Korea
Ansan-si, South Korea
Yei, South Sudan
Juba, South Sudan
Valencia, Spain
Sevilla, Spain
Zaragoza, Spain
Madrid, Spain
Barcelona, Spain
Mount Lavinia, Sri Lanka
Moratuwa, Sri Lanka
Colombo, Sri Lanka
Omdurman, Sudan
Khartoum, Sudan
Paramaribo, Suriname
Lelydorp, Suriname
Longyearbyen, Svalbard and Jan Mayen

Salvador, Brazil
Rio de Janeiro, Brazil
Recife, Brazil
Porto Alegre, Brazil
Osasco, Brazil
Nova Iguaçu, Brazil
Natal, Brazil
Manaus, Brazil
Maceió, Brazil
Guarulhos, Brazil
Goiânia, Brazil
Fortaleza, Brazil
Duque de Caxias, Brazil
Curitiba, Brazil
Campo Grande, Brazil
Campinas, Brazil
Brasília, Brazil
Belo Horizonte, Brazil
Belém, Brazil
Road Town, British Virgin Islands
Kuala Belait, Brunei
Bandar Seri Begawan, Brunei
Sofia, Bulgaria
Plovdiv, Bulgaria
Ouagadougou, Burkina Faso
Bobo-Dioulasso, Burkina Faso
Muyinga, Burundi
Bujumbura, Burundi
Phnom Penh, Cambodia
Battambang, Cambodia
Yaoundé, Cameroon
Douala, Cameroon
Winnipeg, Canada
Vancouver, Canada
Toronto, Canada
Québec, Canada
Ottawa, Canada
Montréal, Canada
Hamilton, Canada
Edmonton, Canada
Calgary, Canada
Praia, Cape Verde
Mindelo, Cape Verde
George Town, Cayman Islands
Bimbo, Central African Republic
Bangui, Central African Republic
N'Djamena, Chad
Moundou, Chad
Valparaiso, Chile
Santiago, Chile
Puente Alto, Chile
Concepción, Chile
Antofagasta, Chile
Zunyi, China

Mosul, Iraq
Erbil, Iraq
Al Başrah, Iraq
Baghdad, Iraq
Dublin, Ireland
Cork, Ireland
Douglas, Isle of Man
West Jerusalem, Israel
Tel Aviv, Israel
Turin, Italy
Rome, Italy
Palermo, Italy
Napoli, Italy
Milano, Italy
Genoa, Italy
Yamoussoukro, Ivory Coast
Bouaké, Ivory Coast
Abidjan, Ivory Coast
Spanish Town, Jamaica
Kingston, Jamaica
Yokohama-shi, Japan
Tokyo, Japan
Shizuoka-shi, Japan
Sendai-shi, Japan
Sapporo, Japan
Saitama, Japan
Ōsaka-shi, Japan
Okayama-shi, Japan
Niigata-shi, Japan
Nagoya-shi, Japan
Kyoto, Japan
Kumamoto, Japan
Kōbe-shi, Japan
Kitakyūshū, Japan
Kawasaki, Japan
Hiroshima-shi, Japan
Hamamatsu, Japan
Fukuoka-shi, Japan
Chiba, Japan
Saint Helier, Jersey
Zarqa, Jordan
Amman, Jordan
Astana, Kazakhstan
Almaty, Kazakhstan
Nakuru, Kenya
Nairobi, Kenya
Mombasa, Kenya
Kisumu, Kenya
Tarawa, Kiribati
Bairiki Village, Kiribati
Prizren, Kosovo
Pristina, Kosovo
Kuwait City, Kuwait
Al Jahra', Kuwait

