

UC Berkeley

UC Berkeley Electronic Theses and Dissertations

Title

Scoring Space: How Real Estate Platform Users Make Sense of Place, Platforms, and Metrics

Permalink

<https://escholarship.org/uc/item/1d36c217>

Author

Resor, Elizabeth Lansdowne

Publication Date

2024

Peer reviewed|Thesis/dissertation

Scoring Space: How Real Estate Platform Users Make Sense of
Place, Platforms, and Metrics

by

Elizabeth Lansdowne Resor

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Philosophy

in

Information Science

and the Designated Emphasis

in

New Media Studies

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor AnnaLee Saxenian, Chair

Professor Jenna Burrell

Professor Paul Duguid

Professor Abigail de Kosnik

Summer 2024

Abstract

Scoring Space: How Real Estate Platform Users Make Sense of Place, Platforms, and Metrics

by

Elizabeth Lansdowne Resor

Doctor of Philosophy in Information Science

and Designated Emphasis in

New Media Studies

University of California, Berkeley

Professor AnnaLee Saxenian, Chair

Real estate platforms, like Zillow, Redfin, and Apartments.com, have transformed real estate information access in the U.S. since they launched in the early 2000s. They assemble information about real estate listings from various sources, including public information (sales and tax history), information from other platforms (Google Maps, Yelp), and listing information that was previously only accessible to real estate agents (through the Multiple Listing Service). On the real estate platforms, home-seekers encounter a range of neighborhood scores – numerical rating and basic heatmaps that rank the schools, walkability, transit, crime and noise of a neighborhood. While some scholars and policymakers praised the platforms and these metrics for making information more universally accessible and potentially correcting historical inequalities in access to housing, others raised concerns that platforms would continue consolidating power for a few actors in housing. Both perspectives fail to consider the multiplicity of the user interactions with the platforms. By contrast, this dissertation takes an interpretivist approach to investigating the platforms and their users. I draw on 32 in-depth interviews with home-seekers from Las Vegas, NV or Oakland, CA, additional interviews with housing experts and activists, and online and in-person participant observation as I recruited interview participants and conducted my own online housing search. Instead of treating information as self-evident, my research shows that people interpreted the platforms' metrics in considerably varied ways. Different users, for example, could draw opposing conclusions from the same neighborhood score. I also present evidence of online housing search activities that extend beyond real estate platforms and analyze user folk theories about the price-estimating algorithm, the Zestimate, that challenge media narratives that hype its influence. This research reveals key gaps in current policy framing of both housing search and platform use.

Contents

Chapter	Page
Acknowledgments	ii
1 – Introduction	1
2 – Methods	13
3 – The Bricolage of Online Housing Search	29
4 – Simple Scores are Messy Signals	50
5 – Ambivalent Users	72
6 – Demystifying the Zestimate	86
7 – Conclusion	107
Works Cited	119

Acknowledgements

First, to my fantastic Dissertation Committee, Chaired by Dr. Anno Saxenian, I always knew you were all rooting for me, and this made the hardest parts just that much easier. I am so grateful for your support and guidance through this project. Jenna Burrell, thank you for your constant encouragement and enthusiasm about my interests and my research. I will always channel your first day of class pitch about rigor in qualitative methods whenever I have a tough reviewer. Paul Duguid, from my first semester in Info Society, and our many discussions in Classics, thank you for teaching me that even the densest theory can be fun and useful when you have the right folks with whom to discuss it. You are the kindest reviewer, able to see the best versions of your students in even their roughest drafts. Anno Saxenian, you have taught me by example how to build a truly supportive, interdisciplinary community. The farther I am from the I School, the more I realize how difficult and rare this was. Thank you! Gail De Kosnik, thank you for all the great, honest advice you have shared, and reminding me that fun pop cultural moments can still be treated with academic rigor.

Beyond my committee, so many other folks were crucial to my success. Coye Cheshire, you created a magical space in DRTW. I improved my writing, but more importantly, I learned how to give supportive, constructive feedback. You taught us the ideal version of collegiality that I only hope future work communities can live up to. Morgan Ames, I am so glad we got the chance to do some fieldwork together! Thank you for always supporting us. To the wonderful administrative team at the I School, thank you for helping me navigate the labyrinth that is the Berkeley bureaucracy these past seven years. Especially, thank you to Inessa, for making sure I didn't fall through any cracks the whole time, but especially these last years of writing far from Berkeley. Your monthly check-ins were so reassuring.

To my I School PhD community, Anne Jonas, Richmond Wong, Emma Lurie, Daniel Griffin, Zoe Kahn, Andrew Chong, Ji Su Yoo, Seyi Olojo, and Shazeda Ahmed, you were the day in and day out support, especially through the pandemic and the isolation of dissertation writing. From weekly check-ins to Zoom co-working, it wasn't the same as being in the office together, but it was still fun and grounding. I have learned so much from you over the years. This dissertation is filled with papers you suggested (or wrote), tweets you sent me, and ideas I talked through with you.

Beyond the I School I was lucky to have Gauthami Penakalapati, Angela Okune, and Adrian Wilson. Thank you for being a sounding board, good conversation at the Swahili Table, and always down for a chat/snack/drink.

To the Matrix – Hilary Faxon, Desiree Fields, Jovanna Rosen, Luis Alvarez Leon, Kendra Kintzi, Courtney Wittekind, Julien Migozzi and Cartus You – I can't imagine the past

few years without your feedback, slack messages, and #scam memes. I look forward to more collaboration and thinking together!

Last but not least, my family and friends beyond Berkeley, you have been so supportive throughout these past seven years. So many of you have patiently asked (and listened) about this project at various stages. A special few have even read some drafts! At various times you have visited, dog sat, sent food, helped me move, sent me memes, and generally made your love felt across the distance of the Bay Bridge or the whole country. Thank you so much!

Funding

I am grateful for the financial support this project received through a Google Research Faculty Award (with Dr. Jenna Burrell), the Connecting the EdTech Research EcoSystem (CERES) Network at UC Irvine, and the UC Berkeley Center for Technology, Society & Policy (CTSP).

1 – Introduction

so zillow let a robot buy up thousands of properties, outbidding real buyers and artificially inflating the market, and now will be laying off a full quarter of its workforce and selling off the properties to rental corps like BlackRock at vastly discounted prices. that right?

6:51 PM · 11/2/21 From Earth

16K Reposts 1.4K Quotes

102K Likes 2.6K Bookmarks



11/2/21
so, for fun, I just locked up zillow owned homes in the areas I've been trying to buy in for several years in order to just get 1 fucking hour in commute time closer to my work... on average they're listing about 60% higher than all nearby properties.

21 654 11K

11/2/21
I'd love to laugh at their failure, but its nothing, they'll simply write off the losses and face no real gov scrutiny for their pillaging. meanwhile they've absolutely succeeded at exacerbating America's nationwide housing affordability crisis.

Here's a good one: Facebook has prevented us from promoting our article on record rents today because it's "discriminatory" against... landlords.

We appealed as well: no dice. Big Tech censorship is off the wall.

The Rent Is Too Damn High

By Joe Bilsborough

Housing is driving the cost of living crisis, with private rents in England the highest ever recorded. That will only change through a struggle of renters against the renters.

2:35 PM · 4/4/22 From Earth

9.8K Reposts 434 Quotes

37K Likes 823 Bookmarks



Saw some homes last month. Here's the update:

List: 0.995m. Sold: 1.6m
List: 1.2m. Sold: 1.75m
List: 0.98m. Sold: 1.6m
List: 0.995m. Sold: 1.48m
List: 1.095m. Sold: 1.925m

Nothing quite like a "typical" sale at 60% or more over list.

I think I'll sit this out.

12:21 PM · 4/14/22 From Earth

1 Quote 3 Likes 1 Bookmark



4/15/22
Update:

List 0.95m. Sale: 1.4m.

2 bed. Crap condition. Zero yard.



Figure 1 Three examples of tweets about housing and technology. The first is about Zillow's automated buying and price-estimating algorithm. The second relates to the regulation of discriminatory information about housing online. The third describes how real estate platforms (implicitly) can be used to access real estate data. Source: author.

In September 2021, more than 18 months into the COVID-19 pandemic, U.S. housing prices were at a peak, and a TikTok video went viral alleging that “a company that everyone used... to look for housing” was inflating home prices (Gotcher 2021). I was a year into this project, researching the real estate platforms that the video was calling out. Until then, the public seemed to consider these platforms harmless entertainment¹ or online search tools. Their reach – across the entire U.S. housing market, with some including in-house sales teams, lending, and automatic purchasing – made them convenient and ubiquitous.² But the pandemic had refocused public attention on the widening wealth gap, the inadequacies of the American social safety net, and the already-strained housing market. On top of this, many large technology companies, like Amazon, were seeing record profits even as much of the economy stagnated. (Figure 1 shows some threads on Twitter that exemplify the intersecting discussions of both housing and technology taking place during the study period.) Real estate platforms brought together housing and big tech, and suddenly that combination had people feeling suspicious – could these platforms be to

¹ Saturday Night Live parodied Zillow voyeurism in a skit that presented it like a late-night phone sex hotline in 2021 (Sinha 2021), a viral social media account that simply shared outrageous listings (@Zillowgonewild) became its own HGTV show in 2024 (Zillow Gone Wild).

² Zillow, the platform with the largest userbase, reported 234 million unique users in the peak of 2021 (July) (Zillow Group 2022).

blame for housing crisis? Most economic experts agreed that the housing market could not be influenced so simply,³ but this moment exposed a larger lingering question about the influence that large platform companies can have when they dominate a specific domain.

This dissertation examines these real estate platforms, and how they shape and are shaped by their users' understandings of the platform and the information it provides. I argue that to understand the impact of a large platform company, we must study how it is used *in practice* and how it fits into the larger social and political context (in this case the context of urban planning and housing policy in the U.S.).

Real estate platforms transformed online housing search. Zillow and Redfin, the two most popular real estate platforms⁴ were founded in 2007, building on the model of precursors like Craigslist and other online mashups of real estate listings and digital mapping platforms. They made real estate information searchable and visible in user-friendly formats. In the following decade, real estate platforms grew their userbases and expanded their market coverage and services until they became nearly ubiquitous tools for home-seekers. Today, Zillow, the largest, boasts 234 million unique monthly users, and shows listings in all 50 states. Real estate platforms assemble information about real estate listings from various sources, including public information (sales and tax history), information from other platforms (Google Maps, Yelp), and listing information that was previously only accessible to real estate agents (through the Multiple Listing Service). They are free for people searching for real estate (I refer to this group as "home-seekers" or "users"), and instead they make their profits through pieces of the real estate transaction (sales, mortgages, closing fees) and/or the promotion of listings or real estate agents (essentially targeted advertising of listings and agents to the users/home-seekers).

This study weaves together three themes that exemplify the real estate platforms but also speak to larger, academic debates: place, platforms, and metrics. Housing is very **place**-specific, with local climate, customs, policies and markets affecting the physical attributes (size, materials, type – apartment or free-standing house) and the regulatory and social expectations (e.g. protections or incentives for affordability). Social sciences including Geography, Housing Studies, Public Policy and Sociology study many of these dynamics of housing and place. By contrast, in Information Science or Science and Technology Studies place is often overlooked or relegated to a site description. Some have argued that the internet obviates the role of place, making the world "flat" (Friedman 2005) or reorganizing it into the internet haves and have-nots (Castells 2010). In the following

³ I go into detail about this idea of market manipulation and the rest of the scandal around the TikTok video in Chapter 6, Demystifying the Zestimate.

⁴ I focused on the five most popular real estate platforms at the time of the study – Zillow, Redfin, Apartments.com, Realtor.com and Trulia (a subsidiary of Zillow), although almost all of my participants mainly used Zillow and Redfin and Apartments.com (if they were renters).

section I will explore some of the key themes that connect place and technology use and are foundational to this dissertation.

The next theme, of which real estate platforms are an example, is the **online platform**. Platform Studies, an offshoot of New Media Studies (Plantin, Lagoze, and Edwards 2018), focuses on platforms as both a kind of online tool with distinct features and a corporate interest that is a political actor in the economic and regulatory sense. Real estate platforms exemplify the way a platform integrates multiple kinds of data, much of it user-generated or from secondary sources. While most of this information was previously available to home-seekers, the platform crucially removes the expert mediator, the real estate agent, allowing the home-seeker to make sense of the information on their own. Because the platform is not regulated like a realtor, it is able to share information that realtors cannot. Other platforms have similarly avoided regulations by changing the nature of relationships between the platform and other actors (e.g. see Dubal (2017) on Uber's avoidance of labor regulations by classifying drivers as independent contractors). In this way platforms use structural and discursive framing to manage their relationship to the state (for regulation) and the public (for public approval – as evidenced by use of the platform) (Gillespie 2010).

Finally, this dissertation focuses on certain kinds of information that the real estate platforms present and produce, **metrics** that include the numerical scores that rate the schools, walkability, safety, noise and crime of a neighborhood and the price estimate produced by the real estate platform company's proprietary algorithm. These metrics are presented without much explanation, as though they are objective measurements that offer self-evident guidance for home-seekers. However, I approach metrics with an interpretivist grounding, considering that they may have multiple, conflicting meanings rather than presenting an objective, singular truth. I attempt to work around the corporate secrecy and computational methods that shroud these measurements in opacity (Burrell 2016) by analyzing their (known) inputs and outputs, and reading any public explanations from their creators. Additionally, I study these metrics as social products (Weber 2016; Espeland and Sauder 2007), considering how the ideas they operationalize – school performance, safety, home valuation – have social and political histories that shape how they are quantified and how they are received and interpreted by users.

The rest of this introduction will explore these three foundational areas of thought and briefly how they intersect with the following chapters.

Place

Since much of this dissertation will discuss the meaning that people ascribe to ideas of housing, neighborhoods, place, and the opportunity they can confer on the occupant, it is important to begin with a brief history of what housing and property mean in America. Here and throughout my dissertation I draw on critical studies of housing and the history of

housing policy in the U.S. (Rothstein 2017; Rosen 2020; Taylor 2019; Desmond 2016; Korver-Glenn 2021) and literature from Geography with particular attention to the role of race (McKittrick 2006; Zaimi 2020) and digital technology (D. Fields and Rogers 2021; D. Fields 2022; McElroy and Vergerio 2022; Safransky 2020) in categorizing, valuing, and controlling space.

Housing in the U.S.

From its founding, the United States used private property to define and deny political and human rights to the people within its boundaries (Mills 2014; Robinson 2020). Early acts of seizing land, trying to eradicate Indigenous people, establishing an economy fueled by chattel slavery, and building a Liberal system of government that only gave rights to property-owning, White men, formed the foundation of what property and citizenship meant in the U.S. (Mills 2014). As these definitions expanded to allow for the inclusion of previously excluded groups, the rights of property and citizenship continued to be protected unequally. Redlining and appraisal science constructed definitions of risk that treated non-White homeowners as too risky to insure, effectively denying equal access to funds for housing (for individual homeowners and property developers) (Rothstein 2017; Zaimi 2020). When the GI Bill created a government-subsidized path to home ownership for White GIs returning from World War II, leading to a boom in suburban construction and single-family homeownership, non-White GIs and non-White neighborhoods were excluded from the government funds and thus the expansion of housing options and access that went with them (Rothstein 2017). When the federal government finally did extend credit programs to Black homeowners, Taylor (2019) describes how this was in fact a form of “predatory inclusion” whereby government support was extended to potential Black homeowners not to correct previous exclusions but to make them a source of profit for the real estate and financing industries that had exhausted the White market. As an effect of these policies, Taylor (2019) shows, Black homeowners ended up buying buildings in disrepair in the inner city (because racial covenants kept them out of most suburbs) and defaulting on mortgages because of huge repair costs. This reinforced the idea that Black homeowners and Black neighborhoods were “high risk” (the premise of redlining), while leaving Black communities without much improvement in their access to livable housing.

The Fair Housing Act (FHA), first passed in 1968 as part of the Civil Rights Act, outlawed housing discrimination based on race and other protected categories.⁵⁵ It applies to all actors in housing transactions, including realtors, landlords, and lenders. However, the FHA puts the onus of detecting and reporting discrimination on the person or people who are discriminated against. Thus, racial discrimination in housing persists with

⁵⁵ Other protected categories were added, including religion, sex, familial status, country of origin and disability.

exclusionary zoning (Thompson 2021), and discriminatory practices among realtors, landlords, appraisers (Howell and Korver-Glenn 2018; Korver-Glenn 2021).

So, what does housing mean? It can be the path to stability, health, and wealth, the mark of a “good” citizen (in the words of President Truman, quoted in (Taylor 2019)), the attainment of the American Dream. Or it can represent a history of exclusion and discrimination, the means with which one’s humanity was denied, a constantly shifting goal post for success that once attained brings financial ruin. These conflicting meanings coexist, making housing a potent and complex cultural signifier.

Innovation into Crisis

In the 21st century, there were two key moments of innovation in housing and real estate that dramatically worsened the conditions of average homeowners and renters. These also ushered in a new era of “platform real estate” (Fields and Rogers 2021), in which platform tools for the management of properties and tenants greatly expanded the power of a small group of actors, institutional buyers, or colloquially, the corporate landlords. First, the creation of subprime mortgages and the repackaging of these mortgages into tradeable products led to the 2008 financial crisis. Then, in response to the glut of foreclosed properties that were a byproduct of the 2008 crisis, investing in housing, especially single-family rentals, became a key corporate financial strategy, a process referred to as “the financialization of housing” (Fields 2018).

In 1999, loosening regulations for the financial industry made it possible to treat mortgages as a tradeable commodity.⁶ This increased the demand for mortgages as a product, leading to the practice of offering subprime mortgages, effectively predatory mortgages to borrowers who would not typically meet the requirements and/or for properties that were overvalued because of the extremely hot real estate market. These bad mortgages were sold with inaccurate ratings that meant funds buying them were taking on more risk than they realized. When the crisis hit in the end of 2007 (with the collapse of Lehman Brothers) and into 2008, it created a tsunami of foreclosures, disproportionately affecting Black and Latinx homeowners and neighborhoods (who had been targeted for subprime lending), over the following several years. In Oakland, a historically Black city, recent analysis of the population changes between the 2010 and 2020 census show the largest population loss among the Black population (Khan 2024). This is at least partly due to foreclosures and evictions after 2008.

The 2008 crisis led to a sharp decrease in property values which compounded the foreclosures, driving down house values, making it nearly impossible to refinance a mortgage or sell a property. In Las Vegas, one of the cities with the highest rates of foreclosure after 2008 (Mallach 2014), the real estate market did not regain its pre-crash

⁶ The best simple explanation of the subprime mortgage crisis is Wikipedia’s (Wikipedia contributors 2024), or the Margot Robbie bathtub scene in (the film version of) *The Big Short*.

peak until 2021 (S&P Dow Jones LLC 2024). This glut of low-priced housing stock was created an investment opportunity that corporate investors (many private equity funds) snatched up, turning single-family homes into rentals (Fields 2018; Fields 2014). Over time corporate landlords realized that renters are a profitable investment (rent keeps going up, even in a pandemic) and invested in other kinds of housing (apartments, retirement communities) as well.

Corporate landlords have the benefit of scale and corporate opacity (LLCs obscure ownership details and contact information) on their side. For tenants, corporate landlords bring increased fees, higher rents, higher eviction rates, more surveillance and less market choice (D. Fields 2022; McElroy and Vergerio 2022; Schaul and O’Connell 2022). Housing regulations were written with the classic “mom and pop” landlord in mind, on norms that assume a human landlord who acts within a range of reasonable behavior. In this landscape, a corporate landlord can stay within the bounds of legality and still evict tenants for the slightest infraction and charge fees for a seemingly endless list of reasons⁷ and arbitrary amounts. Whereas the cost of replacing a tenant might discourage a small landlord from taking every opportunity to evict a tenant, at the scale of a corporate landlord these costs are not deterrents.⁸

For homeowners and would-be homeowners corporate landlords have removed a significant segment of the housing market (especially the “entry-level” priced homes). Across the country corporate landlords only make up about 2% of the market (a fact their proponents are quick to bring out at the first sight of criticism), but in some cities they control as much as 45% of the rental housing stock (Immergluck et al. 2020), often with the highest concentrations in non-White neighborhoods. In 2021, “30 percent of home sales in majority Black neighborhoods were to investors, compared with 12 percent in other Zip codes” (Schaul and O’Connell 2022).

Here again, location matters, and these national contours map differently in different cities. Consider our two sites for this project, Oakland, CA and Las Vegas, NV. In including Las Vegas alongside Oakland, I hope to broaden and complicate some of the dominant narratives about “the housing crisis” in the U.S. in which California is often the center. According to the National Low-Income Housing Coalition, Nevada’s affordable housing crisis is more severe than California’s, although California’s larger population means that in terms of the people affected, California’s crisis is larger in magnitude (NLIHC 2023).

Oakland is one of the cities that makes up the Bay Area in Northern California, a site of the 21st century tech boom that started in Silicon Valley and spread throughout the Bay

⁷ Administration fee, application fee, move-in fee, move-out fee, pet fee, etc. See more: (Spears 2022)

⁸ While I cite amazing scholarship on corporate landlords, I am also indebted to knowledgeable activists, like my good friend, Sofia Lopez, and the trainers at the Alliance of Californians for Community Engagement (ACCE – see: <https://www.acceaction.org/about>).

Area (Saxenian 2006). Recent Bay Area transplants (like me) might assume that the high-paid tech sector is to blame for the Bay Area's affordable housing crisis, but the roots of the crisis go back farther.

Before Google and Facebook existed, Oakland was known as a key city in Black America. One of the endpoints of the Great Migration (Wilkerson 2011), Oakland offered Black men well-paying jobs in manufacturing and as one of the (unionized) Pullman Porters (Tramble and Tramble 2007). These jobs created a growing Black middle class, and became a nexus for Black political power, including the creation of Black Panthers (Self 2005). Black Oakland flourished despite redlining and racial covenants that confined people to certain neighborhoods. One of these areas was West Oakland, convenient for its proximity to the railway and port, until it was cut off by highways during the urban renewal period of the 1970s and 80s. Self (Self 2005) argues that this was an intentional effort to curb Black political power in Oakland. The 2008 mortgage crisis was another strike to the Black wealth built up in Oakland. As noted above, recent analysis of Census data shows displacement from Oakland (likely at least in part due to foreclosures after 2008) disproportionately affected the Black community (Khan 2024). The influx of high-income tech workers with the growth of now-giants like Facebook (founded 2004) and Google (public in 2004) came around the same time as the 2008 crisis, bringing an influx group of young, high-paid tech workers just as home prices hit rock bottom.

Las Vegas followed a different path to a similar conclusion. Built out mostly by real estate developers speculating about future suburban communities, Las Vegas's housing is typified by "master-planned communities" that share nearly identical homes, laid out on meandering streets that lead to a few shared amenities (including schools, recreational spaces, and shopping strips) (Gottdiener, Collins, and Dickens 2000). The combination of space to continue adding housing and the strong unions that ensure most service industry workers are well-paid, meant that Las Vegas was the rare city where working class people could own homes. The relatively low cost of living and lack of state income taxes made Las Vegas a popular retirement destination. This spurred more real estate development, making Vegas one of the markets with the most building in the years just before the 2008. With the crash, Vegas saw one of the highest rates of foreclosure (Mallach 2014). Vegas's glut of relatively recent construction in foreclosure made it a prime market for the new corporate landlords to roll out. The Vegas housing affordability crisis is partly driven by these landlords' aggressive approach to pricing, and also by the influx of people from other, more expensive markets (notably California) moving to Vegas for the relatively lower prices.

Platforms

In the Internet Age of the early 2000s access to more information was praised as a normatively good step, perhaps even one that would lead to democratic revolutions (Tufekci 2017) and a freer markets (Benkler 2007). "Platforms" are computational systems

built to take advantage of the exponentially increasing information, especially user generated content (e.g. Twitter, Facebook). They are easily scalable, rolled out into new markets with a barely changed interface, making the user experience nearly seamless (e.g. Google Maps, Uber). APIs make it possible for a platform to integrate data from another platform, sometimes making it hard for a user to realize that they are interacting with multiple platforms at once (e.g. Uber using Google Maps for navigation until they launched their own mapping system).

Because platforms are private companies and operate with a distinctly capitalist perspective (Srnicek 2017) platform studies brings a political economy lens to analyze the actions and perspective of platforms as large corporate actors. Plantin et al. (2018) explain that a company, like Google, can be analyzed both from the perspective of platform studies and infrastructure studies, but infrastructure studies focuses on how Google is “essential to our daily lives” and platform studies treats it as a “corporate entity” (295). I take the approach of Platform Studies because the capitalist framing of the real estate platforms is a key element for understanding the platform’s motives (profit seeking) and how it translates to the presentation of housing (as a commodity/marketplace).

The Myth of the Neutral Platform

Given their huge economic and representational power, platform companies strategically try to position themselves as politically neutral actors (Gillespie 2010). This is a strategy for limiting regulatory efforts to limit their power, and for appealing to their user base that does not want to feel overly manipulated or taken advantage of. One strategy for seeming neutral is to emphasize the platform’s role as “only” presenting information from secondary sources (including users). This provides the regulatory shelter of Section 230 which protects publishers from being held liable for problematic speech (Olson 2023) and de-emphasizes the curatorial role of the platform. It also shifts the responsibility of interpreting information onto the users (see the rise in “digital literacy” programs as a policy response to online misinformation). Of course, presenting information involves selecting what information to show and choosing which audiences to target. Many studies of online platforms have shown the significant effect of such filtering and curatorial work, including the creation of “filter bubbles” (Nguyen et al. 2014), discriminatory targeting (Noble 2018), and radicalization through content recommendations (Ribeiro et al. 2020). The real estate platforms that are the focus of this dissertation similarly act as an information assembler, with very little of the information on their sites originating with them.

Another way that platforms present as neutral is by offering free services. The implication is that if users are not paying, then they could walk away at any point. However, van Dijk (2013) points out that the ubiquity of platforms can make them much harder to avoid and that people might incur a social (or financial) penalty for opting out. Also, as a few (or a single) platforms corner a market, the user’s “choice” is significantly diminished. In real estate, most of the U.S. has only a handful of platforms to choose from, many of

which are owned by Zillow (including HotPads, Trulia, StreetEasy...). I focus on the largest platforms – Zillow, Redfin, Realtor.com, and Apartments.com (only rentals) – but these share so many features in both their interface design decisions and their business models that they are almost interchangeable. This convergence of designs adds to the sense of market consolidation. Finally, while these platform services might seem free, profits are extracted from users in the form of their data and their attention (Zuboff 2019). Like many other platforms, real estate platforms are essentially advertising platforms that promote real estate listings and professionals to users.

Platforms also act as though they are spatially neutral, or *place agnostic*. This is in part a function of a platform's ability to scale. A platform like Google Maps or AirBnB or Zillow achieves economies of scale by having infrastructure (both in terms of its backend data and user-facing services) that can be applied to different places with minimal adjustment. This gives the user a seamless experience as they use a platform in different places, which in turn gives the platform a sense of universality. This is not to say that place does not matter (quite the opposite) to a platform, many have hit snares in the form of regulatory, labor, or infrastructural differences in different places. Airbnb flouted short-term rental laws in many cities, leading it to get banned; Uber's rollout in cash-based economies like Kenya were seriously slowed until they modified their payment interface to take cash and mobile money. However, the platform wallpapers over these differences with the same interface, the same services, so the user can barely notice.

I challenge all these appeals to neutrality in this study. While I focus on real estate platforms many of the findings have broader implications, either because of the involvement of other platforms (e.g. Yelp, Google Maps) within the real estate platform, or because the dynamics that are exposed by user interactions with real estate platforms maps to other platforms.

Metrics

Like platform, metric is a broad term, overlapping with data, information, measurement, quantification, and even algorithm. This dissertation touches on all these concepts, but I am beginning with metric to refer to a number or output *as well as the process* that created it. Including process means acknowledging the people, assumptions, ideologies, epistemologies, and underlying information that come together to produce a metric. To support this line of approach I draw on Science and Technology Studies (STS) scholars like Porter (Porter 1996), Scott (1998), Hacking (1982), and Bowker and Star (2000), who critically study the histories of “social numbers,” how they relate to the creation of citizens and process of governing (or “governmentality” (Burchell, Gordon, and Miller 1991)), and how definitions of knowledge and science are related to this practice of power. Real estate platforms are not the state, but they present “social numbers” to their users in the form of neighborhood scores that rate the schools, walkability, crime, and noise. STS scholarship

pushes us to consider the effects of such measurement and the presentation of its products.

In STS the process of classification or producing metrics is understood to have political and social motivations and consequences. Consider a classic example of the forest classification system in medieval France (Scott 1998). Scott (1998) describes the development of a classification system to quantify the natural resources available in the forest in France for tax purposes. The system prioritizes counting large trees over small shrubs and other vegetation that is essential for the maintenance of the forest ecosystem that supports the foraging of nearby communities, because to the government the large trees are the most important resource. Over time, forests are replanted in such a way to make tree counts more accurate, at the expense of the other vegetation that thrives in a less orderly forest. In summary, creating a metric involves decisions that prioritize certain definitions or operationalizations of the concepts at play, and then, as these decisions are concretized into a metric, they affect how that concept is governed and eventually how the concept is understood. This feedback loop reifies the expertise of the metric, as it effectively becomes more accurate as it shapes the world it measures.

Espeland and Sauder (Espeland and Sauder 2007) refer to this process as “reactivity” in their study of law school rankings and how they shape the administrative behavior of law schools. A more familiar example of this reactivity is the idea of “teaching to the test.” As standardized tests became the measurement of school performance in the U.S., some teachers would teach their students content known to be on the standardized test, ensuring the students would achieve high results. These high results show that the teacher successfully taught for the test, however, now the test has supplanted the initial goals for teachers (Schneider 2017).

Portable & Persuasive

What is it about a metric that makes it so powerful? Espeland and Sauder (Espeland and Sauder 2007) point to the fact that metrics are “highly portable and easily made public” (18). This is notable in public discourse, how GDP comes to stand for the entire economy of a country, how the body mass index (BMI) approximates one’s fitness (Gordon and Hobbes 2021), or the price of a house sums up its strengths and weaknesses compared to other houses. Espeland and Sauder (2007) explain that

The radical simplification of commensuration produces decontextualized, depersonalized numbers that are highly portable and easily made public. Numbers circulate more easily and are more easily remembered than more complicated forms of information (18).

So, the simplicity of metric is not only what makes it easy to use and remember, it also collapses the complicated process that produced the metric into a simple, comparable number. For example, a house price collapses the benefits of neighborhood, building size,

materials, design, needed maintenance, etc. into one number that can be compared to other houses, even if they are substantially different in characteristic.

A simple number also conveys a sense of objectivity, drawing on the epistemological and philosophical orientation of positivism which seeks to establish a singular truth (Porter 1996). In his book, *Trust in Numbers*, Porter (1996) observes “In most contexts, objectivity means fairness and impartiality” (4) and goes on to connect this perception with the prevalence of public actors who invoke objectivity to enforce their decisions and governing. This echoes the platforms that try to seem like neutral technocrats, since what is a technocrat if not an objective, public actor (Bell 1973).

From numbers to algorithms, the argument that objectivity is an attainable and worthy goal is popular in public (both President George W. Bush and President Obama promoted the use of objective metrics, like school performance, to distribute federal funding) and private sectors. However, scholars of critical theory⁹ have shown how the “aura of objectivity” (Peer and DiSalvo 2022) can be a cover for the political intentions or bias, as Peer and DiSalvo (2022) discuss with the case of civic data dashboards and Safransky (2020) shows in the use of economic development algorithms. Ethnographic studies of the production of metrics, like Jerven’s (2013) study of GDP and Biruk’s (2018) study of HIV/AIDS statistics similarly show the messiness and subjective processes behind supposedly objective metrics.

Interpretation as Subject and Method

This study joins those scholars with a critical perspective in treating skeptically the presumption of objectivity and fixity in metrics and the other objects of my study. Instead, I take an interpretivist stance, seeking to understand the subjective meaning that people find in metrics and platforms and how this shapes their actions. This builds on a sociological understanding of “social action” where “[a]ction is ‘social’ insofar as its subjective meaning takes account of the behavior of others and is thereby oriented in its course” (Weber 2016, 4). So, my study is based on the understanding that metrics shape people’s behavior and thinking, and that people’s behavior and thinking shape metrics; the two are co-constructed.

Methodologically, I draw on a tradition of ethnographies that follow a technology or technique into the field to see how it works in practice. In *In the Age of the Smart Machine* Zuboff (1988) introduces the concept of “informating,” in which the people working with newly automated processes start changing their behavior so as to be more visible or legible to the machine. Ames (2019) introduces the idea of charismatic technology, documenting the rollout of the One Laptop per Child in Paraguay and the gaps between its imagined use case (teaching kids to code intuitively) and actual uses by kids in Paraguay (to play games

⁹ Many build on theories of categorizing and social control from Foucault (1990).

and watch soccer) and the mundane yet unexpected challenges (the high cost of fixing broken machines). The open-ended observational approach of these studies enables them to uncover unexpected findings and identify crucial gaps or misalignments between the imagined use and the actual practices of users.

The Following Chapters

The next chapter (2) presents the methods I used in this study and an explanation of why these methods are best suited to the research questions. I also discuss how my personal experiences with moving have shaped my interest and perceptiveness during this project.

Chapter 3, *The Bricolage of Online Housing Search*, presents evidence of the exploratory and interpretive searching that home-seekers do across a variety of online platforms that are *not* housing oriented. Often these searches happened before starting or in parallel with their search on a real estate platform.

Chapter 4, *Simple Scores are Messy Signals*, focuses on interviewees' interpretations of the neighborhood scores for schools, walking, and crime. I present evidence that many are able to infer indicators of the racial makeup of neighborhoods from the scores (despite the scores having not explicit mention of race). This presents a challenge from a policy perspective since this connection to race on real estate listings seems like a violation of the Fair Housing Act, but real estate platforms are not considered relevant actors.

Chapter 5, *Ambivalent Users*, analyzes the affective experiences of users who are unsure how to interpret the scores, their confusion and frustration at not being clearly instructed and how this mirrors their ambivalence about a housing market in which they feel their individual choice being curtailed by market forces.

Chapter 6, *Demystifying the Zestimate*, takes a step back to consider the most (in)famous metric of the real estate platforms, Zillow's price estimating algorithm. I argue that an understanding of the algorithm that centers users' interpretations and folk theories counteracts media tendencies to overemphasize the influence of an algorithmic system.

Finally, in the Conclusion I elaborate on common themes that arose in the chapters and connect these to some directions for future research. I also present some targeted policy recommendations based on the intersecting realms of housing and technology policy and how each overlook certain kinds of behavior related to online housing search that are relevant to the goals of policymakers (reduce inequality and segregation). I also include several key examples of projects by entrepreneurs, artists, and activists that bring together housing and technology in ways that are similar to the real estate platforms and yet aim for very different goals.

Sources

- Ames, Morgan G. 2019. *The Charisma Machine: The Life, Death, and Legacy of One Laptop per Child*. MIT Press.
- Bell, Daniel. 1973. "From Industrial Society to Post-Industrial Society: Theories of Social Change." In *The Coming of Post-Industrial Society: A Venture in Social Forecasting*, edited by Daniel Bell, 47–119. New York, NY: Basic Books.
- Benkler, Yochai. 2007. *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven, CT: Yale University Press.
- Biruk, Cal. 2018. *Cooking Data: Culture and Politics in an African Research World*. Duke University Press.
- Bowker, Geoffrey C., and Susan Leigh Star. 2000. *Sorting Things Out: Classification and Its Consequences*. MIT Press.
- Burchell, Graham, Colin Gordon, and Peter Miller, eds. 1991. *The Foucault Effect: Studies in Governmentality*. University of Chicago Press.
- Burrell, Jenna. 2016. "How the Machine 'Thinks': Understanding Opacity in Machine Learning Algorithms." *Big Data & Society* 3 (1): 205395171562251.
- Castells, M. 2010. "The Space of Flows." *The Rise of the Network Society*, January, 407–59.
- Desmond, Matthew. 2016. *Evicted: Poverty and Profit in the American City*. Crown.
- Dijck, Jose van. 2013. *The Culture of Connectivity: A Critical History of Social Media*. Oxford University Press.
- Dubal, V. B. 2017. "Wage Slave or Entrepreneur?: Contesting the Dualism of Legal Worker Identities." *California Law Review* 105 (1): 65–123.
- Espeland, Wendy Nelson, and Michael Sauder. 2007. "Rankings and Reactivity: How Public Measures Recreate Social Worlds." *The American Journal of Sociology* 113 (1): 1–40.
- Fields, D. 2018. "Constructing a New Asset Class: Property-Led Financial Accumulation after the Crisis." *Economic Geography*. <https://www.tandfonline.com/doi/abs/10.1080/00130095.2017.1397492>.
- . 2022. "Automated Landlord: Digital Technologies and Post-Crisis Financial Accumulation." *Environment and Planning A: Economy and Space*. <https://journals.sagepub.com/doi/abs/10.1177/0308518X19846514>.
- Fields, D., and D. Rogers. 2021. "Towards a Critical Housing Studies Research Agenda on Platform Real Estate." *Housing, Theory and Society*. <https://www.tandfonline.com/doi/abs/10.1080/14036096.2019.1670724>.
- Fields, Desiree. 2014. "The Rise of the Corporate Landlord." Right To The City Alliance. https://www.saje.net/wp-content/uploads/2021/04/RTC.DF_.report.FINALPROOF-July2_2013.pdf.
- Foucault, Michel. 1990. "The History of Sexuality: An Introduction, Volume I." *Trans. Robert Hurley*. New York: Vintage 95: 1–160.
- Friedman, Thomas L. 2005. *The World Is Flat: A Brief History of the Twenty-First Century*. Macmillan.
- Gillespie, T. 2010. "The Politics of 'Platforms.'" *New Media & Society*. <https://journals.sagepub.com/doi/abs/10.1177/1461444809342738>.
- Gordon, Aubrey, and Michael Hobbes. 2021. *The Body Mass Index*. Podcast. Maintenance Phase. <https://www.maintenancephase.com/>.

- Gotcher, Sean (@seangotcher). 2021. "#housing." Video. TikTok. September 14, 2021.
https://www.tiktok.com/@seangotcher/video/7007855978309848325?is_copy_url=1&is_from_webapp=v1&lang=en.
- Gottdiener, Mark, Claudia Collins, and David R. Dickens. 2000. *Las Vegas: The Social Production of an All-American City*. Hoboken, NJ: Wiley-Blackwell.
- Hacking, I. 1982. "Biopower and the Avalanche of Printed Numbers." *Humanities in Society*.
<https://www.degruyter.com/document/doi/10.7208/9780226226767-005/pdf?licenseType=restricted>.
- Howell, Junia, and Elizabeth Korver-Glenn. 2018. "Neighborhoods, Race, and the Twenty-First-Century Housing Appraisal Industry." *Sociology of Race and Ethnicity* 4 (4): 473–90.
- Immergluck, D., J. Ernsthausen, S. Earl, and A. Powell. 2020. "Evictions, Large Owners, and Serial Filings: Findings from Atlanta." *Housing Studies*.
<https://www.tandfonline.com/doi/abs/10.1080/02673037.2019.1639635>.
- Jerven, Morten. 2013. *Poor Numbers: How We Are Misled by African Development Statistics and What to Do about It*. Cornell University Press.
- Khan, Hussain. 2024. "How Has Downtown Oakland's Population Changed? We Mapped It." The Oaklandside. April 8, 2024. <https://oaklandside.org/2024/04/08/downtown-oakland-population-housing-demographics-map/>.
- Korver-Glenn, E. 2021. "Race Brokers: Housing Markets and Segregation in 21st Century Urban America." https://books.google.ca/books?hl=en&lr=&id=YXQjEAAQBAJ&oi=fnd&pg=PP1&ots=gp_i5C046Q&sig=t2kDvuZ32tJQ9T78xH6Duuy_6qE.
- Llc, S&p Dow Jones. 2024. "S&P CoreLogic Case-Shiller NV-Las Vegas Home Price Index." <https://fred.stlouisfed.org/series/LVXRSA>.
- Mallach, Alan. 2014. "Lessons From Las Vegas: Housing Markets, Neighborhoods, and Distressed Single-Family Property Investors." *Housing Policy Debate* 24 (4): 769–801.
- McElroy, Erin, and Manon Vergerio. 2022. "Automating Gentrification: Landlord Technologies and Housing Justice Organizing in New York City Homes." *Environment and Planning. D, Society & Space* 40 (4): 607–26.
- McKittrick, K. 2006. *Demonic Grounds: Black Women and the Cartographies of Struggle*. Minneapolis, MN: University of Minnesota Press.
- Mills, Charles W. 2014. *The Racial Contract*. Cornell University Press.
- Nguyen, Tien T., Pik-Mai Hui, F. Maxwell Harper, Loren Terveen, and Joseph A. Konstan. 2014. "Exploring the Filter Bubble: The Effect of Using Recommender Systems on Content Diversity." In *Proceedings of the 23rd International Conference on World Wide Web*, 677–86. WWW '14. New York, NY, USA: Association for Computing Machinery.
- Noble, Safiya Umoja. 2018. *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York, NY: NYU PRESS.
- Olson, Brent A. Esq, ed. 2023. "16B:69. CDA Immunity—Third Element of Barnes Test— 'Information Provided by Another Information Content Provider.'" In *Business Law Deskbook, Advanced Topics In Business Law*. Minnesota Practice Series TM. Thompson Reuters.
- Peer, Firaz, and Carl DiSalvo. 2022. "The Work of Infrastructural Bricoleurs in Building Civic Data Dashboards." *Proc. ACM Hum.-Comput. Interact.*, 124, 6 (CSCW1): 1–25.
- Plantin, J. C., C. Lagoze, and P. N. Edwards. 2018. "Infrastructure Studies Meet Platform Studies in the Age of Google and Facebook." *New Media &*.
<https://journals.sagepub.com/doi/abs/10.1177/1461444816661553>.
- Porter, Theodore M. 1996. *Trust in Numbers*. Princeton University Press.
- Ribeiro, Manoel Horta, Raphael Ottoni, Robert West, Virgílio A. F. Almeida, and Wagner Meira. 2020. "Auditing Radicalization Pathways on YouTube." In *Proceedings of the 2020 Conference on*

- Fairness, Accountability, and Transparency*, 131–41. FAT* '20. New York, NY, USA: Association for Computing Machinery.
- Robinson, Cedric J. 2020. *Black Marxism, Revised and Updated Third Edition: The Making of the Black Radical Tradition*. UNC Press Books.
- Rosen, Eva. 2020. *The Voucher Promise: "Section 8" and the Fate of an American Neighborhood*. Princeton University Press.
- Rothstein, Richard. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America*. Liveright Publishing.
- Safransky, Sara. 2020. "Geographies of Algorithmic Violence: Redlining the Smart City." *International Journal of Urban and Regional Research* 44 (2): 200–218.
- Saxenian, Annalee. 2006. *The New Argonauts: Regional Advantage in a Global Economy*. Harvard University Press.
- Schaul, Kevin, and Jonathan O'Connell. 2022. "Investors Bought a Record Share of Homes in 2021. See Where." *The Washington Post*, February 16, 2022. <https://www.washingtonpost.com/business/interactive/2022/housing-market-investors/>.
- Schneider, Jack. 2017. *Beyond Test Scores: A Better Way to Measure School Quality*. Harvard University Press.
- Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press.
- Self, Robert O. 2005. *American Babylon*. Princeton University Press.
- Sinha, Charu. 2021. "Home Ownership Is Better than Sex in SNL Zillow Ad." *Vulture*. February 7, 2021. <https://www.vulture.com/2021/02/watch-snl-parodies-zillow-in-skit.html>.
- Spears, Darcy. 2022. "Fees before Keys: Las Vegas-Area Renters Overwhelmed by Application Fees." Channel 13 Las Vegas News KTNV. February 21, 2022. <https://www.ktnv.com/13-investigates/fees-before-keys-las-vegas-area-renters-overwhelmed-by-application-fees>.
- Srnicek, Nick. 2017. *Platform Capitalism*. John Wiley & Sons.
- Taylor, Keeanga-Yamahatta. 2019. *Race for Profit: How Banks and the Real Estate Industry Undermined Black Homeownership*. UNC Press Books.
- Thompson, Cheryl W. 2021. "Racial Covenants, a Relic of the Past, Are Still on the Books across the Country." *NPR*, November 17, 2021. <https://www.npr.org/2021/11/17/1049052531/racial-covenants-housing-discrimination>.
- Tramble, Thompson, and Wilma Tramble. 2007. *The Pullman Porters and West Oakland*. Charleston, SC: Arcadia Pub.
- Tufekci, Zeynep. 2017. *Twitter and Tear Gas: The Power and Fragility of Networked Protest*. Yale University Press.
- Weber, Max, ed. 2016. "The Definition of Sociology and Social Action." In *Basic Sociological Terms*, 4–26. Social Theory Re-Wired.
- Wikipedia contributors. 2024. "Subprime Mortgage Crisis." Wikipedia, The Free Encyclopedia. July 24, 2024. https://en.wikipedia.org/wiki/Subprime_mortgage_crisis.
- Wilkerson, Isabel. 2011. *The Warmth of Other Suns: The Epic Story of America's Great Migration*. Vintage.
- Zaimi, Rea. 2020. "Making Real Estate Markets: The Co-production of Race and Property Value in Early 20th Century Appraisal Science." *Antipode* 52 (5): 1539–59.
- Zillow Group. 2022. "Annual Report 2021." Zillow Group. [https://s24.q4cdn.com/723050407/files/doc_financials/2021/ar/Zillow-Annual-Report-\(2021-hyperlinks\).pdf](https://s24.q4cdn.com/723050407/files/doc_financials/2021/ar/Zillow-Annual-Report-(2021-hyperlinks).pdf).
- Zuboff, Shoshana. 1988. *In the Age of the Smart Machine: The Future of Work and Power*. USA: Basic Books, Inc.