Mbabane, Swaziland
Manzini, Swaziland
Lobamba, Swaziland
Stockholm, Sweden
Malmö, Sweden
Göteborg, Sweden
Zürich, Switzerland
Genève, Switzerland
Bern, Switzerland
Latakia, Syria
Idlib, Syria
Homs, Syria
Ḥamāh, Syria
Deir ez-Zor, Syria
Dar'ā, Syria
Damascus, Syria
Aleppo, Syria
Al Ḥasakah, Syria
Taipei, Taiwan
Taichung, Taiwan
Kaohsiung, Taiwan
Khūjand, Tajikistan
Dushanbe, Tajikistan
Mwanza, Tanzania
Mbeya, Tanzania
Dodoma, Tanzania
Dar es Salaam, Tanzania
Arusha, Tanzania
Udon Thani, Thailand
Pak Kret, Thailand
Mueang Nonthaburi, Thailand
Nakhon Ratchasima, Thailand
Hat Yai, Thailand
Chiang Mai, Thailand
Bangkok, Thailand
Sokodé, Togo
Lomé, Togo
Atafu Village, Tokelau
Nuku'alofa, Tonga
Port-of-Spain, Trinidad and Tobago
Chaguanas, Trinidad and Tobago
Tunis, Tunisia
Sfax, Tunisia
Samsun, Turkey
Mersin, Turkey
Konya, Turkey
Kayseri, Turkey
İzmir, Turkey
İstanbul, Turkey
Gaziantep, Turkey
Eskişehir, Turkey
Diyarbakır, Turkey
Bursa, Turkey
Antalya, Turkey

Zoucheng, China
Zigong, China
Zibo, China
Zhuzhou, China
Zhuji, China
Zhuhai, China
Zhucheng, China
Zhoushan, China
Zhenjiang, China
Zhengzhou, China
Zhaoqing, China
Zhanjiang, China
Zhangzhou, China
Zhangzhou, China
Zhangqiu, China
Zhangjiagang, China
Zaozhuang, China
Zaoyang, China
Yuzhou, China
Yueyang, China
Yixing, China
Yiwu, China
Yingkou, China
Yinchuan, China
Yichang, China
Yibin, China
Yantai, China
Yangzhou, China
Yangjiang, China
Tongshan, China
Xuchang, China
Xinyi, China
Xinyang, China
Xinxiang, China
Xining, China
Xingtai, China
Xianyang, China
Xiangyang, China
Xiangtan, China
Xiangcheng, China
Xiamen, China
XPan, China
Wuxi, China
Wuwei, China
Wuhu, China
Wuhu, China
Wuhan, China
Wuchuan, China
Wenzhou, China
Wenling, China
Welhai, China
Weifang, China
Ürümqi, China
Tieling, China

Osh, Kyrgyzstan
Bishkek, Kyrgyzstan
Vientiane, Laos
Savannakhét, Laos
Pakxé, Laos
Riga, Latvia
Daugavpils, Latvia
Tripoli, Lebanon
Beirut, Lebanon
Maseru, Lesotho
Leribe, Lesotho
Monrovia, Liberia
Gbarnga, Liberia
Benghazi, Libya
Vaduz, Liechtenstein
Vilnius, Lithuania
Kaunas, Lithuania
Luxembourg, Luxembourg
Esch-sur-Alzette, Luxembourg
Skopje, Macedonia
Bitola, Macedonia
Toamasina, Madagascar
Antananarivo, Madagascar
Lilongwe, Malawi
Blantyre, Malawi
Putrajaya, Malaysia
Kuala Lumpur, Malaysia
Kampung Seberang Perai, Malaysia
Male, Maldives
Sikasso, Mali
Ségou, Mali
Koutiala, Mali
Kayes, Mali
Bamako, Mali
Koulikoro, Mali
Valletta, Malta
Mosta, Malta
Birkirkara, Malta
Majuro, Marshall Islands
Nouakchott, Mauritania
Kiffa, Mauritania
Port Louis, Mauritius
Mamoudzou, Mayotte
Dzaoudzi, Mayotte
Zapopan, Mexico
Veracruz, Mexico
Tijuana, Mexico
San Luis Potosí, Mexico
Saltillo, Mexico
Puebla, Mexico
Naucalpan de Juárez, Mexico
Monterrey, Mexico
Mexico City, Mexico
Mexicali, Mexico

Ankara, Turkey
Adana, Turkey
Türkmenabat, Turkmenistan
Ashgabat, Turkmenistan
Cockburn Town, Turks and Caicos
Islands
Funafuti, Tuvalu
Charlotte Amalie, U.S. Virgin
Islands
Kampala, Uganda
Gulu, Uganda
Zaporizhzhya, Ukraine
Odessa, Ukraine
L'viv, Ukraine
Kryvyi Rih, Ukraine
Kiev, Ukraine
Kharkiv, Ukraine
Donets'k, Ukraine
Dnipropetrovsk, Ukraine
Dubai, United Arab Emirates
Abu Dhabi, United Arab Emirates
Wakefield, United Kingdom
Sheffield, United Kingdom
Nottingham, United Kingdom
Manchester, United Kingdom
London, United Kingdom
Liverpool, United Kingdom
Leeds, United Kingdom
Glasgow, United Kingdom
Edinburgh, United Kingdom
Coventry, United Kingdom
Cardiff, United Kingdom
Bristol, United Kingdom
Birmingham, United Kingdom
Washington, D. C., United States
Tampa, United States
St. Louis, United States
Seattle, United States
San Jose, United States
San Francisco, United States
San Diego, United States
San Antonio, United States
Portland, United States
Phoenix, United States
Philadelphia, United States
Oklahoma City, United States
New York City, United States
Nashville, United States
Minneapolis, United States
Milwaukee, United States
Miami, United States
Memphis, United States
Louisville, United States
Los Angeles, United States

Tianshui, China
Tianjin, China
Tengzhou, China
Tangshan, China
Taizhou, China
Taiyuan, China
Taixing, China
Tai'an, China
Suzhou, China
Suzhou, China
Suqian, China
Suihua, China
Shouguang, China
Shijiazhuang, China
Shenzhen, China
Shenyang, China
Shaoyang, China
Shaoxing, China
Shantou, China
Shanghai, China
Rucheng, China
Rizhao, China
Qujing, China
Quanzhou, China
Qiqihar, China
Qinhuangdao, China
Qingdao, China
Qidong, China
Puyang, China
Putian, China
Pizhou, China
Pingdingshan, China
Panzhihua, China
Pangjin-dong, North Korea
Ningbo, China
Neijiang, China
Nanyang, China
Nantong, China
Nanning, China
Nanjing, China
Nanchong, China
Nanchang, China
Mudanjiang, China
Mianyang, China
Maoming, China
Ma'anshan, China
Luoyang, China
Hefei, China
Liuzhou, China
Linyi, China
Linhai, China
Linfen, China
Liaoyang, China
Liaocheng, China

Santiago de Querétaro, Mexico
Ciudad Juárez, Mexico
Hermosillo, Mexico
Guadalajara, Mexico
Ecatepec, Mexico
Ciudad Nezahualcóyotl, Mexico
Chihuahua, Mexico
Aguascalientes, Mexico
Weno Town, Micronesia
Palikir - National Government
Center, Micronesia
Tiraspol, Moldova
Chişinău, Moldova
Bălţi, Moldova
Monte-Carlo, Monaco
Monaco, Monaco
La Condamine, Monaco
Ulaanbaatar, Mongolia
Erdenet, Mongolia
Podgorica, Montenegro
Nikšić, Montenegro
Cetinje, Montenegro
Plymouth, Montserrat
Brades, Montserrat
Tétouan, Morocco
Tangier, Morocco
Sale, Morocco
Rabat, Morocco
Oujda, Morocco
Meknès, Morocco
Marrakesh, Morocco
Kenitra, Morocco
Fès, Morocco
Casablanca, Morocco
Nampula, Mozambique
Maputo, Mozambique
Rangoon, Myanmar [Burma]
Nay Pyi Taw, Myanmar [Burma]
Mandalay, Myanmar [Burma]
Windhoek, Namibia
Rundu, Namibia
Yaren, Nauru
Pokhara, Nepal
Kathmandu, Nepal
Utrecht, Netherlands
The Hague, Netherlands
Rotterdam, Netherlands
Amsterdam, Netherlands
Wé, New Caledonia
Nouméa, New Caledonia
Wellington, New Zealand
Auckland, New Zealand
Managua, Nicaragua
León, Nicaragua

Las Vegas, United States
Jacksonville, United States
Indianapolis, United States
Houston, United States
Fort Worth, United States
El Paso, United States
Detroit, United States
Denver, United States
Dallas, United States
Columbus, United States
Chicago, United States
Boston, United States
Baltimore, United States
Austin, United States
Tucson, United States
Atlanta, United States
Salto, Uruguay
Montevideo, Uruguay
Tashkent, Uzbekistan
Namangan, Uzbekistan
Port-Vila, Vanuatu
Luganville, Vanuatu
Vatican City, Vatican City
Valencia, Venezuela
Maracaibo, Venezuela
Ciudad Guayana, Venezuela
Ciudad Guayana, Venezuela
Caracas, Venezuela
Barquisimeto, Venezuela
Ho Chi Minh City, Vietnam
Hanoi, Vietnam
Haiphong, Vietnam
Da Nang, Vietnam
Cần Thơ, Vietnam
Mata-Utu, Wallis and Futuna
Laâyoune / El Aaiún, Western
Sahara
Dakhla, Western Sahara
Sanaa, Yemen
Aden, Yemen
Lusaka, Zambia
Kitwe, Zambia
Harare, Zimbabwe
Bulawayo, Zimbabwe