———. 2019. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Public Affairs.

2 – Methods



Figure 1 A bulletin board in a public library in Las Vegas. (My recruitment poster is not visible because only a librarian can post on these boards.)

My Positionality and Experiences of Place

By nature of being a qualitative study, this study is affected by the fact that I am the researcher, the tool of observation and analysis. A different researcher, given the same topic, would ask different questions and notice different patterns.

I think about place and the different practices in different places because I have moved around a lot. My family lived in Khartoum, Sudan until I was five. The rest of my childhood was spent in New York City, but after college I returned to East Africa, to Rwanda to teach for a year. This experience inspired my decision to pursue a Master's in City Planning at MIT, so I moved to Cambridge. After MIT, I moved to Kenya to seek out City Planning work in Nairobi. Four years and three different apartments later, I left Nairobi and moved back to the U.S., to Berkeley, for my PhD. Even my PhD didn't offer seven years of stability, thanks mostly to the Covid pandemic and fieldwork. I spent my first three years in Berkeley, until the pandemic made me seek out more outdoor space in North Oakland. That first year of the pandemic I spent almost as much time with my parents in Wyoming as I did in California, driving in between the two (through northern Nevada each time). Then, with the vaccine making in person research seem possible, I moved to Las Vegas for four months of fieldwork (again stopping in Wyoming on the way, timing my arrival in Vegas with cooler fall weather). Finally, I moved back to New York City to be closer to extended family and take advantage of free housing. When that free housing was sold, I moved into my own apartment in Brooklyn (where I write this).

In summary, by 38 I have lived in four countries (Sudan, the U.S., Rwanda, Kenya), have rented nine apartments (3 in Kenya, 6 in the U.S.), and have moved across the country twice. This peripatetic lifestyle may not be typical, even as a millennial (the generation most defined by its lack of home ownership and job stability), but it defines the way I think about place, identity, housing, and moving.

Some of the questions I ask in this research are based on a foundational understanding that place matters. This is self-evident to me, because in moving so much I have experienced the many, small differences that amount to significant difference in practice. We take our use patterns for granted, until we see behaviors that differ from our own. This even happened when I planned my move to Las Vegas and found myself using new search techniques inspired by the interviews I had conducted in Oakland.

The importance of place is also why it was very important to me to be physically based in the city where I was interviewing people. Being co-located can seem pointless when I was interviewing people on Zoom, but sharing a place is one way in which I make sure my research is connected to the people it affects. From a practical perspective, this means that I can connect with interviewees more easily – over shared weather, traffic, or bagel stores – and that I could post physical flyers for recruitment (see more discussion below). When interviewing people in Las Vegas, I understood what they meant in describing Vegas as a city where “everything is a 25 minute drive”¹ and I could recognize descriptive directions they used to explain their housing search. However, being in the same location confers more than these points of shared experience; it is a shared stake in a place, in trying to understand it, and caring about how it is represented. I would not describe myself as knowing Las Vegas well after living there for four months, but I know it *in a different way* than someone who has only visited or only read about it. Living somewhere also means that your full life is connected to that place, rather than only interacting with it in a work-related sense. When I lived in Las Vegas and Oakland, I had friends there, hosted visitors, found my favorite places to walk my dog, bought groceries, volunteered, and listened to the local news. Part of this is the practice of deeply engaging in ethnographic research, where research and daily life bleed together, but this is about seeing a place as more than a research site, to break out of an extractive mindset in which everything is insight.

These many experiences of moving – including some during the process of data collection – helped me build an empathetic connection with my interview participants, a key element for effective qualitative research (Lareau 2021). Many of the participants moved for similar reasons to me, including moving to be closer to family, moving to take up

¹ Although Las Vegas looks like a spread-out suburban city on a map, its low density and many highways make driving across the city, even during peak traffic hours, pretty quick. Or perhaps it is the fact that ‘working hours’ do not apply in the same fixed sense in Vegas where many people work late shifts and casinos are open for entertainment 24/7. In any case, my experience driving around the city confirmed that 25 minutes is normally the upper limit of a single trip.

a primary care-giving role (even if temporarily), moving for work, and moving to a place that supports your climate/extracurricular activities. This meant that during an interview we were able to commiserate over the disruption of moving, the time and money spent, the physical and mental exhaustion, building a connection that helps the interviewee feel at ease and understood and thus more likely to open up during the interview (Lareau 2021).

When I moved to Las Vegas, after completing interviews in Oakland, I was able to apply many of the techniques the Oakland interviewees mentioned in my own housing search. Like many of those interviewees, I planned to rent an apartment in Las Vegas site unseen. So, it made sense to use every online tool imaginable to contribute to my search. I asked Redditors what neighborhoods to consider and whether I had to worry about the scorpions and black widow spiders my vet tech (who used to live in Vegas) warned me about; I read Yelp reviews of dog parks and coffee shops, the only locations I knew I would frequently visit in person; I looked at Google Streetview trying to parse which neighborhoods might be slightly walkable in a city known for not being walker-friendly; and I investigated building management companies via Google Reviews. (For more discussion of this multi-platform approach to neighborhood research, see chapter 3.) Putting these practices into use for myself helped me understand the process of this multi-platform search, and recruit new participants in the same online places, conducting similar searches to my own.

Literature/Orientation

My methods are informed by the scholarly communities that I am writing in relation to. This is an interdisciplinary study that draws primarily from Information Studies, Science and Technology Studies, and New Media Studies. From these overlapping fields I draw on qualitative approaches that inductively form understandings of sociotechnical systems. Put plainly, this study seeks to understand real estate platforms and the people that use them and how their interactions co-construct meaning and actions that shape the housing market and society more broadly. Acting on the understanding that user beliefs and actions significantly shape how platforms work (Eslami et al. 2015; Seaver 2017; Burrell et al. 2019), I interviewed users about how they use real estate platforms and how they theorize the inner-workings of the neighborhood scores presented on the platforms. I also used ethnographic observation online and in person to add contextual understanding to the topic of housing search (Burrell 2017).

I draw from subfields like Critical Algorithm Studies and Platforms Studies to understand the platform from its material functionality to its discursive and political effects. These fields provide insight into how to study technological systems that are opaque due to computational methods (e.g. machine learning algorithms) and the corporate protection of ideas, including analyzing outputs (Burrell 2016) and accessible user-facing design (Eslami et al. 2015), studying public filings about corporate practices

and public-facing content that describes the company (Bucher 2016), and following the public discourse about the platform companies in question. Studying algorithms in practice also show how they are integrated into other actions by users, sometimes being contested or reframed to meet the user's needs (Citron and Pasquale 2014; Seaver 2017).

This study focuses on the experience of users during their housing search – how they find information, how they draw meaning from it, and how they act on it. I combine more classic sociological methods like in-depth interviews and participant observation with specific techniques from user research like the use of visual prompts that simulate the kinds of images a user encounters on a platform (Glegg 2019) and a walk-through of the platform where the user directs the interviewer through a series of steps on the platform while explaining and reflecting on their reasons for taking these steps (Light, Burgess, and Duguay 2018). The use of visual prompts and the walkthrough also aim to correct for the typical limitations of recollected decision-making - including poor recall, reasonableness bias where interviewees "understand themselves and represent themselves to an interviewer as reasonable" (M. L. Small and Cook 2023, 1603) and single-motive bias or "the tendency of people to report a single motive behind motivated actions even where multiple motivations were at play" (1605).

Interviews with Home-Seekers

This is a qualitative study based on interviews with people who had recently moved (within approximately 2 years) and used an online real estate platform to conduct part of their housing search. Interviews targeted people who had recently moved so as to draw on their complete housing search experience, as opposed to interviewing people who were currently searching for housing. Interviewees lived either in Oakland, CA or Las Vegas, NV. I chose these two sites, not as a comparison but to create a more diverse sample of interviewees, from two cities with distinctly different urban forms (one denser and more urban, one more spread out). Furthermore, while Oakland (like the rest of the Bay Area) is home to many people who work for technology companies, Las Vegas's main employers are the entertainment and service industry. I began the study while living in Oakland, and I moved to Las Vegas for four months while I did interview recruitment and conducted most of the interviews.

Recruitment

I used purposive sampling to guide subject recruitment. Rather than striving for representativeness, a purposive sampling approach is driven by existing knowledge of the phenomenon studied and the goals for the research, and practical adaptation in the field (Emmel 2013). In this case, previous research about housing access indicates that gender, race, age, and income can be determinant factors in a person's housing search despite FHA protections against discrimination (Lareau and Goyette 2014; Desmond 2016; Korver-Glenn 2018). Similarly, studies of technology and platform users show that a user's identity

or positionality can affect their use and experience (Oudshoorn, Rommes, and Stienstra 2004; Noble 2018). So, I aimed for a group of interviewees with diverse identities. I also sought a mix of renters and buyers to represent the two modes of searching possible on most platforms. I used an iterative approach to recruitment, beginning in Oakland with the first round of interviews from January to May 2021, and continuing with recruitment and interviews in Las Vegas, NV from November 2021 to April 2022. Iteration is key for purposive sampling, allowing the research to seek out participants to fill any gaps in the sample and to adapt to the conditions of the field once research is begun. Because all the research took place during the pandemic I worried that typical recruitment approaches would not yield results or would yield uneven results. Therefore, I took an expansive approach to recruitment and continued to adapt my approach when I moved from Oakland to Las Vegas.

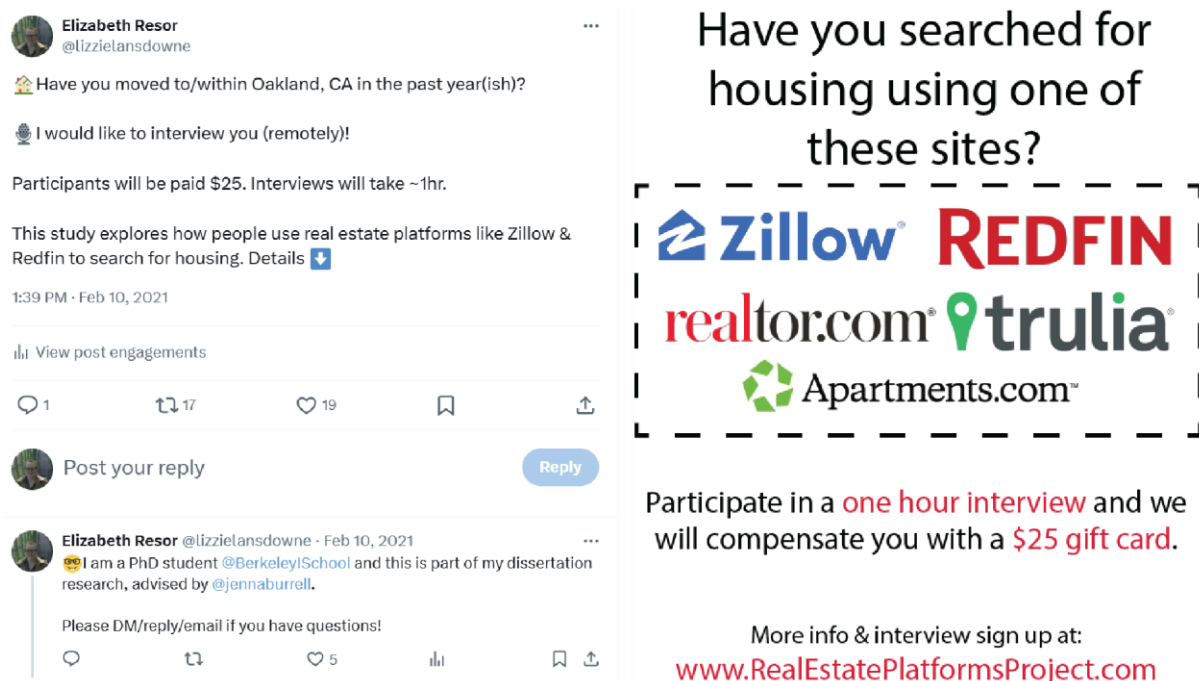


Figure 2 A screenshot of my tweet for Oakland recruitment. (I did the same for Las Vegas.)

R: The digital poster I used for Facebook recruitment.

In Oakland, I recruited participants via Twitter, in Oakland-specific Facebook groups (one general, one for parents), on Nextdoor, and with flyers posted in corner shops (Figure 3 (left)). In online spaces I introduced myself as a researcher, briefly described the project and instructed interested people to reach out to me (see Figure 2 (left) for a screenshot of the tweet I used). I also made a digital flyer (Figure 2 on the right) that I included in posts on Facebook. Paper flyers resembled the digital flyer, with tabs to pull off with the website. The flyers (both digital and paper) included a link to a Google survey and later a project-specific email address. The project specific email yielded more responses than the Google survey, perhaps indicating less familiarity with the Google suite outside academia. Finally, I also

asked participants to share the study information with anyone they knew who could fit the criteria (snowball sampling) and had several participants recommended through my own personal networks.

In Las Vegas, partly informed by Oakland participants' accounts of their search process, I expanded online recruitment to Reddit where I posted on threads about moving or looking for housing in r/VegasLocals. I also posted flyers in public libraries after observing that they were busy and had event boards in the entrance with other similar flyers (see Figure 1). This approach was quite successful in Las Vegas, yielding the plurality of interviewees in my Las Vegas group (see Figure 4). By contrast, in Oakland online recruitment was much more successful than physical posters. I tried posting in libraries in Oakland in May 2022 (after completing Vegas fieldwork), based on their success in Vegas, but still no one responded. Subjects recruited from libraries included some of the oldest participants and some with the lowest price windows, so the library was a useful site for diversifying my subject pool in Las Vegas.



Have you recently moved to/within Oakland?

I am looking to interview people who have moved to or within Oakland in the past year (or so). I am interested to hear about buying, selling, or renting experiences. These interviews are part of a research project that investigates how people use real estate platforms (like Zillow, Redfin, Trulia, etc.) to search for housing and choose a neighborhood.

[SCHEDULE AN INTERVIEW](#)

Interviews last about 45 min – 1 hour and can be conducted via Zoom or in person. Interview participants will receive a \$25 gift card to compensate them for their time. Participants will be anonymized in all publications.

Figure 3 L: A recruitment flyer posted in a corner store in Oakland.
R: The mobile version of my recruitment website.

In Las Vegas, in response to some Oakland interviews that made me suspect that they were not actually in Oakland, I started using a Qualtrics screening survey to collect the interviewee's IP address location. If this indicated that someone was not in Las Vegas (even if they were in another part of the U.S.) I simply informed them that I had enough participants for the study and did not proceed with an interview. I also switched to using a project website (as shown in Figure 3 (right)) rather than an email or phone number. This

made it easier to post a short message in a Reddit thread, for example, but still make sure a potential participant had all the information about me, my university affiliation, etc. On the website I used a Calendly link to enable someone to directly sign up for an interview time without having to email back and forth with me. For the most part this was very successful. A few people emailed me after setting a meeting with Calendly to ask when we were meeting, perhaps indicating unfamiliarity with online calendars. However, only one person was completely turned off by the online meeting setting process² and did not complete an interview after indicating interest.

All participants received a \$25 gift card for an interview that took 45 minutes to one hour. In total I interviewed 45 users, but in the dissertation, I rely on data from 32 user interviews because 13 Oakland interviews raised suspicions about their veracity. These suspicious interview subjects came in a cluster over a couple of days. It seemed like one of my recruitment posts on Facebook reached people outside of Oakland and the U.S. I retroactively identified a cluster of 13 interviews that I determined were suspicious for a pattern of small errors and practices that made me question the location of the interviewees. Small errors included using non-U.S. terminology like references to “school fees,” or the “ministry of education,” or the “SQ” (for servant’s quarters, a common element of middle-class apartments in Kenya). Many of these emails also came within a few days of each other and showed similar writing styles that could indicate unfamiliarity with U.S. email norms, like being very brief, almost text message like in style, with no greeting or sign off. A friend working at Facebook suggested that because I was posting in public Facebook groups, my post might be visible to my Facebook friends even if they were not in the group. Since I have many Facebook friends outside the U.S., especially in East Africa, this friend reasoned, it was possible that my recruitment information was circulated among people in this region. Suspicious online study participants were a common problem during the pandemic, particularly with studies, like mine, that offered a financial payment for participation.³ For the sake of my data credibility I did not use these 13 interviews in my data.

² She was suspicious of the automated email from Google Calendar, thinking it indicated an official connection to Google and ended up not participating.

³ For example, this person mentions “professional survey takers” in her tweet (<https://twitter.com/AmeliaNGibson/status/1671618321752502272>) and this person describes “people trying to catfish” their way into the study (<https://twitter.com/builtfoesuccess/status/1577046972485156864>).

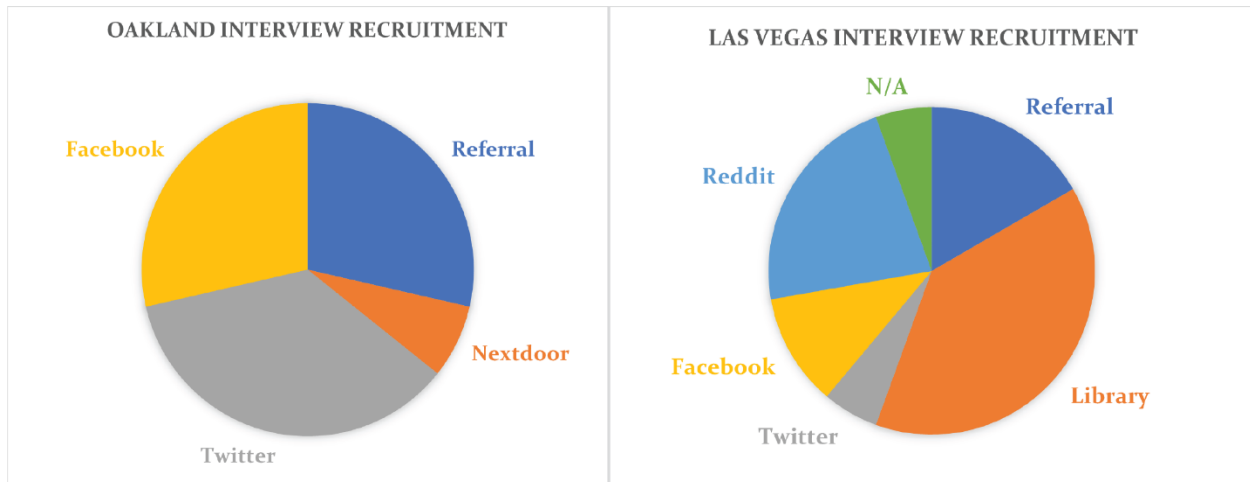


Figure 4 Interview recruitment modes by site. (Las Vegas N = 18, Oakland N = 14)

Interviewee Demographics

Table 1 summarizes the demographic information for the interview participants. As explained above, I sought a group of interviewees that spanned differences in gender, race, age, and housing modality (own/rent). Gender and race information is based on self-reporting, either during the interview or at the end through an optional form. Throughout this dissertation the terms used to describe someone reflect the terms the interviewee used to describe themselves. (In the table I use the most commonly used terms.) Socioeconomic information was not directly collected from participants, although most gave a price range during the interview which is used as a proxy.

Table 1 Interviewee Demographic Information
(Note: Gender and race are based on self-reporting; NR = not reported)

	Total	Gender				Race					
		Man	Woman	Trans	NR	White	Black	Hispanic	Asian	Multiple	NR
Oakland	14	3	11	0	0	8	2	0	2	1	1
Vegas	18	6	10	1	1	5	3	2	5	1	2

Table 2 shows the spread of prices ranges for participants, broken down by renters and buyers. In the two sites these price ranges span a broad range, although neither reaches the average rents of the neighborhoods with the highest housing precarity, as estimated by the Urban Displacement Project's Housing Precarity Risk Model ("Housing Precarity Risk Model" 2021), indicating that this study does not include people who are most at risk whether renters or owners.

Table 2 Interviewee Housing Modality and Price Ranges.
(Source: Rent Market Median from Rent Café, Buy Market Median from Zillow)

	Rent				Own		
	Total	Price Range	Market Med.		Total	Price Range	Market Med.
Oakland	8	\$1,800 - \$4,000	\$2,700	6	\$600,000 - \$1,750,000	\$885,252	
Vegas	8	\$1,300 - \$3,500	\$1,500	10	\$165,000 - \$1,000,000	\$345,274	

Interview Structure

All but two interviews were conducted via Zoom or Google Hangouts.⁴ The interview was made up of three distinct parts: first, the interviewee described their recent housing search, including where and why they moved, and how they searched for housing beyond use of the real estate platform; second, the interviewee did a virtual walkthrough (Light et al 2018) of a typical search on a real estate platform of their choice; third, I showed screenshots of the scores (schools, walking, transit, crime and noise) for two contrasting neighborhoods and asked the interviewee to reflect on the scores.

For the walkthrough I shared my screen and navigated the platform website while the interviewee narrated their actions and explained what they would look for and why. At this stage, I would probe any mention of the scores with follow-up questions. If they did not naturally mention the scores, I asked about the scores that were visible during the walkthrough, which depended on the platform (see Table 3 for the distribution of scores across platforms). These first two parts of the interview focused on the interviewee's recent housing search and how they did (or did not) use the scores (and other visible information on the platform) for their search.

Table 3 Distribution of Scores by Real Estate Platforms

	Zillow	Redfin	Realtor.com	Apartments.com	Trulia
Schools	X	X	X	X	X
Walking	X	X	-	X	-
Crime	-	-	X	-	X
Noise	-	-	X	X	-

Visual Prompts

In the final section of the interview, I showed screenshots of the scores as they appeared on the real estate platform. For each score I showed examples from two neighborhoods with different scores.⁵ I asked the subject to consider each score generally, regardless of

⁴ The two were conducted in person, at a coffee shop, with my laptop shared between us for the walkthrough. In fact, this format was less ideal, both for the clumsiness of sharing a laptop and the challenges of audio-recording with the ambient noise of a coffee shop.

⁵ The prompts used the same two neighborhoods for all interviews in a city with the exception of the first Oakland interview which used a different neighborhood comparison based on that person's housing search.

whether they used it during their search. I asked what they could infer about the neighborhoods based on the scores, and what information they thought went into calculating the score. Because all the scores are the product of proprietary processes, I reminded interviewees that I did not know “the truth” of how a score worked, and so they did not need to worry about hazarding an incorrect guess.

In each city, I chose two neighborhoods for the visual prompts because they had different scores. In both places, these neighborhoods brought their own identities that some interviewees commented on when they were familiar with them (and sometimes even with limited familiarity). In Oakland, the two neighborhoods in the visual prompts were West Oakland and Dimond District. Dimond District is a smaller neighborhood, east of Downtown where the hills meet the flatlands, with lower scores for walking and transit compared to West Oakland which is denser and closer to downtown Oakland and the BART (and so has higher walking and transit scores). Historically, because of its location next to the railroad, West Oakland was “the center of midcentury East Bay African American social life and politics” (Self 2005, 48). The school scores shown for West Oakland are also higher than the school scores for Dimond District.

In Las Vegas, the two example neighborhoods were North Las Vegas and Green Valley North. Both are treated as neighborhoods of the greater Las Vegas valley (which is how I bounded interview recruitment). Green Valley North is made up of master planned communities, characterized by single family homes in gated communities, with some larger apartment building complexes and shopping corridors (strip malls). Green Valley North has higher school scores, and relatively high walking scores (for a city with very low scores in general) (Gottdiener, Collins, and Dickens 2000). North Las Vegas also has single family homes in gated communities but was not developed as a master planned community. North Las Vegas is adjacent to the Westside, the historically Black area of the city (starting with racial covenants and redlining) (Davis 2002; Gottdiener, Collins, and Dickens 2000). Today, North Las Vegas is gentrifying and has won some recent large public investments (two new branches of the Public Library, the large Craig Ranch Regional Park) (Apgar 2022).

It is important to note that in both pairs of visual prompts one neighborhood is known to be a Black neighborhood, given that many of the inferences that interview subjects draw from the scores are racialized. However, one of the Black neighborhoods, West Oakland, has higher scores and the other Black neighborhood, North Las Vegas, has lower scores, so they do not share the same directionality in the comparison. Table 4 summarizes the four neighborhoods’ scores as represented by the visual prompts. (For examples of how each score looks, see chapter 4 (Simple Scores) Figures 2, 3 and 4.)

Each part of the interview allowed the interviewee to amend or add to their response about how they used the platforms, and the prompts and the walkthrough reminded them of the process and gave them immediate examples to respond to.

Table 4 Summary of scores shown on visual prompts by neighborhood

	Oakland		Las Vegas	
	West Oakland	Dimond District	North Las Vegas	Green Valley North
School	2/10 – 7/10	2/10 – 5/10	2/10 – 5/10	6/10 – 8/10
Walking	89/100	58/100	15/100	48/100
Transit	64/100	47/100	31/100	33/100
Crime	High	Mid	Low	Low, High
Noise	Mid-High	Low	Low	Mid-High

Expert Interviews

In addition to the user interviews, I interviewed 17 real estate and housing experts (including policymakers and activists). Table 5 summarizes the field and location of these interview participants. Depending on the preference of the interviewee some of these interviews were recorded and for some I took notes by hand. They ranged in time from 45 to 90 minutes. I did not give financial compensation to the experts (including realtors), but I did give significant compensation to the activists (\$150 for 90 minutes). It was important to compensate activists for their time and expertise since their work is often uncompensated (Banks 2020). Furthermore, given that my research took place during the pandemic, when housing issues were especially pressing, I wanted to fairly compensate activists for sharing time for a project that would not yield immediate results for their organizing goals. This compensation plan was supported by CPHS after some back and forth discussion about not wanting to unduly influence people to participate. (Several activists did not respond to interview requests, indicating that this compensation did not unduly influence them.)

Table 5 Summary of Expert Interviewees

	Location	Total
Realtors	Bay Area, CA	2
	Seattle, WA	1
	Las Vegas, NV	1
	New York City, NY	1
	Hudson, NY	1
	Boston, MA	1
Activists	Oakland, CA	2
Policymaker	Las Vegas, NV	6
Housing Private Sector	Las Vegas, NV	2

The realtor interviews were completed before I began user interviews and informed my interview guide for users. Other expert interviews were conducted in parallel to user interviews as experts became available and known to me. All these participants were recruited either through direct contact through professional email or as referrals from other participants or my personal networks.

Policymakers and private sector experts were targeted to get a sense of how they used housing information for their work. Initially I hypothesized that data from real estate

platforms could be a useful source for policymakers given its relative accessibility compared to public data. However, the policymakers I spoke with described a preference for other data sources like Census data which while messier to use, has been available longer than platform data and can offer more detail and a scale of data that matches public programs (e.g. Census tracts, the definition of low-income households). These interviews were useful for understanding the many perspectives on housing policy and to what extent housing search, especially for renters, is considered from the perspective of policy and advocacy organization (very little). I concluded that online housing search is undertheorized and mostly overlooked in policy discussions, a clear gap that this research can begin to address.

Online and In-Person Participant Observation

To augment my interviews, I use a combination of online and in-person observations. Online observations began with online recruitment efforts. As I joined Facebook groups and subreddits I checked them regularly for relevant discussions that could offer a thread where I could post information about my study. I found this approach yielded more interest than posting directly in a group or on a subreddit. In Oakland, the “Oakland Now” Facebook group was the most active space for Oakland-related discussions. Issues of housing and real estate development came up regularly. In Las Vegas, the r/Vegaslocals subreddit was most similar in hosting all kinds of Vegas-related discussions. I also asked to join several Facebook groups in Las Vegas for moms/parents so I could post recruitment information (in Oakland, my advisor, Jenna Burrell, was already in some Oakland parents’ groups and posted for me). Once I was part of these groups, I started reading the discussions beyond my recruitment needs. In each of these online spaces I introduced myself as a researcher and (when appropriate) shared information about my research.

At the start of this project, in Oakland, because of the pandemic I expected this to be a fully online project. This affected my awareness of the in-person activities I could have formally included as observations. I took notes from observations of online events that I attended, but my daily, in-person activities did not seem relevant. Notable among these in-person activities are door-to-door canvassing in May 2021 on the topic of Oakland’s budget and differing versions of safety.⁶ While I did not take fieldnotes on this activity, the conversations about the varying experiences and definitions of “safety” certainly resonated with the discussions of safety and crime maps in interviews, and likely increased my attentiveness in analysis to differences in how subjects defined their safety.

When I attended virtual events related to housing (see Table 6) I took notes on these and formally considered them as online fieldwork. I also followed social media accounts

⁶ Issues of safety at that moment were strongly connected to housing, the high cost of housing despite pandemic relief programs, and the unhoused community in Oakland.

that posted about housing issues in Oakland and the Bay Area – journalists, activists, local newspapers, other academics. In these ways I immersed myself in the ongoing discussions in public and policy-focused spaces.

My move to Las Vegas created a clear inflection point from which my role as a participant observer began. I began formally taking fieldnotes when I started to plan my move to Las Vegas. Starting this search from Oakland made me reflect on how these two places might be similar or different, including testing some of the virtual search tools on my Oakland neighborhood to see what it would look like in a similar search. Similarly, learning from the Oakland interviews how much people used other social media sites in their search, I started observing these sites more carefully, seeing them as more than an avenue to recruitment. I include my online housing search in Chapter 3.

Once I arrive in Las Vegas I took fieldnotes (often as voice notes because I found those easier to do in the moment without causing too much of a pause or disruption) as I got to know the city, settled into my neighborhood, and went about recruiting interview participants. I sought out in-person activities and events, but about two months after I arrived the Omicron variant hit hard and many in-person events started reverting to online. Las Vegas is also a suburban city so a whole day of errands amounted to mostly time spent alone in my car. So, I took notes about that. I also listened to local radio, watched the local TV news, and subscribed to the *Las Vegas Review Journal*. I took my dog for walks and hikes and explored the local food selections to find my favorite regulars (soup dumplings and Jewish pastries were a success, Ethiopian food was not) and discover some new delights (Hawaiian BBQ). As I described above, these everyday activities helped me connect with Las Vegas interview participants, sharing notes on finding food or agreeing with the “everywhere in 25 minutes” maxim about getting around the city.

Table 6 Events attended as part of fieldwork

Event	Date	Modality	Location
Tech Equity Black Homeownership Panel	5/6/21	Virtual	Greater Bay Area, CA
ECHO Fair Housing Training	6/4/21	Virtual	Hayward, CA
Oakland “Just Recovery Budget” Public Meeting	6/24/21	Virtual	Oakland, CA
ACCE Corporate Landlord Training	8/25/21	Virtual	Greater Bay Area, CA
First-time Homebuyers Workshop	11/17/21	In-Person	Las Vegas, NV
Tenant Union Training	12/14/21	Virtual	Las Vegas, NV
Project GREEN Wash Cleanup	12/18/21	In-Person	Las Vegas, NV
NV State Housing Lunch & Learn	1/26/22	Virtual	Las Vegas, NV
NV Partners Homebuyers Training	1/27/22	Virtual	Las Vegas, NV
Tech Equity “Corporate Takeover of the American Dream”	1/27/22	Virtual	Greater Bay Area, CA

The best connections I made to other people in Las Vegas came from volunteering with a housing justice organization. I joined 10 virtual meetings, two in person social events, and did four half-days of canvassing (in-person). I took notes on these activities, but they were primarily an outlet for my frustration with the slowness of research in the face

of a dire housing crisis. I have experience with political canvassing and trusted the leaders to manage everyone's safety regarding COVID. There were parallels in this work and my research, but I do not write directly about these activists here because I worry that describing their tactics in detail, particularly for identifying problematic landlords, could diminish the efficacy of those tactics.⁷ Instead, I used this experience with the activists to direct my interviews and analysis, raising possible concerns with the platforms that I would not notice (e.g. the barriers for people with untraditional incomes that do not show up in a regular paystub – a frequent requirement for rental applications) and underscoring practices that overlap with interview subjects. Similarly to the role of expert interviews in guiding the research questions and checking that I was not overlooking significant applications of the real estate platforms, online and in-person activist activities oriented my understanding of housing crisis in their view and the kinds of online information they used for targeting their endeavors.

Media and Public Discourse Analysis

To understand the public view of the real estate platforms as well as the platforms' positioning of themselves, I studied media coverage, press releases, and website copy (including Zillow's "research" blog posts). In part this is an approach to combatting the opacity of both the companies and their algorithmic tools (Burrell 2016; Bucher 2016). It also recognizes that all speech these companies put forward serves to position their work politically and discursively (Gillespie 2010). I read these texts in the context of the political and social moment in which events were unfolding, including the on-going housing crisis that was exacerbated by the COVID pandemic, the increase in housing regulation (e.g. the national eviction ban) in response to the pandemic, and the increased attention from the public and the federal government on the challenge of regulating large technology platform companies, especially those that are de facto monopolies in their field (e.g. Google). This sociopolitical context situated the discourses I read and analyzed.

Media coverage makes up the other side of this coin, setting public narratives, sometimes in line with the platform company's framing, sometime against it. For example, I built a specific corpus of media coverage about Zillow's i-buying (the topic of Ch. 5 Demystifying the Zestimate) in the fall of 2021, trying to collect every analytic article in major business and mainstream media outlets (not including short reporting pieces that only stated the fact of the exit). This corpus shows how "the algorithm" looms large in the telling and critiquing of Zillow's exit, demonstrating how hype or exaggeration of the potential influence of a technology works in a positive and negative representation.

⁷ The publication of the "Shitty Men in Media" Google Sheet similarly made it ineffective because once it was completely public people stopped contributing to it and the threat of retaliation became real.
<https://www.vox.com/culture/2018/1/11/16877966/shitty-media-men-list-explained>

Table 7 Media Coverage of Zillow I-Buying Exit

Title	Publisher	Date
<i>Redfin CEO, Zillow pour cold water on TikTok's iBuyer theory</i>	Inman (online real estate news)	9/23/2021
<i>Zillow Caught Up in TikTok Drama Over Big-Money Role in Housing</i>	Bloomberg News	9/24/2021
<i>Redfin, Zillow respond to viral TikTok theory</i>	Inquisitr (online news and entertainment)	9/24/2021
<i>Viral TikTok video accuses Zillow and others of manipulating the housing market. Here's what's really going on</i>	Marketwatch	9/24/21
<i>Zillow exposed?! TikTok presents nefarious theory and everyone's talking about it!</i>	Perez Hilton (entertainment website)	9/24/2021
<i>Zillow responds to viral Tik Tok video claiming housing market manipulation</i>	Yahoo Finance	9/27/21
<i>'Don't Buy Zillow Homes': A Tale of Failure, Mistrust and Hot Housing Markets</i>	Bloomberg News	11/3/2021
<i>Why the iBuying algorithms failed Zillow, and what it says about the business world's love affair with AI</i>	GeekWire	11/3/2021
<i>The \$300m flip flop: how real-estate site Zillow's side hustle went badly wrong</i>	Guardian	11/4/2021
<i>Invaluable data science lessons to learn from the failure of Zillow's flipping business</i>	Towards Data Science (blog)	11/5/2021
<i>Zillow's Algorithm-Fueled Buying Spree Doomed Its Home-Flipping Experiment</i>	Bloomberg Businessweek	11/8/2021
<i>Why Zillow couldn't make algorithmic house pricing work</i>	Wired	11/11/2021
<i>What went wrong with Zillow? A real-estate algorithm derailed its big bet</i>	Wall Street Journal	11/17/2021
<i>Zillow collapse proves AI is not perfect: Let me explain</i>	Towards Data Science (blog)	11/22/2021
<i>Zillow estimates: Not as accurate as you think</i>	Investopedia	11/30/2021
<i>The \$500mm+ Debacle at Zillow Offers – What went wrong with the AI models?</i>	Inside Big Data	12/13/2021
<i>Zillow's Great Data Science Disaster</i>	Analytics India	12/20/2021
<i>What Zillow's failed algorithm means for the future of data science</i>	Fortune Education	2/1/2022

Data Analysis

My data analysis was guided by grounded theory (Charmaz, 2006); I inductively coded data – interview transcripts, field notes, news articles – and developed those themes by writing analytic memos (Lofland & Lofland). Data analysis was also iterative, allowing me to adjust the interview guide and recruitment plans in response to developing themes. The most significant example of this is my adjusted recruitment process in Las Vegas that made use of Reddit and Facebook groups for recruiting home-seekers in spaces where they were seeking out housing information. Starting data analysis as I was collecting data also allowed me to assess the interviewees I was reaching and think about who could be missing from my group (Small and Calarco 2022).

Interviews were transcribed by a professional transcription service, and I coded them using themes that emerged from the data using MaxQDA (a qualitative coding software). Some codes referred to the concepts interviewees associated with a specific score. Other codes focused on how interviewees reacted to the idea of scoring or squared their personal identity with the scores. I developed themes by writing memos reflecting on particular instances from interviews and certain themes that stood out. Often, I used voice notes to take memos in the field (i.e. in my car or while walking the dog) and found these easy to get down ideas, but more challenging for returning to as content. Memos became chapter drafts or outlines. I found that the writing process advanced my analysis significantly. I submitted an extended abstract of Chapter 5 to a workshop on “Platform Ambivalence” which greatly helped me take seriously the “ambivalence” code that I second-guessed frequently. I also submitted Chapter 4 and 6 for publication (slightly reformatted as papers) and received feedback from reviewers that helped shape some of the theoretical arguments.

Limitations and Directions for Future Study

This study has some limitations that open directions for future studies of online housing search and the interpretation of neighborhood metrics. All interviews took place during the COVID-19 pandemic, a period of time in which people were conducting their housing search almost entirely online. Also because of the pandemic, housing prices went dramatically down and then up, possibly causing people to make faster housing decisions than they would make in a more normal market setting. Future research could study a more typical period of time for housing search, possibly combining in-person observations with the digital interview methods described here. Studies in which home-seekers could be observed *in the process of* looking for housing (as opposed to at the end of their search), either through ethnographic study (Desmond 2016) or experimental design (Bergman, Chan, and Kapor 2020) could perhaps be more attentive to the actual point of decision-making. Housing is also very place determinant and this study is located in two cities, Oakland and Las Vegas. Studies of other housing markets could yield different results given different histories and socio-spatial dynamics. More future directions for research that build off the findings discussed in the following chapters are presented in the Conclusion chapter.

Works Cited

- Apgar, B. 12/2022. "Craig Ranch Regional Park to Get Upgrades Funded by County Grant." *The Las Vegas Review-Journal*, 12/2022.
<https://www.reviewjournal.com/local/north-las-vegas/craig-ranch-regional-park-to-get-upgrades-funded-bycounty-grant-2202127/>.
- Bergman, Peter, Eric W. Chan, and Adam Kapor. 2020. "Housing Search Frictions: Evidence from Detailed Search Data and a Field Experiment." Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w27209>.
- Bucher, Taina. 2016. "Neither Black Nor Box: Ways of Knowing Algorithms." In *Innovative Methods in Media and Communication Research*, edited by Sebastian Kubitschko and Anne Kaun, 81–98. Cham: Springer International Publishing.
- Burrell, J. 2017. "The Fieldsite as a Network: A Strategy for Locating Ethnographic Research." *The Routledge Companion to Digital Ethnography*.
<https://www.taylorfrancis.com/chapters/edit/10.4324/9781315673974-15/fieldsite-network-strategy-locating-ethnographic-research-jenna-burrell>.
- Burrell, Jenna. 2016. "How the Machine 'Thinks': Understanding Opacity in Machine Learning Algorithms." *Big Data & Society* 3 (1): 205395171562251.
- Burrell, Jenna, Zoe Kahn, Anne Jonas, and Daniel Griffin. 2019. "When Users Control the Algorithms: Values Expressed in Practices on Twitter." *Proc. ACM Hum.-Comput. Interact.*, 138, 3 (CSCW): 1–20.
- Citron, D., and Frank A. Pasquale. 2014. "The Scored Society: Due Process for Automated Predictions." *Washington Law Review* 89 (March): 1.
- Davis, Mike. 2002. "The Racial Cauldron." In *The Grit Beneath the Glitter: Tales from the Real Las Vegas*, edited by Hal K. Rothman and Mike Davis, 175–86. Berkeley, CA: University of California Press.
- Desmond, Matthew. 2016. *Evicted: Poverty and Profit in the American City*. Crown.
- Emmel, N. 2013. "Sampling and Choosing Cases in Qualitative Research: A Realist Approach," October. <https://doi.org/10.4135/9781473913882>.
- Eslami, Motahhare, Aimee Rickman, Kristen Vaccaro, Amirhossein Aleyasen, Andy Vuong, Karrie Karahalios, Kevin Hamilton, and Christian Sandvig. 2015. "I Always Assumed That I Wasn't Really That Close to [Her]': Reasoning about Invisible Algorithms in News Feeds." In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 153–62. CHI '15. New York, NY, USA: Association for Computing Machinery.