Xinpu, China
Lanzhou, China
Langfang, China
Laiwu, China
Kunming, China
Kashi, China
Kaifeng, China
Jinzhou, China
Jining, China
Jinhua, China
Jingzhou, China
Jinan, China
Jilin, China
Jiaxing, China
Jiaozuo, China
Chengjiang, China
Jiangmen, China
Jiamusi, China
Huludao, China
Huizhou, China
Huazhou, China
Huangshi, China
Huainan, China
Huaibei, China
Hua'an, China
Hong Kong, Hong Kong
Hohhot, China
Hezhou, China
Heze, China
Hengyang, China
Hengyang, China
Hefei, China
Harbin, China
Hangzhou, China
Handan, China
Haimen, China
Haikou, China
Haicheng, China
Guiyang, China
Guilin, China
Guigang, China
Guangzhou, China
Fuzhou, China
Fuyang, China
Fuxin, China
Fushun, China
Fuqing, China
Feicheng, China
Ezhou, China
Dongying, China
Dongguan, China
Dingzhou, China
Dezhou, China
Dengzhou, China

Zinder, Niger
Niamey, Niger
Zaria, Nigeria
Port Harcourt, Nigeria
Ogbomoso, Nigeria
Maiduguri, Nigeria
Lagos, Nigeria
Kano, Nigeria
Kaduna, Nigeria
Jos, Nigeria
Ilorin, Nigeria
Ibadan, Nigeria
Ibadan, Nigeria
Enugu, Nigeria
Benin City, Nigeria
Abuja, Nigeria
Abeokuta, Nigeria
Aba, Nigeria
Alofi, Niue
Kingston, Norfolk Island
Pyongyang, North Korea
Hamhŭng, North Korea
Chongjin, North Korea
Saipan, Northern Mariana Islands
Oslo, Norway
Bergen, Norway
Şalālah, Oman
Muscat, Oman
Rāwalpindi, Pakistan
Peshāwar, Pakistan
Multān, Pakistan
Lahore, Pakistan
Karachi, Pakistan
Islamabad, Pakistan
Hyderābād, Pakistan
Gujrānwāla, Pakistan
Faisalābād, Pakistan
Bahāwalpur, Pakistan
Melekeok, Palau
Koror State, Palau
Ramallah, Palestine
Hebron, Palestine
Gaza, Palestine
Panamá, Panama
David, Panama
Port Moresby, Papua New Guinea
Lae, Papua New Guinea
Ciudad del Este, Paraguay
Asunción, Paraguay
Trujillo, Peru
Lima, Peru
Arequipa, Peru
Callao, Peru
Zapote, Philippines