- Gillespie, T. 2010. "The Politics of 'Platforms.'" *New Media & Society*.
<https://journals.sagepub.com/doi/abs/10.1177/1461444809342738>.
- Glegg, Stephanie M. N. 2019. "Facilitating Interviews in Qualitative Research With Visual Tools: A Typology." *Qualitative Health Research* 29 (2): 301–10.
- Gottdiener, Mark, Claudia Collins, and David R. Dickens. 2000. *Las Vegas: The Social Production of an All-American City*. Hoboken, NJ: Wiley-Blackwell.
- "Housing Precarity Risk Model." 2021. Urban Displacement Project. June 13, 2021.
<https://www.urbandisplacement.org/maps/housing-precarity-risk-model/>.
- Korver-Glenn, Elizabeth. 2018. "Compounding Inequalities: How Racial Stereotypes and Discrimination Accumulate across the Stages of Housing Exchange." *American Sociological Review* 83 (4): 627–56.
- Lareau, Annette. 2021. *Listening to People: A Practical Guide to Interviewing, Participant Observation, Data Analysis, and Writing It All Up*. University of Chicago Press.
- Lareau, Annette, and Kimberly Goyette. 2014. *Choosing Homes, Choosing Schools*. Russell Sage Foundation.
- Light, Ben, Jean Burgess, and Stefanie Duguay. 2018. "The Walkthrough Method: An Approach to the Study of Apps." *New Media & Society* 20 (3): 881–900.
- Noble, Safiya Umoja. 2018. *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York, NY: NYU PRESS.
- Oudshoorn, Nelly, Els Rommes, and Marcelle Stienstra. 2004. "Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technologies." *Science, Technology & Human Values* 29 (1): 30–63.
- Seaver, Nick. 2017. "Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems." *Big Data & Society* 4 (2): 2053951717738104.
- Self, Robert O. 2005. *American Babylon*. Princeton University Press.
- Small, M. L., and J. M. Cook. 2023. "Using Interviews to Understand Why: Challenges and Strategies in the Study of Motivated Action." *Sociological Methods & Research*.
<https://journals.sagepub.com/doi/abs/10.1177/0049124121995552>.
- Small, Mario Luis, and Jessica Mccrory Calarco. 2022. *Qualitative Literacy: A Guide to Evaluating Ethnographic and Interview Research*. Univ of California Press.

3 – The Bricolage of Online Housing Search



Figure 1 Photos of "for rent" signs in (clockwise from top left) Brooklyn, Los Angeles, Brooklyn, Berkeley, Berkeley, and Brooklyn. Source: author.

How do people search for housing? How has it changed with the proliferation of online housing platforms? These key questions orient the rest of this project. My initial inquiry centered on the real estate platform and imagined the search process beginning there. However, after just a few initial interviews it became clear that there were parts of online housing search that could come before the platform, and that these initial investigations shaped how users conducted their search on the platform. These other search activities made use of a range of online platforms – social media, reviewing, mapping – many of which were used unconventionally by home-seekers. Many home-seekers used several of these methods during their online housing search, piecing together bits of information from different places. I describe this process of piecing together various sources of information to fit a customized set of needs or interests, often by using platforms in unconventional ways, as the *bricolage* of online housing search.

“Bricolage” is the act of “construction (of a sculpture or a structure of ideas) achieved by using whatever comes to hand” (“Bricolage” n.d.). In an academic sense, it was introduced as a description for certain kinds of collective behavior by Claude Levi-Strauss (Duymedjian and Rüling 2010). Peer and DiSalvo (2022) apply bricolage to civic

data projects, describing it as “highly situated, relational, and deeply rooted in the personal and collective skill and experience of the individual in their community of practice” (124). I use the term bricolage to describe this collection of online housing search practices because they involve piecing together several existing tools, and often using tools in unintended ways.

Deciding where to live is a consequential decision, both on the individual and societal scale. Where we live affects the communities we are a part of, our access to nearby resources (jobs, schools, amenities), where we vote, and where our local tax dollars are collected. For this reason, scholars and policymakers have long been interested in understanding how people make this decision. Sociologists have documented the role of social networks in directing, and sometimes restricting, housing search; home-seekers rely on family, friends, and colleagues for advice on where to live. Economists theorize the process of choosing where to live as one of balancing price with the benefits of location (proximity to work, schools). In this framing, having more information about those variables can help the home-seeker make a better, more efficient decision. At first glance online real estate platforms and websites (like Craigslist) seem to answer both challenges – making more information about housing choices easily accessible to any home-seeker, regardless of their social networks. However, the findings in this chapter show how the social sorting process typical of an off-line housing search is partially reproduced with online behavior, and that in seeking out more information home-seekers still interpret it through their sociocultural lens.

This chapter will first discuss the relevant literature from sociology, economics, and urban policy regarding housing search generally, and online housing search. Then, I will present the findings from interviews and online observations that together makeup the bricolage of online housing search. These behaviors fall into three categories: (1) asking social networks for neighborhood suggestions, (2) seeking out spatial indicators or, more colloquially, mapping vibes, and (3) using reviews to avoid apartment complexes and landlords with red flags. Finally, I will discuss how these findings raise further questions about the potential steering and social sorting effects of online housing search, and how some newer online housing platforms seem to incorporate some of these techniques in their platform design.

Housing Search Literature

Housing search has been studied in its off-line existence by several areas of social science. For sociologists, housing search and housing choice is relevant to questions of social stratification by race and class. For economists housing choice brings up the housing market and how various locations are valued (including the role of key amenities like schools and access to jobs/transit) and is a key example of observable individual market interactions. Social policy draws from the previous two fields to propose interventions around housing

choice that seek to improve long-term economic and social outcomes by influencing housing choices.

Economists theorize housing decisions as a set of tradeoffs between price, location (which includes access to amenities including jobs, schools, and public transportation) and the physical elements of the housing (size, materials, aesthetics). In this theoretical framing, more information about these elements will reduce the friction of unknowns and improve the market's efficiency in distributing housing according to individual preferences. And, by extension, the value of a piece of information can be measured through the differences in the housing (price) outcomes, as Black (1999) demonstrates in a study that uses home choices to measure how much parents "value" higher school ratings. In this way, economists' understanding of housing decisions is an example of how they theorize information and its effect on decision making in a broader sense. Economists also analyze the markets for renting and buying separately because they involve different actors. The rental market connects renters and landlords, whereas the market for buying housing connects owners and buyers. However, most real estate platforms serve both markets, only distinguishing between them by toggling a filter. Because my research follows the platform, I also treat renters and buyers similarly (i.e. using the same interview guide), although I note key differences when they arise (as in the section on Reviews).

Urban informatics scholar Geoff Boeing and colleagues (Boeing and Waddell 2017; Boeing et al. 2021) investigated online housing information on Craigslist through the information access-focused logic of economists and techno-optimists, explaining, "optimistically, large corpora of rental listings could provide housing researchers and practitioners with actionable insights for policymaking while also equalizing access to information for otherwise disadvantaged home-seekers" (Boeing et al. 2021). Where previously a home-seeker would be confined in their search options by their location and their social networks, online housing search would allow them to search more broadly, seeing listings in different geographic locations, without the filter of their social network (race, class, preferences). Boeing et al. (2021) measured whether the information available on Craigslist was evenly distributed and found that rental listings in majority Black or Hispanic neighborhoods have less information than listings in majority White neighborhoods. Additionally, they reviewed a similar study (Besbris, Schachter, and Kuk 2018) of Craigslist listings that found "the information in listings in tracts with more Black, Latino, or poorer residents disproportionately focuses on tenant (dis)qualifications (e.g., proof of income, eviction history, criminal history) rather than unit/amenity descriptions" (Boeing et al. 2021, 116). Thus, they concluded that renters searching in these neighborhoods were still at a disadvantage, despite the potential informational affordances of Craigslist.

Sociologists have studied how housing choices are influenced by social networks and reproduce social sorting by class and race (Lareau and Goyette 2014; Krysan and

Bader 2014; Carrillo et al. 2016). Krysan and Bader (2014) summarize the debate around segregation with three potential explanations: “discrimination, economics, and preferences” (678). Discrimination came in the form of professionals including realtors, lenders, and landlords who intentionally shaped what housing options were available to which home-seekers (Korver-Glenn 2021). For example, Rosen (2020) found evidence that not all landlords would accept housing vouchers, even though denying them is illegal, and that some landlords with multiple properties redirected potential tenants to specific neighborhoods based on their race or family structure.

Differences in income and wealth by race also caused non-White home-seekers to be disproportionately confined to low-cost housing or to rely on public housing or voucher programs. Rosen’s (2020) *The Voucher Promise* is an ethnography of a neighborhood in Baltimore where many people with housing vouchers live, that explores how vouchers intersect with segregation and the economic deterioration of formerly middle-class Black neighborhoods. Desmond’s (2016) *Evicted* documents the high occurrence of evictions for low-income and poor Black households in Milwaukee, another factor that leads to different housing access (because evictions count against future rental applications in addition to being emotionally and financially traumatic). Finally, because low-income people are more dependent on public transit, some research shows that they prioritize access to transit (to reach places of employment) over access to the highest rated schools (Rhodes and De Luca 2014).

Investigating how racial preferences can be a factor in housing segregation can focus on an individual’s choice, essentially trying to measure the prevalence of racial prejudice among groups of different races (Farley et al. 1978). However, more recent research has expanded this idea of racial preferences to look at how using social networks as an information source for housing search tends to reproduce similar housing decisions in the same (racially homogenous) network (Lareau and Goyette 2014). For example, Carrillo et al. (2016) interviewed low-income Hispanic mothers about their housing decisions in Chicago and found that “social networks were most determinative of housing search strategies... and led to short-distance moves that did not alter patterns of racial and class segregation” (109). This work expands the understanding of segregation to consider how some of the causes may be more structural (by nature of how people access information) than driven by individual preferences or prejudices. In particular, this framing pushes back against arguments that social programs should not promote racial integration because segregation is the outcome of individual choices (with the implicit argument that non-White people prefer to live in segregated neighborhoods) (Krysan and Bader 2014).

Social Policy brings sociology and economics together to look at the issue of housing through the lens of poverty alleviation and the “neighborhood effects,” the understanding that giving a person access to a ‘better’ neighborhood will improve their economic and social attainment. This framing undergirds many studies in policy,

behavioral economics, and sociology that try to quantify and describe the magnitude of neighborhood effects and to test social programs designed to give some poor households access to ‘better’ neighborhoods.¹ The HUD “Moving to Opportunity” study tested this by following low-income households in 5 cities² over several years (up to 10) to see whether those with vouchers were able to access better neighborhoods and schools (Ferryman et al. 2008). Later studies expanded on this, adding more information treatments, including school ratings (Bergman, Chan, and Kapor 2020), counseling in how to act during interviews with landlords, and financial assistance (Galiani, Murphy, and Pantano 2015). Notably, these interventions did not address the known racism that restricts home-seekers’ at the point of their interaction with housing professionals.

The Information Landscape

I independently arrived at the term “(housing) information landscape” to describe the range of online resources that home-seekers consulted for their search, notably including many that are not explicitly for housing. This term evokes a space of varied platforms and websites; each home-seeker may not search in every single place but collectively searchers overlap enough to define a discrete area.

In other information science literature “information landscape” is variably used to describe online search behavior (O’Day and Jeffries 1993) and the underlying structure used to sort information for digital library catalogues (Smith 2022). Lloyd and Wilkinson (2016) use it to describe how refugee youth find relevant information; they explain, “information landscapes represent knowledge spaces that have resonance with people who are involved in collective practices, endeavours or situations” (Lloyd and Wilkinson 2016, 302). This meaning, which combines online search and a community of practice, is quite compatible with my own application of the term. A key similarity is the *sharing of search practices* as well as information. As I will illustrate, in venues where home-seekers may look for information (e.g. Reddit, Facebook) they will also encounter people sharing search practices or suggesting other places to look.

I emphasize the term information landscape because it is distinct from some other, similar terms from Media or Information Studies. Madianou and Miller (2013) introduce a theory of “polymedia” to explain how diasporic communities communicate using a combination of several digital media including email, videochat (Skype), instant messaging and texting. They focus on how users choose which media to use based on its affordances (including an image, cost of transmission, ease of use) and the relationship with the target of their communication. Polymedia also encapsulates a shift in media use over time as new technologies become accessible (e.g. the proliferation of smartphones). However, a

¹ In the next chapter I dig more deeply into this implication that some neighborhoods are better than others, or that what makes a place good or better is universally defined and measurable.

² Baltimore, Boston, Chicago, New York City, and Los Angeles

key difference between polymedia and information landscape is that polymedia focuses on communication between specific people or groups of people while the information landscape describes a range of sites in which some involve communicating (e.g. Reddit, Facebook) and some do not (e.g. Google Maps, Yelp).

Similarly, Benkler (2007) proclaimed the arrival of the “networked public sphere,” an online version of the Habermasian public sphere where anyone can participate and popular or “good” ideas will naturally rise to the top. This kind of optimistic thinking was popular in the early 2000s, when the Arab Spring and Occupy Wall Street seemed poised to bring sweeping social change via social media organizing (Tufekci 2017). While some of the spaces described in this chapter fit the simplest understanding – an online forum where anyone (with an internet connection, awareness of the site, etc.) can participate (e.g. Reddit, Facebook) – not all of the online sites and tools that participants described using in their search fit. The Las Vegas specific subreddit, r/VegasLocals, conceivably brings together people who live in Vegas (or plan to or used to) to discuss issues relevant to that. There is no requirement of proof, so this boundary is implied rather than enforced. Several interviewees admitted to being lurkers (people who read threads but do not comment) on Reddit rather than participants. Some found Reddit posts through a broader search (e.g. a Google search for “good neighborhoods in Vegas”), indicating that they were not even a lurking participant in r/VegasLocals but were still able to find the relevant content. By contrast, sites like Yelp and Google Maps may rely to some extent on user-generated content (Yelp reviews, Google maps reviews and user-confirmed content), but they are not communities in the sense of a recurring group of participants or a shared identity. Therefore, the networked public sphere, like polymedia, does not completely fit the dynamics I present in this chapter. So I call it the housing information landscape and show the varying ways users explore it for their specific purposes.

The Housing Search Process

The process of searching for housing is variable, but generally conforms to a pattern of (1) choosing a neighborhood, (2) identifying available properties, and (3) selecting a property to buy or rent. Both neighborhoods and properties are selected to optimize for certain characteristics – location, price, schools, near to job or transit, amenities (parks, restaurants, shops). If your first criteria do not return desirable results, you will likely adjust your criteria and start your search again (Suchman 1990).

Before online housing search, home-seekers relied on family, friends, and colleagues for advice on what neighborhoods to consider. Given that many moves are motivated by being close to work or family, it was logical that these people would have useful insights about location. Then, the home-seeker might walk or drive around these target areas looking for signs that homes were for sale or for rent (such signs still exist, as shown in Figure 1, suggesting that some of this in-person, walking around searching still happens).

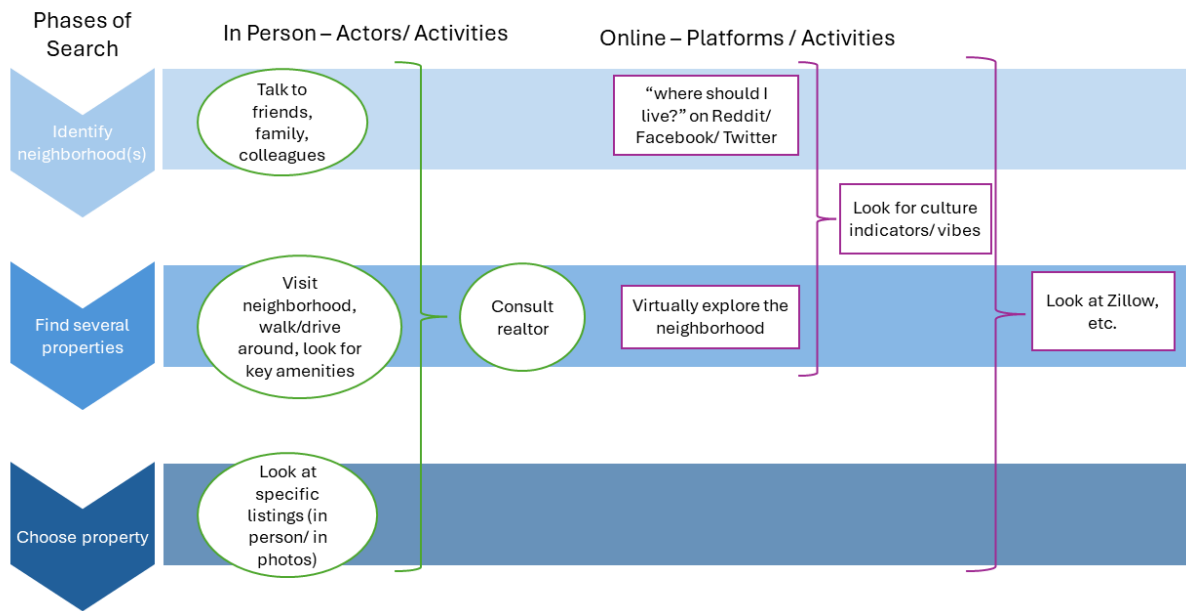


Figure 2 Housing Search In-Person and Online

Maybe a colleague had a neighbor who was planning to sell their house, or a friend had a great landlord with some open units in their building. A real estate agent would be necessary for looking through a complete catalogue of current listings (using the multiple listing service, or MLS). The agent might even suggest some different neighborhoods based on the home-seeker's criteria. For renters in markets where agents were not generally involved in rentals, the home-seeker could search in person, looking for posters advertising apartments or homes for rent. They might ask landlords or property managers if they had other buildings with available units.

Once the home-seeker found some properties that seemed to fit their criteria they would visit the property to see it in person. Viewing in person allowed the home-seeker to examine experiential details (finishes, light, noise). Considering a specific property could also focus questions about commute, school, and amenities from 'what are the options?' to 'how long of a walk to the train station?' or 'which grocery store is closest?' This might involve more detailed information gathering from social networks – which teachers at this school were the best, what restaurants did they like, which street was especially dark and empty at night.

With the availability of online housing search the search process does not necessarily change, but now there are online sources of information at each stage of the search. The most dramatic change in the access to listings without the involvement of a realtor. Most buyers will still eventually involve a realtor, but they may conduct much of their search on their own, involving the realtor just for the final negotiations. Having all this information online can also speed up the process – a home-seeker can go from getting

neighborhood recommendations to looking at properties in that neighborhood, to choosing a property they like by shifting between several apps on their phone or websites on their computer.

This chapter expands on the kinds of online information gathering home-seekers can do beyond the real estate platform. Usually this falls in the first two phases of the search process. In Figure 2 I diagram the process of home search, breaking out the in-person and online information gathering activities. These are drawn from my interviews and from studies of housing search (Lareau and Goyette 2014; Bergman, Chan, and Kapor 2020). Certainly, these activities might not fit so clearly in the bounds of one phase, but I locate them in the phase where they best fit the objective. For example, when trying to decide which neighborhoods to consider, a home-seeker might look at some listings to see the kinds of houses available in their price range, but this is less to pick the actual house they will choose and more a check that this neighborhood generally meets their requirements. Similarly, some interviewees described checking in with friends throughout the search process, from finding neighborhoods to picking their final choice. Often these friends were a source for specific kinds of information – they lived in the area or they worked in real estate or construction and could offer some expert knowledge.

The realtor and the real estate platform seemed to enter the process at any stage. Some interviewees said they did not engage a realtor until they were ready to make an offer on a property (the final phase). Others met their realtor at an open house, during the middle phase of their search. Before online search was possible with real estate platforms the realtor would enter the search process much earlier, directing home-seekers to particular neighborhoods. Before online real estate platforms home-seekers could not access property listings without a realtor. Similarly, the real estate platform can enter at any phase of the housing search. Browsing Zillow for voyeurism became a popular pastime during the pandemic, and Zillow claims that some of these voyeurs eventually convert into home-seekers. The ease of searching a wide area – the whole city, multiple cities – online suits Zillow to the early phase of choosing a neighborhood. Still, some interviewees described steps in their search that came before going to the real estate platform. Also, the lack of friction with online search (and the hyper-competitive real estate market) has shortened the time span of housing search. It's possible to cycle through these phases quite quickly, all from the convenience of a mobile phone or computer.

I began interviews with home-seekers by asking them to tell me about their housing search. Notably, they did not all begin at the beginning. Some would tell me about their search using real estate platforms (understandably, since this was the purported focus of my study), and only later in the interview mention the kinds of search activities that came before looking at the platforms. The behaviors described in this chapter were unexpected discoveries. After a few early interviewees mentioned using other online platforms in their search, I added a question to the first section of the interviews explicitly about other online

When I was apartment searching, I'd actually done some research online and [was] asking people I knew in the area as well as looking at sites like Reddit, like Neighborhood Suggestions... And just basically, oh what's a neighborhood that's pretty walkable, maybe close to BART, has cool stuff to do ... just like what I was looking for. And then, most people told me [to] look around the lake, look at Temescal, potentially look at Rockridge. (O5)

After learning about these key neighborhoods, the home-seeker could type them into a real estate platform or Google Maps to continue their search.

Seeking out neighborhood suggestions like this is common. It is so common that some interviewees looked for pre-existing discussions rather than asking with their own search parameters. I frequently observed posts seeking neighborhood suggestions on r/VegasLocals. Typically, the post included a brief description of the home-seeker's needs or demographics. For example, one such post (from 3/22/22) reads:

Not a Vegas local but soon to be one. Moving down from Oregon in May and we are apartment shopping right now. What are the utility costs for an apartment vs a smallish house? It looks like the houses go quickly so we are focusing our search on apartments. Any advice on what to look for/ what to avoid would help a lot!

The replies range from discussions of what websites to use to for searching ("we've been using Zillow and apartments.com- their app is super easy to use. [Craigslist] seems like it's full of scams") to the possibility of using solar panels to reduce utility costs.

Interviewees also used Facebook to solicit neighborhood suggestions. They could post a question to their friends or join specific groups targeting housing in that city, or certain groups of people, like parents. V12 took both approaches. She explained that she "went on Facebook and said, 'What are really good areas?' I joined that Las Vegas Moms group and I said, 'What are good areas for kids, to like grow up in in Vegas?'" Other interviewees mentioned using groups for military spouses, people looking for roommates, and "minority housing." In doing online recruitment and observations I joined several Facebook groups for housing in Oakland and Las Vegas. I found a group in Las Vegas that targeted people with low credit scores and other strikes against their housing application. This group shared advice and resources as well as posts about seeking housing or a roommate.

In the groups that I was able to observe (several "mom's" groups in Las Vegas, renter groups in Las Vegas and Oakland) the discussions in response to neighborhood suggestion requests followed familiar patterns. In parent-focused groups the request was often made in relation to "good schools," sometimes with details about the age(s) of children. This could lead to lengthy discussions about specific schools and the school district in general. (Nevada is ranked very low for school quality in the country and this came up regularly.) Often some replies encouraged home-schooling or exiting the public school system in

favor of charter or private schools. These felt like well-worn argumentative paths with advocates for almost every side.

In many groups (not just for parents) another common theme was the rising cost of housing and the competitiveness of the market. In Las Vegas, a city where homeownership was relatively accessible until 2008 (helped by the strong unions securing high wages for the service industry), the rising house prices of the pandemic (and even few years before that) was a sea change. A critique of incomers raising prices frequently blamed “Californians” moving to Las Vegas for cheaper houses and driving up the prices.³ There is some truth behind this trope: Gupta and Miller (2012) empirically demonstrated the “ripple effect” of home prices in LA effecting home prices in Las Vegas.⁴ As a state without an income tax, Nevada courts people from states with high taxes (like California), especially for retirement. My interviewees included several people who mentioned lower taxes as a reason they chose Nevada, including some from California. Of course, my interviewees also included people who moved from other parts of the U.S., including the Midwest, Southwest, and Southeast. In these discussions, as well as in the greater public narrative around the affordable housing crisis in the Mountain West, “Californians” seemed to be a shorthand for the “coastal elite” moving with (or retiring from) a high-paying remote job.⁵

Whereas newcomers in Las Vegas discussions were blamed for rising prices, in Oakland discussions the contentious topic was crime. Either the home-seeker would ask about whether a neighborhood or Oakland in general is “safe,” or comments would introduce the issue of safety and give unsolicited advice. For example, part of a comment on one such posts end “Be careful and super careful at night” (8/17/22), despite the original post (OP) not mentioning safety concerns. Another response gives advice on car break-ins, despite the OP explicitly saying they will not have a car. Whether or not it was asked, safety is understood or assumed to be one of the key issues in discussing neighborhoods. Although this might seem like a product of the media’s emphasis on stories of crime in the Bay Area during the pandemic, the Reddit archives indicate that these questions of crime and safety in Oakland go back at least a decade. In the large Oakland-specific Facebook group there were similar discussions about crime and housing (usually starting with a news article, not with a housing searcher) that typically turned to debates about gentrification and the growing population of unhoused people.

³ The anti-California sentiments were pervasive enough that I was relieved to not have California plates on my car. (Mine were from Wyoming.) I felt this way driving between Wyoming, California, and Nevada (via Idaho and Utah). Throughout the Mountain West, during the pandemic, between the influx of new remote workers with high salaries and the differences in COVID protocols (especially mask-wearing), being a “Californian” felt politically charged.

⁴ However, it would be interesting to see how these results replicate more than a decade later.

⁵ In 2019 a mayoral candidate in Boise, ID made keeping Californians out a central part of his campaign (La Ganga 2019). (He lost.)

These discussions show that these threads about neighborhood suggestions serve a dual purpose, allowing home-seekers to get some direction while also letting residents express their opinions about the key housing issues in their city. Interviewees did not talk about these debate-like comments in relation to their searches, but given that many indicated that gathering neighborhood recommendations was one of the first steps of a search, it is likely that they brought an awareness of these issues – crime, gentrification, school performance, tensions between locals and newcomers – to their housing search. Indeed, many of these issues came up later in interviews, in discussions of general preferences and interpretations of the neighborhood scores (as discussed in depth in the following chapter). Crime and schools are represented in the scores, indicating a common understanding (even among platforms) of their relevance to housing search. Concerns about gentrification and rising home prices are less explicitly called out on the platforms, but several interviewees still brought them up in discussing their home search. These were the salient narratives related to housing at the time. They showed up in local and national media coverage.⁶

What neighborhoods are suggested?

The literature about home search and social groups focuses on the reproduction of class- and race-based patterns. In this literature the understanding is that by using our (in-person) social networks to search for housing, we move to neighborhoods that share our racial and economic traits. However, in asking similar questions about what neighborhoods they should consider online, home-seekers are asking a broader group of people. Some people do include their demographic information as though this is relevant in knowing which neighborhoods *someone like them* would like, but the neighborhoods recommended tend to be the same ones regardless of who is asking.

For example, in Las Vegas, the two neighborhoods that are suggested the most (both in the online spaces I observed and according to interviewees) are Summerlin and Henderson and/or Green Valley (which is part of Henderson). These are the two big suburbs, respectively to the West and Southeast of downtown Las Vegas and the Strip. These neighborhoods have the reputation for being mostly middle class and White. They are the sites of the master planned communities that characterized Las Vegas's expansion through the second half of the 20th century. However, not every housing unit in those areas is in a master planned community. For example, I lived in a newer apartment complex in Henderson that was tucked between major roads and strip mall developments.

⁶ See for example an article in the *Wall Street Journal* with the subtitle that reads “Buyers far from big cities lose out to investors and deep-pocket rivals in places where properties until a year ago offered affordable entry to the middle class” (Taylor 2021), or an episode of the Bay Area culture radio show, Bay Curious, that explores gentrification and displacement in Oakland (Allen-Price 2017).

Consider two interviewees who are quite different but both came away with the recommendation to consider these two areas. V7 is an Asian trans person in their 60s. They bought an apartment on the very low end of the price range for the area, looking to spend around \$200,000. V13 is a White woman in her 30s, looking for a house for her family to buy for between \$500,000 and \$800,000. V7 ended up living in Paradise (near downtown) despite receiving the opposite suggestions: “Everyone told me not to live [in Paradise]; they told me to live in Henderson, Green Valley or Summerlin. And [Paradise] is kind of like San Francisco because it’s very mixed. Henderson, Green Valley and Summerlin are very White.” It was unclear whether the “everyone” V7 referred to was online or in person friends (although they said they did not know anyone in Las Vegas before moving, which suggests at least some were online). V13 learned about the same neighborhoods by reading other people’s requests for neighborhood suggestions online, but in the end, she also did not end up taking this advice:

if you just Google ‘Neighborhoods to live in on Reddit’, then, no matter what you do you get the same information. Everyone’s like, ‘Oh, there is some nice housing in Henderson. Summerlin is really nice. Everyone likes to live in Summerlin, [but] don’t live in the northern areas, it’s dangerous up there.’ But then, like, we don’t live in Summerlin, we live north of Summerlin. It’s a nice, quiet neighborhood. (V13)

These two home-seekers illustrate how despite being socioeconomically different, they found the same neighborhood recommendations, but ultimately did not use them. Still, the consistency in the focus on these neighborhoods suggests that they are representative of a norm or ideal – a White, suburban, middle-class norm – for the city. This raises the question of whether being able to search on a wider platform – an all-city subreddit or Facebook group – is broadening the information available to home-seekers (Boeing et al. 2021) or narrowing it to the most dominant group’s perspective (Yosso 2005).

Finding the “nice” neighborhoods in unconventional ways

Home-seekers also described using a variety of platforms that provide mapped information to virtually explore a neighborhood or city, to look for certain services and amenities, or to look for indicators of the character of a neighborhood (the vibe). While technically, in terms of how they searched and what tools they used, these two kinds of searches seem the same, I argue that there is a distinction between looking for a service to use and looking for a signal of a “nice” area.

Seeking Amenities

Home-seekers described using Google Maps and Yelp to search for important amenities that they wanted to live near or hazards they wanted to avoid. Looking to be close to amenities is a typical use case for these platforms, and one that is replicated within most real estate platforms (pulling data directly from Google Maps or Yelp). V19, an Asian man in his early 30s moved to Las Vegas from San Francisco when his tech job went remote.

in general, I use Google Maps and Yelp to help identify stores and places and where I'd like to be [in] relation to like those things. (Int: What kinds of things would you look for?) So, supermarkets are a big one, in particular because I am Asian. I want it to be relatively close to particularly a Korean supermarket. (V19)

At most he is inverting the process of finding a property and then checking the nearby amenities; he is finding the amenities and then looking for nearby properties.

O4 was moving from San Francisco to Oakland and looking to buy a home. Her familiarity with the Bay Area and the earthquake risk led her to look for the liquefaction risk of an area (not something included on real estate platforms). She explained:

Huge parts of the Bay Area are built on landfill. Basically, in an earthquake, it liquefies and the houses then basically collapse. Yeah, it's terrifying. And I am currently living in a liquefaction zone, right on the edge of it. Which I knew when I bought. To some extent, you can't really avoid it. But I was always looking at hazard zones, basically. (O4)

She found these hazard zones as "a liquefaction map layer for Google Maps" possibly through a state government website.

V7 used Google Maps to explore their neighborhood and look for public transit and nearby restaurants and casinos. At first, I thought this was for gambling, but in fact they explained the casinos were a part of the street infrastructure, providing extra lights at night:

What I like is - because it's close to the casinos, I like it because at night when I drive home is not dark. All the streets are lit up... I like that. I don't like driving in the dark because it gets dark at 5:00pm. (V7)

V7 is using Google Maps in a typical fashion, but from those results they are inferring slightly different information. This adaptation of Google Maps information, or O4's seeking out liquefaction risk, or V19's inversion of the process of searching for housing by starting with amenities exemplify the bricolage of search. They are slight changes or additions, personalizing their search process to meet their needs, bringing in information from other sources or interpreting information slightly differently to meet their specific needs.

More than a "nice" area

Sometimes interviewees described using mapping platforms to look for indicators of a "nice" neighborhood or one that meets their "type of culture." I separate this level of interpretation from the previous examples because these home-seekers are inferring more than the maps present. Their interpretation of certain signals illustrates a kind of social sorting that has implicit classes and racialized implications that they may not be fully aware of.

The example that drew my attention to this kind of interpretation from a map came from O12, a White woman in her 30s. She explained that she searched “oat milk latte” on Yelp,

because one, I really liked my coffee so I want to make sure that I have my local coffee spot. And second, as I find that that’s generally a trend of—like my type of culture’s going to be there. There will be reclaimed wood, there will be sustainability, and there will be green energy. Like all of those different things. (O12)

For her, the oat milk latte is a cultural signal as much as it is a literal amenity she wants to live near. This kind of symbol, the “hipster type cafes” as she called them, immediately made me think of gentrification, but as I reread the interview transcript, I could not find more explicit indications that she was looking for – or thinking about – gentrifying areas in her housing search. Gentrification is a process in which a lower-income neighborhood is infiltrated by higher-income residents (and visitors) who drive up rents, property values, and the prices in nearby stores. Often the original population is majority non-White and the incoming population is majority White. The harms of gentrification include the displacement of the original population as they are priced out, higher police presence that can be harmful⁷ to non-White residents and visitors, and the erasure of the cultural presence of the original population (even as some of them remain).

Gentrification is an explicitly capitalist process (the objective is raising rents and property values), and often the first signs of it are detectable in shifts in consumer attention (Zukin 2010). In the age of platforms like Yelp and AirBnB the signs and mechanism for this kind of shifting attention have globalized, creating an almost universal visual language of gentrification (Chayka 2016; Lindner and Sandoval 2021). Describing the ubiquitous aesthetic of independent coffee shops, Chayka (2016) explains, “they have all independently decided to adopt the same faux-artisanal aesthetic” including “raw wood tables, exposed brick, and hanging Edison bulbs.”⁸ Zukin et al. (2017) explain the feedback loop from Yelp review to gentrification, “if gentrification is socially constructed by capital, state policy, media images, and consumers’ tastes, Yelp restaurant reviewers make discursive investments in two of its formative areas: media images and tastes” (462).

To the target audience, it feels like the world is anticipating their preferences, “my kind of culture” O12 calls it. This normalization of the dominant culture puts the cultural preference (and financial needs) of other groups at a disadvantage (Yosso 2005), devaluing them and even targeting them as areas for “improvement.” Zukin et al (2017) show this racialized difference by comparing the language in Yelp reviews for restaurants in two

⁷ “Harmful” may not be a strong enough word. Often this harm is deadly. The killing of Breonna Taylor has been linked to gentrification and the increased presence (and violence) of police (Holcome and Snyder 2020).

⁸ Although that’s the 2016 aesthetic, for 2022 I’d point to an abundance of plants, cheeky neon signs, terrazzo counters or floors and macrame accessories.

gentrifying neighborhoods in Brooklyn, Greenpoint (predominantly White) and Bed-Stuy (predominantly Black):

reviews of restaurants in Greenpoint construct a frame of an imagined homeland. Reviewers positively identify with a “cozy,” “European” neighborhood and an “authentic” Polish cuisine. By contrast, comments about restaurants in Bed-Stuy construct a frame of contested territory. Reviewers negatively identify with “dark,” “dangerous,” “ghetto” conditions in the neighborhood and praise the trendy restaurants for bringing a welcome change to an area with “no options” (269)

The home-seeker using coffee shop aesthetics to guide her search may not realize what she is filtering for, but this is what makes gentrification so pernicious, that it can appeal to some people in a seemingly innocuous way – a preference for coffee shops – without seeming to connect to the displacement, rising rents, and increased police surveillance. Of course, to the current residents of these neighborhoods, Ramírez (2020), writing about Oakland, argues “The borders constructed are not only aesthetic, representations of gentrification underway, but intangible frictions that arise as borders are enforced” (148). She tracks noise ordinances and noise violations as another form of early warnings of gentrification, specifically how incoming residents redefine “acceptable” noise levels as a way of policing (and driving out) current residents.

Another interviewee described using Google Streetview to look around a neighborhood, searching for, among other things, multi-unit apartment buildings.

O4: So I would look at the houses next to it; like, are your neighbors maintaining their homes, basically? And I would often, in a case like this, actually scroll into the street and sort of navigate down the street a little bit and get a sense of, like, what are the other houses like? Sometimes you’d see, for example, ‘Oh, there’s a big multiunit apartment building on that street.’ And that just tells you something about the neighborhood, right?

INT: To be explicit, what do you think that would tell you about the neighborhood if, say, there was a big multiunit here?

O4: Oh, just that it’s like... it’s more dense, and so by definition you’re going to have, more people around, more activity, more traffic, potentially more noise. It’s just not as quiet of a neighborhood if I’m seeing multiunit apartment buildings.

Density may seem like a neutral concept in an urban area, but in cities like Oakland with a lot of single-family homes the presence of multi-unit buildings is an indicator of shifting zoning and often a remnant of redlining. During the period of urban expansion in the mid-20th century, wealthier, Whiter areas were protected by single family (R1) zoning which limited how many new units of housing could be added and prevented multiple households from occupying the same house (as was more common in non-White neighborhoods to

offset high costs of houses without government-backed mortgages). So, even today, many of the areas that continue to have R1 zoning are the wealthier, Whiter areas.⁹

Several other interviewees described looking for indicators of wealth, or in their terms, the “nice” areas. V13 explained searching for Whole Foods:

before I was even familiar with the area, the way that I figured out where I wanted to live, is I found where all the Whole Foods are... Because if there’s a Whole Foods, then that’s where all the nice houses are... They don’t put a Whole Foods in a bad neighborhood. (V13)

V19 used AirBnB. He explained, “I would look at where there were nice homes and where there were sort of shoddier areas based on the AirBnBs that were present and the reviews on those places. And I would cross reference that with my friends and Google Maps.” These home-seekers created a heuristic for finding the neighborhoods they consider to be desirable. In a theoretical housing market, price would indicate the desirability of a neighborhood. It is possible that the competitiveness of the real estate market at this moment raised prices so much as to make it hard to distinguish neighborhoods by price. Or these home-seekers moving from another state (both came from California) were more confident using a heuristic that relates to their understanding of other places rather than price which is less commensurate between different housing markets.¹⁰

This section presents the gradations of interpretation done in making sense of various indicators of a neighborhood. Some – looking for “nice” areas – seem straightforward, but others hinge on associations that may not be fully conscious. A home-seeker can acknowledge a preference for being near certain kinds of cafés or lower density buildings, but do they realize the connection between those preferences and histories of racial segregation and on-going processes of gentrification? Their indicators allow them to elide those associations and couch their search in terms of their preferences.

Whereas the neighborhood suggestions reproduce the use of social networks without (seemingly) the social sorting effects, the use of these mapping platforms can lead to social sorting through these indicators and heuristics for wealth and race.

“If the reviews don’t check out, then I just keep looking.”¹¹

The final unexpected element of online housing search is the role of reviews. Several interviewees, all renters, in both Oakland and Las Vegas, described using reviews on Apartments.com, Google, or Yelp to investigate potential apartment buildings and

⁹ This is why cities like Oakland have made recent pushes to eliminate or reduce R1 zoning as part of an effort to both address racial inequity and improve housing affordability (Orenstein 2021).

¹⁰ The median home price at the end of 2021 was \$383,000 and \$800,000 in Oakland.

¹¹ This is a quote from interviewee V2.

management companies. They are an economically diverse group of searchers; their searches ranged from luxury apartment complexes to low-priced, weekly rentals. While reviews can contain positive, negative, and neutral information, these interviewees usually explained their use of reviews as a way to rule out potential negative elements that they would otherwise not know about from the official listing or even (in some cases) an in person visit.

These red flags included poor maintenance and non-functioning utilities, the presence of encampments of unhoused people nearby, and drug use. For example, V6, who was looking for a furnished apartment to share with his brother, explained:

V6: You never know, you could be housing yourself into like a trap house unknowingly. Yeah. That's what they say about the Harbor... What did they call it? Heroin Hallway.

INT: Wait, they say that on the property website?

V6: No, no, no. It's a [laughs] no. It's a review somewhere.

While V6 was on the lookout for any kind of problem, O6 looked at reviews specifically to ascertain if there were encampments of unhoused people near a potential apartment building in Oakland. Despite looking at only luxury apartments, she found this did not preclude the possibility of nearby encampments, which made her feel unsafe. She explained:

O6: If I'm very honest what I mostly used were Google and Yelp reviews [of] apartment complexes.

INT: So the apartment building has a posting on Yelp?

O6: Yeah. They have reviews. So, I used reviews... And I cross-referenced them to see what was good. Because that's how I realized that there was a homeless encampment somewhere. That's how I chose not to live in a couple of apartment buildings because they would talk about, like you would see ten people reviewing saying they never pick up our trash. And I was like, yeah, I'm not living there. But you would have no idea based on their website.

She used reviews on secondary sites – Google and Yelp – rather than relying on the reviews on Apartments.com. Another interviewee (V2) explained her preference:

Google, I feel like that's the first place people go to express their view. Apartments, I feel like if you have a good review, or if you've had a very good experience, then you want to brag on Apartments.com that you had a really good experience. But if it's a bad experience, you want everybody to be able to see that you had a bad experience and you put it on Google. (V2)

For some, reviews were particularly useful for remote searching during the pandemic. V15, a young woman who moved to Las Vegas from Memphis, TN, explained that she used reviews because she was not able to get all her questions answered in person:

You definitely have to come out here and get a feel for yourself and talk to a person face-to-face. But that's an issue because [of] business hours and COVID protocols. And I understand completely, but there is a thin line of communication when it comes to somebody looking for a home here. So, it's really hard. (V15)

During my own housing search for Las Vegas (which I did completely remotely), I used reviews to get a better sense of neighborhoods and apartment complexes that seemed relatively similar online. My fieldnotes note more than just negative elements in the review:

Remembering one of my interviewees mentioning Google Reviews, I went back to the [Apartments.com] search results to see the reviews. They are mainly – but not entirely – positive. I learned that the College of South Nevada (CSN) is nearby, and several reviewers are students. I also hadn't realized that it's a gated community. People seem to like that here, but I feel weird about it.

Although reviews rely on the subjective opinion of others, they also offer the views of an actor that has nothing to gain from the home-seeker's decision. Particularly when moving to a new city where the norms of renting may be different¹² (or there may be no renter protections, as in Nevada), reviews offer a chance to see what other people consider relevant.

Reviews as Renter Solidarity

A comment section on Zillow would really be 🔥 I need to see the reviews from other people that toured the house before I pull up!

10:26 PM · Mar 2, 2024 · 127 Views

Figure 4 An example of a tweet suggesting a review section on Zillow.

Apartments.com is unique among real estate platforms included in this study in having a review section to their listings. It is also the only platform that is only for rental listings. While some people on Twitter bemoan the lack of a review section on Zillow to weigh in on weird houses (several Twitter, Instagram and TikTok accounts exist solely to highlight weird Zillow listings), the role of reviews for renters seems different given the different power relationship between a renter and a landlord than between that of buyer and seller. Furthermore, in the current rental market, with increasing rents, an affordability crisis that

¹² For example, in Southern California, rental apartments are not required to include a refrigerator (Tobias and Dillon 2022).

affects most renters¹³, and the growing control of corporate landlords that are shielded by financial and algorithmic opacity (Fields 2022), reviews are a way for renters to share information with each other and expose landlords and management companies. Reviews are a far cry from forming a tenant union (another practice that is on the rise since the pandemic) or working towards passing better renter protection laws, but they still seem like a small step towards renters recognizing their shared disadvantage.

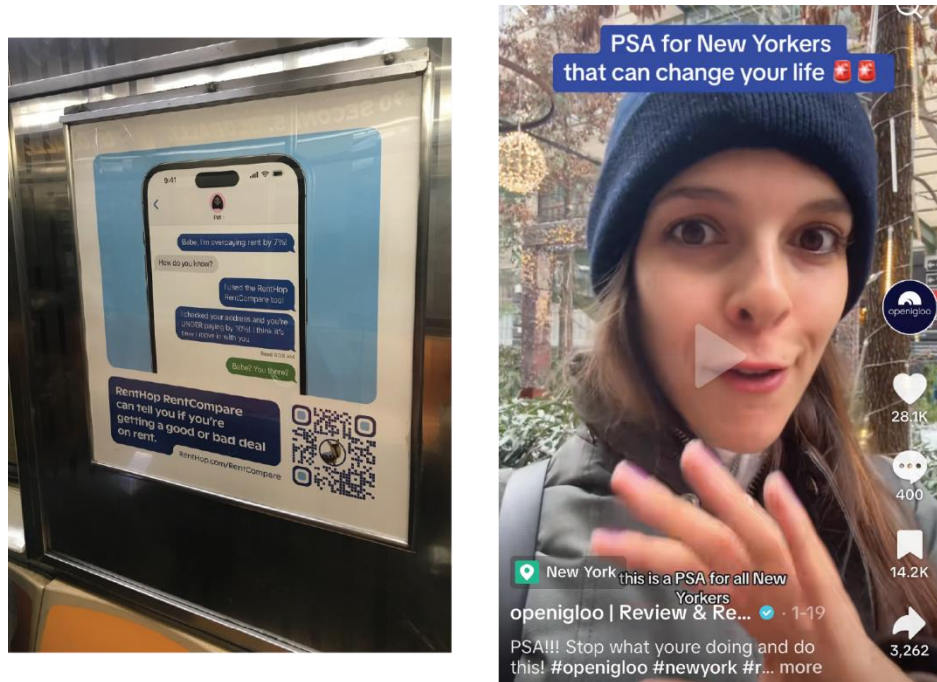


Figure 5 L: A subway ad for RentHop (taken 5/8/23) R: A screenshot of a TikTok video by openigloo on 1/19/24.

Several new(er) platforms make reviews and other pro-renter tools the angle of their company. RentHop¹⁴ scores apartment listings based on comparisons with similar, nearby listings. This can mean indicating that the listed rent is so many percentage points above the average for the neighborhood or highlighting missing information in the listing. Openigloo¹⁵ collects reviews of apartment buildings (you get free access to the paid site if you leave a review of your building) and public records of complaints against the landlord. Public records are available but hard to find if one is unfamiliar with them (as are many online city records), but openigloo makes them accessible and easily associated with a

¹³ A 2022 study found that 50% of renters are rent burdened, paying more than 30% of their income in rent, and more than half of those renters are severely rent burdened, paying more than 50% of their income in rent (Joint Center for Housing Studies 2022).

¹⁴ RentHop was founded in 2009 and received an early investment from Y Combinator (a Silicon Valley tech incubator) (“RentHop” n.d.). It focuses on rental properties in New York City. See more at <https://www.renthop.com/>.

¹⁵ Openigloo is a start-up technology company that was founded in 2020 in New York City (“Openigloo” n.d.). It currently operates in the NYC and Boston metro areas. See more at <https://www.openigloo.com/>.

rental listing. Both companies are based in New York City, an outlier for both the size and share of the rental market (renting is the majority housing modality in New York City) and for New York's legal landscape that provides some of the strongest renter protections in the country. Still, these may indicate a new direction for platforms geared to renters.

Conclusion

This chapter presents the patchwork and unconventional ways that people use online tools other than real estate platforms for their housing search. I call the collective practice *bricolage* because it involves each home-seeker pulling together a bespoke collection of inputs via multiple online tools, sometimes using tools in ways that are beyond their intended purpose. These practices do not replace the role of in-person networks, but in some ways they replicate them. Asking in an online forum for suggestions of neighborhoods is similar to asking in-person social networks. While these forums may be a broader (or more diverse) group of people than a home-seeker's personal networks, it seems that the recommendations are also broader to the point of being quite similar, regardless of who is asking. This study did not test the causal effects of these online searches, but one direction for future research would be a test of the social sorting effect on housing search to see how (if at all) it impacts segregation by race and class.

The role of reviews for rental listings stands out as a key distinction between how renters search and how homeowners search. It will be interesting to see how the range of online tools continues to develop. Will more explicit housing sites incorporate reviews? Will newer websites, like *openigloo*, expand to include more rental markets across the U.S.? Reviews offer a way for renters to expand networks of solidarity beyond their in-person community, building power as a group (and consciousness in Marxian terms) and collectively try to hold landlords and management companies responsible to tenants.

Understanding these online search practices creates a context in which to situate the home-seekers' use of real estate platforms. Often these unconventional searches happen before the home-seeker turns to the real estate platform, providing initial direction to their search. Other times these other online tools provide some context or background information that home-seekers may bring into their interpretations of the information presented on the real estate platforms, as explored in the following chapter.

- Allen-Price, Olivia. 2017. "How Many Are Being Displaced by Gentrification in Oakland?" KQED. February 9, 2017. <https://www.kqed.org/news/11307279/how-many-are-being-displaced-by-gentrification-in-oakland>.
- Benkler, Yochai. 2007. *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven, CT: Yale University Press.
- Bergman, Peter, Eric W. Chan, and Adam Kapor. 2020. "Housing Search Frictions: Evidence from Detailed Search Data and a Field Experiment." Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w27209>.
- Besbris, M., A. Schachter, and J. Kuk. 2018. "The Language of Segregation: Variation in the Description of Rental Housing across Neighborhoods." In *American Sociological Association Annual Meeting, Philadelphia, PA*.
- Black, Sandra E. 1999. "Do Better Schools Matter? Parental Valuation of Elementary Education*." *The Quarterly Journal of Economics* 114 (2): 577–99.
- Boeing, Geoff, Max Besbris, Ariela Schachter, and John Kuk. 2021. "Housing Search in the Age of Big Data: Smarter Cities or the Same Old Blind Spots?" *Housing Policy Debate* 31 (1): 112–26.
- Boeing, Geoff, and Paul Waddell. 2017. "New Insights into Rental Housing Markets across the United States: Web Scraping and Analyzing Craigslist Rental Listings." *Journal of Planning Education and Research* 37 (4): 457–76.
- Carrillo, Laura, Mary Pattillo, Erin Hardy, and Dolores Acevedo-Garcia. 2016. "Housing Decisions Among Low-Income Hispanic Households in Chicago." *Cityscape* 18 (2): 109–50.
- Chayka, Kyle. 2016. "Welcome to AirSpace." The Verge. August 3, 2016. <https://www.theverge.com/2016/8/3/12325104/airbnb-aesthetic-global-minimalism-startup-gentrification>.
- Duymedjian, Raffi, and Charles-Clemens Rüling. 2010. "Towards a Foundation of Bricolage in Organization and Management Theory." *Organization Studies* 31 (2): 133–51.
- Farley, Reynolds, Howard Schuman, Suzanne Bianchi, Diane Colasanto, and Shirley Hatchett. 1978. "'Chocolate City, Vanilla Suburbs:' Will the Trend toward Racially Separate Communities Continue?" *Social Science Research* 7 (4): 319–44.
- Ferryman, Kadija, X. Briggs, S. Popkin, and María G. Rendón. 2008. "Do Better Neighborhoods for MTO Families Mean Better Schools? Brief No. 3." *Urban Institute (NJ1)*, March. <https://doi.org/10.1037/e690762011-001>.
- Fields, D. 2022. "Automated Landlord: Digital Technologies and Post-Crisis Financial Accumulation." *Environment and Planning A: Economy and Space*. <https://journals.sagepub.com/doi/abs/10.1177/0308518X19846514>.
- Galiani, Sebastian, Alvin Murphy, and Juan Pantano. 2015. "Estimating Neighborhood Choice Models: Lessons from a Housing Assistance Experiment." *The American Economic Review* 105 (11): 3385–3415.
- Gupta, Rangan, and Stephen M. Miller. 2012. "'Ripple Effects' and Forecasting Home Prices in Los Angeles, Las Vegas, and Phoenix." *The Annals of Regional Science* 48 (3): 763–82.
- Holcome, Madeline, and Alec Snyder. 2020. "Warrant in Fatal Encounter between Breonna Taylor and Police Was Linked to Gentrification Plan, Family's Lawyers Claim." *CNN*,

- July 7, 2020. <https://www.cnn.com/2020/07/07/us/breonna-taylor-lawsuit-gentrification/index.html>.
- Joint Center for Housing Studies. 2022. "The State of the Nation's Housing." Harvard University. https://www.jchs.harvard.edu/sites/default/files/reports/files/Harvard_JCHS_State_Nations_Housing_2022.pdf.
- Korver-Glenn, E. 2021. "Race Brokers: Housing Markets and Segregation in 21st Century Urban America." https://books.google.ca/books?hl=en&lr=&id=YXQjEAAAQBAJ&oi=fnd&pg=PP1&ots=gpi5C046Q&sig=t2kDvuZ32tJQ9T78xH6Duuy_6qE.
- Krysan, Maria, and Michael D. M. Bader. 2014. "Racial Blind Spots: Black-White-Latino Differences in Community Knowledge." *Social Problems* 56 (4): 677–701.
- La Ganga, Maria L. 2019. "Go Back to California': Wave of Newcomers Fuels Backlash in Boise." *Los Angeles Times*, November 10, 2019. <https://www.latimes.com/california/story/2019-11-10/go-back-to-california-wave-of-newcomers-fuels-backlash-in-boise>.
- Lareau, Annette, and Kimberly Goyette. 2014. *Choosing Homes, Choosing Schools*. Russell Sage Foundation.
- Lindner, Christoph, and Gerard Sandoval. 2021. *Aesthetics of Gentrification: Seductive Spaces and Exclusive Communities in the Neoliberal City*. Amsterdam University Press.
- Lloyd, Annemaree, and Jane Wilkinson. 2016. "Knowing and Learning in Everyday Spaces (KALiEds): Mapping the Information Landscape of Refugee Youth Learning in Everyday Spaces." *Journal of Information Science and Engineering* 42 (3): 300–312.
- Madianou, M., and D. Miller. 2013. "Polymedia: Towards a New Theory of Digital Media in Interpersonal Communication." *The European Legacy, toward New Paradigms: Journal of the International Society for the Study of European Ideas / Sponsored by the European Cultural Foundation*. <https://journals.sagepub.com/doi/abs/10.1177/1367877912452486>.
- O'Day, Vicki L., and Robin Jeffries. 1993. "Orienteering in an Information Landscape: How Information Seekers Get from Here to There." In *Proceedings of the INTERACT '93 and CHI '93 Conference on Human Factors in Computing Systems*, 438–45. CHI '93. New York, NY, USA: Association for Computing Machinery.
- "Openigloo." n.d. Crunchbase. Accessed August 3, 2024. <https://www.crunchbase.com/organization/openigloo>.
- Ramírez, Margaret M. 2020. "City as Borderland: Gentrification and the Policing of Black and Latinx Geographies in Oakland." *Environment and Planning. D, Society & Space* 38 (1): 147–66.
- "RentHop." n.d. Crunchbase. Accessed August 3, 2024. <https://www.crunchbase.com/organization/rethop>.
- Rhodes, Anna, and Stephanie De Luca. 2014. "Residential Mobility and School Choice among Poor Families." In *Choosing Homes, Choosing Schools*, edited by Annette Lareau and Kimberly Goyette, 137–66.

- Rosen, Eva. 2020. *The Voucher Promise: "Section 8" and the Fate of an American Neighborhood*. Princeton University Press.
- Smith, Catherine. 2022. "Automating Intellectual Freedom: Artificial Intelligence, Bias, and the Information Landscape." *IFLA Journal* 48 (3): 422–31.
- Suchman, Lucy A. 1990. *Plans and Situated Actions: The Problem of Human-Machine Communication*. Vol. 103. University of Illinois Press.
- Surfpunk, Yoga. 2014. "Las Vegas, NV #1." Judgmental Maps: Your City. Judged. 2014. <https://judgmentalmaps.com/post/82916342074/lasvegas1>.
- Taylor, Candace. 2021. "Real-Estate Frenzy Overwhelms Small-Town America: 'I Came Home Crying.'" *The Wall Street Journal*, May 20, 2021. <https://www.wsj.com/articles/real-estate-frenzy-overwhelms-small-town-america-i-came-home-crying-11621511972>.
- Tobias, Manuela, and Liam Dillon. 2022. *Gimme Shelter: Why L.A. Apartments Don't Come with Fridges*. CalMatters. Cal Matters. <https://calmatters.org/housing/2022/06/california-housing-fridges/>.
- Tufekci, Zeynep. 2017. *Twitter and Tear Gas: The Power and Fragility of Networked Protest*. Yale University Press.
- Yosso, Tara J. 2005. "Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth." *Race, Ethnicity and Education* 8 (1): 69–91.
- Zukin, Sharon. 2010. *Naked City: The Death and Life of Authentic Urban Places*. Oxford University Press.
- Zukin, Sharon, Scarlett Lindeman, and Laurie Hurson. 2017. "The Omnivore's Neighborhood? Online Restaurant Reviews, Race, and Gentrification." *Journal of Consumer Culture* 17 (3): 459–79.

4 – Simple scores are messy signals

Introduction

This chapter focuses on home-seekers' interpretations of the supplementary information on real estate platforms, specifically information that does not directly describe a property for sale or rent. I focus on numerical scores and shaded maps that rate the schools, walkability, and crime level of the neighborhood. Interviews explored users' theories about the scores' general meaning, how they interpret the scores to explain differences in neighborhoods, and how they used this information (if they did) in their own housing search. Interviewees expressed a wide range of ideas about these scores. Some converged around commonly held beliefs in the U.S., like the connection between standardized test scores and school quality. Others questioned the implied hierarchy of the scoring systems and how they fit their individual needs.

In the U.S., housing inequality is highly racialized. Racial covenants, mortgage redlining maps that labeled non-White neighborhoods “high risk,” and Federal home loan assistance that was not extended to Black and Hispanic households created segregated neighborhoods and patterns of wealth disparity that persist today (Rothstein 2017). The Fair Housing Act (FHA) aims to protect people’s access to housing (buying, renting, getting housing assistance or a mortgage) from discrimination based on “race, color, national origin, religion, sex (including gender identity and sexual orientation), familial status and disability” (“Housing Discrimination under the Fair Housing Act” n.d.). This includes regulating the actions of real estate agents to prevent discrimination or any other actions that could constitute “racial steering,” when an agent “differentially directs clients toward particular neighborhoods and away from others on the basis of race or ethnicity” (Galster and Godfrey 2005). However, real estate platforms are not regulated like real estate agents (Humber 2020). These platforms supply information that agents are explicitly prohibited from discussing (some neighborhood demographics¹) and often implicitly instructed to avoid (crime, schools²).

¹ According to the National Association of Realtors' (a large trade association for real estate agents in the U.S.) Code of Ethics: “When involved in the sale or lease of a residence, REALTORS® shall not volunteer information regarding the racial, religious or ethnic composition of any neighborhood nor shall they engage in any activity which may result in panic selling, however, REALTORS® may provide other demographic information” (“Code of Ethics and Standards of Practice of the National Association of Realtors” 2024).

² Crime and schools are only prohibited topics in as much as they can be coded ways of talking about race. This leaves room for different interpretations. All 6 of the real estate agents I interviewed clearly stated that they would not discuss crime with clients, but there was less consistency on the topic of schools. Some agents indicated that they would direct clients to real estate platforms to consult the scores explicitly as a workaround for this gray area. For more discussion of the practices of real estate agents (unrelated to this project), see (Korver-Glenn 2021).

In interviews, many people picked up on these racialized patterns of inequality when interpreting differences in neighborhood scores. The seemingly race-neutral scores yielded varying interpretations that lead to (or supported) varying and even conflicting understandings of the neighborhoods they represent. When asked to explain these connections, some interviewees blamed the people they assumed to be in those neighborhoods. Another group of interviewees, by contrast, explained the connection between the scores and race as signs of structural racism and purposeful disinvestment. Using the concept of colorblind racism (Bonilla-Silva 2003) to examine both the rationalizations of interviewees and the implied neutrality of the scores themselves, I argue that allowing race to go unaddressed risks the perpetuation of harmful stereotypes and further entrenchment of inequitable patterns of investment in neighborhoods.

Real estate platforms are gradually becoming aware of the underlying assumptions about race that pertain to their data, and have recently taken actions to curtail it, at least in regard to crime data. In December 2021, Zillow and Realtor.com, two of the largest real estate platforms in the U.S., announced that they would remove crime data from their sites. These announcements came days after Redfin CEO Glenn Kelman tweeted out a blog post (Figure 1) about Redfin's decision to never include crime data on their site. The post explained their decision to exclude crime data because "the data available don't allow us to speak accurately to that question [of safety], and given the long history of redlining and racist housing covenants in the United States there's too great a risk of this inaccuracy reinforcing racial bias" (Taubman 2021).



Figure 1 "Crime data can show which neighborhoods have the most crime, but also which are over-policed."
Tweet by Redfin CEO, Glenn Kelman on 12/14/2021.

Prior to this, a technocratic approach that assumed the neutrality and beneficence of information was (and in many cases still is) widespread among platform companies, including real estate platforms (Kitchin, Lauriault, and McArdle 2015; Gillespie 2010). This framing misses the societal level impacts of individual housing decisions that could be radically reshaped by real estate platforms while concealing the complexity of the concepts represented by simple numbers. Instead, this chapter argues that the neighborhood information on real estate platforms is effectively civic data. It describes issues of the public and civic domain (schools, crime and safety, public infrastructure (walkability)); it draws on data from public institutions (the census, schools, police); and it is used to make decisions that have societal impacts. Previous work on civic data projects points to the importance of providing context for data and scaffolding to help non-experts interpret the data and use it to make decisions (Kitchin, Lauriault, and McArdle 2015; Peer and DiSalvo 2022). This chapter presents the implications of such data being presented without context about how the score was calculated or scaffolding by human intermediaries (real estate agents) to guide in the interpretation of the score. I conclude by elaborating on what it means for platforms to recognize their broader civic role and make judicious decisions about sensitive information, including removing it when they cannot adequately represent it on their platforms.

Background: The Scores

This chapter considers three different kinds of secondary neighborhood information, collectively referred to as “scores,” that rate schools, walkability and crime.³ These scores are presented with varying frequency on real estate platforms (see Table 1). Each comes from a different secondary source and is calculated using proprietary methods that are explained to varying degree on the website of the score’s creator. The school and walking scores are presented as round numbers, and the crime score is presented as a shaded map with five levels of shading. This section will briefly explain each score, its source, and how it is computed (to the extent that that is made public). It will also give a brief explanation of the concept rated by the score to explain how these scores fit into a larger landscape of civic metrics and, particularly, how these scores can act like proxies for race and income in the U.S.

Table 1 Distribution of Scores by Real Estate Platforms

	Zillow	Redfin	Realtor.com	Apartments.com	Trulia
Schools	X	X	X	X	X
Walking	X	X	-	X	-
Crime*	-	-	X	-	X

* Crime maps were removed in December 2021.

³ While interviews also covered noise and transit scores, the three scores I focus on in this chapter had the strongest reactions from interviewees.

School Score

The school score rates public schools (grades 1-12) with a rating between 1 and 10 (see Figure 2). These scores are produced by GreatSchools, a non-profit organization that aims to provide “high-quality information that supports parents pursuing a great education for their child, schools striving for excellence, and communities working to diminish inequities in education.”⁴ On their website, GreatSchools provides extensive information about the methodology for computing their school ratings. They also break down a school’s summary score (which is shown on real estate platforms) into four sub-scores: test scores, academic progress, equity and college readiness (“About GreatSchools’ Ratings System and Methodology” n.d.). This methodology is the outcome of a 2020 update to address criticisms of their ratings, and school ratings in general, that pointed to the fact that higher rated schools tend to be Whiter and wealthier than other schools (Hasan and Kumar 2019). Real estate platforms link to the GreatSchools website, where one could learn more about their methodology, in tiny explanatory text below the scores (see Figure 2).

Until late 2017, the GreatSchools scores were entirely based on test scores (Sparks 2017). Standardized test scores still make up a significant part of the GreatSchools score (about 23% according to their current methodology) and are a heavily weighted indicator in state rankings of schools. The problem is, standardized test scores are intertwined with race and income in the U.S. As Koretz (2009) explains,

Differences in educational quality are strongly confounded with the social factors that influence test scores. The quality of educational resources is on average lower in poor and high-minority neighborhoods than in wealthier ones, and it is extremely difficult to disentangle the effects of the educational and social factors (118).

Low-income students face unique hurdles to school performance such as unstable housing conditions and parents or guardians who must work longer hours and so are unavailable to help with homework. By nature of being standardized, test scores also reinforce the cultural perspective of the majority, in language (English), and assumed cultural knowledge (e.g. knowing a yacht is a boat) (Schneider 2017; Yosso 2005). Further complicating the concept of school performance, research has shown that low-performing schools can still be supportive environments. Ewing’s (2018) study of school closures in Chicago investigated why a community fought to save so-called “bad” and “underperforming” schools. She found that these schools were sites of community, family history, sources of love and support. Nonetheless test scores and ratings dominate the education policy and public discourse (Schneider 2017; Koretz 2009).

⁴ For more information about GreatSchools’ mission and approach, see: (GreatSchools 2023).

Schools

This home is within the [Oakland Unified School District](#).

Oakland's enrollment policy is not based solely on geography. Please check the school district website to see all schools serving this home.

GreatSchools Rating

5/10	Redwood Heights Elementary Sch... Public • K to 5 • Choice school	372 Students	★★★★★ 9 reviews	0.7 mi Distance
3/10	Laurel Elementary School Public • K to 5 • Serves this home • Choice school	475 Students	★★★★★ 21 reviews	0.5 mi Distance
2/10	Bret Harte Middle School Public • 6 to 9 • Serves this home • Choice school	556 Students	★★★★★ 21 reviews	0.5 mi Distance
4/10	Montera Middle School Public • 6 to 8 • Choice school	727 Students	★★★★★ 44 reviews	1.3 mi Distance
4/10	Skyline High School Public • 9 to 12 • Serves this home • Choice school	1592 Students	★★★★★ 15 reviews	1.9 mi Distance
NR	Community Day School Public • 9 to 12 • Choice school	25 Students	N/A	1.4 mi Distance

School data provided by [GreatSchools](#). School service boundaries are intended to be used as reference only. To verify enrollment eligibility for a property, contact the school directly.

Figure 2 A screenshot of some school scores in Oakland from the Redfin website

“Good” schools are also strongly tied to property values in the U.S. Whether or not one has children, it is a common belief that being close to a “good” school ensures that a property’s value will maintain or increase over time. Empirical research in real estate economics verifies this relationship (Black 1999; Figlio and Lucas 2004). Black (1999) demonstrated that families were willing to pay 2.5% more for a house with a 5% better test scores. Because property taxes also contribute to the public school budgets the correlation between school performance and property value can seem like a closed loop. However, some states and cities, including California and Oakland, have equity initiatives that redirect more funds to schools and school districts that serve low-income and “high needs” students (McBride 2022). The relationship between property values (and taxes) and school budgets is not always so linear. The composite effect of these interacting relationships is that it is nearly impossible to disaggregate school performance ratings from the economic and racial context of schools.

Walk Score

Walk Score, a mission driven start-up that aims to encourage “walkable neighborhoods” for the benefit of “our environment, our health and our economy” rates the walkability of

neighborhoods with a number 0 to 100 (see Figure 3).⁵ Walk Score was acquired by Redfin in 2014 but it maintains an independent website. According to their published methodology, the walkability score measures distance to amenities and adds information about the surrounding infrastructure “by analyzing population density and road metrics such as block length and intersection density” (“Walk Score Methodology” n.d.). Walk Score claims the highest rating range (90-100) indicates that “daily errands do not require a car,” demonstrating a focus on commercial accessibility rather than other purposes like walking for pleasure or exercise. Previous research about users’ interpretation of the walkability score surfaced tension between the subjective qualities that make a space feel walkable (sense of community, safety) but are not included in the score, and the quantifiable aspects of urban design the score is able to capture (Diaz and Diakopoulos 2019).

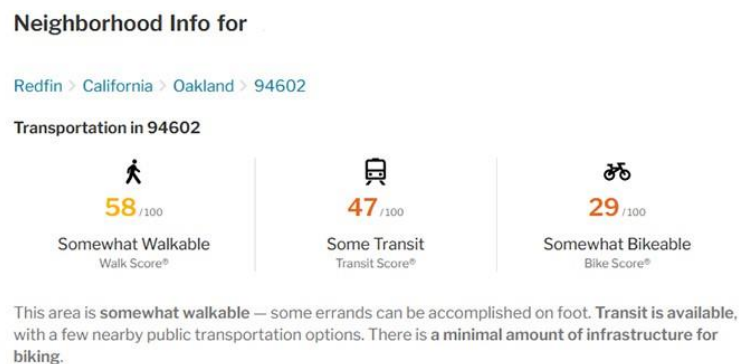


Figure 3 A screenshot of walking, transit, and biking scores in Oakland from the Redfin website

A study of the distribution of the walk scores in U.S. cities found a divergent pattern: high-income, majority White neighborhoods tended to have low walk scores, but low-income, majority Black neighborhoods had the lowest walk scores (Conderino et al. 2021). However, the environmental elements that contribute to improved walkability – fewer pedestrian deaths (Sanders and Schneider 2022), more mature street trees (Burghardt et al. 2023), lower “urban heat island intensity” (Hsu et al. 2021), less air pollution (Thind et al. 2019) – do correlate with wealthier, Whiter areas in the U.S. Collectively, these patterns illustrate environmental racism, extensions of racist housing and planning policies, like red-lining and urban renewal, that pushed non-White communities into less desirable areas, and then continued to invest less in those communities (Rothstein 2017; Pulido 1996).

Crime Score

The crime map on Realtor.com used five levels of shading in red to display crime rates (see Figure 4).⁶ It did not indicate the time frame represented by the data, or the categories of crime displayed. The underlying data came from Location Inc., a geographic big data

⁵ For more information about Walk Score see: <https://walkscore.com>

⁶ Trulia had a similar map shaded in blue.

company.⁷ Zillow's Trulia sourced crime data for its crime map from similar crime data aggregators. Notably, these data sources give the most minimal explanation of their methods compared to the sources for the other scores. Location Inc. merely describes their data as “reported crimes;” Trulia described their data aggregators working with “hundreds of police agencies, crime feeds and news outlets” (“Where Does Trulia Get Crime Information?” 2020). Although these crime maps were removed from Realtor.com and Trulia in December 2021, mapped crime data is still accessible on websites like CrimeMapping.com and Spot Crime.

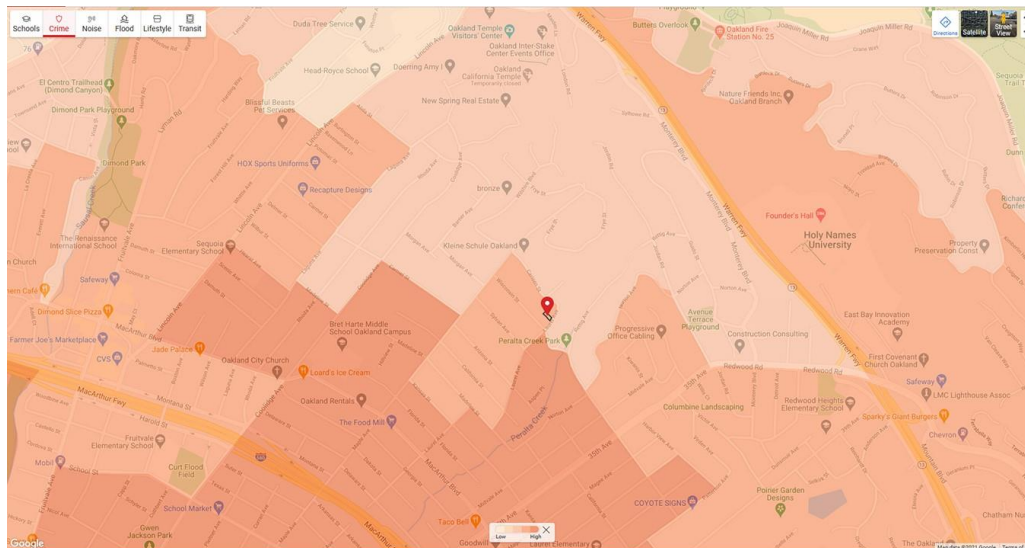


Figure 4 A screenshot of Oakland crime map from Realtor.com website

The accuracy of crime maps depends on how crime is defined. The crime data displayed on crime aggregating sites tends to focus on violent crime and property damage. This is not a complete picture of all illegal or harmful activity. Some kinds of crimes are systematically underreported, like domestic violence, rape, and sexual assault (Kelly and Stermac 2008). Vulnerable populations may also be less likely to report a crime committed against them to the police. For example, in their study of trans women in the Bay Area, Gyamerah et al. (2021) find that “over half of the participants (51.1%) who experienced a transphobic hate crime did not report the crime incident to the police” (4). Meanwhile, certain neighborhoods and groups of people receive more attention by police (over-policing), in particular people of color, causing them to be overrepresented in crime data and in prisons (Joh 2017; Alexander 2010). As Ruha Benjamin (Benjamin 2019) explains, “‘Criminal’ in this era, is code for Black, but also for poor, immigrant, second-class, disposable, unwanted, detritus” (9). Finally, police violence and harassment, while serious sources of harm, are not usually recorded as crimes, particularly in data collected by the

⁷ Location Inc. was acquired by CoreLogic, the leading real estate data compiler, in January 2022, the month after Realtor.com and Zillow (Trulia) removed crime maps from their platforms.

police (Mapping Police Violence n.d.). The sum of these over- and under-emphases produces a representation of “crime” that is biased in its representation of marginalized communities and neighborhoods.

The three neighborhood scores come from secondary sources with differing levels of transparency about their methods and how they define the concepts they rate. The social concepts they try to simplify intersect with other issues, particularly histories of marginalization and unequal treatment of people who are low-income and/or Black, Latinx or Indigenous. The result is scores that unevenly map onto the experiences of low-income people and communities of color and obscure the social, economic, and political processes that led to spatialized inequality they represent.

Related Work

Studies of Scoring, Rating, and Reviewing Systems

Human computer interaction (HCI) research has studied similar online platforms that provide scores, ratings or reviews that users can view and contribute to. Li and Hecht (2021) quantitatively analyzed differences in restaurant ratings between Yelp and Google Maps for seven metropolitan areas in the U.S., demonstrating a significant difference between the two platforms and offering a potential explanation (Google’s favoring of chain restaurants). They argued that this disputes the “universal assessment assumption” that assessments average out across platforms; instead, the user’s choice of platform could affect the restaurant they eventually choose. Stors and Baltes (2018) demonstrated the discursive effect of neighborhood descriptions on AirBnB in Berlin. They showed how quotidian neighborhood features were recast as tourist attractions by hosts, effectively co-constructing a new perspective of the social urban environment. This chapter will focus on numerical scores, like Li and Hecht’s study (2021), but analytically it follows more closely to Stors and Baltes’ (2018) approach in thinking about how a platform’s representation of place can have real-world impacts.

Sometimes scores and reviews present subjective assessments of places. There is a tension in user-generated scoring between the subjectivity of a singular user/reviewer and the supposedly objective or generalized summary score. Instead of focusing on the impact of the scores on average, this chapter looks at the differences in individual interpretations and the significant impact these different interpretations can have. In particular, I raise concerns about societal biases that can be encouraged if a majority interpretation is taken to be the objective truth (Yosso 2005). In that sense, it is a critique of work that takes subjective assessments of place and presents them as objective simply because they fit the common or majority experience (Redi et al. 2018). In this sense it builds on work from STS and critical geography that is attentive to the discursive power of spatial representation. For example, Zukin et al. (2017) look at the relationship between Yelp reviews and gentrification, finding that businesses in majority Black gentrifying

neighborhoods receive more negative reviews than majority White gentrifying neighborhoods.

Interpretivist HCI and User Interpretations

In the classic study of human computer interaction, the user's (mis)interpretation of a technology is a central challenge for designers and engineers to solve, steering them to the "single authoritative interpretation" that will result in the correct use of the technology (Sengers and Gaver 2006). However, in the past two decades a growing branch of HCI scholars sought out "a more nuanced view of interpretation in which multiple, perhaps competing interpretations can co-exist" (Sengers and Gaver 2006, 99). These scholars are recognizable by their interpretivist research methods (Bardzell and Bardzell 2015), including user-centered research that considers users' multiple (Eslami et al. 2016), contradictory (Burrell et al. 2019), and even inaccurate (Eslami et al. 2015) understandings of technology, and ethnographically informed observations (Seaver 2017; Dourish 2006; Dye et al. 2019).

Interpretivist HCI recognizes user behavior that contradicts the intended design of a product or the intentions of the company as nonetheless having social utility. For example, in their investigation of tweets about the "Twitter algorithm," Burrell et al. (2019) found that some users tried to control the algorithm "through careful word selection, hashtag use, word omission or other coded language" (10). Sometimes these manipulations were in line with the algorithm's purported aims to show the content a user is interested in. However, other kinds of control responded to perceived failures or misalignment between Twitter's goals for the algorithm and the users', such as when users instructed others to avoid certain words in their tweets so as not risk account suspension. Similarly, it is important to understand the misunderstandings and misconceptions that nonetheless inform user behavior. Eslami et al. discovered that some Facebook users were not aware that their News Feed was curated by an algorithm and instead attributed what they saw to the actions of their friends (Eslami et al. 2015). Later work uncovered several common folk theories that informed user interactions with the News Feed (Eslami et al. 2016).

Ethnographic observations allow for an understanding of technology use situated in particular social, political, and geographic contexts. Seaver's study of "US-based developers of algorithmic music recommender systems" showed how the concept of "the algorithm" is changeable and unstable, even among experts (Seaver 2017). Dye et al. (2019) present the social relationships that are built into the physical maintenance work of maintaining a community network in Havana, Cuba. In these cases, the context of the users informs their behavior and the researcher's interpretations.

Mental Models

The study of users' mental models or folk theories focuses on how users operationalize their interpretations of technical systems from calculators (Norman 1987) to the Facebook

News Feed algorithm (Eslami et al. 2016). Norman defined mental models as being observable, having predictive power, and reflecting the user's belief system (Norman 1987). Thus, it is possible for a researcher to build an understanding of how a user explains a system and acts in accordance with their prediction of an outcome. For example, Kempton (1986) presented two different mental models of heating systems that affect how users adjust the thermostat. Norman (1987) warned that in studying users' mental models the researcher is influenced by their own mental model. In this study, I used a model of the scores in which input information is used to calculate a score. Looking at the score together, I asked the user about their thoughts on the inputs ("what goes into the score?"). My mental model affected how I investigated the users' interpretations. Instead of trying to narrow users' responses into a few (or a single authoritative) mental models, this paper presents the breadth of responses to show the variation in users' interpretations of seemingly simple indicators.

Civic Data and Platform Urbanism

Using statistics, open data, and scores or indicators to assess cities and neighborhoods is often framed as civic data work. Civic data work is done by policymakers and elected officials, sometimes using dashboards (Kitchin, Lauriault, and McArdle 2015) or publicized indicators, like the Sustainable Development Goals ("The 17 Goals" n.d.). It can also involve everyday citizens, usually in a participatory process centered on a particular goal (e.g. bicycle safety (Le Dantec et al. 2016)) or area (e.g. neighborhood planning (Johnson et al. 2018)). Past research demonstrates that providing non-experts (either citizens or policymakers) with data is not enough; these users need context for the data and scaffolding, often in the form of experts who facilitate the process (Johnson et al. 2018; Asad et al. 2017; Balestrini et al. 2017). The users are not blank slates but bring their own experiences into the decision-making process as well. "We emphasize the importance of neighbourhood data as more than the data captured about the community and held by authorities; it also includes the data produced by the community," explained Johnson et al. (2018; 14). Furthermore, the process of producing data is just as important and political as the final outcome of a civic data project (Asad et al. 2017; Le Dantec et al. 2016).

Private technology companies, like the real estate platforms, do not typically frame their impact in terms of civics or politics. In fact, they go out of their way to seem like neutral actors (Gillespie 2010). Nonetheless, platforms are involved in cities and space at many levels. The concept of "platform urbanism" encompasses the market-scale effects of platforms (Sadowski 2020), platforms as political actors (van Doorn 2020), and the ways in which platforms continue socio-spatial histories of control (corporate landlords (Fields 2022), evictions (McElroy 2023)). While HCI research brings a clear focus on users and how they interact with sociotechnical systems, platform studies brings the implications of user-focused research to bear at the scale of the city or the housing market.

"Radical Simplification" and the "Aura of Objectivity"

Civic data and platform urbanism share a critical core that contests the idea that a platform or a dataset can be neutral. Peer and DiSalvo warn that the “aura of objectivity” can make it tempting to see the city through a collection of quantitative indicators (Peer and DiSalvo 2022). The data dashboard brings together several metrics, much like the real estate platform presents scores, photos, and a map alongside a listing. They explain, “By encouraging intuitive use and pleasurable experience, the dashboard highlights the objectivity of data, while underemphasizing their messiness, biases, and shortcomings” (Peer and DiSalvo 2022; 3). The same could be said for the scores on real estate platforms.

The sociological study of quantification also problematizes metrics’ seeming objectivity. Espeland and Sauder (2007) focused on the process of commensuration, or making complex, different things comparable through a common metric (e.g., pricing houses, ranking law school). They explained: “The radical simplification of commensuration produces decontextualized, depersonalized numbers that are highly portable and easily made public” (Espeland and Sauder 2007; 18). Simplification obscures the messy details that are collapsed into a single metric. For example, consider the factors commonly associated with a house price - location, size, style, quality of the building, the price of similar houses in the area - these are all collapsed into a single number, the price, so they can be easily compared with other houses.

The so-called portability of metrics explains how a measurement of a specific feature over time comes to stand for a much broader concept. For example, standardized tests are a measurement of students’ math and reading abilities that through policy and public discussion come to represent school performance in a broader sense (Koretz 2008). As the metric stands for the larger concept, people and institutions start to change their behavior to shift the metric as though they are in fact affecting the broader concept (e.g. teaching to the test) (Espeland and Sauder 2007). Kitchen et al. (2015) raised similar concerns with urban data/indicators, explaining that they “do not merely reflect cities, but actively frame and produce them” (7).

This chapter investigates the implications of user interpretations of decontextualized civic metrics. To do this, it brings together the concerns of civic data projects and the perspective of platform studies with the methods and focus of user research.

Findings

The findings are broken into two main sections. The first section focuses on users' understandings of what the scores mean and how they used them to make their own housing decisions. There is a lot of overlap in users' ideas about the main input information for the scores. Yet, some described a gap between their specific needs and their

understanding of a score's generalized definition. This led them to purposefully not seek out neighborhoods with the 'best' scores.

The second section focuses on the interviewees expanding beyond their own specific use of the scores to draw broader conclusions about the neighborhoods and communities represented by the scores. Notably, interviewees picked up on race and income as the subtext of the neighborhood scores. However, their reasons for this connection fall into two distinct patterns of thinking: those who focused on the "kinds of people" in neighborhoods with less desirable scores (blaming people), and those who saw disparities as signs of structural inequality (blaming systems).

Making Sense of Scores

When asked about the kinds of information that might be used to compute scores, interview subjects suggested a wide range of possible inputs. Most expressed uncertainty or caveated their responses with phrases like "I have no idea, but..." or "I would guess," and yet their responses showed that they did have some ideas. Responses converged around some frequently mentioned inputs, like shopping locations for walkability and standardized test scores for schools. The following quotes from three different interviews are indicative of both the overlap and diversity in interviewees' theories about school scores:

I would guess that it's relying a little bit on test scores and, you know, maybe something else. Maybe there's some sort of crowdsourced rating, but I would guess it's test scores based. (Oakland-4)

They're probably using testing scores, they're probably using who receives—what's it called? Free lunch. So, like, the free lunch scores, test scores. Yeah, that's what I think they're probably using. (Vegas-2)

Testing probably. Maybe they use reviews. It's not like they have access to PTA transcripts [laughs], which would be creepy... They probably gather as much information as they can, and then they have their own like agencies of how they score it. Possibly like school violence, you know? How many fights or suspensions they have. (Vegas-6)

Like these three examples, nearly every interviewee brought up standardized testing when discussing school scores. The second quote also references the federal program that supplies free and reduced lunch for students from poor families, effectively a measurement of student poverty.⁸ Other ideas about the school score inputs included quantitative metrics, like graduation rates, student-to-teacher ratios, and college acceptance rates; descriptive elements, like the range of extracurricular activities and sports teams; and qualitative assessments from teachers, students, parents and

⁸ Since this program is tied to household incomes – at or below 130% of the federal poverty line receives free lunch, 130 - 185% of the federal poverty line received reduced-price – this acts as a proxy for poverty rate.

community members. For walkability, the concept evoked similarly varied responses, including physical elements (sidewalks, streetlights, street trees, crosswalks) and experiential elements (pleasantness, safety, slower/less traffic).

The crime score elicited the narrowest range of suggestions, with most interviewees not suggesting inputs beyond police reports. However, many interviewees questioned what kinds of crime counted in the crime score, explaining that non-violent crimes were less distressing than violent crimes.

General Definitions vs. Specific Needs

While users' interpretations might converged on a general meaning of the scores, they understood their individual needs in *specific* terms that can diverged from (their view of) the general user. For example, when discussing walkability several subjects explained that their walking needs were too specific to fully rely on Walk Score's assessment of walkability. A young woman who did not have a car when she first moved to Las Vegas explained, "A lot of this neighborhood... is walkable. They do have stores and things nearby, so it's very convenient to get out somewhere. But if you're elderly, that's hard" (Vegas-15). She did not dispute the area's higher walkability score, but found it inapplicable for older people.

Another Las Vegas interviewee, a parent of young children, felt that the walk score was not for her because her walking needs diverged from (her understanding of) the Las Vegas-specific standard of walkability: downtown and the Strip. She explained:

SUB: It's like, how close am I to a park versus can I walk to the store? I'm not walking to a grocery store, but I do want to be able to walk to a park, you know?

INT: Mhm. And you felt like the walk score was more about walking to the grocery store?

SUB: I feel like it's more about walking to event venues or walking—because you know like if you're in Downtown, it has like the better walk score because you're next to all these event venues. But I'm not necessarily going to all these events. I just wanted to be able to walk to a school or walk to the park or walk to the library possibly. (Vegas-12)

Her understanding of the walking score was grounded in the local context of Las Vegas, a mostly car-centric city with the exception of the dense downtown area and the entertainment-focused Strip which is filled with pedestrians, day and night. In each of these cases, the interviewee did not dispute the walk score's assessment; instead, they were sure that their specific needs did not fit the generalized or typical imagined user.

The gaps that these users identified between their generalized understanding of the walk score and their specific needs point to the instability of the concept of walkability. As a result, these users might have disregarded the walk score or looked for more information

to confirm their particular needs could be met. One interviewee in Oakland explained that she ignores the walk score because "for me I don't—the walkability to amenities is not important for me as much as like the walkability of like walking around the block in a place" (Oakland 20). She detailed her requirements for "walking around the block" walkability:

Like away from busy streets, so not having to cross busy streets. Wider sidewalks. Just places where it's easy to kind of see—to have the kids somewhat in front of you, but be able to see them. I would say like, flatter ground instead of huge hills... just thinking of them being on bikes or skates or something. And—yeah, like general safety. (Oakland-20)

These qualities were not necessarily in conflict with the amenity-focused walkability that was presumed to be the target of the score, but her uncertainty made the score an ambiguous signal.

Deciding Against the Scores

The ordinality of the scores implies a hierarchy that some users resisted. For example, two interviewees brought up the issue of racial diversity as a something that they valued but felt was not prioritized to the same extent in the school score.^{\footnote{In fact, GreatSchools includes a measurement of diversity as one of the four sub-scores to make up the summary score shown on real estate platforms. However, only two interviewees indicated that they looked into the GreatSchools methodology.}} Therefore, they preferred schools with lower scores, seeing this as confirmation that they would have more diversity. One such subject, a White woman, explained choosing to send her children to a school with a 5/10 score. She rationalized that the lower score might be related to having many students who are English language learners: "We actually see that as a benefit... [our kids] are getting diversity... I don't think their actual education is going to be impacted" (Oakland-24). She did not identify her kids as part of the diversity, rather they are being exposed to it, but the exposure was a benefit.