Datong, China	Zamboanga, Philippines
Datong, China	Tanza, Philippines
Daqing, China	Tanga, Philippines
Danyang, China	Quezon City, Philippines
Dandong, China	Manila, Philippines
Dalian, China	Makati City, Philippines
Cixi, China	General Trias, Philippines
Chongqing, China	Davao, Philippines
Chifeng, China	Cebu City, Philippines
Chengdu, China	Antipolo, Philippines
Changzhou, China	Adamstown, Pitcairn Islands
Changshu City, China	Wrocław, Poland
Changsha, China	Warsaw, Poland
Changde, China	Łódź, Poland
Changchun, China	Kraków, Poland
Bozhou, China	Porto, Portugal
Binzhou, China	Lisbon, Portugal
Benxi, China	San Juan, Puerto Rico
Bengbu, China	Bayamón, Puerto Rico
Beijing, China	Doha, Qatar
Bazhou, China	Al Khawr, Qatar
Baotou, China	Pointe-Noire, Republic of the Congo
Baoji, China	Brazzaville, Republic of the Congo
Baoding, China	Cluj-Napoca, Romania
Anyang, China	Bucharest, Romania
Anshan, China	Yekaterinburg, Russia
Anqing, China	Yaroslavl, Russia
Flying Fish Cove, Christmas Island	Voronezh, Russia
Bantam Village, Cocos [Keeling]	Volgograd, Russia
Islands	Ulyanovsk, Russia
Cali, Colombia	Ufa, Russia
Medellín, Colombia	Tyumen, Russia
Cartagena, Colombia	Tomsk, Russia
Bogotá, Colombia	Tol'yatti, Russia
Barranquilla, Colombia	Saratov, Russia
Moutsamoudou, Comoros	Samara, Russia
Moroni, Comoros	Saint Petersburg, Russia
Avarua, Cook Islands	Ryazan', Russia
San José, Costa Rica	Rostov-na-Donu, Russia
Limón, Costa Rica	Orenburg, Russia
Zagreb, Croatia	Omsk, Russia
Split, Croatia	Novosibirsk, Russia
Santiago de Cuba, Cuba	Novokuznetsk, Russia
Havana, Cuba	Nizhniy Novgorod, Russia
Willemstad, Curacao	Moscow, Russia
Nicosia, Cyprus	Perm, Russia
Limassol, Cyprus	Makhachkala, Russia
Kyrenia, Cyprus	Krasnoyarsk, Russia
Prague, Czechia	Krasnodar, Russia
Brno, Czechia	Khabarovsk, Russia
Lubumbashi, Democratic Republic	Kemerovo, Russia
of the Congo	Kazan, Russia
Kinshasa, Democratic Republic of	Izhevsk, Russia
the Congo	Izhevsk, Russia

Copenhagen, Denmark
Århus, Denmark
Djibouti, Djibouti
Ali Sabieh, Djibouti
Roseau, Dominica
Santo Domingo, Dominican
Republic
Santiago de los Caballeros,
Dominican Republic
Dili, East Timor
Dare, East Timor
Quito, Ecuador
Guayaquil, Ecuador
Shubrā al Khaymah, Egypt
Al Jtazah, Egypt
Cairo, Egypt
Alexandria, Egypt
Santa Ana, El Salvador
San Salvador, El Salvador
Malabo, Equatorial Guinea
Bata, Equatorial Guinea
Assab, Eritrea
Asmara, Eritrea
Tartu, Estonia
Tallinn, Estonia
Dire Dawa, Ethiopia
Addis Ababa, Ethiopia
Stanley, Falkland Islands
Tórshavn, Faroe Islands
Suva, Fiji
Helsinki, Finland
Espoo, Finland
Paris, France
Marseille, France
Saint-Laurent-du-Maroni, French
Guiana
Cayenne, French Guiana
Papeete, French Polynesia
Mahina, French Polynesia
Port-Gentil, Gabon
Libreville, Gabon
Brikama, Gambia
Banjul, Gambia
Bakau, Gambia
Zugdidi, Georgia
Tbilisi, Georgia
Rust'avi, Georgia
P'ot'i, Georgia
K'ut'aisi, Georgia
Gori, Georgia
Batumi, Georgia
Stuttgart, Germany
Munich, Germany
Hamburg, Germany

Irkutsk, Russia
Chelyabinsk, Russia
Barnaul, Russia
Kigali, Rwanda
Gitarama, Rwanda

Frankfurt am Main, Germany
Essen, Germany
Düsseldorf, Germany
Dortmund, Germany
Köln, Germany
Bremen, Germany
Berlin, Germany
Kumasi, Ghana
Accra, Ghana
Gibraltar, Gibraltar
Thessaloníki, Greece
Pátra, Greece
Athens, Greece
Sisimiut, Greenland
Nuuk, Greenland
Saint George's, Grenada
Tamuning-Tumon-Harmon Village,
Guam
Mangilao Village, Guam
Hagåtña, Guam
Quetzaltenango, Guatemala
Guatemala City, Guatemala
Saint Peter Port, Guernsey
Gueckedou, Guinea
Conakry, Guinea
Gabú, Guinea-Bissau
Bissau, Guinea-Bissau
Linden, Guyana
Georgetown, Guyana
Port-au-Prince, Haiti
Gonaíves, Haiti
Tegucigalpa, Honduras
San Pedro Sula, Honduras
Kowloon, Hong Kong
Hong Kong, Hong Kong
Debrecen, Hungary
Budapest, Hungary