Another interviewee, also a parent, explained his rationale for not choosing schools (or neighborhoods) with the highest school scores, "I'd be turned off. Because that doesn't meet my diversity score... I know what's pushing up the school scores there. And that's also not the kind of school I'm looking for, or the locality I'm looking for, really" (Oakland-10). For him, racial diversity was a driving factor in his move to Oakland, and a high school score is a sign of a mostly White school ("I know what's pushing up the schools scores there"). He explained, "I am Brown, my wife is Armenian American. I think one of the biggest factors for us was seeing how much more diverse Oakland is even compared to [San Francisco]" (Oakland-10). So, his whole housing decision was influenced by the signal he is interpreting from school score and other signs of racial diversity or the lack thereof.

A third interviewee made similar comments regarding the crime scores in Las Vegas. They are trans and Chinese and indicate that their housing choices were directly affected

by their identity and how it impacts their safety. Reflecting on the collection of scores, they explained, “I know the White neighborhoods are better,” but they chose to live in Downtown Vegas which is mixed income and racially diverse: “So you see, it’s sacrificing a little bit of the safety because I’m just used to seeing that [diversity]” (Vegas-7). Later in the interview they returned to the issue of safety from the perspective of the LGBTQ+ community, explaining again the conflicting definitions of safety: safety in community and safety in the absence of crime and presence of police. “I live near the GLBTQ area. But you know that in GLBTQ areas, those are also marginalized areas... And in marginalized communities the police are awful. In the nice White communities, the police are very nice.” They were very clear about the fact that they are choosing the “higher crime” area for their own safety. They did not dispute the crime score by trying to claim that their neighborhood of choice is safe, instead they noted that that definition applies differently to marginalized people.

Comparing Scores Across Neighborhoods

When asked what they could infer about a neighborhood based on low or high scores, many interviewees drew conclusions about the income level and racial makeup of the community. These attributes came up most often when interview subjects discussed the school scores and crime maps, but walking scores occasionally brought them to similar conclusions. In general, the negative directionality of scores (e.g. low school score or higher rate of crime) would be taken as an indicator of lower incomes and greater presence of non-White residents. While incomes can be associated with the property values established by listing prices on the real estate platform, the visual prompts used in the interviews did not include property information, including prices. Furthermore, it must be emphasized that nowhere on any of the real estate platform listings (or in the visual prompts) is there any mention of race or racial makeup of a neighborhood, city, etc.

Although most interview subjects connected the scores to race and income, they did not all explain these connections in the same way. One group of subjects located the cause of less favorable scores in the people of a neighborhood. I labeled this group of interviewees those that **blame people** for the scores. By contrast, another group of interview subjects explained their conclusions about race and income with theories of structural inequality. In other words, they **blamed systems** for undesirable scores. In explaining their interpretations, these subjects referenced the history of racial segregation and discrimination in the U.S. and sometimes even their own experiences with discrimination.

Blaming people

The interviewees that blamed people for the lower scores did not talk about race directly. Instead, they made oblique comments, or expressed concern that their statements would “sound racist” without explicitly saying what about it was racist. For example, a woman who defined her race as “human (Greek/French/Irish ethnicity)” in Las Vegas explained the connection between income and school scores matter-of-factly:

[the school score] also gives you an idea about the neighborhood, like is it [a] low-income neighborhood because – I know this sounds racist kind of and mean but – predominantly White schools test higher because they're usually in middle class, upper class families. They just have more money to invest in their kids' education... Like when you have a family that is working three jobs to make ends meet and their kids are latchkey kids, they're just not necessarily going to do as well as a kid whose parent has one parent at home and they're in like five different sports and tutoring... It's not me being racist, it's just the facts of life. (Vegas-12)

Despite the concern that she might "sound racist," she only explicitly talked about White schools. Yet, there is an implication in the statement that White schools are made up of "usually in middle-class, upper-class families," that the other, lower income families are not White. This economic and racial disparity was accepted as "just the facts of life."

Some interview subjects in this group focused on "the kinds of people" they expected to find in a neighborhood with less desirable scores. As an interview participant who identified himself as a White man explained, "high crime follows low income and there are certain ethnic groups that are more prone to violence, and whether that's cultural or social, who knows..." (Vegas-14). He did not identify which ethnic groups he had in mind, but given that he is White, we can assume he was talking about non-White people. Similarly, some interviewees used distancing language to describe the people they blamed for undesirable scores. Consider this statement by a Caucasian interviewee in Las Vegas:

the thing that makes schools good is just that people care about their kids... [the low school score] just tells me that this is a bad neighborhood. If the schools are bad, it means that parents don't care about their kids. Like, even a dog cares about their kids. (Vegas-13)

She did not explicitly identify any racial group, but her language is particularly dehumanizing when she implies that some people are less than animals ("even a dog..."). In the context of housing and schools, this kind of language is implicitly racialized.

Blaming systems

The other group of interviewees read the scores as indicators of racial inequality, but their explanations focused on purposeful disinvestment and histories of exclusion and discrimination. A White interviewee in Oakland reacted to the crime maps:

I've lived in areas of other cities that have been considered really high crime, that it's... just reinforcing people's preconceived notions of things. And will end up keeping property values low and then leading to just a recurring cycle. Like, it's just reinforcing housing segregation and stuff. (Oakland-8)

She did not dispute the crime map's accuracy, but instead situated it in the context of "housing segregation" and "a recurring cycle" of low property values and low assessments

of the neighborhood. A White interviewee in Las Vegas took a step further, pointing to low walking scores as a sign of *intentionally* poor planning. She explained:

Excuse my extreme radicalness but in lower income areas I feel like it's always more difficult for the people who live there... Part of me thinks it's got to be on purpose... I feel like the way they build things up, it's more accessible in better areas where the income is higher. And I know that has to do with taxes and everything. Versus like [in] lower [income] areas it's hard, it's just less accessible. (Vegas-16)

In the interview she went on to reference her time as a public school teacher, mentioning an example of school zoning in which a Las Vegas principal intentionally excluded a low-income neighborhood from the school's catchment area. She gave this specific evidence to further justify her suspicions. In her view, all these infrastructural slights were rooted in the same purposeful lack of care for low-income communities. Another interviewee, a Black woman also from Las Vegas, made a similar point:

In better served neighborhoods, there's landscape, there's streetlights, there's just— more money put in that area. So, when there's a school that doesn't have such a high score, it makes me think that it's an under-served area and that they're not putting in any money in their school. They're not putting any money in the area that is surrounding that, stuff like that. So, that's what I mean by under-served. Just not putting money in the community. (Vegas-2)

She also described the purposeful allocation of resources *away from* some communities. She was responding to the school score primarily, but also raised elements that came up in discussions of the walk score, like landscaping and streetlights, showing how her idea of "under-served areas" connects across the scores.

The interview subjects who read the scores as evidence of structural inequality often brought up other information to support their explanation. A Hispanic woman in Las Vegas showed a similar line of thinking when explaining the lower school scores in North Las Vegas. She was especially familiar with these schools having grown up in the city. She explained:

I know these high schools... North Las Vegas just has like a bad reputation because it's where all like minorities, like African Americans are usually at... some parts of North Las Vegas are not taken as well care of from the city as some others... The city doesn't put money into it. So, these schools don't have the budget to give a better education, to have more electives, any of that. They just kind of keep putting money into the nicer places. (Vegas-8)

She qualified her assessment of the scores with her more contextualized knowledge of the schools and the system of funding schools in Las Vegas. Her narrative of disinvestment

supports the fact that these neighborhoods would have lower rated schools and infrastructure.

Some subjects mentioned doing research about a neighborhood using tools like Google and Wikipedia to learn more about a neighborhood's history. One subject, a White woman, who mentioned consulting historic redlining maps of Oakland (see Figure 5) and Wikipedia entries for potential neighborhoods, returned to these sources as the end of the interview when I asked about any additional information she would want included on the real estate platforms.⁹ She reflected out loud:

I guess it could add one interesting data point to the mix if you saw redlining maps or something like that, for someone who wanted to proactively try to right past wrongs. But that's so fraught anyways... I would probably look at that type of information out of interest and awareness, just to learn more about the history of an area... But I feel like as a buyer you have—unless you have two million dollars – you have such limited options. I don't know that... it would change much about my decision making. But it might change how I get to carry myself as a neighbor. (Oakland-13)

She recognized that this new information can illuminate the historical and structural roots of housing inequality, but also that that may not be enough to change a user's decision, given the restrictions they face in the housing market.

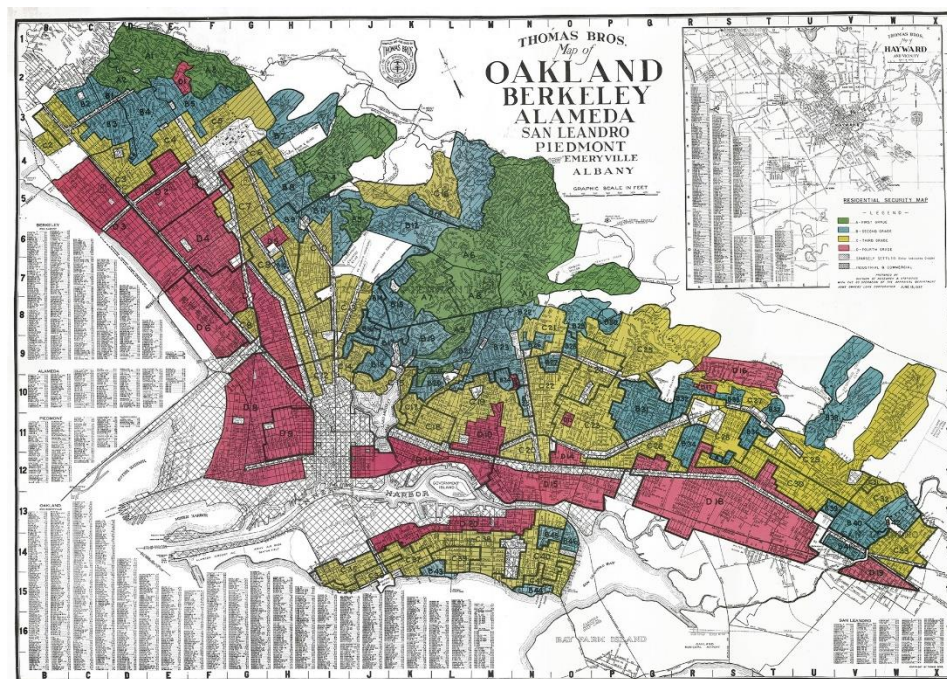


Figure 5 A map of Oakland from the Home Owners Loan Corporation in 1937 shows the redlining of neighborhoods, including West Oakland (D8) Source: Mapping Inequality Project (Nelson & Ayers, n.d.)

⁹ This was my typical closing question for everyone.

Discussion

This chapter presented users' interpretations of the walking, school, and crime scores included on real estate platforms in the U.S. While their general understandings of the scores shared common assumptions, like the inclusion of test scores in the school scores, many raised specific gaps between their individual needs and the standardized meaning of a score. In some cases, these gaps identified subjective elements that did not fit into the objective premise of a score. This finding is consistent with previous research about the walk score (Diaz and Diakopoulos 2019).

Most of the scoring literature uncritically assumes that everyone will try to optimize their choices with scores, whether choosing restaurants (Li and Hecht 2021), schools (Bergman, Chan, and Kapor 2020), or neighborhoods (Redi et al. 2018). However, some of the users in this study explicitly contradict that behavior. They resist the directionality of scores, preferring schools and neighborhoods that do not have the best scores for school performance or safety. Some, but not all, of these users are part of minoritized groups. They point to their identity when explaining their differing applications of the scores, acknowledging that their needs are not necessarily prioritized in a general score. The undervaluing of communities, cultures, and practices that belong to minoritized groups is part of the process that keeps these groups marginalized (Yosso 2005).

This finding is relevant for policymakers who deploy scores like these as policy interventions. Such an intervention assumes that everyone will respond to the score in the same way. One such study uses the GreatSchools school scores to nudge low-income families using housing vouchers to move to neighborhoods schools with higher scores (Bergman, Chan, and Kapor 2020). The study, and the ensuing policy decision to roll out the scores across the full website for housing vouchers, did not consider that parents could have alternative responses to the scores, such as those mentioned in the interviews in this study.

Colorblind Racism

The explanations of the group of interviewees who "blamed people" for differences in scores are a clear example of what Bonilla-Silva (2006) defines as an "ideology of color blind racism." This ideology allows people to acknowledge evidence of racialized inequality but deny the existence of racism by rationalizing racial disparity as naturally occurring or inevitable. This shifts a discussion of racialized inequality to simply one of inequality (hence "colorblind") couched in liberal concepts of individual choice and freedom (Ogbonnaya-Ogburu et al. 2020). This is evident in how the interviewees who blamed people avoided talking about race. They referred to "certain ethnic groups" without saying which, or used dehumanizing language ("only a dog") that did not explicitly name race. One person even evaded the question of their own race, identifying as "human."

One method of colorblind racism is "naturalization," when someone "explain[s] away racial phenomena by suggesting that they are natural occurrences" (Bonilla-Silva 2003, 69). Bonilla-Silva (2003) explains key signs: "the word 'natural' or the phrase 'that's the way it is' is often interjected to normalize events or actions that could otherwise be interpreted as racist" (70). When an interviewee ended a long explanation of racial differences in school scores with "It's not me being racist, it's just the facts of life" (Vegas-12), it was classic naturalization. It allowed her to acknowledge differences without engaging with the cause of those differences and or suggesting they should be righted.

Another feature of colorblind racism is the "biologization of culture" which uses a biological understanding of race to assert that racist stereotypes are true. When crime maps are read as indicators of the racial makeup of a neighborhood, it often elides a biologization of crime, or the idea that some groups of people are biologically predisposed to be violent. Sometimes, the connection is made more explicit, such as when an interviewee stated that "certain ethnic groups that are more prone to violence" (Vegas-14). The insinuation that Black, Latinx, and Indigenous people are more dangerous or criminal is a feature of white supremacy used to justify high incarceration rates and profiling and harassment by police (Alexander 2010).

The ideology of colorblind racism maintains racial hierarchy by denying that racism exists and blaming any observable inequality on inherent qualities (biologization) or as a natural occurrence (naturalization). In discussing the scores this line of thinking locates the cause (or blame) for the lower scores in the people of a neighborhood, not in the infrastructure, the politics of funding decisions, or histories of segregation and racialized inequality. When the scores so directly evoke racial disparity, they enable users to talk about race without using explicitly racial terms. This oblique language can offer a cover of deniability to the platform and to the users.

Recognizing Systemic Racism

The interviewees who "blame systems" show that another interpretation of the scores is possible. They brought contextual knowledge about historical and ongoing structural racism in housing, school funding, policing, and even basic infrastructure for walking to help make sense of the scores. This context enabled them to see the scores as symptoms of a larger problem: systemic racism and inequality.

How were these interviewees able to contextualize the scores? Comparing the two groups the "blaming systems" group is much more diverse in terms of race (the "blaming people" interviewees are all White) and encompasses a wider range of housing price window (a proxy for income), highest educational degree, and age. However, both groups include renters and owners, parents and non-parents, and people who have worked in education. Some people referenced their personal lived experience when explaining their understanding of the scores. Some referenced their professional expertise, particularly those who have worked in education (at least one in each group). This is all to say that our

identity and experiences certainly influence how we interpret these scores, but they are not prescriptive in terms of guaranteeing one interpretation or another.

A distinguishing feature of the "blaming systems" group is the reference to specific events in history and their lives that substantiate their systemic understanding of inequality. This includes the interviewees who referenced red-lining maps, a historical representation of segregating policies, and the interviewee who told a story about a principle trying to change the school catchment area to exclude low-income students. By contrast the arguments presented by the interviewees who "blame people" used abstract or universalizing statements. This emerging trend raises an avenue for future interventions and study: could contextualizing information guide users away from harmful interpretations that "blame people" to a more systemic understanding of societal inequality?

Recontextualizing Simple Scores as Civic Data

Real estate platforms present the neighborhood scores alongside real estate listings with no explanatory context, as though the scores speak for themselves. This is typical of a platform playing the neutral actor (Gillespie 2010), simply a conveyor of information. However, in light of the findings presented above, I argue that these scores and the real estate platforms presenting them should be evaluated as **civic data**, with both civic objectives and implications. The scores describe issues of the public and civic domain (schools, crime and safety, public infrastructure); they draw on data from public institutions (the census, schools, police); and they are used to make decisions that have societal impacts. This means taking a normative position on how users should interpret the scores, one that is actively anti-racist.

These scores act both as a representation of people and places, and as informative indicators intended to shape individual housing decisions. Previous research has shown that online representations of place can reshape the physical world (Kitchin, Lauriault, and McArdle 2015), driving investment and spending to some neighborhoods over others (Zukin, Lindeman, and Hurson 2017), and recasting new spaces as tourist attractions (Stors and Baltes 2018). In her book about communities fighting to save "failing" public schools in Chicago, Eve Ewing reminds us that labeling important community symbols a failure is harmful to the people who feel represented by those symbols. She writes, "in naming the school as a failure, public discourse also implicated [the community] as failures as students, parents, and teachers" (Ewing 2018, 134). Similarly, low school scores and high crime ratings label neighborhoods and the communities that live in them as failing, under-performing, and dangerous. In the context of informing housing decisions, the scores seem to violate the Fair Housing Act by acting as proxies for race (Humber 2020). Understanding the many ways home-seekers are able to interpret the scores is crucial for evaluating potential biasing or steering effects, particularly at the scale of a nation-wide platform.

Civic data projects also provide an example of how the scores could be recontextualized in a way to promote a systemic understanding of racism and inequality. Instead of isolated metrics that emphasize the "aura of objectivity", Peer and DiSalvo describe the process of creating a dashboard that "included a mix of quantitative and qualitative data to highlight the neighborhoods' assets and their historic significance" (2) (Peer and DiSalvo 2022). This mix of data seems similar to the kinds of evidence interviewees referenced when explaining their systemic interpretations of the scores. Notably, exemplar projects emphasize community involvement in the development of metrics and data dashboards (Peer and DiSalvo 2022; Kitchin, Lauriault, and McArdle 2015; Le Dantec et al. 2016).

When removing information is the solution

Not all information can be contextualized and scaffolded to the point of not doing harm. As the blog post (referenced in the tweet in Figure 1) explaining Redfin's decision to not show crime data plainly states, "there's too great a risk of this inaccuracy reinforcing racial bias" (Taubman 2021). Zillow and Realtor.com publicly supported this view with their own decisions to remove crime data from their platforms in December 2021. Removing (or excluding) certain information adds a kind of friction to the user experience. Someone searching for housing can still find crime data, but now instead of having it presented alongside other listing information on a real estate platform, they must seek it out specifically. Friction slows the process, perhaps acting as a deterrent or making the user more conscious of the information they seek out. In this sense not including crime data is both a case of "seamful design" (Eslami et al. 2016) and a choice not to design (Baumer and Silberman 2011). It is also evidence that these real estate platforms are willing to make normative decisions about which information to include in their listings.

Conclusion

Currently real estate platform users are not asked to think about their housing decision in a civic or societal way, and yet some do read larger narratives of spatial, political, and social structures in the information presented. These contextualized understandings of the scores stand in sharp contrast to those interviewees who blamed the people in neighborhoods with less desirable scores. The differences in user interpretations of the scores is evidence that these scores are not neutral metrics and are more complex than their seeming simplicity implies. The implications of these interpretations, particularly the common connection made between each of the scores and race, are serious. Left unchecked, user interpretations like those reported in this paper could, at the scale of the platform, lead to the perpetuation of harmful stereotypes and further entrench inequitable patterns of investment in neighborhoods in the U.S. To combat this societally deleterious outcome, I recommend future work that looks at efforts to recontextualize walking and school scores with information about current and historical patterns of racial inequality in cities and housing.

- “About GreatSchools’ Ratings System and Methodology.” n.d. GreatSchools. Accessed July 24, 2024. <https://www.greatschools.org/gk/ratings/>.
- Alexander, Michelle. 2010. “The War on Drugs and the New Jim Crow.” *Race, Poverty & the Environment* 17 (1): 75–77.
- Asad, Mariam, Christopher A. Le Dantec, Becky Nielsen, and Kate Diedrick. 2017. “Creating a Sociotechnical API: Designing City-Scale Community Engagement.” In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 2295–2306. CHI ’17. New York, NY, USA: Association for Computing Machinery.
- Balestrini, Mara, Yvonne Rogers, Carolyn Hassan, Javi Creus, Martha King, and Paul Marshall. 2017. “A City in Common: A Framework to Orchestrate Large-Scale Citizen Engagement around Urban Issues.” In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 2282–94. CHI ’17. New York, NY, USA: Association for Computing Machinery.
- Bardzell, Jeffrey, and Shaowen Bardzell. 2015. “What Is Humanistic HCI?” In *Humanistic HCI*, 13–32. Synthesis Lectures on Human-Centered Informatics. Cham: Springer International Publishing.
- Baumer, E. P. S., and M. S. Silberman. 2011. “When the Implication Is Not to Design (Technology).” *GROUP ...:] Proceedings of the International ACM SIGCHI Conference on Supporting Group Work. ACM SIGCHI International Conference on Supporting Group Work*. <https://dl.acm.org/doi/abs/10.1145/1978942.1979275>.
- Benjamin, R. 2019. *Race after Technology: Abolitionist Tools for the New Jim Code*. Polity.
- Bergman, Peter, Eric W. Chan, and Adam Kapor. 2020. “Housing Search Frictions: Evidence from Detailed Search Data and a Field Experiment.” Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w27209>.
- Black, Sandra E. 1999. “Do Better Schools Matter? Parental Valuation of Elementary Education*.” *The Quarterly Journal of Economics* 114 (2): 577–99.
- Bonilla-Silva, Eduardo. 2003. “Racial Attitudes or Racial Ideology? An Alternative Paradigm for Examining Actors’ Racial Views.” *Journal of Political Ideologies* 8 (1): 63–82.
- Burghardt, Karin T., Meghan L. Avolio, Dexter H. Locke, J. Morgan Grove, Nancy F. Sonti, and Christopher M. Swan. 2023. “Current Street Tree Communities Reflect Race-Based Housing Policy and Modern Attempts to Remedy Environmental Injustice.” *Ecology* 104 (2): e3881.
- Burrell, Jenna, Zoe Kahn, Anne Jonas, and Daniel Griffin. 2019. “When Users Control the Algorithms: Values Expressed in Practices on Twitter.” *Proc. ACM Hum.-Comput. Interact.*, 138, 3 (CSCW): 1–20.
- “Code of Ethics and Standards of Practice of the National Association of Realtors.” 2024. National Association of Realtors. <https://cdn.nar.realtor/sites/default/files/documents/2024-nar-coe-standards-of-practice-2023-12-21.pdf>.
- Conderino, Sarah E., Justin M. Feldman, Benjamin Spoer, Marc N. Gourevitch, and Lorna E. Thorpe. 2021. “Social and Economic Differences in Neighborhood Walkability Across 500 U.S. Cities.” *American Journal of Preventive Medicine* 61 (3): 394–401.

- Diaz, Mark, and Nicholas Diakopoulos. 2019. "Whose Walkability? Challenges in Algorithmically Measuring Subjective Experience." *Proc. ACM Hum.-Comput. Interact.*, 126, 3 (CSCW): 1–22.
- Doorn, Niels van. 2020. "A New Institution on the Block: On Platform Urbanism and Airbnb Citizenship." *New Media & Society* 22 (10): 1808–26.
- Dourish, Paul. 2006. "Implications for Design." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 541–50. CHI '06. New York, NY, USA: Association for Computing Machinery.
- Dye, Michaelanne, David Nemer, Neha Kumar, and Amy S. Bruckman. 2019. "If It Rains, Ask Grandma to Disconnect the Nano: Maintenance & Care in Havana's StreetNet." *Proc. ACM Hum.-Comput. Interact.*, 187, 3 (CSCW): 1–27.
- Eslami, Motahhare, Karrie Karahalios, Christian Sandvig, Kristen Vaccaro, Aimee Rickman, Kevin Hamilton, and Alex Kirlik. 2016. "First I 'like' It, Then I Hide It." In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM. <https://doi.org/10.1145/2858036.2858494>.
- Eslami, Motahhare, Aimee Rickman, Kristen Vaccaro, Amirhossein Aleyasen, Andy Vuong, Karrie Karahalios, Kevin Hamilton, and Christian Sandvig. 2015. "I Always Assumed That I Wasn't Really That Close to [Her]': Reasoning about Invisible Algorithms in News Feeds." In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 153–62. CHI '15. New York, NY, USA: Association for Computing Machinery.
- Espeland, Wendy Nelson, and Michael Sauder. 2007. "Rankings and Reactivity: How Public Measures Recreate Social Worlds." *The American Journal of Sociology* 113 (1): 1–40.
- Ewing, Eve L. 2018. *Ghosts in the Schoolyard: Racism and School Closings on Chicago's South Side*. University of Chicago Press.
- Fields, D. 2022. "Automated Landlord: Digital Technologies and Post-Crisis Financial Accumulation." *Environment and Planning A: Economy and Space*. <https://journals.sagepub.com/doi/abs/10.1177/0308518X19846514>.
- Figlio, David N., and Maurice E. Lucas. 2004. "What's in a Grade? School Report Cards and the Housing Market." *The American Economic Review* 94 (3): 591–604.
- Galster, George, and Erin Godfrey. 2005. "By Words and Deeds: Racial Steering by Real Estate Agents in the U.S. in 2000." *Journal of the American Planning Association*. *American Planning Association* 71 (3): 251–68.
- Gillespie, T. 2010. "The Politics of 'Platforms.'" *New Media & Society*. <https://journals.sagepub.com/doi/abs/10.1177/1461444809342738>.
- Gyamerah, Akua O., Glenda Baguso, Edda Santiago-Rodriguez, Aria Sa'id, Sean Arayasirikul, Jess Lin, Caitlin M. Turner, et al. 2021. "Experiences and Factors Associated with Transphobic Hate Crimes among Transgender Women in the San Francisco Bay Area: Comparisons across Race." *BMC Public Health* 21 (1): 1053.
- Hasan, Sharique, and Anuj Kumar. 2019. "Digitization and Divergence: Online School Ratings and Segregation in America." <https://doi.org/10.2139/ssrn.3265316>.
- "Housing Discrimination under the Fair Housing Act." n.d. Hud.gov / U.S. Department of Housing and Urban Development (HUD). Accessed July 23, 2024.

- https://www.hud.gov/program_offices/fair_housing_equal_opp/fair_housing_act_overview.
- Hsu, Angel, Glenn Sheriff, Tirthankar Chakraborty, and Diego Manya. 2021. "Publisher Correction: Disproportionate Exposure to Urban Heat Island Intensity across Major US Cities." *Nature Communications* 12 (1): 4104.
- Humber, Nadiyah J. 2020. "In West Philadelphia Born and Raised or Moving to Bel-Air? Racial Steering as a Consequence of Using Race Data on Real Estate Websites." *Hastings Race* 1 (17): 133–76.
- Joh, Elizabeth E. 2017. "Feeding the Machine: Policing, Crime Data, & Algorithms." *Wm. & Mary Bill Rts. J.* 26: 287.
- Johnson, Ian G., Aare Puusaar, Jennifer Manuel, and Peter Wright. 2018. "Neighbourhood Data: Exploring the Role of Open Data in Locally Devolved Policymaking Processes." *Proc. ACM Hum.-Comput. Interact.*, 83, 2 (CSCW): 1–20.
- Kelly, Theresa C., and Lana Stermac. 2008. "Underreporting in Sexual Assault: A Review of Explanatory Factors." *Baltic Journal of Psychology* 9 (1/2): 30–45.
- Kempton, Willett. 1986. "Two Theories of Home Heat Control." *Cognitive Science* 10 (1): 75–90.
- Kitchin, Rob, Tracey P. Lauriault, and Gavin McArdle. 2015. "Knowing and Governing Cities through Urban Indicators, City Benchmarking and Real-Time Dashboards." *Regional Studies, Regional Science* 2 (1): 6–28.
- Koretz, Daniel. 2009. *Measuring Up*. Harvard University Press.
- Korver-Glenn, E. 2021. "Race Brokers: Housing Markets and Segregation in 21st Century Urban America." https://books.google.ca/books?hl=en&lr=&id=YXQjEAAAQBAJ&oi=fnd&pg=PP1&ots=gpi5C046Q&sig=t2kDvuZ32tJQ9T78xH6Duuu_6qE.
- Le Dantec, Christopher A., Caroline Appleton, Mariam Asad, Robert Rosenberger, and Kari Watkins. 2016. "Advocating through Data: Community Visibilities in Crowdsourced Cycling Data." In *Bicycle Justice and Urban Transformation: Biking for All?*, edited by Aaron Golub, Melody L. Hoffmann, Adonia E. Lugo, and Gerardo F. Sandoval, 70–85. Routledge.
- Li, Hanlin, and Brent Hecht. 2021. "3 Stars on Yelp, 4 Stars on Google Maps: A Cross-Platform Examination of Restaurant Ratings." *Proc. ACM Hum.-Comput. Interact.*, 254, 4 (CSCW3): 1–25.
- Mapping Police Violence. n.d. "About the Data —." Mapping Police Violence. Accessed July 24, 2024. <https://mappingpoliceviolence.us/aboutthedata>.
- McBride, Ashley. 2022. "Oakland Schools Are Facing \$50M in Cuts. Here Are Some Budget Basics." The Oaklandside. January 13, 2022. <https://oaklandside.org/2022/01/12/oakland-schools-are-facing-50m-in-cuts-here-are-some-budget-basics/>.
- McElroy, Erin. 2023. "DIS / POSSESSORY DATA POLITICS : From Tenant Screening to Anti-eviction Organizing." *International Journal of Urban and Regional Research* 47 (1): 54–70.
- Norman, D. 1987. "Some Observations on Mental Models." *Human-Computer Interaction*, December, 241–44.

- Ogbonnaya-Ogburu, Ihudiya Finda, Angela D. R. Smith, Alexandra To, and Kentaro Toyama. 2020. "Critical Race Theory for HCI." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–16. CHI '20. New York, NY, USA: Association for Computing Machinery.
- Peer, Firaz, and Carl DiSalvo. 2022. "The Work of Infrastructural Bricoleurs in Building Civic Data Dashboards." *Proc. ACM Hum.-Comput. Interact.*, 124, 6 (CSCW1): 1–25.
- Pulido, Laura. 1996. "A Critical Review of the Methodology of Environmental Racism Research." *Antipode* 28 (2): 142–59.
- Redi, Miriam, Luca Maria Aiello, Rossano Schifanella, and Daniele Quercia. 2018. "The Spirit of the City: Using Social Media to Capture Neighborhood Ambiance." *Proc. ACM Hum.-Comput. Interact.*, 144, 2 (CSCW): 1–18.
- Rothstein, Richard. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America*. Liveright Publishing.
- Sadowski, Jathan. 2020. "Cyberspace and Cityscapes: On the Emergence of Platform Urbanism." *Urban Geography* 41 (3): 448–52.
- Sanders, Rebecca L., and Robert J. Schneider. 2022. "An Exploration of Pedestrian Fatalities by Race in the United States." *Transportation Research Part D: Transport and Environment* 107 (June): 103298.
- Schneider, Jack. 2017. *Beyond Test Scores: A Better Way to Measure School Quality*. Harvard University Press.
- Seaver, Nick. 2017. "Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems." *Big Data & Society* 4 (2): 2053951717738104.
- Sengers, Phoebe, and Bill Gaver. 2006. "Staying Open to Interpretation: Engaging Multiple Meanings in Design and Evaluation." In *Proceedings of the 6th Conference on Designing Interactive Systems*, 99–108. DIS '06. New York, NY, USA: Association for Computing Machinery.
- Sparks, Sarah D. 2017. "School-Rating Site GreatSchools Expands Its Measuring Stick." *Education Week*, November 2, 2017.
- Stors, Natalie, and Sebastian Baltes. 2018. "Constructing Urban Tourism Space Digitally: A Study of Airbnb Listings in Two Berlin Neighborhoods." *Proc. ACM Hum.-Comput. Interact.*, 166, 2 (CSCW): 1–29.
- Taubman, Christian. 2021. "Neighborhood Crime Data Doesn't Belong on Real Estate Sites." Redfin Real Estate News. Redfin. December 13, 2021. <https://www.redfin.com/news/neighborhood-crime-data-doesnt-belong-on-real-estate-sites/>.
- "The 17 Goals." n.d. United Nations Department of Economic and Social Affairs. Accessed July 28, 2024. <https://sdgs.un.org/goals>.
- Thind, Maninder P. S., Christopher W. Tessum, Inês L. Azevedo, and Julian D. Marshall. 2019. "Fine Particulate Air Pollution from Electricity Generation in the US: Health Impacts by Race, Income, and Geography." *Environmental Science & Technology* 53 (23): 14010–19.
- "Walk Score Methodology." n.d. Walk Score. Accessed July 24, 2024. <https://www.walkscore.com/methodology.shtml>.

- “Where Does Trulia Get Crime Information?” 2020. Trulia. April 14, 2020.
<https://support.trulia.com/hc/en-us/articles/115001564128-Where-does-Trulia-get-crime-information>.
- Yosso, Tara J. 2005. “Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth.” *Race, Ethnicity and Education* 8 (1): 69–91.
- Zukin, Sharon, Scarlett Lindeman, and Laurie Hurson. 2017. “The Omnivore’s Neighborhood? Online Restaurant Reviews, Race, and Gentrification.” *Journal of Consumer Culture* 17 (3): 459–79.

5 – Ambivalent Users

In discussing their housing search, several interviewees contradicted themselves throughout the interview or discussed conflicting responses to the scores. They expressed ambivalence – “simultaneous and contradictory attitudes” or “uncertainty as to which approach to follow” (“Ambivalence” n.d.). The target of their ambivalence ranged from how they used the scores in their housing decision and the idea of scoring neighborhood features generally, to a broader ambivalence towards the whole housing market. I argue that the users’ ambivalence about the scores is indicative of the scores’ instability as individual indicators and collectively as an approach to assessing place, neighborhoods, and the intangible qualities bound up in safety, walkability, and neighborhood desirability.

A subset of the interviewees expresses ambivalence about the entire housing market. They struggle with the idea that their housing is a simple, individual choice, as it is presented by the platforms, when they recognize the limitations of their decision-making power. I analyze this particular ambivalence with Lauren Berlant’s theory of “cruel optimism.” I argue that these interviews are responding to the cruel optimism of the housing market, in which they can see the solution to their needs – a dream house – but also the impossibility of attaining it. In conclusion I offer some thoughts on why a real estate platform would allow or even create a sense of ambivalence among their users. In the case of the neighborhood scores, I argue that ambivalence creates distance between the platform and the potential conclusions a user can draw from the scores. As the previous chapter showed, these conclusions can be problematic, and it is possible that leaving the scores in an ambivalent presentation provides some plausible deniability for the platform.

This chapter uses Affect Theory, specifically the work of critical theorist Lauren Berlant, to explore the significance of users’ ambivalent responses to the real estate platform. Ambivalence is difficult to pin down because it often comes out over the course of the interview. At first an interviewee says one thing, only to later say the opposite. Like the previous chapter, this chapter explores the real estate platform users’ interpretations of the neighborhood scores. Here, most of the subjects are less clear about whether or to what extent they use the scores in their housing decisions. Some say that they do and do not use the scores, while others say that they use the scores but have trouble explaining why.

The ambivalence I discuss is not the users’ assessment of the platform. No one said, ‘this score is ambivalent’ or ‘I am ambivalent about schools/walking/etc.’ Rather it arises from the users’ response to the platform, the scores, *and to my questions*. It accrued over the span of the interview, as the interviewee struggled to express their thoughts about certain scores, or the premise of scoring, or the entire premise of their having a choice in their housing decisions (and thus the premise of my study). “Ambivalence” was the code

that I used as / struggled to analyze interview transcripts that contained contradictions, hesitations that became hedges, questions answered with questions.¹ I turn to affect theory to explore ambivalence because it considers the emotions or felt responses that produce collective meaning or meaning that connects individual responses to a broader societal understanding.

While the interviewees' ambivalence may have targeted different aspects of the topic in question, their frustration that did not lead to a full rejection of the platform or its premise remained consistent. They have questions or reservations or cannot fully articulate what they learn from a score. Some still incorporate the score into their housing search, despite their unsureness. Others express a broader ambivalence that is more about the project of scoring schools, walkability, crime or noise. However, because they cannot be sure about the makeup of the scores, they cannot fully dismiss them. Some interviewees also express ambivalence about the housing market, realizing that much of their power in making the decision of where to live is circumscribed by the constraints of the market (especially price). Some also talked about the inequality in the housing market with an ambivalent powerlessness towards the power of their individual choices. Using Berlant's concept of "cruel optimism" I connect these broader views of the housing market and the home-seeker's ambivalence towards their own power to make a choice to the neoliberal framing of housing and housing choices that undergirds real estate platforms and the common understanding of housing in the U.S.

Related Literature

Ambivalence & Affect Theory

Affect Theory's origins can be traced to the 1990s, to critical theorists like Eve Kosofsky Sedgwick and Lauren Berlant who wrote about culture and literature drawing on gender studies and queer theory. Clough (2010) explains "the turn to affect and emotion extended discussions about culture, subjectivity, identities, and bodies begin in critical theory and cultural criticism under the influence of post-structuralism and deconstruction" (206).

Affect Theory analyzes the *affect* or feelings created by a piece of media or culture. It seriously considers affect as a social phenomenon that speaks not only to the significance of the media causing the affect but also to greater sociological themes like gender, class, or political identity. I focus on Lauren Berlant's work on affect because much of their work relates to the pursuit of "the good life" amidst the "retraction, during the last three decades, of the social democratic promise of the post-Second World War period in the United States and Europe" (Berlant 2011, 3). Housing is such a weighty element of "the good life" in the U.S., and while Berlant does not directly focus on it, the pursuit of housing

¹ I am grateful that I was able to develop some of these ideas and validate my experience with other PhD students at a workshop about "Platform Ambivalence" at the University of Amsterdam's Media Studies department in 2022.

exemplifies how Berlant describes “the affective structure of an optimistic attachment” that “involves a sustaining inclination to return to the scene of fantasy than enables you to expect that this time, nearness to this thing will help you or a world to become different in just the right way” (2). Ambivalence is also a key theme of their work.² Their book, *Cruel Optimism* (Berlant 2011), uses this seemingly contradictory term to explore how people make harmful (cruel) choices repeated in pursuit of :

that moral-intimate-economic thing called “the good life.” Why do people stay attached to conventional good-life fantasies – say, of enduring reciprocity in couples, families, political systems, institutions, markets, and at work – when the evidence of their instability, fragility, and dear cost abounds? (Berlant 2011, 2)

A home is certainly a pillar of “the good life” in the American imagination. However, for many it feels out of reach, or the effort to attain that dream home puts other needs (financial, emotional) at risk.

Relevant Applications of Affect Theory

There are several ways that affect theory has crossed into studies of technology use in fields including Media Studies, Communication, and STS. Many scholars have explored affective labor that underpins social media use. Abidin (2015) wrote about Singaporean social media influencers who create and rely on parasocial relationships with their audience. Neville (2021) similarly notes the importance of a “warm” affect for a technology review to garner trust on YouTube. While these cases focus on eliciting a certain affective response from an audience, McGlotten (2013) locates affective responses of the poster (person creating a profile) as much as the viewer (of others’ profiles) in discussing the affective experiences of using Grindr. Similarly, in her book *Death Glitch*, Kneese (2023) investigates affective responses to technology as well as affective labor mediated by technology. work and impact of experiencing and navigating death through social technologies like blogs and social media. This includes the work of preserving “communicative traces” and other “digital heirlooms” – which hold value because of their affective meaning. Affect expands the study of use and users, explaining nuanced differences in the context of or response to technology use. For example, Kneese (2023) writes about algorithms: “Algorithms also shape people’s affective experiences of death, sending prompts and triggering responses that feel welcome or creepy, depending on the context” (5). Functionally, the algorithm can be doing the same thing – reminding the user of a picture they posted – and without being attentive to affect, it would be difficult to explain why one context elicits a negative response and another a positive response.

² Andrea Long Chu remembers Berlant signing an email “Ambivalently, LB” explaining it “was their way of saying ‘sincerely,’ because they were always thinking about what’s ambivalent about what’s sincere” <https://www.nplusonemag.com/online-only/online-only/on-lauren-berlant/>

Some HCI research aims to “measure” or “detect” affect, but this work is based on a very different understanding of affect than affect theory. In this context, affect is emotion and efforts to capture it tend to the positivist (recording physiological responses like heart rate or facial expression), with the exception of self-reporting (Shami et al. 2008). However, in the study of users and their experience of technology, affect is helpful for distinguishing a range of responses beyond use/non-use. For example, “creepiness” identifies users’ varying boundaries and discomfort with the data collection and privacy implications of wearable (Wissinger 2018) or smart home technologies (Pierce 2019). Bissel (2023) takes a qualitative and poststructuralist approach, identifying “experiences of unknowability, illegibility and ambivalence” to explore the limits of what can be known to ‘actually exist’ in platform urbanism (57).³ He also explores ambivalence in decision-making, focusing on how and when people use food delivery apps. Through interviews he situates users’ ambivalence in the “temporal dimensions... both in terms of how decision making is a fickle process that takes place in unpredictable ways during the day... but also that orientations to on-demand platforms evolves incrementally over time” (68).

Anderson et al. (Anderson et al. 2022) write that the concept of “cruel optimism” “offers geographers and others a way into the perplexing question of why detachment from harmful lives can be so difficult, if not impossible” (144).

Interpreting Interfaces, Interpreting Urban Design

To look critically at the design of a platform interface is to seek to understand its aesthetic choices as well as its functional choices and what they can reveal of the intentions of the actor(s) responsible for making the platform. Values in design (VID) takes a similar approach. Shilton et al. (2014) explain, “Values are understood to contribute to technology design, to shape affordances that mediate technology use, and to pervade the social contexts mediated by technology” (426). Values include “instrumental values as effectiveness, efficiency, safety, reliability, and ease of use” but also “liberty, justice, privacy, security, friendship, comfort, trust, autonomy, and transparency” (Nissenbaum 2005, lxvi). Much of this research targets designers and engineers, seeking to inform or even influence their work. Instead, I use the same approach – examining the object – but focus on how the design choices lead to certain affective outcomes for the users (namely ambivalence).

It is difficult to know the intention of a platform because it is a company made up of many actors making decisions at the same time. Seaver (2017) identifies “corporate heteroglossia” as a particular challenge in studying technology companies: “Speaking through advertisements, job postings, and its engineers, the company said many things at once” (9). In the chaos of these multiple perspectives the interface is a (relatively) stable output that the user encounters as a singular experience (even if it has the fingerprints of

³ ‘Actually exist’ is Bissell’s reference to Shelton and Lodato’s paper “Actually existing smart citizens” (2019).

many teams). While the intention behind the interface is difficult to know, the impact of the interface – the user’s experience of it – is observable. Also, as with other unanticipated or even ‘wrong’ user behaviors or folk theories, even if an affective response of ambivalence was not intended by the platform, the fact that it happens, and shapes users’ actions, makes it worthy of study.

The choice to include certain scores, and how to incorporate them into the rest of the listing page, likely involved many people, possibly even multiple teams – user experience, advertising, even public relations (the previous chapter showed the crime scores as a point of public attention). The intentions of a platform company are not necessarily straightforward – different teams might be working to different ends (e.g. the user experience team might care about users’ confusion, while maximizing advertising income may not be completely compatible with user experience).

Fittingly for this project, a classic reference for the politics of objects draws on urban planning, specifically Robert Moses’s use of low over-passes on the Long Island Expressway to prevent access to certain areas, like Jones Beach, a public park, by the buses typically used by working class people (buses being taller than private cars) (Winner 1980). Winner offers the overpasses as an example of a technical object “deliberately designed to achieve a social effect” and motivated by “Moses’s social class bias and racial prejudice” (Winner 1980, 123). So, they are tools of an individual’s politics and a larger political agenda.

Findings

Ambivalence about using the scores

Not all interviewees had clear answers about how they used the neighborhood scores. Several stood out for their conflicting and conflicted responses. They contradicted themselves over the course of the interview or responded to my questions with more questions. These users do not fully embrace or dismiss the scores. Their ambivalence at first seemed to challenge the qualitative coding process, until I realized that instead of looking at single moments in the interview I had to follow the thread of ambivalence throughout their responses.

For example, consider Oakland10, an Asian man who had recently had a child with his wife. From the start of the interview, he expressed his focus on schools, and by extension school scores: “anything over the five of ten, or six out of ten.” He did not want the top-rated schools (as discussed in detail in the previous chapter) because he was concerned that they would not meet his diversity requirements. Also, as a one car household, he appreciated high walk scores (“when it says, “Walkers’ paradise,” that’s a plus”). However, as the interview progressed to the comparison of neighborhoods using the scores in the visual prompts, he was broadly dismissive, stating “I usually don’t use the

website to make any inferences about the neighborhood.” A little later he amended, conceding that “all these websites are a good search engine for me to just do the first shortlisting. But I don’t depend on any of the data to really tell me what a neighbor should tell me about the place.” Finally, at the end of the interview he summarized his opinion about the scores:

I don’t like to color my—to me, it’s the same thing as fake news, that I would not base any opinions based on what maps are telling me. Other than—I do look at crime scores overall. But that’s not a factor in my decision to—if I see a good property I would [buy] and [it has] a high crime [score]... I do try to find out what these numbers really mean in terms of statistics. (O10)

So, to summarize, he does not use the scores, except the school score, the walk score, and the crime score. He considered them “fake news” but is interested in understanding the underlying data. These conflicting responses indicate his ambivalence about the scores. He mentions other sources of information (“what a neighbor should tell me”) and conducting his own research (“find out... statistics”).

Many users who expressed some ambivalence about the scores, ultimately described using the scores to inform their decision. For example, one subject in Oakland [12] explains,

I also don’t know what makes a school a ten versus a three. So, is that performance? Is that the neighbors rating it? I don’t really know. But I guess I would be more willing to live next to a school or close to a school that had a higher ranking than a lower ranking even without knowing what that ranking is. (O12)

This subject does not have children and is a renter; so, the common application of the scores to either rate the schools or predict future sales values would not be relevant to her. In this case, she is ambivalent about the usefulness of the score: she sounds dismissive of it but then says it informs her preference.

Several subjects expressed a broader ambivalence – less focused on their own interests and instead on idea of the scores in general. They brought up more existential questions about the information (they assumed to be) used to create the scores and even the idea of scoring or rating schools and walking in general. As [Oakland 24] struggled to explain her resistance to offer what information could improve school scores, she explained, “It’s hard... I think my gut is that you can’t really get enough summary information about a school community in one line. You need to talk to people that go there or visit.”

Several users raised the potential for the scores to be based on biased or inaccurate data. This concern was commonly invoked in the context of school scores and the possibility that they are based substantially on standardized test scores. Subjects objected to the incorporation of standardized tests because of the potential for racial and economic

biases, and as one [Oakland 12] said, I'm personally anti-testing because I don't think that it's actually correlated to intelligence or success or anything like that."

Ambivalence about the scores in general

Some interviewees expressed ambivalence about the scores' general premise. They pointed out details about how the scores are presented on the platform, specifically the information that is lacking. From the perspective of the platform, users' ambivalence about the neighborhood scores indicates that the design of the platform is failing to clearly define the user experience. Noise and crime – perceived as more subjective and inconstant compared to fixed infrastructure (walking, transit) and schools. Also, these are the two indicators that are visualized as maps rather than being presented as numbers. Here interviewees brought up issues of how the information is presented – what is missing, what is unclear. Presumably the real estate platform includes these scores from secondary sites because they are considered relevant to the user.

Many of the interviewees expressed conflicting opinions about the crime map, finding it at once relevant to their search and hard to interpret. Most focused on the lack of details about the types of crime – from violent crimes to misdemeanors – that were collapsed in the shading. "I would like to see more information on what crimes are actually there. If it's all stolen cars then, yeah, there's a huge issue. But if it's littering, then it could be as dark as it wants." (V5) This interviewee cares about crime, but without knowing the detail of kinds of crime represented on the map she cannot know how to treat this information.

Several interviewees brought up other variables that were key to understanding the scope of the crime maps such as the time frame represented by the map. O8's response to my question about what the crime maps means shows her ambivalence about the indicator:

I have no idea. It's just lower crime. And it could mean it's higher income, but also it just could not. It's less dense, it seems like. My impression based on what we've talked about—and looking at the streets. So, is this crime per capita? Or is it instances? (O8)

She references the previous scores we discussed (schools, walking) and how these indicated this neighborhood (Dimond District) was more residential and less dense. So, even with these added contextual details gathered from the other scores, she is unsure how to interpret the crime score. She also points out that the visualization – shading areas of the neighborhood – projects a false sense of discrete borders. She explains, "this gives a weird sense that if you live on one of these line boundaries, you'll be safe. And if you live on the other side, you won't be safe. Which... makes no sense." The overall effect, without the contextualizing details of time frame, type of crime, and population, is to represent crime – a fluctuating social phenomenon – as a fixed constant.

Noise – the other neighborhood score represented in a visual map rather than a number – also elicited confusion from interviewees. O9 waffles a lot when talking about the noise map:

I think that's cool. I'm skeptical [laughs], because, like, how did they gather that? Is it just like they looked at highways, and they said, "X distance from the high—like, the highway is red, and then it gets slightly less as you go out." Like, is it just like based on the map? Is it based on actual, like sensors? But, so I would want to know that. But like, I think that looking at the map, it looks about right. And so, I think that's interesting. It would probably, I don't know that it would help me a ton in... yeah, I mean I guess it could be a useful thing to be one of the very last things before going in person. (O9)

He expresses doubts about the methods used to produce the noise map, but then admits that it "looks right" and expresses conflicting thoughts about whether or not it would be a helpful indicator. Some of his unsureness seems to stem from not understanding exactly how the indicator is produced, does it give him information he doesn't otherwise have access to (through his own reasoning about sound and traffic patterns).

O6 highlights the actor responsible for the school score as the reason she was skeptical of the scores:

O6: Like who's writing the schools? Is it the parents? Is it the teachers? Who's rating these schools?

INT: It says here that the school data is provided by Great Schools, which is a separate entity from Redfin and Zillow.

O6: I guess I don't know what Great Schools is. So, in order for this data to make any sense to me, like what I'm looking at, I would want to know, who the hell is Grade Schools and why am I giving them weight... Is Great Schools a company that is mostly funded by major corporations that own Zillow and [other] property real estate management companies? I don't know. So like, in order for me really to understand this information, I would have to know who was providing it. And honestly, you're talking to someone that's like, like who's funding them?

She needs to understand the financial motives of the actors behind the scores before she can trust their information. She is not completely dismissing the scores, nor is she following their ranking. She is frustrated at being asked to evaluate something without all the information she needs.

Ambivalence towards the Housing Market

Not all ambivalence expressed by interviewees targeted the real estate platforms or the neighborhood scores; several interviewees also expressed ambivalence towards the

housing market in general. They expressed frustration at a market in which they did not have much choice because of the high prices and competitiveness for both renters and buyers. Consider, for example, two very different interviewees – one renter, one buyer, in different cities – saying very similar things: choice is an illusion.

V14: “Your thesis is that... renters have the luxury of deciding where they rent. And what I will tell you is that I’m a very high quality tenant and I applied to forty houses—thirty or forty houses—and got offered one. So, you know, there’s a delta there. Like if I had options, sure. But I didn’t have options... And like they were things I considered, certainly, and I think that they did at some level pre-qualify houses that I applied to. But, you know, all the houses that I applied to had a range of crime, had a range of noise, had a range of schools.”

O13: “we started out thinking, ‘Close to transit, close to good schools, blah, blah, blah,’ and then it came down to like, ‘Okay, well what’s even worth looking at that isn’t going to go instantly out of our price range?’”

The renter feels at the mercy of landlords picking applications and the buyer is hemmed in by price restrictions. They focus on their *lack of choice*: “like if I had options, sure. But I didn’t have options” (V14) and “what’s even worth looking at that isn’t going to go instantly out of our price range?” (O13). Real estate platforms present housing as an individual choice, with a range of different variables that the home-seeker can balance to fit their unique needs and preferences. Both quotes highlight the sense of being cheated that comes from realizing the choice is mostly made for you. This frustration about the extremely high prices of the housing market during the pandemic (and continuing today) resonates with social media memes and media coverage (see for example (Taylor 2021)).

Some interviewees expressed a slightly different kind of ambivalence related to the housing market, focusing on the systems of inequality that undergird it. These interviewees talked about gentrification and referenced maps and local histories of red-lining and indigenous lands and peoples. One of these interviewees, O13, returned to these alternate sources of information when I asked if there was anything she would add to the scores, but she was ambivalent about whether they would make a difference:

If you saw redlining maps or something like that, for someone who wanted to—I don’t know, [chuckles] proactively try to right past wrongs. But that’s so fraught anyways... I would probably look at that type of information out of interest and awareness, just to kind of learn more about the history of an area... There’s that great map of tribal lands that could be like similarly useful. But I feel like as a buyer you have—unless you have two million dollars – you have such limited options, I don’t know that it would change much about my decision making. But it might change how I get to carry myself as a neighbor. (O13)

She returns to her earlier point about price circumscribing choice, “unless you have two million dollars – you have such limited options” but also acknowledges that even if more information about historical inequalities would not change her decisions “it might change how I get to carry myself as a neighbor” (O13). Her ambivalence has two targets – the idea of her ‘choice’ in the housing market, but also her ability to affect change for sweeping, historical injustices.

When asked about the neighborhood scores as a group of indicators, another interviewee (O9) was torn between their possibly utility and how they might contribute to segregation:

It seems useful, definitely, I mean with all the caveats that I said about things that I didn’t think were useful. I think that there are potential societal issues with access to information... the people who have the resources to use that information. I think it probably contributes, to some extent, to segregation... essentially everyone has access to Zillow. I think that probably there are different uses of Zillow between different groups of people. You know, income, race, language... yeah... and so that definitely would contribute to segregation. (O9)

Earlier in the interview, as he talked through each score individually, he connected the scores with trends in income and race, for example, pointing out that his positionality as a White man made crime scores seem less important to him but he could imagine for more marginalized groups they might be important. However, in this statement he shifts from his personal doubts to a broader and less specified concern about how the scores might encourage segregation. Like the previous interviewee, he connects deeper inequities in the housing market to his ambivalence about how much one can (or should) operationalize tools like the scores to maximize their advantage.

Discussion

Platforms Ambivalent by Design?

Flatness is different than lack. It is not only a subtraction, but a form of performance, a style of showing up. It may be a performance of an enigmatic transmission that forces the interlocutor into anxiety or discomfort; at the same time, a performance of casualness or recessive force that might produce an atmosphere of ease (Berlant 2017).

Berlant writes of flatness as “a form of performance, a style of showing up.” How do real estate platforms “show up” to users? Gillespie (2010) describes how even the term, platform, allows a platform company to make several discursive moves at once, simultaneously appealing to the varying interests of users, policymakers, and advertisers. In the case of real estate platforms, they are at once replacing the real estate agent, providing the capabilities of searching through available properties directly to the home-

seeker, but avoiding being regulated in the way that agents are (Humber 2020). Both of these interpretations of the real estate platform rely on a representation of their function [the work of the platform] as one of delivering information only. Most of the information on the real estate platform comes from another source – the MLS, public tax records, Google Maps, and the scoring companies. The platform is an aggregator (and curator, although this angle is not emphasized), built on the key feature of platform infrastructure, the API, the makes such integrations nearly seamless.

Users want to find all the relevant information as seamlessly as possible, to make the best decision they can. However, regulators may have restrictions on what kinds of information are provided in certain circumstances – like the restriction on providing information about race alongside a real estate listing. Platforms seek “to strike a regulatory sweet spot between legislative protections that benefit them and obligations that do not, and to lay out a cultural imaginary within which their service makes sense” (Gillespie 2010, 348). The computational structure of a platform enables embedding information from secondary sources, and the platform is not responsible for these secondary sources, according to Section 230 (Olson 2023).

In a classic user experience design framing, users’ ambivalence about elements of the platform would be indicative of a failure of those features to communicate the “singular authoritative vision” (Sengers and Gaver 2006) to the users. Even accounting for users to have multiple, complex interpretations of the scores, as discussed in the previous chapter, the expressions of ambivalence here are indications of confusion and frustration. They don’t know what to do, and this is an uncomfortable and unfamiliar feeling.

While it is difficult to know whether the platform companies intended to create an interface that elicits this kind of uncertainty and discomfort, let us consider what it would mean for ambivalent design to be a purposeful choice. In other words, what does ambivalence accomplish?

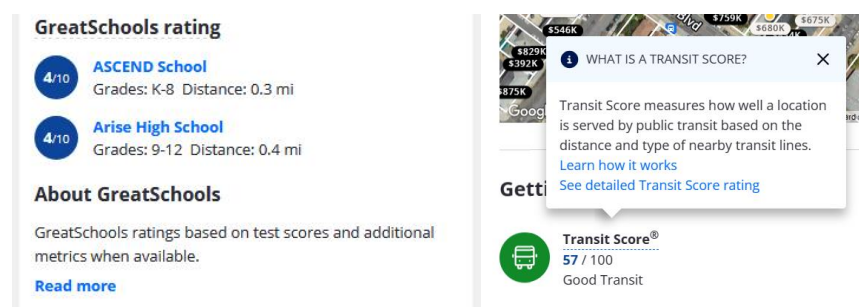


Figure 1 Two screenshots from Zillow showing the explanatory text for the school score and transit score.

Ambivalent design is not an absence of design, just as Berlant clarifies that “flatness is different than a lack” (Berlant 2017). The platform makes curatorial decisions about which scores to include (or remove, in the case of the crime score). It provides some context, if minimal, to explain the scores, including links to the scoring companies’

websites (see Figure 1). This presentation can produce discomfort or ease, be enigmatic or obvious. The quotes highlighted in this chapter focused on the discomfort of users asked to explain their use of scores that they did not fully understand or had conflicting feelings about. However, other study participants did not share this discomfort, instead readily explaining their interpretations of the scores (as seen in the previous chapter). For the users who were not ambivalent about the scores, the ambivalent design is like a buffet, allowing different users can take what they want and ignore the rest: if you have kids, here are some school scores; if you take public transit, there's a score for that.

By contrast, many of the interviewees highlighted in this chapter focused on missing information or explanations – a time scale or categories for the types of crime, an explanation of the methods used to compute the noise score. Other interviewees focused on adding new features (e.g. including hills in the walking score or police violence in the crime score).

Ambivalence provides the platform with some plausible deniability. It creates distance between the problematic associations that users can draw from the scores and the role of the platform in shaping user decisions by providing all this information (the listing and the scores). In this sense, the ambivalence of the platform's design creates legal ambiguity. The real estate platform is not explicitly telling users how to incorporate the neighborhood scores. Plausible deniability would be lost if the platform were to acknowledge the possibility of racist interpretations by trying to contextualize the scores. They only admitted the racial bias of crime scores after removing them from the platform. Just as other platform companies have used discursive ambiguity to create legal loopholes (e.g. calling gig-workers "partners" or "contractors" to avoid labor laws that protect their treatment and compensation) (Gillespie 2010; Dubal 2017), these real estate platforms rely on ambivalent design to emphasize the interpretive flexibility of the information they provide via the neighborhood scores.

Like any platform built on other websites and platforms through use of their API, the real estate platform benefits from the presence of the secondary platform's data (the scores) while simultaneously distancing itself from critiques of the secondary data. Those critiques can include both critiques about the content or the functionality. Platforms are able to explain that they are not responsible for creating or maintaining the secondary platform, a rhetorical strategy long used by platforms to evoke the perception that they are an apolitical neutral intermediary (Gillespie 2010). This distance between layered platforms is so common we likely do not notice (eg. How many platforms use Google Maps, or Yelp).

The Cruel Optimism of the Housing Market

In The Female Complaint, Berlant (2008) uses ambivalence to describe the tension between the learned commitment toward conventionality and the often thwarted

desire to break from that conventionality through a literary analysis of a commodified 'women's culture' in the United States. Ambivalence describes the continued attachment (however unwilling) to structures that might lead to complaint in the first place—a kind of disappointment without disenchantment... ambivalence can be understood, at least in part, as a conservative tendency epitomising the hesitant convictions of white American liberalism. Ambivalence describes how people remain attached to violent structures even when they may also want to reject them. (Anderson et al. 2022)

The third category of ambivalence turns from the platform to focus broadly on the housing market and the choices (or lack thereof) available to the home-seekers. These interviewees describe their frustration and anger upon realizing the extent to which their choices are circumscribed by the market. The renter who describes himself as a “very high-quality tenant” is angry that he is not every landlord’s first choice. The home-seeker limited by her price range is frustrated that the neighborhood qualities she desires are out of reach.

These are highly individualized views of the housing market – as befits our current neoliberal era. Neoliberalism centers on the role of the private market as the fair and efficient way to distribute resources and is pitched to citizens through the promise of individual choice.⁴ The real estate platforms also frame housing search as a matter of choice: toggle some preferences and filters (rent/buy, price, bedrooms, pet policy), explore your options in photos and on the map, and make a choice. However, this means that it is just as easy to see what is *out of reach*, the more expensive homes, the higher rated schools, entirely different cities. For these home seekers they are optimistically attached to an idea of home that is viewable via the real estate platform, but unattainable. For many the result is a housing decision that does not fulfill their wishes and still feels too expensive (recall that the majority of renters are rent burdened, and with rising interest rates, homeowners are paying higher interest on mortgages in a market that is already at a peak – at least it was in 2021).

Despite their frustrations, the interviewees do not see how their individual struggles are symptoms of the structural challenges that qualify the current housing market as a crisis. Neither suggests that all neighborhoods should be walkable and have good schools or that all tenants deserve housing. They display ambivalence in the sense of “the continued attachment (however unwilling) to structures that might lead to complaint in the first place – a kind of disappointment without disenchantment” that Anderson et al (2023) describe in Berlant’s work.

⁴ Examples of contemporary neoliberalism include charter schools (often framed as an issue of “school choice”), the argument that private health insurance markets are “more efficient” than a fully public health insurance system and allow individuals to choose the insurance that works best for them, and the Section 8 housing voucher program that lets home-seekers rent on the private market – in the unit and neighborhood of their choice (assuming they are not discriminated against and their voucher is sufficient for market-rate rents) – instead of relying on state-sponsored affordable housing.

Even the interviewees who express knowledge of the systems of inequality perpetuated by the housing market, like redlining and the erasure of indigenous peoples' land rights, cannot see how that information would change their housing decisions. One at least says it "might change how I get to carry myself as a neighbor" (Oakland 13), gesturing to the many decisions one makes *after* choosing where to live and how these actions can impact others. They are aware of how current housing decisions are built on the foundations of these past harms and maintain inequality, but they cannot see an alternative choice.

Berlant explains their concept of "cruel optimism" as "when something you desire is actually an obstacle to your flourishing" (1). Home-seekers desire a home, more specifically a home in a certain neighborhood, with their preferred amenities, etc. When they realize that the home they want is unattainable or would be financially disastrous the suggestion that they have a choice, that a home that meets all their specific criteria exists, feels cruel. On a societal level, in the U.S., owning a home is part of the American dream: the sign of success, a promise of stability, and a pathway to wealth.

In the individualized framing of liberalism (and the real estate platform) societal problems like racialized poverty and disinvestment, gentrification and displacement become too big to address, making it easier to focus on one's own problems and price limits. Berlant would point out that the status quo benefits from this inertia.

- Abidin, C. 2015. "Communicative Intimacies: Influencers and Perceived Interconnectedness." *Ada: A Journal of Gender, New Media, and Technology* 8 (November): 1–16.
- "Ambivalence." n.d. Merriam-Webster. Accessed August 4, 2024. <https://www.merriam-webster.com/dictionary/ambivalence>.
- Anderson, Ben, Akanksha Awal, Daniel Cockayne, Beth Greenhough, Jess Linz, Anurag Mazumdar, Aya Nassar, et al. 2022. "Encountering Berlant Part Two: Cruel and Other Optimisms." *The Geographical Journal*, December. <https://doi.org/10.1111/geoj.12493>.
- Berlant, Lauren. 2011. *Cruel Optimism*. Duke University Press.
- . 2017. "Affective Assemblages: Entanglements & Ruptures—An Interview with Lauren Berlant." *Atlantis: Critical Studies in Gender, Culture & Social Justice* 38 (2): 12–17.
- Bissell, David. 2023. "Negative Urbanism: Unknowability, Illegibility and Ambivalence in the Platform City." *Cityscape* 27 (1–2): 56–75.
- Clough, Patricia T. 2010. "The Affective Turn: Political Economy, Biomedicine and Bodies." In *The Affect Theory Reader*, edited by Melissa Gregg and Gregory J. Seigworth, 206–28. Duke.
- Dubal, V. B. 2017. "Wage Slave or Entrepreneur?: Contesting the Dualism of Legal Worker Identities." *California Law Review* 105 (1): 65–123.
- Gillespie, T. 2010. "The Politics of 'Platforms.'" *New Media & Society*. <https://journals.sagepub.com/doi/abs/10.1177/1461444809342738>.
- Humber, Nadiyah J. 2020. "In West Philadelphia Born and Raised or Moving to Bel-Air? Racial Steering as a Consequence of Using Race Data on Real Estate Websites." *Hastings Race* 1 (17): 133–76.
- Kneese, Tamara. 2023. *Death Glitch: How Techno-Solutionism Fails Us in This Life and Beyond*. Yale University Press.
- McGlotten, Shaka. 2013. *Virtual Intimacies: Media, Affect, and Queer Sociality*. State University of New York Press.
- Neville, Stephen J. 2021. "The Domestication of Privacy-Invasive Technology on YouTube: Unboxing the Amazon Echo with the Online Warm Expert." *Convergence* 27 (5): 1288–1307.
- Nissenbaum, Helen. 2005. "Values in Technical Design." In *Encyclopedia of Science Technology and Ethics*, edited by Carl Mitcham, lxvi–lxx. MacMillan.
- Olson, Brent A. Esq, ed. 2023. "16B:69. CDA Immunity—Third Element of Barnes Test— 'Information Provided by Another Information Content Provider.'" In *Business Law Deskbook, Advanced Topics In Business Law*. Minnesota Practice Series TM. Thompson Reuters.
- Pierce, James. 2019. "Smart Home Security Cameras and Shifting Lines of Creepiness: A Design-Led Inquiry." In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–14. CHI '19. New York, NY, USA: Association for Computing Machinery.
- Seaver, Nick. 2017. "Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems." *Big Data & Society* 4 (2): 2053951717738104.
- Sengers, Phoebe, and Bill Gaver. 2006. "Staying Open to Interpretation: Engaging Multiple Meanings in Design and Evaluation." In *Proceedings of the 6th Conference on Designing Interactive Systems*, 99–108. DIS '06. New York, NY, USA: Association for Computing Machinery.
- Shami, N. Sadat, Jeffrey T. Hancock, Christian Peter, Michael Muller, and Regan Mandryk. 2008. "Measuring Affect in HCI: Going beyond the Individual." In *CHI '08 Extended Abstracts on Human Factors in Computing Systems*, 3901–4. CHI EA '08. New York, NY, USA: Association for Computing Machinery.
- Shelton, Taylor, and Thomas Lodato. 2019. "Actually Existing Smart Citizens." *Cityscape* 23 (1): 35–52.
- Shilton, Katie, Jes A. Koepfler, and Kenneth R. Fleischmann. 2014. "How to See Values in Social Computing: Methods for Studying Values Dimensions." In *Proceedings of the 17th ACM*

- Conference on Computer Supported Cooperative Work & Social Computing*, 426–35. CSCW '14. New York, NY, USA: Association for Computing Machinery.
- Taylor, Candace. 2021. "Real-Estate Frenzy Overwhelms Small-Town America: 'I Came Home Crying.'" *The Wall Street Journal*, May 20, 2021. <https://www.wsj.com/articles/real-estate-frenzy-overwhelms-small-town-america-i-came-home-crying-11621511972>.
- Winner, Langdon. 1980. "Do Artifacts Have Politics?" *Dædalus* 109 (1): 121–36.
- Wissinger, Elizabeth. 2018. "Blood, Sweat, and Tears: Navigating Creepy versus Cool in Wearable Biotech." *Information, Communication and Society* 21 (5): 779–85.

6 – Demystifying the Zestimate



Figure 1 A meme about Zillow's price estimates. (Source: @kristamashore, Instagram, 4/3/24)

Introduction

On September 14, 2021, Sean Gotcher, a real estate agent in Las Vegas posted a video to TikTok that went viral.¹ In the video, he talked about “a company that everybody used... to look for houses” and hypothesized how that company could manipulate the prices of houses with its iBuying practice. (An iBuyer, or instant buyer, is a company that makes offers to buy homes directly from the owners, for a value set by the price-estimating algorithm.) Specifically, Gotcher theorized that the company could identify popular zip codes based on user search behavior on their site and buy up many houses in that zip code through their iBuying arm. By overpaying for the last house, the company would set a higher comparative sale (“comp”) that would in turn increase the values of the other houses the company had just bought, yielding the company a profit and raising home prices for other buyers. In a few days the video had 1.5 million views on TikTok. In comments and reactions, most assumed the company was Zillow, the largest real estate search platform in the U.S., and one with an iBuying arm, Zillow Offers.² Within two weeks, the video had surpassed 2 million views, was making the rounds on Twitter, and was being discussed by housing economists on financial news websites.³ Although the experts expressed doubt that Zillow could impact housing prices across the country, the pervading

¹ Gotcher, S. [@seangotcher] (2021, September 14). #housing. [video] Tiktok.

² By comparison, other large platforms, Realtor.com and Apartments.com, did not have an acquisition model. Redfin did have an iBuying arm, RedfinNow, that it shut down in November 2022.

³ For example, see (Poulter 2021).

sentiments on social media were anger and suspicion towards Zillow. This negative public sentiment was not surprising, given that the U.S. real estate market was at its peak in response to the pandemic, even as households struggled with rising daily expenses due to inflation and the prolonged pandemic. Additionally, large companies, like Amazon, Walmart, and Zillow, were seeing record profits.

On November 2, 2021, Zillow shut down Zillow Offers, its iBuying arm, explaining that “the unpredictability in forecasting home prices far exceeds what we anticipated” (Zillow Group 2021). The media coverage that followed this dramatic turn-around focused on Zillow’s price estimating algorithm with titles like “Zillow’s Algorithm-Fueled Buying Spree Doomed Its Home-Flipping Experiment” (Bloomberg) (Clark 2021) and “What went wrong with Zillow? A real-estate algorithm derailed its big bet” (Wall Street Journal) (Parker and Putzier 2021). Zillow did not respond to the TikTok video’s accusations of price manipulation, although their failure to make a profit iBuying seemed to be a clear indication that they could *not* influence house prices in their favor.⁴ The fact that the media seized on Zillow’s algorithm as source of its rise and fall illustrates how “the algorithm” has become the salient focus of media accounts and user understandings of large technology platforms.

What is meant by “the algorithm” is less clear, as some seem to use it variously to refer to the company, an embodiment of corporate power, or the entire platform; a symbol of the technical control over users, data, and the functional possibilities for the two. This synecdoche obscures the actual function of the algorithm (or algorithms), making it difficult to parse the critiques of the technical abilities of the algorithm(s) and the commentary on the technical might of the company, symbolized in the algorithm. This discursive ambiguity is compounded by the opacity of algorithms and algorithmic systems that make them hard to examine (Pasquale 2015; Burrell 2016; Bucher 2016). Broad statements about “the algorithm” therefore could be a response to lack of detail about the actual technical functionality and the theorized potential outcomes of the larger technical and political system that is a large technology company, like Zillow. Particularly in critical appraisals, grandiosity can seem like a strength, emphasizing the worst possible outcome or taking the theoretical impacts to the extreme in order to underscore the necessity of the critique, but effectively promoting the object of the appraisal as fantastically as those who benefit from its presumptive power (Vinsel 2021).

In this chapter, I take the case of the Zestimate and the hype surrounding Zillow’s exit from iBuying as an opportunity to explore an alternative to critique that hinges on hype.

⁴ Labor and supply shortages also extended the turn-around time for basic repairs for flipping houses (painting, minor repairs), potentially depleting the margin of profit.

I present methods for investigating proprietary algorithms that are grounded in what we *do* know: about how it functions, how users interact with it, and how it shapes a particular place (Las Vegas). To do this I draw on scholarship and methods from both Digital Geography and Critical Algorithm Studies. Digital Geography scholarship attends to algorithms that act on and enact space, often as part of “platform urbanism” (Sadowski 2020; D. Fields, Bissell, and Macrorie 2020; Leszczynski 2020) and its offshoot “platform real estate” (Shaw 2020). This literature discusses the presence of algorithms and addresses the discursive and political power drawn from their opacity and seeming objectivity (McElroy and Vergerio 2022; Safransky 2020; Hupalo 2021; Payne 2018), but does not extend the analysis into the function and role of any specific algorithm. In this perspective, an algorithm is a tool that is *used by* actors in society and space, and it is not considered something that is *acting on* society and space. The field of Science and Technology Studies (STS) accounts for the role of non-human actors, such as algorithms, influencing society. However, in these situated accounts of technology *place* is often absent, making Digital Geography and STS particularly complementary.

The subfield of Critical Algorithm Studies looks at algorithms from a sociotechnical standpoint, to understand how the technical and functional elements of algorithms are intertwined with the social imaginaries of the algorithm’s users, creators, and the public. Algorithms are often described as opaque “black boxes” because their inner workings are mysterious and inaccessible, but to stop at that allows this mystery to enhance the persuasive power that an algorithm wields as a tool of expertise (Pasquale 2015). Critical Algorithm Studies provides an alternate route, both through and around the algorithm. Bringing methods from anthropology, sociology and human and computer interaction (HCI), this interdisciplinary field provides examples of studying the algorithms “in practice” (Christin 2017), studying the people who create and work with algorithms (Seaver 2017), auditing the inputs and outputs of an algorithm (Burrell et al. 2019; DeVos et al. 2022), and examining the documentation of the companies (Bucher 2016).

Because the Zestimate is a machine learning algorithm the paper focuses on two concepts that are particularly relevant to machine learning algorithms – feedback loops and user folk theories. Machine learning algorithms are a subset of algorithms so called because they are “trained” on a dataset and then continue to “learn” and adjust according to accuracy parameters and human feedback.⁵ A feedback loop is a useful concept for

⁵ For a more detailed example of how a machine learning algorithm work, consider this example of a spam filter from Larson (2021): “The output is a binary yes or no: either an email is spam or it is not. Typically, the spam classification system is supervised by the user of the email account as he or she marks incoming emails as spam, sending them to the spam or junk folder. In the background, the machine learning system tags the emails that are positive examples of spam. After enough examples of spam are gathered, the system

explaining the dynamic nature of machine learning algorithms, particularly as they respond to user interactions with the algorithm. With the Zestimate, feedback loops explain how buyers and sellers influence the Zestimate and vice versa. Feedback loops also introduce the idea of how historical patterns of (dis)investment and segregation can be reproduced. User folk theories center users' understanding of an algorithm and can clarify how users interact with an algorithm. User folk theories reveal why the Zestimate fails to manipulate users. Users' skepticism and questioning of the Zestimate combined with the use of other non-Zillow information sources keeps users from giving the Zestimate any special weight, despite the allure of its artificial intelligence.

With the approaches from these two fields, I unearth concerns that the hyping critiques of Zillow and the Zestimate miss. Instead of focusing on the idea that Zillow (or any real estate platform) could control the U.S. housing market, I find mitigating evidence that shows some users are skeptical of the Zestimate, considering it just one more piece of information to weigh in their housing decisions. Additionally, in considering the feedback loops that the algorithm contributes to, I raise the concern that existing inequalities will be further encoded and made opaque through the algorithm's processing.

Literature

Algorithmic Systems & Geography

Algorithmic systems are increasingly being deployed in ways that have consequences for people and places, and thus are of concern to Geography scholarship. Platform urbanism accounts for the many digital platforms (a digital tool or system that brings together user activity and large streams of data, often in real-time) that have spatial effects. These interventions come from private companies like AirBnB, Yelp, Uber, and Google, but their effects become so pervasive that even those who do not directly use them cannot escape their influence. For example, AirBnB disrupts the rental housing market by removing units from long-term rental stock to be used instead for short-term stays (Wachsmuth and Weisler 2018), and increases the strain on public infrastructure (Jiao and Bai 2020). Google Maps redirects traffic through smaller side streets in neighborhoods that border highways, with negative impacts for the residents of those neighborhoods. The actions of these platforms are enabled by algorithms that sort, rank and recommend routes, sights, apartments, or restaurants. Algorithms are also responsible for these actions being scalable across many places and for the incorporation of so many data points.

trains itself using them and other incoming emails, creating **a feedback loop** that converges on the difference between acceptable emails and spam" (134).

Attention to spatial patterns and reordering illuminates how platforms like Yelp represent certain neighborhoods in ways that contribute to gentrification and other forms of preferential treatment for certain aesthetic and cultural choices (Zukin, Lindeman, and Hurson 2017). Drawing on the example of user-generated ratings on FourSquare, which has been connected to gentrification and increased living costs, Payne (2018) explains, “the users who sustain these platforms are working hard to evict themselves from the cities they’re mapping for free.” Here, it is the algorithm that enables the platform to extract value from users, and through the users, from the places they inhabit. The algorithm takes their input and uses it to adjust ratings, perhaps valuing the input of certain users more, or favoring reviews that contain certain key words.

Algorithms are also present in more technocratic tools, like economic development modeling software that predicts areas that will see the greatest return on investment, and property management tools that help landlords manage tenants and properties. Geography scholars have highlighted how these tools bring their own kind of influence to the existing power dynamics in urban planning and politics. Algorithmic systems are part of what Alvarez León & Rosen’s (2019) call the “rising ideology of technology” that transforms urban issues into technology issues. Safransky (2020) illustrates how “algorithmic planning” can be used to neutralize the political decisions of economic development spending by recasting them as pragmatic and data driven. McElroy and Vegerio (2022) show how landlords employ social imaginaries of “innovative” and “futuristic” technology to frame new surveillance technology as improvements.

An algorithm can be presented as a basic tool of convenience, ideal for managing large quantities of data or repetitive tasks. However, convenience for the landlord using algorithmic “proptech” (a portmanteau of property and technology) (D. Fields 2022; Shaw 2020) to manage multiple units and/or buildings, also means keeping tenants at a distance and under control. The inflexibility and absence of nuance that define algorithmic decision making translates into systematic violence against tenants who cannot reason with an algorithm (Fields 2022; McElroy and Vegerio 2022).

Critical Study of Algorithms

Science and Technology Studies (and Critical Algorithm Studies by extension) is compatible with (Social) Geography because the fields share an interest in the social and an epistemological commitment to situated or embodied knowledge. Where Geography is focused and specific in examining the role of space and place, STS is equally focused and specific in examining the role of technology. Therefore, bringing in some of the methods and work of STS, in this case specifically from Critical Algorithms, can extend the work of Geographers already engaged in studying digital elements.

The opacity or “black box” nature of algorithms is frequently raised as a challenge to studying and regulating algorithms (Citron and Pasquale 2014; D. Fields, Bissell, and Macrorie 2020). This refers to the fact that algorithms are often protected as proprietary secrets and require highly technical knowledge of computer science to be understood. This opacity is not experienced only by the researchers and policymakers who lack access to proprietary technology. As Burrell (2016) explains, even the computer scientists who built algorithms cannot fully comprehend their logic due to the large quantities of data that elude human reasoning:

When a computer learns and consequently builds its own representation of a classification decision, it does so without regard for human comprehension... the workings of machine learning algorithms can escape full understanding and interpretation by humans, even for those with specialized training, even for computer scientists (10).

There are a range of methods that have been successfully deployed to study algorithms despite these barriers. Seaver (2017) proposes using ethnographic approaches to look at algorithms and the people who create them. He describes this approach as studying algorithms “as culture” because “algorithms are not singular technical objects that enter into many different cultural interactions, but are rather unstable objects, culturally enacted by the practices people use to engage with them” (5). Bucher (2016) instructs us to look at “what is at stake in framing algorithms [as a black box], and what such a framing might possibly distract us from asking” (83). This can take the form of “speculative experimentation” with the algorithm, or examining public documents – patents, press releases and promotional materials – to reveal “norms and values that have been delegated to and materialized in a technology” (86). Gillespie (2014) similarly looks to the discursive and political role of the algorithm, such as when “algorithmic objectivity” is used to emphasize the expertise and knowledge of the algorithmic system.

An algorithmic audit (Sandvig et al. 2014) draws on the audit study developed by the U.S. Department of Housing and Urban Development (HUD) to identify racial discrimination by real estate professionals. An algorithmic audit similarly looks for disparate outputs based on known inputs. Depending on the algorithm being audited, the audit might work with users by interviewing them about their experience or collecting their data. Or an audit can send automated requests to an algorithm and scrape the results to look for patterns that indicate uneven treatment. ProPublica’s audit of the COMPAS pre-trial risk assessment algorithm used a similar approach, comparing the algorithm’s prediction with the actual outcomes for 10,000 defendants. Their findings demonstrated that Black defendants were incorrectly labeled as high risk at a higher rate, while White defendants were more likely to be mislabeled as low risk (J. Larson et al. 2016). Noble

(Noble 2018) similarly uses Google search results to show biases in the algorithm that return sexualized images for “Black girls” but do not for “White girls.”

Feedback Loops

Machine learning algorithms are frequently the type of algorithms used for classification and prediction. They are commonly used for the ranking, sorting, and recommending that shape user experience. The prevalence of machine learning algorithms and their dynamic nature make them especially relevant for methods of study that focus on their functionality. A feedback loop helps explain the “learning” element of machine learning algorithms (Larson 2021).

Often machine learning algorithms use data collected from user interactions – likes, saves, clicked links, etc. – as input for the “learning” to improve their outputs. This means that as machine learning algorithms rank and recommend outputs to users, the users are in turn training the algorithm with their responses. This is a feedback loop, inextricably linking user behavior to the algorithm.⁶

This feedback loop between user and algorithm is an example of reactivity, the phenomenon in which a measurement affects the behavior of the subject of measurement. Espeland and Sauder (2007) presented the example of law school rankings (in the U.S.) to illustrate how rankings shift individual and institutional behavior, redirecting resources to features that are known to influence rankings. Like teaching to the test, this reactivity compromises the metric, as the original concept (law school performance) becomes eclipsed by the features of the metric (e.g. acceptance rates). Histories of social statistics (Porter 1996; Scott 1998) present complementary historical evidence that as measurements are adopted and utilized by the government, over time people change their behavior in ways that reinforce these imposed rationalizations and categories. In Gotcher’s viral video he describes the reactivity of the residential real estate market, in which setting the price of one house with a sale can change the “real” value (and proposed prices) of neighboring houses.

Users & Folk Theories

Feedback loops and reactivity emphasize the importance of including the users and their use of the algorithm in a study of the algorithm’s function, since one leads back into the other. Users and other laypeople have their own explanations for an algorithm’s actions or outcomes that may or may not be accurate or related to the company’s explanation of the algorithm. As these explanations are shared, they become folk theories. Understanding

⁶ Not all machine learning feedback loops involve users, but in the cases where users do interact with machine learning algorithms this feedback loop is particularly useful to highlight.

users' folk theories can help explain how users interact with an algorithm. Some are not even aware of an algorithm working in the background, even when they are interacting with it. For example, Eslami et al. (2016) interviewed users about the Facebook feed and found that some were not aware that there was an algorithm choosing what posts to show. Among users who were aware of the algorithm there were several different theories to explain how the algorithm "decided" to show a certain post – some depended on the user's previous actions (following or liking past posts), but others gave full agency to the algorithm.

Burrell et al. (2019) analyzed the content of tweets about the Twitter algorithm to understand some of the circumstances in which users blame, explain, and try to control the algorithm. In blaming the algorithm for visibility issues (e.g. followers seeing a tweet because you liked it), users exposed their theories of how the algorithm worked. In trying to exert control over the algorithm, users acted on their theories, trying to be more legible to the algorithm, to encourage broader promotion of their message, and/or to be "algorithmically unrecognizable" (10). These actions included carefully not mentioning an account so as not to give it attention ("voldemorting" (van der Nagel 2018)) or using sharing screen shots rather than retweeting, again to deny attention. These varied interpretations of the algorithm and strategies for interacting with it show how the effects of an algorithm are not fixed or deterministic but can be greatly dependent on user perceptions.

Additionally, users may choose to ignore or reject an algorithm. In researching how journalists and lawyers work with algorithms "in practice," Christin (2017) discovered that these workers used "buffering strategies to minimize the impact of algorithms on their daily work, namely foot-dragging, gaming, and open critique" (2). These techniques could be as straightforward as not incorporating the algorithmic rankings in their work, or superficially engaging (e.g. using a "clickbait" title to earn a higher engagement ranking). Using ethnographic observation and interviews, Christin contrasted the workers' perspectives with their managers' enthusiasm and belief in the transformative impact of algorithms in their workplaces. Noticing these differences in the framing of algorithms provides "an important empirical check against the dominant and all-encompassing rhetoric of algorithmic power" (Christin 2017, 2).

In this chapter, I focus on one specific algorithm, Zillow's Zestimate, to demonstrate a close reading of how the platform presents the algorithm, how the users make sense of the algorithm, and how media discusses the algorithm. Triangulating our understanding of the algorithm in this way does not completely break through the opacity of the algorithm's methods and corporate protection, but it refocuses possible critiques from those that hype the algorithm's (and Zillow's) influence and power in the market to

instead illuminate the ways in which the Zestimate could maintain or exacerbate inequalities in the housing market.

What is the Zestimate?

First, let's explore what we know about the Zestimate according to Zillow. The Zestimate⁷ is the machine learning algorithm that Zillow uses to estimate or predict the value of residential properties, including those not listed for sale. Zillow explains a Zestimate as an: estimated market value for a home, computed using a proprietary formula including public and use-submitted data, such as details about a home (bedrooms, bathrooms, home age, etc.), location, property tax assessment information and sales histories of the subject home as well as other homes that have recently sold in the area ("How Much Is My House Worth?" 2021).

The Zestimate dates to the company's origin in 2006 and was a key feature that drew in users and distinguished Zillow from its competitors both on- and offline. Stan Humphries, the long-time Chief Analytics Officer at Zillow recalled, "So many people visited Zillow on our first day to check out their home values that the website crashed" ("What Is a Zestimate?" 2020). Zillow's competitors, like Redfin and Realtor.com, eventually also offered price estimates, following Zillow's lead, but never managing to overtake Zillow's market share.⁸

Today, most listings on Zillow show the Zestimate right below the asking price, next to the "for sale" indicator at the top of a listing (see Figure 1). The instant accessibility of the Zestimate sets it apart from the traditional appraisal process which happens as part of a sale, although its inputs – quantitative measures of the home (size, age, beds and baths), its location, sales and tax history, and similar information for nearby properties – are not so different from the factors a realtor or appraiser would use. An appraisal is based on a comparison of a property's features to similar properties ("comps") in the area, adjusted according to recent local sales and market trends. The appraisal process is based on the expert's (the realtor or appraiser) assessment of the property. By contrast, the Zestimate's

⁷ In this chapter I refer to the algorithm as "the Zestimate" and an output for a single property is that property's "Zestimate" or "a Zestimate". This naming procedure tries to follow Zillow's practice on its website and in promotional material. This idea that the Zestimate is a singular algorithm, rather than an output of many, overlapping or cascading algorithmic processes, is likely a simplification, but since this is how it is described by the company and then discussed by the media and users, I follow this discursive approach.

⁸ Zillow has 236 million unique monthly users (Zillow Group 2022), compared to 51 million at Redfin and 103 million at Realtor.com ("Realtor.com® Celebrates the Individuality of Buyers with Its New 'Homes for Every Home Buyer' Campaign" 2021).

valuation offers a sense of “algorithmic objectivity” (Gillespie, 2014) and can operate at a much larger scale than a human realtor.

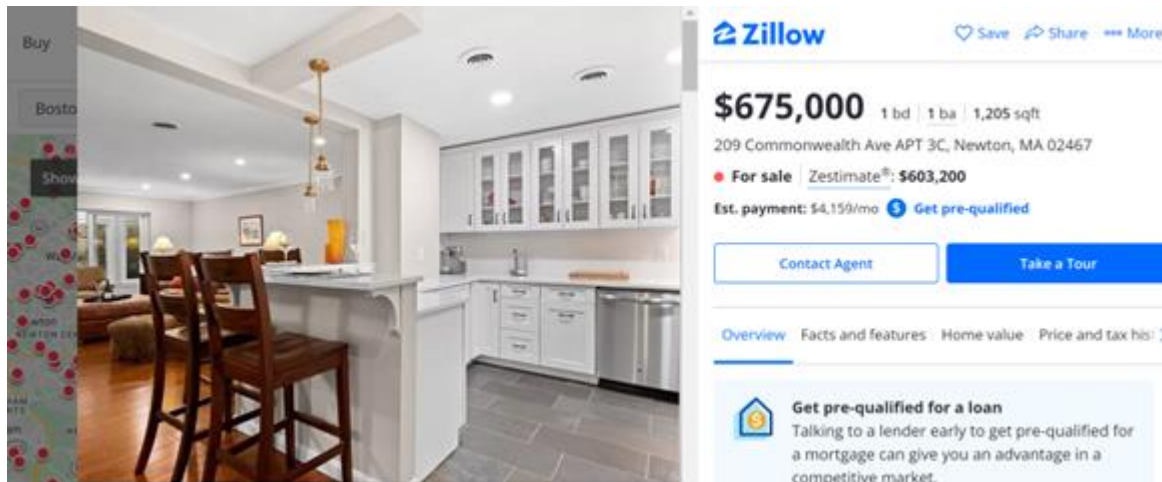


Figure 2 A screenshot of a listing on Zillow, notice the Zestimate just below the address.

How does it work?

Since 2006, the Zestimate has been updated and improved many times, with major updates publicized in press releases and on the Zillow AI Research blog. The first big overhaul came in 2017 when Zillow launched a \$1 million competition to overhaul the Zestimate algorithm. This tactic has been employed by other large technology companies (e.g. Netflix) as a public way of announcing plans to advance their technical methods and simultaneously attract “the brightest minds in data science” to help bring their technology to the bleeding edge of innovation (“Zillow Prize Winners” 2020). In early 2019, another blog post announced the resulting updates to the Zestimate which included “computer vision to analyze photos of a home to understand not just its facts and figures, but its quality and curb appeal” and “training convolutional neural networks with millions of photos of homes on Zillow” (Humphries 2019). These technical details provide some insight into the inner workings of the algorithm. Neural networks are a kind of machine learning that have been promoted as mimicking the human brain (“What Is a Neural Network?” 2021). However, neural networks often use unsupervised learning, which means there is less human (computer scientist) involvement with the training of the algorithm. Instead, uncategorized data are fed into the algorithm, and it devises means of sorting the data on its own. These algorithms are especially hard to explain because the steps they take to reach the output are not explainable in a human sense (Burrell 2016). So, while the blog post anthropomorphizes the algorithm (“to understand... its quality and curb appeal”) to make it understandable to the general audience of Zillow users, investors, and advertisers, exactly how the Zestimate makes inferences with “millions of photos” is likely less straightforward.

The Zestimate is trained to predict a certain outcome, the sale price, with a certain level of accuracy compared to the actual sale price. With the 2019 updates to the algorithm, the Zestimate is described as “more accurate than ever” with a “median error rate of less than 2 percent for homes listed for sale” (Humphries 2019). The accuracy was so trusted by Zillow that in February 2021 a press release announces that Zillow would now use the Zestimate to make cash offers on houses in 20 markets, as part of the I-buying arm, Zillow Offers (“Zillow Starts Making Cash Offers for the Zestimate” 2021). In June 2021, another press release celebrated the “New Neural Zestimate” that technically seemed similar to the 2019 updates, but now included accuracy improvements for off-market properties through the incorporation of “deeper history of property data such as sales transactions, tax assessments and public records” (“Zillow Launches New Neural Zestimate” 2021).

The Icarus Moment: Zillow’s I-Buying Exit

When Sean Gotcher’s TikTok video went viral in September 2021, Zillow’s I-Buying practice had been slowly ramping up for several years. Zillow began buying properties directly with Zillow Offers in April 2018, beginning in Phoenix, AZ and Las Vegas, NV. By the fall of 2021 Zillow Offers was active in 25 markets. In those markets, buyers could even search for Zillow-owned homes. Like other I-Buyers, Zillow only targeted a small and specific slice of the national real estate market: in June 2021, Zillow estimated that about 900,000 homes were eligible for that cash offer via Zestimate, compared to the 104 million homes that Zillow had Zestimates for across the U.S. (“Zillow Launches New Neural Zestimate” 2021). However, for the markets where Zillow was active, like Las Vegas, the opportunity for sellers, and the competition for buyers, was felt deeply. In an already hot market where offers over asking price were common, and all cash offers came not just from Zillow, but also from institutional buyers, the average home buyer who planned to use a mortgage to buy a property was at a disadvantage.

The viral TikTok video was the first public crack in Zillow’s iBuying façade, although their quarterly earnings reports showed that they had not yet made a profit from iBuying despite continuing to expand their inventory. The biggest peak in Zillow’s iBuying follows the February 2021 press release announcing the use of the “New Neural Zestimate” for iBuying (see Figure 3). When Zillow announced their exit from iBuying on November 2, 2021, Zillow’s co-founder and CEO Rich Barton seemed to blame the algorithm in a press release for investors, stating that “the unpredictability in forecasting home prices far exceeds what we anticipated” (Zillow Group 2021).



Figure 3 A chart showing the Zillow Offers Inventory. The gray box highlights the period after the release of the updated Zestimate and the announcement that it will be used to make cash offers.

Source: Author, data: Zillow financial statements

The media readily blamed the Zestimate for Zillow’s iBuying failure as well (see for example: Clark 2021; Parker and Putzier 2021). It made a strong narrative – tech company putting too much faith in their tool – and conveniently evaded topics that might bring customer blowback (corporate greed) or a broader critique of the sector (large-scale real estate investing). The Zestimate remains a key element of Zillow listings, but it has not been highlighted in Zillow research and PR posts, nor has it received any (public) major updates.

Feedback Loops

With the understanding that the Zestimate is a machine learning algorithm, a further exploration of the feedback loops that exist between the algorithm and the world that it measures reveals how interdependent the Zestimate, its users, and housing transactions are. First, the most obvious feedback loop is between the Zestimate and the sale price of a home. This shows that the Zestimate can influence sales and listing prices, but that the sales and listing prices also influence the Zestimate, meaning that no one is in control of the others. Next, taking a step back, I consider what the Zestimate is built on top of – the data that represent real estate, property, and space (and the people that occupy that space) in the U.S. – and what this can mean in terms of biases that could be encoded in the Zestimate. Finally, I present the hypothetical application of user interaction data and what it could mean as another source of input data for the Zestimate.

The main concern with feedback loops is whether the feedback can shift the algorithm in unanticipated ways, perhaps reproducing biases, skewing results, or

otherwise incrementally shifting the algorithm as it ‘learns’ from potentially problematic inputs.

Price Reactivity: The Obvious Feedback Loop

In the simplest sense the Zestimate is a feedback loop that learns from comparing its past performance to the actual sale prices of properties and readjusting to improve its accuracy. Because the listing price and sales price of a property are inputs to the algorithm, the actions of sellers and buyers are part of that feedback loop. In concept, a seller sets a price that they think is fair, and a buyer either accepts that price or counters with their offer until the buyer agrees. With the Zestimate, there is a third actor. The Zestimate has a price for an off-market property that the seller may consult when setting the listing price. Then, the Zestimate recalculates using the new listing price as input. A buyer can look at the listing price and the Zestimate when considering their offer. Finally, when the property is sold, the Zestimate has yet another input to adjust its model for the next properties. Figure 4 illustrates this feedback loop.



*Figure 4 A diagram of the feedback loop between the Zestimate, the sale price and the listing price.
Source: Author*

Fu, Jin and Liu (2022) demonstrated this feedback cycle and investigated the extent to which buyers and sellers interacted with the Zestimate. They scraped real-time Zestimates for listed properties before and after sales in Boston, Austin, and Pittsburgh. While they did find evidence for the interaction between buyers, sellers and the Zestimate, they found that this interaction **does not lead** to endlessly increasing prices. They explained the absence of unchecked price increases with two hypotheses. First, they hypothesized internal checks in the Zillow interface that suppressed the Zestimate for a property when it falls outside a certain confidence interval. This is confirmed by the fact that Zillow does not show Zestimates for some properties, and when a Zestimate is far off from a listed price Zillow adds a note drawing the user’s attention to this. Second, the authors hypothesized that users adjust their faith in the Zestimate when it seems to not

align with the listing and sale prices of similar properties in the vicinity. In other words, the users perform their own rough appraisal to check the Zestimate. (This is supported by the user folk theories discussed in the next section.)

If the Zestimate is interacting with the buyers' and sellers' prices, then it is not an outside measurement or prediction, it is a variable in the overarching formula. This is a classic example of reactivity, where the metric (the Zestimate) affects the object of its measurement (the sale price), and actors (buyers and sellers) may adjust their behavior to follow the metric. In their study of law school rankings Espeland and Sauder (2007) discuss how the accuracy of a ranking is "threatened by reactivity" (7); in other words, the ranking supersedes the concept it is trying to measure. The Zestimate is not so much predicting the sale price but playing a part in setting it. Yet, Zillow (and media coverage) focus on how "accurate" the Zestimate is by comparing it to the final sale price of properties by city. Las Vegas makes a useful case for investigating the idea of the Zestimate's accuracy because it is one of a few major metropolitan areas where the Zestimate is more accurate (1.66%) than the national average (1.9%) ("What Is a Zestimate?" 2020).

Las Vegas is a city built on speculation (the real estate version of prediction, where market needs are predicted with developments). Most of its residential properties were developed by real estate prospectors in big master-planned communities (Gottdiener et al, 1999). This development process accounts for the large swaths of single-family homes that look nearly identical, a defining feature of the Las Vegas residential property landscape. This regularity – of design, year built, location – makes these houses especially predictable in terms of sale and rental value, making them prime material for investors, institutional buyers, and eventually, pricing algorithms (Buchak et al. 2020).

Predictability does not guarantee stability: Las Vegas "experienced one of the sharpest patterns of price appreciation and collapse" during the early 2000s housing bubble and the following sub-prime mortgage crisis in 2008, leading to one of the highest rates of foreclosure in the U.S. following the 2008 collapse (Mallach 2014, 771). Home values only returned to the 2006 high at the peak of the pandemic housing rush between May and June 2021 according to the Case-Shiller Index.⁹ Investors and corporate buyers returned to profit from the foreclosure deluge. A study of all single-family home and condo purchases in 2010 in four zip codes "representing low- to middle-level housing market subareas with a combined 2010 population of approximately 211,000" found that "53% of all buyers of detached single-family houses and 68% of all buyers of condominium units were non-owner-occupant buyers" (Mallach 2014, 773). Foreign investors and large corporate buyers such as Blackstone and Colony Capital also took advantage of this

⁹ For details and data see (LLC 2024).

buyers' market (Mallach, 2014). Today, corporate landlords dominate the single family and apartment rental markets in Las Vegas, leaving tenants with few options that avoid large application fees, tenant screening, and ever-rising rents (D. Fields 2022; Spears 2022).

Gotcher made his viral TikTok video in Las Vegas, inspired by trends he was seeing as a local realtor. Perhaps being in Las Vegas made him more sensitive to the signs of speculation. The Zestimate is simply another form of speculation, only in being viewable to buyers and sellers, it can influence them more directly than the predictions that guide investors and speculative developers. Therefore, the supposed accuracy of the Zestimate in Las Vegas says more about the city than it does about the algorithm. Such predictability could explain why Zillow began their I-buying in Las Vegas.

Historical Context: The Feedback Loop in the Baseline Data

The Zestimate is the latest chapter in a long-running feedback loop of the social and spatial history of the U.S. that is represented in the spatial data that underpin real estate transactions, property records, and assessment techniques. From modern appraisal science to the early maps of manifest destiny, the technologies used to measure, assess and represent the lands that became the United States have been wielded to create power and profit for a powerful minority group: from early European settlers to the first White male citizens of the U.S. to contemporary landowners (but especially the large, corporate landowners) (Desiree Fields 2024).¹⁰ To create value these tools must enclose and quantify space and use concepts of difference and scarcity to make some piece more valuable than others. For example, Taylor (Taylor 2019) and Zaimi (2020) both argue that race was operationalized to create value in U.S. property markets through appraisal science (Zaimi 2020), federally endorsed definitions of risk (Taylor 2019), and as a threat to existing property value. For example, “block breaking” realtors would use the threat of incoming Black and Brown households to convince White home owners to sell their property for a low price, and then sell those properties at a profit to the Black and Brown households (Rothstein 2017). The Zestimate is the product of appraisal science, holding these origins in its intellectual DNA if not literally in its code.

Understanding these processes as feedback loops emphasizes how each stage builds on the past, making it difficult to delineate the end of one and the beginning of another. Indeed, scholarly disagreement persists as to the causal relationship between red-lining maps and discriminatory mortgage and real estate practices, despite all having demonstrably deleterious impacts on access to housing for Black Americans (Markley

¹⁰ Recent events (in April/May 2024) remind us that universities are among those few and powerful large landowners, and the state (embodied by the police) is only too willing to reinforce those property rights at the expense of citizens' other rights – of free speech, of freedom from unlawful search and arrest.

2024). We can see the persistence of these feedback loops in the persistence of the racial wealth gap¹¹ and disparities in cities that map to racialized neighborhoods such that Whiter, wealthier areas have fewer pedestrian deaths (Sanders and Schneider 2022), more mature street trees (Burghardt et al. 2023), lower “urban heat island intensity” (Hsu et al. 2021), and less air pollution (Thind et al. 2019). The ideology of colorblind racism might try to dismiss these variables as unrelated or naturally occurring, but collectively the pattern of disinvestment and inequity is understood to be the outcome of environmental racism (Pulido 1996).¹²

How can the value of a location be calculated separately from these histories of inequity, discrimination, and disinvestment? Some would say it is impossible. Junia Howell, a sociologist at the University of Illinois Chicago explained, “We can have all the data in the world — every single appraisal for the last 200 years could be accessed... If we are still using the same assumptions about space and race, we’re going to perpetuate the same problem” (quoted in (Mock 2023)). Yet others, including the Urban Institute, suggest that with the proper training, automatic valuation models (AVMs), of which the Zestimate is an example, could be less biased than human appraisers (Neal et al. 2020). In 2023, a joint taskforce in HUD proposed a new set of guidelines for the appraisal industry, specifically focused on reducing racial bias in AVMs (Mock 2023). However, real estate platforms like Zillow fall in a gray area in terms of regulation. The Zestimate is an appraisal model that operates outside of explicit lending activities (compared to an AVM used by a mortgage lender or bank). While Zillow does offer lending services that would be regulated as such, the Zestimate operates outside the scope of Zillow’s Home Loans, viewable to anyone who uses the site or the app.

Due to the opacity of the Zestimate’s methods and corporate ownership, it is difficult to assess whether these inequities are replicated in the Zestimate’s calculations. Debiasing of datasets is possible, but it requires a definition of that bias and an objective of removing it. Technology companies have shown a troubling preference for calling replicated racial bias a “glitch” and only addressing the underlying bias when there is an abundance of proof or public attention (Noble 2018; Raji and Buolamwini 2022).

¹¹ The racial wealth gap describes the persistent economic distribution in the U.S. where “the average Black and Hispanic or Latino households earn about half as much as the average White household and own only about 15 to 20 percent as much net wealth” (Aladangady and Forde 2021). This is attributed to income inequality and wealth inequality (both in quantity and types of wealth). Housing makes up a considerable part of most people’s wealth (it is the largest asset for the 20th – 80th percentile of households according to a 2019 Survey of Consumer Finances (referenced in Aladangady and Forde 2021)).

¹² Richardson (2022) makes a similar argument for how the racial bias in (American) society impacts the field of computer science, the development of data-driven tools and the datasets.

User Interaction Data: A Hypothetical Feedback Loop

A third *possible* feedback loop involves user interaction data. Zillow does not list user interaction data as an input to the Zestimate, although it is possible that these data are part of the Zestimate that is kept proprietary. Zillow does admit to collecting user interaction data to “improve targeting” of search results (showing you what you want to see).

User interaction data are created by the actions users take on a platform, such as clicking, liking/saving, and using search terms or filters. Other technology platforms like Google and Facebook employ user interaction data to “improve” their products (using the promise of convenience and better functionality to quell users’ concerns about their data privacy) and have shown that user interaction data can be highly lucrative for targeted advertising. A particular benefit is that user interaction data are free to the company and uniquely theirs (unless they are sold to other companies). These data are the key to “surveillance capitalism” (Zuboff 2019). As Zuboff explains with the example of Google’s search algorithm, “[Google] thus created out of thin air and at zero marginal cost an asset class of vital raw materials derived from users’ non-market online behavior.”

In Gotcher’s TikTok video he suggests, “everybody goes on and searches for houses when they’re bored and stuff. So that company, they just sit back, and they collect all the data. They just know what zip code is looking at what zip code, and how much those people can afford.” He is correct in the sense that interaction data gathered from Zillow’s extremely high number of users would be a unique advantage, and could indicate popular zip codes, or search terms, or types of houses. As much as price is a measure of desirability, it is conceivable that these user-generated indicators of popularity could be useful inputs for the Zestimate. In such a case Zillow could contribute to uneven patterns of valuation and attention, like the gentrification that Zukin et al. (2017) trace to the Yelp algorithm’s uneven promotion of some neighborhoods over others.

While the existence of this feedback loop is hypothetical, it is important to keep in mind as the behavior and understanding of users is considered in the next section.

User Folk Theories of the Zestimate

Users’ understandings of an algorithm like the Zestimate can affect how they interact with that algorithm, including whether they are aware of its existence (as in the case with algorithms that operate behind the scenes) and how much they trust its output. After all, the Zestimate is not binding; it is only a suggestion of information, made meaningful by a user’s integration of it into their actions.

Many of the people I interviewed in Las Vegas did not put much thought into the Zestimate. If they considered it at all (to renters it can seem irrelevant), it was usually with a grain of salt. Perhaps this was a reaction to the volatile market that had been steadily increasing since the start of the pandemic.¹³ It was also likely influenced by Zillow's recent and very public exit from I-buying, supposedly because of the Zestimate's failure, which happened just before I started conducting home-seeker interviews in Las Vegas. In a typical response to a question about the Zestimate, one interviewee explained: "I did look at [the Zestimate] just to see, but I kind of relied more on my realtor... because I heard that Zillow isn't really reliable in terms of how much things are worth" (V12).

During exploratory interviews with realtors at the beginning of this project (in mid-2020) the Zestimate came up frequently when I asked about their experiences working with (or against) information from real estate platforms. Realtors had reason to project skepticism about the tools that could be seen as a replacement for their expertise. Still, their responses showed a broader understanding of these platforms, including the Zestimate. R5, who had worked in Las Vegas real estate for 14 years, gave a comprehensive response:

It's really hard for a consumer, especially if the price that they find on Zillow is to their favor... They just think that's the real number. But there's so many factors that go into evaluating a property's value that you can't just base it on a computer generating a value for you. It's very generic and it's very like an average of the sales in the community. So sometimes it's correct, sometimes it's not. Even when you have a real estate agent analyzing the real value of your property, it can be hard to convey to the buyer, to the seller. (R5)

He presents the Zestimate as another piece of information he has to explain to his client. He is sympathetic with why a client might want to believe in a favorable estimate, but in the end, it is the realtor who can come up with "the real value." This realtor and the searcher quoted above both treat the Zestimate as **another piece of information** about a listing. One might imagine that the technical spectacle of an algorithm (Ames) and the artificial intelligence that powers it could make users see the Zestimate's prediction as true or more persuasive. And yet, these interviews do not show such reverence.

A slightly different folk theory takes a more complex understanding of the Zestimate. This theory builds out an understanding of how the Zestimate arrives at its prediction as **an automated appraisal**. For example, consider these comments on a

¹³ Recall that interviews in Las Vegas took place from November 2021 to April 2022, just after the peak of the real estate market during the pandemic in the summer of 2021.

January 2022 Reddit thread about increasing home prices in Las Vegas. The discussion quickly turned to the question of the Zestimate's accuracy. Although the participants in the discussion have varying levels of faith in the Zestimate, they all operate with the theory that the Zestimate is an automated version of the human appraisal process:

- A: How accurate do you think Zillow's numbers are on home values?
- B: Extremely rough ballpark at best. Any time I do home valuations for prospective clients they are never the same whether they are buying or selling. Zillow can be off by tens of thousands or even hundreds. They can't tell what has been done to a house for better or worse via algorithm.

Their homebuying branch went out of business late last year so that should tell you how confident they are in their own numbers.

- C: You're saying you alone can do better than the data crunching faculties of the likes of Zillow, Redfin, OpenDoor, etc. in the long term?
- B: Any Realtor worth their salt can provide a better estimate than an algorithm that doesn't factor in property condition and upgrades.
- C: You just answered the question. It's simply a matter of collecting and integrating more data, which machines and algos are excellent at compared to humans. The reality is that they already have images of almost every damn home in the country. If not at the moment, I'd bet it's just a matter of time before they incorporate it, if not already in the works
- B: They've been trying to figure out the algorithm for Vegas for years. Pictures are subjective and until machines can start critiquing art it's going to be pretty difficult for an algorithm to differentiate if carpet is in good condition on a cell phone photo vs a high resolution photoshopped picture. If these companies were anywhere near, appraisers would be out of the job.
- D: My dad was a residential real estate appraiser. That's literally what he did when doing an appraisal. 3 similar properties in the neighborhood that are currently for sale and 3 that have been sold recently.

These Redditors assess their observations of the Zestimate's performance by describing how well it is able to do the work of a human appraiser: comparing similar listings, assessing detail for quality. The algorithm's competitive advantage (particularly for Speaker C) is the scale of data that it can include. The algorithm's disadvantage (argues B) is the difficulty of discerning differences in the details. No one suggests that the algorithm may take a completely different path to arrive at a price estimate. This logic echoes Zillow's own description of the Zestimate's ability that emphasizes its ability to recognize details like granite countertops.

These folk theories suggest a tepid middle ground – the users do not either firmly reject or wholeheartedly believe the Zestimate's price prediction. This may be partly

because the folk theories are so grounded in the familiar practices of real estate and housing search – the Zestimate is just a slightly newer piece of information or appraisal. Understanding the Zestimate in familiar terms seems to make users more comfortable critiquing it. These folk theories are compatible with Fu, Jin and Liu’s (2022) hypotheses that users will not follow the Zestimate if it is widely off base from other indicators (like other nearby properties). Both indicate that users’ trust their own ability to assess the Zestimate.

Zillow and its fellow real estate platforms do not encompass the full extent of online housing search from the perspective of the searcher. As explored in Chapter 3, home-seekers use a range of other online platforms to gather information and recommendations over the course of their housing search, including social media – Facebook, Reddit and Twitter – and spatial data platforms – Yelp, Google Maps, Streetview and Reviews. Understanding how Zillow fits into this wider information landscape helps explain how users are comfortable challenging and contextualizing information from Zillow, including the Zestimate. These searches did not replace the use of Zillow and other real estate platforms, but they informed the searchers before and during their use of real estate platforms.

Conclusion: Critique without Hype

An algorithm can seem like a mysterious, almost magical, tool that predicts the future by incorporating more information than a human could take in and comprehend and applying mathematical techniques that most people can barely understand (Ames 2018; Burrell 2016). In fact, the opacity of algorithms can shield them from scrutiny and bolster their persuasive power (Pasquale 2016). A lack of specificity about how the algorithm functions can enable hype, particularly the kind that originates with the company developing the technology, that emphasizes potential wins and minimizes known weaknesses (Narayanan, 2019). The prevalence of hype around AI technologies, of which machine learning algorithms are just one example, is well documented (for some examples see Larson 2021; Raji et al. 2022; Narayanan and Kapoor 2024). Luckily, the field of critical algorithm studies provides a path for evaluating these algorithms despite their opaque nature, dispelling hype in the process.

In the case of the Zestimate, the speculative power of the algorithm hinges on its performance *and* to what extent market actors believe it. Both the user folk theories and the statistical analysis by Fu, Jin, and Liu (2022) show that users feel confident pushing back on the Zestimate with their own understandings of real estate. They do consider the Zestimate, but as another piece of information, rather than one that trumps all else. Ironically, it was Zillow’s I-buying practice that seemed to take the Zestimate’s hype at face

value, leading them to acquire inventory at high rates in 2021, at the peak of the pandemic real estate boom.

Although the approaches I have presented in this chapter cannot fully expose or explain the inner workings of a proprietary algorithm, they attempt to chip away at the unknowns so we are left with a clearer understanding of what remains unconfirmed or untested (e.g. the use of user interaction data in the Zestimate) and what we can triangulate through public documentation, observation of the product and its users, and technical knowledge of similar products. In gaining specificity, we also avoid hyping the potential abilities of the algorithm – hype that could encourage the very speculative frenzy that we wish to avoid.

- Alandangady, A., and A. Forde. 2021. "Wealth Inequality and the Racial Wealth Gap, FEDS Notes. Washington, DC: Board of Governors of the Federal Reserve System. October 22, 2021."
- Alvarez León, Luis F., and Jovanna Rosen. 2019. "Technology as Ideology in Urban Governance." *Annals of the Association of American Geographers*. Association of American Geographers 110 (October): 497–506.
- Ames, Morgan G. 2018. "Deconstructing the Algorithmic Sublime." *Big Data & Society* 5 (1): 2053951718779194.
- Buchak, Greg, Gregor Matvos, Tomasz Piskorski, and Amit Seru. 2020. "Why Is Intermediating Houses so Difficult? Evidence from iBuyers." Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w28252>.
- Bucher, Taina. 2016. "Neither Black Nor Box: Ways of Knowing Algorithms." In *Innovative Methods in Media and Communication Research*, edited by Sebastian Kubitschko and Anne Kaun, 81–98. Cham: Springer International Publishing.
- Burghardt, Karin T., Meghan L. Avolio, Dexter H. Locke, J. Morgan Grove, Nancy F. Sonti, and Christopher M. Swan. 2023. "Current Street Tree Communities Reflect Race-Based Housing Policy and Modern Attempts to Remedy Environmental Injustice." *Ecology* 104 (2): e3881.
- Burrell, Jenna. 2016. "How the Machine 'Thinks': Understanding Opacity in Machine Learning Algorithms." *Big Data & Society* 3 (1): 205395171562251.
- Burrell, Jenna, Zoe Kahn, Anne Jonas, and Daniel Griffin. 2019. "When Users Control the Algorithms: Values Expressed in Practices on Twitter." *Proc. ACM Hum.-Comput. Interact.*, 138, 3 (CSCW): 1–20.
- Christin, Angèle. 2017. "Algorithms in Practice: Comparing Web Journalism and Criminal Justice." *Big Data & Society* 4 (2): 2053951717718855.
- Citron, D., and Frank A. Pasquale. 2014. "The Scored Society: Due Process for Automated Predictions." *Washington Law Review* 89 (March): 1.
- Clark, Patrick. 2021. "Zillow's Algorithm-Fueled Buying Spree Doomed Its Home-Flipping Experiment." *Bloomberg Businessweek*, November 8, 2021. <https://www.bloomberg.com/news/articles/2021-11-08/zillow-z-home-flipping-experiment-doomed-by-tech-algorithms>.
- DeVos, Alicia, Aditi Dhabalia, Hong Shen, Kenneth Holstein, and Motahhare Eslami. 2022. "Toward User-Driven Algorithm Auditing: Investigating Users' Strategies for Uncovering Harmful Algorithmic Behavior." In *CHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM. <https://doi.org/10.1145/3491102.3517441>.
- Espeland, Wendy Nelson, and Michael Sauder. 2007. "Rankings and Reactivity: How Public Measures Recreate Social Worlds." *The American Journal of Sociology* 113 (1): 1–40.
- Fields, D. 2022. "Automated Landlord: Digital Technologies and Post-Crisis Financial Accumulation." *Environment and Planning A: Economy and Space*. <https://journals.sagepub.com/doi/abs/10.1177/0308518X19846514>.

- Fields, D., D. Bissell, and R. Macrorie. 2020. "Platform Methods: Studying Platform Urbanism Outside the Black Box." *Urban Geography*.
<https://www.tandfonline.com/doi/abs/10.1080/02723638.2020.1730642>.
- Fields, Desiree. 2024. "Digital Experiments with Landed Property: Robots, Race, and Rent." *Tijdschrift Voor Economische En Sociale Geografie = Journal of Economic and Social Geography = Revue de Geographie Economique et Humaine = Zeitschrift Fur Okonomische Und Soziale Geographie = Revista de Geografia Economica y Social* 115 (3): 329–45.
- Fu, Runshan, Ginger Zhe Jin, and Meng Liu. 2022. "Human Algorithm Interactions: Evidence from Zillow.com." Working Paper Series. National Bureau of Economic Research. <http://www.nber.org/papers/w29880>.
- Gillespie, T. 2014. "The Relevance of Algorithms." https://direct.mit.edu/books/edited-volume/chapter-pdf/2273545/9780262319461_cai.pdf.
- "How Much Is My House Worth?" 2021. Zillow. November 17, 2021.
<https://www.zillow.com/how-much-is-my-home-worth/>.
- Hsu, Angel, Glenn Sheriff, Tirthankar Chakraborty, and Diego Manya. 2021. "Publisher Correction: Disproportionate Exposure to Urban Heat Island Intensity across Major US Cities." *Nature Communications* 12 (1): 4104.
- Humphries, Stan. 2019. "Introducing a New and Improved Zestimate Algorithm - Zillow Tech Hub." Zillow. June 27, 2019. <https://www.zillow.com/tech/introducing-a-new-and-improved-zestimate-algorithm/>.
- Hupalo, Masha. 2021. "The Politics of Zestimate: Merging Technology and Real." *Radical Housing Journal* 3 (2): 215–19.
- Jiao, Junfeng, and Shunhua Bai. 2020. "An Empirical Analysis of Airbnb Listings in Forty American Cities." *Cities* 99 (April). <https://doi.org/10.1016/j.cities.2020.102618>.
- Larson, Erik J. 2021. *The Myth of Artificial Intelligence*. Harvard University Press.
- Larson, Jeff, Julia Angwin, Lauren Kirchner, and Surya Mattu. 2016. "How We Analyzed the COMPAS Recidivism Algorithm." ProPublica. May 23, 2016.
<https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm>.
- Leszczynski, Agnieszka. 2020. "Glitchy Vignettes of Platform Urbanism." *Environment and Planning. D, Society & Space* 38 (2): 189–208.
- Llc, S&p Dow Jones. 2024. "S&P CoreLogic Case-Shiller NV-Las Vegas Home Price Index." <https://fred.stlouisfed.org/series/LVXRSA>.
- Mallach, Alan. 2014. "Lessons From Las Vegas: Housing Markets, Neighborhoods, and Distressed Single-Family Property Investors." *Housing Policy Debate* 24 (4): 769–801.
- Markley, Scott. 2024. "Federal 'Redlining' Maps: A Critical Reappraisal." *Urban Studies* 61 (2): 195–213.
- McElroy, Erin, and Manon Vergerio. 2022. "Automating Gentrification: Landlord Technologies and Housing Justice Organizing in New York City Homes." *Environment and Planning. D, Society & Space* 40 (4): 607–26.

- Mock, Brentin. 2023. "Reforms to Home Appraisal Bias Target Algorithms and Tech." *Bloomberg News*, June 12, 2023. <https://www.bloomberg.com/news/articles/2023-06-12/biden-wants-to-regulate-home-appraisal-algorithms-to-reduce-bias>.
- Nagel, Emily van der. 2018. "'Networks That Work Too Well': Intervening in Algorithmic Connections." *Media International Australia* 168 (1): 81–92.
- Narayanan, Arvind, and Sayash Kapoor. 2024. *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference*. Princeton University Press.
- Neal, Michael, Sarah Stochak, Linna Zhu, and Caitlin Young. 2020. "How Automated Valuation Models Can Disproportionately Affect Majority-Black Neighborhoods." *Washington, DC: Urban Institute*, December. <https://www.urban.org/research/publication/how-automated-valuation-models-can-disproportionately-affect-majority-black-neighborhoods>.
- Noble, Safiya Umoja. 2018. *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York, NY: NYU PRESS.
- Parker, W., and K. Putzier. 2021. "What Went Wrong with Zillow? A Real-Estate Algorithm Derailed Its Big Bet." *Wall Street Journal*, November 17, 2021. <https://www.wsj.com/articles/zillow-offers-real-estate-algorithm-homes-ibuyer-11637159261>.
- Pasquale, Frank. 2015. *The Black Box Society: The Secret Algorithms That Control Money and Information*. Cambridge, MA and London, England: Harvard University Press.
- Payne, W. 2018. "Crawling the City." *Logic Magazine*. https://scholar.google.ca/scholar?cluster=2250979320357726575&hl=en&as_sdt=0,5&sciodt=0,5.
- Porter, Theodore M. 1996. *Trust in Numbers*. Princeton University Press.
- Poulter, Amy. 2021. "Zillow Responds to Viral Tik Tok Video Claiming Housing Market Manipulation." Yahoo Finance. September 27, 2021. <https://finance.yahoo.com/news/zillow-tiktok-video-real-estate-housing-211403123.html>.
- Pulido, Laura. 1996. "A Critical Review of the Methodology of Environmental Racism Research." *Antipode* 28 (2): 142–59.
- Raji, Inioluwa Deborah, and Joy Buolamwini. 2022. "Actionable Auditing Revisited: Investigating the Impact of Publicly Naming Biased Performance Results of Commercial AI Products." *Communications of the ACM* 66 (1): 101–8.
- Raji, Inioluwa Deborah, I. Elizabeth Kumar, Aaron Horowitz, and Andrew Selbst. 2022. "The Fallacy of AI Functionality." In *2022 ACM Conference on Fairness, Accountability, and Transparency*. New York, NY, USA: ACM. <https://doi.org/10.1145/3531146.3533158>.
- Richardson, Rashida. 2022. "Racial Segregation and the Data-Driven Society: How Our Failure to Reckon with Root Causes Perpetuates Separate and Unequal Realities." *Berkeley Tech. LJ*.
- Rothstein, Richard. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America*. Liveright Publishing.
- "Realtor.com® Celebrates the Individuality of Buyers with Its New 'Homes for Every Home Buyer' Campaign." 2021. PR Newswire. May 10, 2021.

- <https://www.prnewswire.com/news-releases/realtorcom-celebrates-the-individuality-of-buyers-with-its-new-homes-for-every-home-buyer-campaign-301287090.html>.
- Sadowski, Jathan. 2020. "Cyberspace and Cityscapes: On the Emergence of Platform Urbanism." *Urban Geography* 41 (3): 448–52.
- Safransky, Sara. 2020. "Geographies of Algorithmic Violence: Redlining the Smart City." *International Journal of Urban and Regional Research* 44 (2): 200–218.
- Sanders, Rebecca L., and Robert J. Schneider. 2022. "An Exploration of Pedestrian Fatalities by Race in the United States." *Transportation Research Part D: Transport and Environment* 107 (June): 103298.
- Sandvig, C., K. Hamilton, K. Karahalios, and C. Langbort. 2014. "Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms." *Data and Discrimination: Converting Critical Concerns into Productive Inquiry* 22: 4349–57.
- Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press.
- Seaver, Nick. 2017. "Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems." *Big Data & Society* 4 (2): 2053951717738104.
- Shaw, Joe. 2020. "Platform Real Estate: Theory and Practice of New Urban Real Estate Markets." *Urban Geography* 41 (8): 1037–64.
- Spears, Darcy. 2022. "Fees before Keys: Las Vegas-Area Renters Overwhelmed by Application Fees." Channel 13 Las Vegas News KTNV. February 21, 2022. <https://www.ktnv.com/13-investigates/fees-before-keys-las-vegas-area-renters-overwhelmed-by-application-fees>.
- Taylor, Keeanga-Yamahtta. 2019. *Race for Profit: How Banks and the Real Estate Industry Undermined Black Homeownership*. UNC Press Books.
- Thind, Maninder P. S., Christopher W. Tessum, Inês L. Azevedo, and Julian D. Marshall. 2019. "Fine Particulate Air Pollution from Electricity Generation in the US: Health Impacts by Race, Income, and Geography." *Environmental Science & Technology* 53 (23): 14010–19.
- Vinsel, Lee. 2021. "You're Doing It Wrong: Notes on Criticism and Technology Hype." Medium. February 1, 2021. <https://sts-news.medium.com/youre-doing-it-wrong-notes-on-criticism-and-technology-hype-18b08b4307e5>.
- Wachsmuth, David, and Alexander Weisler. 2018. "Airbnb and the Rent Gap: Gentrification through the Sharing Economy." *Environment & Planning A* 50 (6): 1147–70.
- "What Is a Neural Network?" 2021. IBM. October 6, 2021. <https://www.ibm.com/topics/neural-networks>.
- "What Is a Zestimate?" 2020. Zillow. November 11, 2020. <https://www.zillow.com/z/zestimate/>.
- Zaimi, Rea. 2020. "Making Real Estate Markets: The Co-production of Race and Property Value in Early 20th Century Appraisal Science." *Antipode* 52 (5): 1539–59.
- Zillow Group. 2021. "Zillow Group Reports Third-Quarter 2021 Financial Results & Shares Plan to Wind Down Zillow Offers Operations." Zillow Group. November 2, 2021. <https://investors.zillowgroup.com/investors/news-and-events/news/news->

- details/2021/Zillow-Group-Reports-Third-Quarter-2021-Financial-Results--Shares-Plan-to-Wind-Down-Zillow-Offers-Operations/default.aspx.
- . 2022. “Annual Report 2021.” Zillow Group. [https://s24.q4cdn.com/723050407/files/doc_financials/2021/ar/Zillow-Annual-Report-\(2021-hyperlinks\).pdf](https://s24.q4cdn.com/723050407/files/doc_financials/2021/ar/Zillow-Annual-Report-(2021-hyperlinks).pdf).
- “Zillow Launches New Neural Zestimate, Yielding Major Accuracy Gains.” 2021. Zillow MediaRoom. June 15, 2021. <https://zillow.mediaroom.com/2021-06-15-Zillow-Launches-New-Neural-Zestimate,-Yielding-Major-Accuracy-Gains>.
- “Zillow Prize Winners.” 2020. Zillow. May 26, 2020. <https://www.zillow.com/z/info/zillow-prize/>.
- “Zillow Starts Making Cash Offers for the Zestimate.” 2021. Zillow MediaRoom. February 25, 2021. <https://zillow.mediaroom.com/2021-02-25-Zillow-Starts-Making-Cash-Offers-For-the-Zestimate>.
- Zuboff, Shoshana. 2019. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Public Affairs.
- Zukin, Sharon, Scarlett Lindeman, and Laurie Hurson. 2017. “The Omnivore’s Neighborhood? Online Restaurant Reviews, Race, and Gentrification.” *Journal of Consumer Culture* 17 (3): 459–79.

7 – Conclusion

As online platforms represent our social and spatial surroundings, they can transform our understanding and our actions. This dissertation argues that in seeking to understand the impact of a platform transforming an existing social process, like the real estate platform has transformed online housing search, it is crucial to consider the multiplicity of user interpretations of the platform – both its functionality and the information it presents. Users' interpretations inform their actions, sometimes leading them to unexpected decisions, such as the users in this study who did not seek out the neighborhoods with the best scores. When users are assumed to act as a monolith often the platform's persuasive impact can be overhyped, as in the case of the Zestimate. Furthermore, just as users bring their identities and experiences into their interpretations, the platform is built on the existing social and political fabric. shape its underlying data. This complicates questions of bias, for example, because the sociospatial reality of the U.S. housing market is one defined by histories of racial bias. And yet, to leave these questions unaddressed allows the platform to proceed as though it is a neutral actor rather than one with political stakes and the potential to make a normative impact on society.

In *Search Bricolage* (Ch. 3), I presented evidence that home-seekers do not confine their housing search to online sites that are explicitly about housing. Instead, they piece together information from social media, online reviews, and searches for niche indicators. Their searches may have to do with their individual preferences (e.g. oat milk lattes) or the location where they are searching (e.g. using casinos for their extra streetlighting in Las Vegas). At least, it is clear that the real estate platform is only part of the complete information landscape for online housing search. Future research could investigate to what extent these online search patterns replicate the social sorting observed in pre-internet studies of housing search.

In *Simple Scores* (Ch. 4), I challenged the dominant understanding from previous studies of online ratings that assumed that everyone seeks the place with the highest rating. Interviewees explained their concern that the generalized definition of scores did not fit their specific needs – for racial diversity, for walking infrastructure, for safety. I also presented two groups of responses to the neighborhood scores, one that displayed colorblind racism in blaming people for negative scores and one that interpreted scores as signals about structural racism and disinvestment.

In *Ambivalent Users* (Ch. 5), I presented evidence of some interviewees' ambivalence towards the neighborhood scores and the housing market in general. Ambivalence towards the scores stemmed from confusion about how to interpret the scores' meaning in relation to the interviewee's housing search, or ambivalence about the idea of scoring (and its implied universal of objective measurement of) schools or safety or

even, walkability. While a classic HCI approach would interpret such confusion and ambivalence as an indication that the presentation of the scores is flawed, I argued that perhaps this ambivalence created some plausible deniability for platform companies in the case that users draw problematic conclusions from the scores.

In *Demystifying the Zestimate* (Ch. 6), I demonstrated an approach for studying an algorithm like the Zestimate. In this approach I focused on user folks theories that gave insight into how users incorporate the Zestimate into their decisions and the feedback loops that the algorithm is part of as a way of considering how it could contribute to or be affected by existing inequalities in the housing market. I argue that these approaches are grounded in the material reality of the algorithm and what we know of it (despite not knowing everything due to its corporate and computational opacity). This approach also stands in contrast to hyping critiques that overemphasize the power and efficacy of the algorithm.

Across these four chapters I made the case for studying platforms in the context of their use, so as to see them as part of a larger process (in this case, searching for and making decisions about housing) and in the social and political context from which users also experience them. This study took place during a first-in-a-century pandemic that caused many people to do more activities remotely (including searching for housing) and added strain to an already stretched thin housing market in the U.S. From this context arise several policy recommendations and directions for future research that I briefly discuss in the next section. Finally, I offer some exemplar projects that offer alternative visions of housing and platforms.

Policy Recommendations

While policy was not the focus of this study, it is hard not to notice a few interesting gaps between where policy today applies to the platforms and search activities studied in this dissertation and where those platforms and behaviors expose problems. Below I briefly discuss two areas where policy could be expanded to improve protection against discrimination and support for renters. They also show where the separate realms of housing and technology policymakers seem to miss each other.

Preventing Discrimination

First, two areas in which regulations could be expanded to fully account for preventing discrimination in housing decisions. Both Section 230 and the FHA leave gaps in how real estate platforms can be regulated to prevent discrimination, bias, and inequity. Whether by replacing the regulated mediator (realtor, lender, appraiser) or maintaining a level of distance from problematic third-party information, the platforms have created loopholes in existing regulations.

The FHA focuses on restricting the use of *certain information* (about race, gender, religion, family status, and age) *in the context* of housing decisions (buying, selling, lending), in the hands of *certain actors* (realtors, lenders, appraisers). Real estate platforms sidestep these regulations by not being a realtor/lender/appraiser (when a user is just using them to browse listings – some (Zillow, Redfin) have appraisal and lending services and some, like Redfin, have affiliated realtors). Humber (2020) explains, “The practice of posting race data online does not fit within the current legal definition of steering, despite the fact that providing race data during an in-person interaction would likely constitute illegal steering” (135). Thus, the platform shifts the context of the interaction (to online) and the actors involved (home-seeker and platform instead of home-seeker and realtor) and is able to create a loophole in the regulation.

Extending the FHA’s applicability to real estate platforms explicitly could encourage platforms to more carefully regulate what kinds of information they add to their platform, as they did when Zillow and Realtor.com removed the crime maps in 2021. The FHA requires proof of disparate impact based on a protected class (“Fair Housing: Disparate Impact” n.d.), such as when the National Fair Housing Alliance (NFHA) (and other advocacy groups) showed that Redfin’s minimum price requirements for their expanded services disproportionately excluded non-White neighborhoods (Woodruff 2022). While I presented data that shows that users are able to draw conclusions about race from the neighborhood scores and that some of these users use the scores to support harmful, racist opinions about certain people and neighborhoods, this still does not constitute a violation of the FHA because it is not causally tied to an outcome.¹ However, in future research, an interdisciplinary approach that combined legal scholarship with platform studies could further explore what kinds of data could be collected to establish disparate effects (if they do exist) for home-seekers (or sellers) using real estate platforms. This could build on previous legal work (Humber 2020), combined legal and STS work (like (Citron and Pasquale 2014), and new approaches to user-driven audits of online platforms (Li et al. 2023; DeVos et al. 2022).

Another potentially applicable regulation to real estate platforms is Section 230, which protects websites from being liable for third-party information that they share or platform (Olson 2023). This could shield real estate platforms from implications of the neighborhood scores that they share on their platform. The 9th Circuit Court decided a case in 2008 against Roommates.com, a website for searching for and matching potential roommates, indicating that by requiring users to fill out a profile with their demographic information (including gender, sexual orientation, and whether they had children) the website violated FHA regulations against steering housing decisions based on these protected characteristics and that the website was not protected by section 230 because it directly collected this information (Olson 2023). However, a comments section where

¹ as I, not a lawyer, understand it

users could add more general comments was protected by 230 because the Court determined that a “simple, generic prompt does not make [Roommates] a developer of the information posted” (quoted in Olson 2023). By this logic, real estate platforms are not the developers of the school, walking, transit, noise and crime scores, and so would be protected by Section 230. If the **FHA updated their definition of pertinent actors to include real estate platforms**, perhaps this would override Section 230 protections, as Humber (2020) suggests.

The price-estimating algorithms or automated valuing models (AVMs), like the Zestimate, are not protected by Section 230 because they are directly developed by the platforms. A recent (2023) rule adopted under the Dodd-Frank Act (Office of the Comptroller of the Currency 2023) requires

institutions that engage in certain credit decisions or securitization determinations must adopt policies, practices, procedures, and control systems to ensure that AVMs used in these transactions to determine the value of mortgage collateral adhere to quality control standards designed to ensure a high level of confidence in the estimates produced by AVMs; protect against the manipulation of data; seek to avoid conflicts of interest; require random sample testing and reviews; and comply with applicable nondiscrimination laws (2-3).

It seems that this rule only applies to AVMs on real estate platforms when they are used to calculate a mortgage, not when they are viewable to home-seekers, home-sellers, and real estate professionals. In these contexts, the FHA is the “applicable nondiscrimination law,” meaning the AVMs real estate platforms use for lending products should be tested to see if they have disparate impacts on the groups protected by the AVMs. However, as with the application of the FHA to the neighborhood scores, I recommend **an expanded definition of the FHA that included any consultation of the Zestimate (or other user-facing AVMs)**. This is based on a broader understanding of how these platforms and the information they host guide home-seekers’ search and decision-making process. In interviews and in online discussions home-seekers describe using the Zestimate as another piece of information in their housing decision, just like the neighborhood scores, listing information and photos, etc. Therefore, the Zestimate (and other user-facing AVMs on other platforms) should be investigated for any disparate impacts or steering effects. The user-facing Zestimate may not be the same model that Zillow’s lending tools use, necessitating separate audits. Are there patterns in high and low estimates that disadvantage certain neighborhoods? Do users interpret high or low estimates in ways that could constitute racial steering? These are the kinds of questions that arise with a wider view of real estate platform use. They are both policy-relevant and avenues of potential future research.

Don't Forget Renters!



Figure 1 Three Twitter threads that show mounting frustration with policy framings of the housing crisis.

Throughout the research and writing of this dissertation I would read or listen to policy analysis or media coverage of the housing market with confusion and disbelief at the extent to which renters remain an afterthought or are almost entirely overlooked. As a renter myself, I was surprised that I had not noticed this before, despite my awareness of the rising cost of rent and the lack of renter supports (even in states like New York and California that are generally leading the way for renter protections). Homebuyers, especially first-time homebuyers, have a multitude of support available throughout the process, including real estate professionals, federal and state grants, and free trainings² that help orient you to all these other resources. Homeowners also get a tax break for their mortgage payment. Renters, by contrast, are mostly on their own. The majority of renters are rent burdened (spending more than 30% of their income on housing). Affordable housing options are often spread across several programs and/or non-profit organizations, making them difficult to navigate.³ Affordable housing programs do not come close to meeting the need, as years-long wait lists and overflowing homeless shelters attest.

Housing regulators need to look more closely at housing from a renter's perspective, starting with how people search for and access housing. Where are the programs to help people search for rental housing and know their rights? (I've only seen this covered by activist groups.) Where are the regulations to protect renters from the excessive power of corporate landlords with platform tools (from capping high and

² I attended one at a public library in Las Vegas that featured presentations from a realtor and a lender.

³ Oakland's local online newspaper, the *Oaklandside*, made a great digital guide explaining all the options for low-income renters ("How to Find Affordable Housing in Oakland" 2023), but the fact that they saw the need for this guide demonstrates the lack of cohesive support for renters, even in a city like Oakland that has a lot of social support programs.

excessive fees to the protection of personal information submitted for rental applications)? Despite a preponderance of data to support these problems from academia (for example (Maharawal and McElroy 2018; McElroy and Vergerio 2022; Fields 2022) and activists alike, movement from policymakers is glacial.⁴

One possible roadblock to renter-focused policy is a lack of information to generally describe the rental market conditions. This lack of information became apparent when federal aid for renters when uncollected or unadministered during the pandemic (Clark 2021). During the COVID pandemic some local governments proposed bills to create a “rental registry” as an answer to the general mystification regarding the current state of renters, rental units, and landlords. In the face of this lack of information, turning to the ready-made datasets from real estate platforms can be tempting,⁵ but this is where policymakers must remember that **real estate platforms are not incentivized to collect complete data for the housing market**, likely excluding the lowest end of the market, and informal housing options like short-term rentals, SROs, and rooms for rent. The full extent to which the real estate platforms do or do not represent the housing market would be an interesting question for future research to address.

Alternate Visions of Housing and Platforms

Given the history of housing in the U.S. and the current moment of Big Tech domination, one could be excused for thinking that this is all inevitable. And in some ways, many of my findings were not surprising: that discussions of housing turn into discussions of race and “acceptable” levels of inequality; that platform companies serve profits and market share over ethical impact; that regulations are decades behind the daily experience of platform users. And yet, this is also a moment of huge organizing power, where tenant unions make national headlines (Callaghan 2023; Evans, Cogan, and Alter 2023), and student activists connect their struggle to be paid a living wage with anti-apartheid solidarity for Palestine.⁶ This energy challenges the capitalist status quo that favors the corporate landlord or large platform company.

⁴ In 2022 the Stop Wall Street Landlords Bill was introduced in the House of Representatives to curtail corporate landlordism but it did not make it out of committee. As I finish, in July 2024 Sen. Nine Democratic Senators introduced a new bill to the Senate that would require reporting of large real estate acquisition in the hopes of applying anti-trust regulations against large landlords (Capps 2024).

⁵ My CA State Assemblymember, Buffy Wicks, suggested using real estate platform information to create a rental registry on a California housing podcast (Tobias and Dillon 2022b). I sent a message via her website explaining my concerns, but never hear back.

⁶ Just in the span of this dissertation, my graduate student workers union (UAW) led a successful strike for our cost of living and a series of protests and encampments for divestment from Israel. These movements shared organizing techniques and participants, but also organizers emphasized that both struggles were against the University’s financial logics.

Rather than have the future possibilities curtailed by my individual imagination, I will share just a few projects that I encountered during this research. These examples take advantage of some of the features of real estate platforms but put them to very different ends.

Platforming Place

These projects take advantage of the reach of platforms to share experiences of specific places and times. Rather than trying to make a universalist or placeless claim, they present context and detail. Viewers may draw similarities to places in their lives, or simply learn about new detail and history of the featured places.

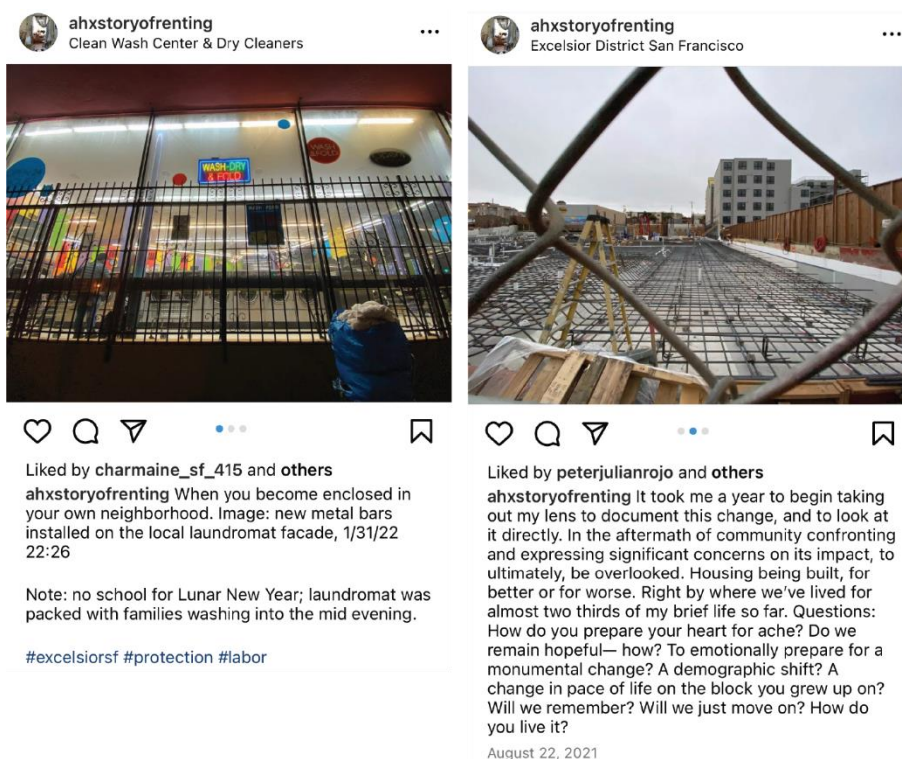


Figure 2 Two screenshots from A Hxstory of Renting's Instagram feed.

A Hxstory of Renting⁷ is an art project that documents the life of three generations of a family that rented in the Mission and Excelsior neighborhoods in San Francisco (Harshaw 2020). Photographer, Erina Alejo, captured images of her neighborhood, and home, noting in captions on Instagram and in the book version, the memories and associations with certain places. Many of the images show the effects of change or document change over time: the same garbage can photographed year after year, new bars installed on the windows of the laundromat (Figure 2, left), and change in progress (Figure 2, right). It is an intimate visual portrait of gentrification, part nostalgia, part defiance in its commemoration of those often displaced and forgotten.

⁷ <https://erinacalejo.com/a-hxstory-of-renting>

Another visual project, **Segregation by Design**⁸, is also part visual archive, part activism. It uses side-by-side comparisons of aerial photographs, many from Google Earth, that show the before and after of urban renewal in U.S. cities. The composite images highlight the change in scale as dense areas of housing were replaced by large, impersonal infrastructure, often interspersed with or bordered by vacant lots. There is an implicit argument in the visual contrast, that today's urban environment is the product of active choices that prioritized economic infrastructure (highways, stadiums) over (certain – low income, non-White) people and housing. It's like a 21st century version of Jane Jacobs' fight to preserve Greenwich Village in New York against Robert Moses and the planned Lower Manhattan Expressway.

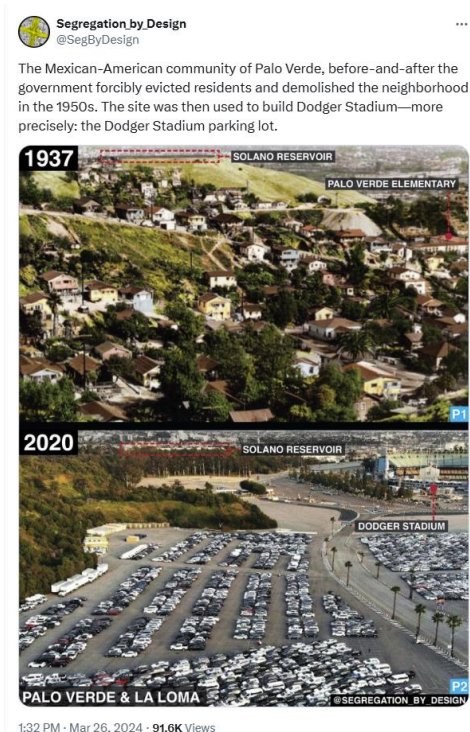


Figure 3 A screenshot of a Tweet by @SegregationbyDesign

These projects use photographs to show the still visible traces of these historical practices of erasure. They are local context made visual, captured as an archive against future forgetfulness or willful ignorance towards the people who came before. They highlight the long-lasting effects of processes that may seem contained to a past era. They show the persistent impact of these physical, political, and social decisions. They demonstrate how to archive these moments of history and local context, celebrating the local on a global scale.

⁸ <https://www.segregationbydesign.com/>

Scalable Methods & Public Data

The next two examples combine platform logics, public data, and activism. Like the platforms, these projects leverage public data to connect specific properties to owners and patterns of ownership. They rely on scalable methods so their activism can benefit from networked effects.

Moms4Housing were a group of unhoused mothers in Oakland who squatted in an abandoned house in West Oakland that had been owned by an absentee landlord for years (Martin 2019). When the owner, an real estate investment company, tried to evict them, the Moms4Housing took them to court and waged a public protest to raise awareness of their case. They connected their house to the increasing prevalence of investors buying property and holding it empty while they wait for the value to increase, effectively removing housing from a market that is already stretched thin. Ultimately, they won their case, and were able to buy the house with the help of a land trust. One of the women, Carol Fife, went on to win a seat in the Oakland City Council where she continued to work for more affordable housing and the housing rights of low-income Oaklanders.

This example might seem like another example of hyperlocal activism via social media – and it is that – but it also demonstrates how to use public records as an offensive strategy. Moms4Housing built their case – legally and in the court of public opinion – by identifying their landlord, “a leading acquirer of distressed residential real estate” (quoted in (Martin 2019)). They used the same public records the landlord would have used to find “distressed housing” (e.g. foreclosures). In the publicity of their win, the Moms4Housing gave credence to similar challenges to absentee landlords and real estate warehousing. In 2024, an Australian lawyer who shares information about abandoned investment properties via his TikTok account (@puplepingers) received national media attention for that unhoused people could legally occupy abandoned properties.⁹

The **Anti-Eviction Mapping Project** similarly mobilizes data, particularly publicly available records to identify problematic landlords and management companies, to produce digital maps and databases open to the public (Maharawal and McElroy 2018). These become tools for organizers and researchers. They make it possible to quantify and spatialize mass evictions, a process that is otherwise hidden in the courts and individual housing records (Desmond 2016). This project is a collaboration between activists and academics. It leverages the scalability of online mapping and data infrastructures that closely resemble those used by real estate platforms. One can similarly look up an address or browse maps of a city. The methods and aesthetic representation can be scaled from the place they were developed (the Bay Area) to other places, just as activists share their

⁹ He hilariously lays out his entire model during a TV interview that leaves the hosts stumped: <https://www.tiktok.com/t/ZPRovveKD/>

strategies.¹⁰ At larger scales (such as looking at Northern California), it is possible to trace the ripple effects of evictions in one city as the displaced populations move to another nearby city, and the networked portfolios of institutional buyers that cross city and state boundaries. It is ironic that activists have deployed similar data practices to the institutional buyers that they organize against. As these landlords scale up, their tenants' organizing base grows.

These are the same tools that institutional buyers have used to amass real estate portfolios across cities and states, even internationally. They use LLCs and other forms of legal obfuscation to make the owners difficult to trace or even contact. However, projects like the Anti-Eviction Mapping Project are learning to follow the traces that are available, identifying LLCs through land registries and linking LLCs through shared mailing addresses. With these connections made, tenants can connect with those who share the same landlord, patterns of predatory behavior can be established, and public campaigns and legal procedures can try to hold them accountable. Thus, activists can try to right the uneven housing and regulatory environments. The replicability of these methods give such efforts their own economies of scale.

Reframing the Market for Non-Commercial Ends

These final examples work within a market framework but aim to accomplish more than profit.

The **Sogorea Te' Land Trust** aims to rematriate land in the Bay Area to the Ohlone people (who are the indigenous people in the area). One of their means to raise the funds for this effort is encouraging people who live or work on unceded Ohlone land to pay a shuumi land tax.¹¹ The land tax is easily calculated on their website by answering a few questions – do you rent or own; how much do you pay (in rent). In the end you receive an amount that you can pay annually. When I lived in the Bay Area, I paid a shummi of a couple hundred dollars a year, based on my rented one-bedroom apartment. This program builds on a market concept (a tax) and a simplified version of the same data points used to calculate a price or conduct a housing search. Through these familiar lenses they are able to raise a difficult issue – reparations for generations of land theft – and make it manageable for an individual to take action. Not that a shuumi completely absolves a settler for their complicity in these historic and ongoing processes, but it enables a first step taken in that direction.

¹⁰ When I volunteered with the eviction defense activists in Las Vegas, we learned from movements in the Bay Area, Minnesota, and Virginia.

¹¹ <https://sogoreate-landtrust.org/shuumi-land-tax/>

SOGOREA TE' LAND TRUST
LED BY URBAN INDIGENOUS WOMEN

About Lisjan (Ohlone) Prog

What is your relationship to Lisjan Ohlone land?

I rent residential property on Lisjan Ohlone land

How much is your monthly rent?

That results in a recommended annual Shuumi contribution of \$0.00

Please note, this is your recommended **annual** Shuumi contribution. We encourage you to consider signing up for **recurring** contributions, either monthly or annually, by clicking the box below. To calculate your monthly amount, simply divide the annual recommendation by 12.

Figure 4 A screenshot of the Shuumi Land Tax form

The second example is a new “social real estate platform,” **Live Near Friends**.¹² This website reimagines housing search in a way that prioritizes living close to friends (as the name suggests). It enables the friend to send out a personalized link to current real estate listings within a certain radius of the friend’s home. Technically, this is a simple adjustment to the standard real estate platform – a location filter, much like drawing a boundary on a map, but it also enrolls the friend in the process of promoting real estate to their friends. You might ignore those emails from Zillow about “new homes in your area,” but an email from an actual friend? That is likely to get more attention.

Live Near Friends does not challenge the capitalist framing of housing, but it does push back on the individualized choice framing of housing search that is so inherent in both (traditional) real estate platforms and public discourse about housing in the U.S. Proponents of intentional community living are not new, but the isolation of the pandemic and the increasing accommodation of remote work has reinvigorated the topic.¹³ However, like the shuumi land tax, by making a slight adjustment to a familiar concept, perhaps Live Near Friends can encourage home-seekers to make an incremental shift in their thinking.

¹² <https://livenearfriends.com/>

¹³ See for example (Bernard 2024).

This area currently
has 34 homes for rent
and 36 homes for
sale.

Start exploring whether any of these homes are a fit for you and
your friends

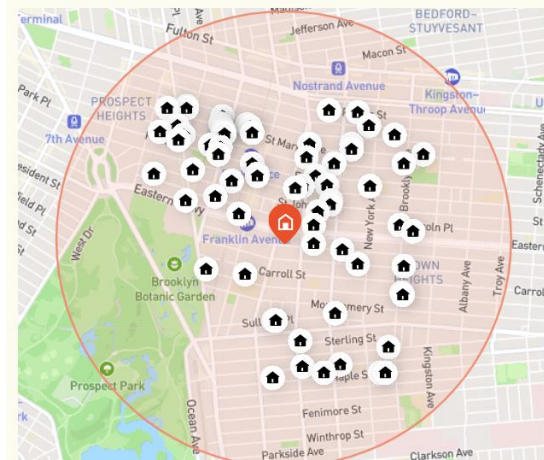


Figure 5 A screenshot of my apartment filter on LiveNearFriends

These examples show that both housing and online platforms are malleable concepts, malleable toolkits. Like the interview subjects in Chapter 5 who expressed a broad ambivalence for the false choices of the housing market, these creators, artists, and activists found the current models lacking and made adjustments and additions. They centered place and placed histories; they used the same scalable methods to resist the unchecked power of corporate landlords and investors; and they used the framework of the market to present new perspectives to typical housing transactions.

Projects like these remind researchers, policymakers, and technologists that mass-market products, like the real estate platforms, are not foregone conclusions or some objective reflection of reality. As I have endeavored to demonstrate in this dissertation, platforms, algorithms, and metrics can consequentially shape their users and the world they represent, but at the same time, users shape the metrics, platforms, and algorithms through their actions and interpretations.

- Bernard, Zoë. 2024. "It Shouldn't Be so Hard to Live near Your Friends." Vox. May 6, 2024. <https://www.vox.com/even-better/354903/it-shouldnt-be-so-hard-to-live-near-your-friends>.
- Callaghan, Peter. 2023. "Unpacking the Sweeping Tenant Rights Changes Made by the Minnesota Legislature." MinnPost. June 15, 2023. <https://www.minnpost.com/state-government/2023/06/unpacking-the-sweeping-tenant-rights-changes-made-by-the-minnesota-legislature/>.
- Capps, Kriston. 2024. "Senate Democrats Make Antitrust Case Against Corporate Landlords." *Bloomberg News*, July 11, 2024. <https://www.bloomberg.com/news/articles/2024-07-11/senate-democrats-make-antitrust-case-against-corporate-landlords>.
- Citron, D., and Frank A. Pasquale. 2014. "The Scored Society: Due Process for Automated Predictions." *Washington Law Review* 89 (March): 1.
- Clark, Dartunorro. 2021. "The Government Is Fixing the Federal Rental Aid Program, but Funds Are Still Slow to Reach Renters." NBC News. October 26, 2021. <https://www.nbcnews.com/politics/politics-news/government-fixing-federal-rental-aid-program-funds-are-still-slow-n1282111>.
- Desmond, Matthew. 2016. *Evicted: Poverty and Profit in the American City*. Crown.
- DeVos, Alicia, Aditi Dhabalia, Hong Shen, Kenneth Holstein, and Motahhare Eslami. 2022. "Toward User-Driven Algorithm Auditing: Investigating Users' Strategies for Uncovering Harmful Algorithmic Behavior." In *CHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM. <https://doi.org/10.1145/3491102.3517441>.
- Evans, Isabel, Marley Cogan, and Charlotte Alter. 2023. "Renters Are in Revolt. This Tenant Union Plans To Get Them Organized." Time Magazine. October 26, 2023. <https://pulitzercenter.org/stories/renters-are-revolt-tenant-union-plans-get-them-organized>.
- "Fair Housing: Disparate Impact." n.d. National Low Income Housing Coalition. Accessed July 26, 2024. <https://nlihc.org/racial-equity-and-fair-housing-disparate-impact>.
- Fields, D. 2022. "Automated Landlord: Digital Technologies and Post-Crisis Financial Accumulation." *Environment and Planning A: Economy and Space*. <https://journals.sagepub.com/doi/abs/10.1177/0308518X19846514>.
- Harshaw, Pendarvis. 2020. "'Sometimes, It Takes Time': Erina Alejo, the Third-Generation Renter." KQED. September 4, 2020. <https://www.kqed.org/arts/13885733/sometimes-it-takes-time-erina-alejo-the-third-generation-renter>.
- "How to Find Affordable Housing in Oakland." 2023. The Oaklandside. April 5, 2023. <https://oaklandside.org/affordable-housing-guide/>.
- Humber, Nadiyah J. 2020. "In West Philadelphia Born and Raised or Moving to Bel-Air? Racial Steering as a Consequence of Using Race Data on Real Estate Websites." *Hastings Race* 1 (17): 133–76.
- Li, Rena, Sara Kingsley, Chelsea Fan, Proteeti Sinha, Nora Wai, Jaimie Lee, Hong Shen, Motahhare Eslami, and Jason Hong. 2023. "Participation and Division of Labor in User-Driven Algorithm Audits: How Do Everyday Users Work Together to Surface Algorithmic Harms?" In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–19. CHI '23 567. New York, NY, USA: Association for Computing Machinery.
- Maharawal, Manissa M., and Erin McElroy. 2018. "The Anti-Eviction Mapping Project: Counter Mapping and Oral History toward Bay Area Housing Justice." *Annals of the Association of American Geographers*. *Association of American Geographers* 108 (2): 380–89.
- Martin, Jeffery. 2019. "Activist Group 'Moms for Housing' Occupies Vacant Home in Oakland to Protest City's Homeless Crisis." Newsweek. November 18, 2019. <https://www.newsweek.com/activist-group-moms-housing-occupies-vacant-home-oakland-protest-citys-homeless-crisis-1472535>.

- McElroy, Erin, and Manon Vergerio. 2022. "Automating Gentrification: Landlord Technologies and Housing Justice Organizing in New York City Homes." *Environment and Planning. D, Society & Space* 40 (4): 607–26.
- Office of the Comptroller of the Currency. 2023. *Quality Control Standards for Automated Valuation Models*. <https://www OCC.treas.gov/news-issuances/news-releases/2024/nr-ia-2024-78a.pdf>.
- Olson, Brent A. Esq, ed. 2023. "16B:69. CDA Immunity—Third Element of Barnes Test— 'Information Provided by Another Information Content Provider.'" In *Business Law Deskbook, Advanced Topics In Business Law*. Minnesota Practice Series TM. Thompson Reuters.
- Tobias, Manuela, and Liam Dillon. 2022. *Gimme Shelter*. Podcast. Cal Matters. <https://calmatters.org/housing/2022/01/california-housing-crisis-podcast-new-leader/>.
- Wikipedia contributors. 2024. "Section 230." Wikipedia, The Free Encyclopedia. July 24, 2024. https://en.wikipedia.org/w/index.php?title=Section_230&oldid=1236400038.
- Woodruff, Izzy. 2022. "National Fair Housing Alliance and Redfin Agree to Settlement Which Greatly Expands Access to Real Estate Services in Communities of Color." NFHA. April 29, 2022. <https://nationalfairhousing.org/national-fair-housing-alliance-and-redfin-agree-to-settlement-which-greatly-expands-access-to-real-estate-services-in-communities-of-color-%ef%bf%bc/>.

Works Cited

- Abidin, C. 2015. "Communicative Intimacies: Influencers and Perceived Interconnectedness." *Ada: A Journal of Gender, New Media, and Technology* 8 (November): 1–16.
- "About GreatSchools' Ratings System and Methodology." n.d. GreatSchools. Accessed July 24, 2024. <https://www.greatschools.org/gk/ratings/>.
- Alandangady, A., and A. Forde. 2021. "Wealth Inequality and the Racial Wealth Gap." FEDS Notes. Washington, DC: Board of Governors of the Federal Reserve System. October 22, 2021.
- Alexander, Michelle. 2010. "The War on Drugs and the New Jim Crow." *Race, Poverty & the Environment* 17 (1): 75–77.
- Allen-Price, Olivia. 2017. "How Many Are Being Displaced by Gentrification in Oakland?" *KQED*. February 9, 2017. <https://www.kqed.org/news/11307279/how-many-are-being-displaced-by-gentrification-in-oakland>.
- Alvarez León, Luis F., and Jovanna Rosen. 2019. "Technology as Ideology in Urban Governance." *Annals of the Association of American Geographers* 110 (October): 497–506.
- "Ambivalence." n.d. Merriam-Webster. Accessed August 4, 2024. <https://www.merriam-webster.com/dictionary/ambivalence>.
- Ames, Morgan G. 2018. "Deconstructing the Algorithmic Sublime." *Big Data & Society* 5 (1): 2053951718779194.
- . 2019. *The Charisma Machine: The Life, Death, and Legacy of One Laptop per Child*. MIT Press.
- Anderson, Ben, Akanksha Awal, Daniel Cockayne, Beth Greenhough, Jess Linz, Anurag Mazumdar, Aya Nassar, et al. 2022. "Encountering Berlant Part Two: Cruel and Other Optimisms." *The Geographical Journal*, December. <https://doi.org/10.1111/geoj.12493>.
- Apgar, B. 12/2022. "Craig Ranch Regional Park to Get Upgrades Funded by County Grant." *The Las Vegas Review-Journal*, 12/2022. <https://www.reviewjournal.com/local/north-las-vegas/craig-ranch-regional-park-to-get-upgrades-funded-bycounty-grant-2202127/>.
- Asad, Mariam, Christopher A. Le Dantec, Becky Nielsen, and Kate Diedrick. 2017. "Creating a Sociotechnical API: Designing City-Scale Community Engagement." In

- Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 2295–2306. CHI '17.
- Balestrini, Mara, Yvonne Rogers, Carolyn Hassan, Javi Creus, Martha King, and Paul Marshall. 2017. "A City in Common: A Framework to Orchestrate Large-Scale Citizen Engagement around Urban Issues." In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 2282–94. CHI '17.
- Bardzell, Jeffrey, and Shaowen Bardzell. 2015. "What Is Humanistic HCI?" In *Humanistic HCI*, 13–32. Synthesis Lectures on Human-Centered Informatics. Cham: Springer International Publishing.
- Baumer, E. P. S., and M. S. Silberman. 2011. "When the Implication Is Not to Design (Technology)." *Proceedings of the International ACM SIGCHI Conference on Supporting Group Work*. <https://dl.acm.org/doi/abs/10.1145/1978942.1979275>.
- Bell, Daniel. 1973. "From Industrial Society to Post-Industrial Society: Theories of Social Change." In *The Coming of Post-Industrial Society: A Venture in Social Forecasting*, by Daniel Bell, 47–119. New York, NY: Basic Books.
- Benjamin, R. 2019. *Race after Technology: Abolitionist Tools for the New Jim Code*. Polity.
- Benkler, Yochai. 2007. *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven, CT: Yale University Press.
- Bergman, Peter, Eric W. Chan, and Adam Kapor. 2020. "Housing Search Frictions: Evidence from Detailed Search Data and a Field Experiment." Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w27209>.
- Berlant, Lauren. 2011. *Cruel Optimism*. Duke University Press.
- . 2017. "Affective Assemblages: Entanglements & Ruptures—An Interview with Lauren Berlant." *Atlantis: Critical Studies in Gender, Culture & Social Justice* 38 (2): 12–17.
- Bernard, Zoë. 2024. "It Shouldn't Be so Hard to Live near Your Friends." *Vox*. May 6, 2024. <https://www.vox.com/even-better/354903/it-shouldnt-be-so-hard-to-live-near-your-friends>.
- Besbris, M., A. Schachter, and J. Kuk. 2018. "The Language of Segregation: Variation in the Description of Rental Housing across Neighborhoods." In American Sociological Association Annual Meeting, Philadelphia, PA.
- Bissell, David. 2023. "Negative Urbanism: Unknowability, Illegibility and Ambivalence in the Platform City." *Cityscape* 27 (1–2): 56–75.

- Black, Sandra E. 1999. "Do Better Schools Matter? Parental Valuation of Elementary Education*." *The Quarterly Journal of Economics* 114 (2): 577–99.
- Boeing, Geoff, Max Besbris, Ariela Schachter, and John Kuk. 2021. "Housing Search in the Age of Big Data: Smarter Cities or the Same Old Blind Spots?" *Housing Policy Debate* 31 (1): 112–26.
- Boeing, Geoff, and Paul Waddell. 2017. "New Insights into Rental Housing Markets across the United States: Web Scraping and Analyzing Craigslist Rental Listings." *Journal of Planning Education and Research* 37 (4): 457–76.
- Biruk, Cal. 2018. *Cooking Data: Culture and Politics in an African Research World*. Duke University Press.
- Bonilla-Silva, Eduardo. 2003. "Racial Attitudes or Racial Ideology? An Alternative Paradigm for Examining Actors' Racial Views." *Journal of Political Ideologies* 8 (1): 63–82.
- Bowker, Geoffrey C., and Susan Leigh Star. 2000. *Sorting Things Out: Classification and Its Consequences*. MIT Press.
- "Bricolage." n.d. Merriam-Webster. Accessed August 9, 2024. <https://www.merriam-webster.com/dictionary/bricolage>.
- Buchak, Greg, Gregor Matvos, Tomasz Piskorski, and Amit Seru. 2020. "Why Is Intermediating Houses so Difficult? Evidence from IBuyers." Working Paper Series. National Bureau of Economic Research. <https://doi.org/10.3386/w28252>.
- Bucher, Taina. 2016. "Neither Black Nor Box: Ways of Knowing Algorithms." In *Innovative Methods in Media and Communication Research*, edited by Sebastian Kubitschko and Anne Kaun, 81–98. Cham: Springer International Publishing.
- Burchell, Graham, Colin Gordon, and Peter Miller, eds. 1991. *The Foucault Effect: Studies in Governmentality*. University of Chicago Press.
- Burghardt, Karin T., Meghan L. Avolio, Dexter H. Locke, J. Morgan Grove, Nancy F. Sonti, and Christopher M. Swan. 2023. "Current Street Tree Communities Reflect Race-Based Housing Policy and Modern Attempts to Remedy Environmental Injustice." *Ecology* 104 (2): e3881.
- Burrell, Jenna. 2016. "How the Machine 'Thinks': Understanding Opacity in Machine Learning Algorithms." *Big Data & Society* 3 (1): 205395171562251.
- . 2017. "The Fieldsite as a Network: A Strategy for Locating Ethnographic Research." *The Routledge Companion to Digital Ethnography*. <https://www.taylorfrancis.com/chapters/edit/10.4324/9781315673974-15/fieldsite-network-strategy-locating-ethnographic-research-jenna-burrell>.

- Burrell, Jenna, Zoe Kahn, Anne Jonas, and Daniel Griffin. 2019. "When Users Control the Algorithms: Values Expressed in Practices on Twitter." *Proc. ACM Hum.-Comput. Interact.*, 138, 3 (CSCW): 1–20.
- Callaghan, Peter. 2023. "Unpacking the Sweeping Tenant Rights Changes Made by the Minnesota Legislature." *MinnPost*. June 15, 2023. <https://www.minnpost.com/state-government/2023/06/unpacking-the-sweeping-tenant-rights-changes-made-by-the-minnesota-legislature/>.
- Capps, Kriston. 2024. "Senate Democrats Make Antitrust Case Against Corporate Landlords." *Bloomberg News*, July 11, 2024. <https://www.bloomberg.com/news/articles/2024-07-11/senate-democrats-make-antitrust-case-against-corporate-landlords>.
- Carrillo, Laura, Mary Pattillo, Erin Hardy, and Dolores Acevedo-Garcia. 2016. "Housing Decisions Among Low-Income Hispanic Households in Chicago." *Cityscape* 18 (2): 109–50.
- Castells, M. 2010. "The Space of Flows." *The Rise of the Network Society*, 407–59. Wiley-Blackwell.
- Chayka, Kyle. 2016. "Welcome to AirSpace." *The Verge*. August 3, 2016. <https://www.theverge.com/2016/8/3/12325104/airbnb-aesthetic-global-minimalism-startup-gentrification>.
- Christin, Angèle. 2017. "Algorithms in Practice: Comparing Web Journalism and Criminal Justice." *Big Data & Society* 4 (2): 2053951717718855.
- Citron, D., and Frank A. Pasquale. 2014. "The Scored Society: Due Process for Automated Predictions." *Washington Law Review* 89 (March): 1.
- Clark, Dartunorro. 2021. "The Government Is Fixing the Federal Rental Aid Program, but Funds Are Still Slow to Reach Renters." *NBC News*. October 26, 2021. <https://www.nbcnews.com/politics/politics-news/government-fixing-federal-rental-aid-program-funds-are-still-slow-n1282111>.
- Clark, Patrick. 2021. "Zillow's Algorithm-Fueled Buying Spree Doomed Its Home-Flipping Experiment." *Bloomberg Businessweek*, November 8, 2021. <https://www.bloomberg.com/news/articles/2021-11-08/zillow-z-home-flipping-experiment-doomed-by-tech-algorithms>.
- Clough, Patricia T. 2010. "The Affective Turn: Political Economy, Biomedicine and Bodies." In *The Affect Theory Reader*, edited by Melissa Gregg and Gregory J. Seigworth, 206–28. Duke.

- “Code of Ethics and Standards of Practice of the National Association of Realtors.” 2024. National Association of Realtors.
<https://cdn.nar.realtor/sites/default/files/documents/2024-nar-coe-standards-of-practice-2023-12-21.pdf>.
- Conderino, Sarah E., Justin M. Feldman, Benjamin Spoer, Marc N. Gourevitch, and Lorna E. Thorpe. 2021. “Social and Economic Differences in Neighborhood Walkability Across 500 U.S. Cities.” *American Journal of Preventive Medicine* 61 (3): 394–401.
- Davis, Mike. 2002. “The Racial Cauldron.” In *The Grit Beneath the Glitter: Tales from the Real Las Vegas*, edited by Hal K. Rothman and Mike Davis, 175–86. Berkeley, CA: University of California Press.
- DeVos, Alicia, Aditi Dhabalia, Hong Shen, Kenneth Holstein, and Motahhare Eslami. 2022. “Toward User-Driven Algorithm Auditing: Investigating Users’ Strategies for Uncovering Harmful Algorithmic Behavior.” In *CHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM.
<https://doi.org/10.1145/3491102.3517441>.
- Desmond, Matthew. 2016. *Evicted: Poverty and Profit in the American City*. Crown.
- Dijck, Jose van. 2013. *The Culture of Connectivity: A Critical History of Social Media*. Oxford University Press.
- Diaz, Mark, and Nicholas Diakopoulos. 2019. “Whose Walkability? Challenges in Algorithmically Measuring Subjective Experience.” *Proc. ACM Hum.-Comput. Interact.*, 126, 3 (CSCW): 1–22.
- Doorn, Niels van. 2020. “A New Institution on the Block: On Platform Urbanism and Airbnb Citizenship.” *New Media & Society* 22 (10): 1808–26.
- Dourish, Paul. 2006. “Implications for Design.” In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 541–50. CHI ’06. New York, NY, USA: Association for Computing Machinery.
- Dubal, V. B. 2017. “Wage Slave or Entrepreneur?: Contesting the Dualism of Legal Worker Identities.” *California Law Review* 105 (1): 65–123.
- Duymedjian, Raffi, and Charles-Clemens Rüling. 2010. “Towards a Foundation of Bricolage in Organization and Management Theory.” *Organization Studies* 31 (2): 133–51.
- Dye, Michaelanne, David Nemer, Neha Kumar, and Amy S. Bruckman. 2019. “If It Rains, Ask Grandma to Disconnect the Nano: Maintenance & Care in Havana’s StreetNet.” *Proceedings of the ACM Conference on Computer Supported Cooperative Work & Social Computing*, 187, 3 (CSCW): 1–27.

- Emmel, N. 2013. *Sampling and Choosing Cases in Qualitative Research: A Realist Approach*. Sage. <https://doi.org/10.4135/9781473913882>.
- Eslami, Motahhare, Aimee Rickman, Kristen Vaccaro, Amirhossein Aleyasen, Andy Vuong, Karrie Karahalios, Kevin Hamilton, and Christian Sandvig. 2015. “I Always Assumed That I Wasn’t Really That Close to [Her]”: Reasoning about Invisible Algorithms in News Feeds.” In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, 153–62. CHI ’15. New York, NY, USA: Association for Computing Machinery.
- Eslami, Motahhare, Karrie Karahalios, Christian Sandvig, Kristen Vaccaro, Aimee Rickman, Kevin Hamilton, and Alex Kirlik. 2016. “First I ‘like’ It, Then I Hide It.” In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM. <https://doi.org/10.1145/2858036.2858494>.
- Espeland, Wendy Nelson, and Michael Sauder. 2007. “Rankings and Reactivity: How Public Measures Recreate Social Worlds.” *The American Journal of Sociology* 113 (1): 1–40.
- Evans, Isabel, Marley Cogan, and Charlotte Alter. 2023. “Renters Are in Revolt. This Tenant Union Plans To Get Them Organized.” *Time Magazine*. October 26, 2023. <https://pulitzercenter.org/stories/renters-are-revolt-tenant-union-plans-get-them-organized>.
- Ewing, Eve L. 2018. *Ghosts in the Schoolyard: Racism and School Closings on Chicago’s South Side*. University of Chicago Press.
- “Fair Housing: Disparate Impact.” n.d. National Low Income Housing Coalition. Accessed July 26, 2024. <https://nlihc.org/racial-equity-and-fair-housing-disparate-impact>.
- Farley, Reynolds, Howard Schuman, Suzanne Bianchi, Diane Colasanto, and Shirley Hatchett. 1978. “‘Chocolate City, Vanilla Suburbs:’ Will the Trend toward Racially Separate Communities Continue?” *Social Science Research* 7 (4): 319–44.
- Ferryman, Kadija, X. Briggs, S. Popkin, and María G. Rendón. 2008. “Do Better Neighborhoods for MTO Families Mean Better Schools? Brief No. 3.” Urban Institute (NJ1), March. <https://doi.org/10.1037/e690762011-001>.
- Fields, Desiree. 2014. *The Rise of the Corporate Landlord*. Right To The City Alliance. https://www.saje.net/wp-content/uploads/2021/04/RTC.DF_.report.FINALPROOF-July2_2013.pdf.
- . 2018. “Constructing a New Asset Class: Property-Led Financial Accumulation after the Crisis.” *Economic Geography*. <https://www.tandfonline.com/doi/abs/10.1080/00130095.2017.1397492>.

- . 2022. “Automated Landlord: Digital Technologies and Post-Crisis Financial Accumulation.” *Environment and Planning A: Economy and Space*.
<https://journals.sagepub.com/doi/abs/10.1177/0308518X19846514>.
- . 2024. “Digital Experiments with Landed Property: Robots, Race, and Rent.” *Tijdschrift Voor Economische En Sociale Geografie = Journal of Economic and Social Geography* 115 (3): 329–45.
- Fields, D., D. Bissell, and R. Macrorie. 2020. “Platform Methods: Studying Platform Urbanism Outside the Black Box.” *Urban Geography* 41 (2):1-7.
- Fields, D., and D. Rogers. 2021. “Towards a Critical Housing Studies Research Agenda on Platform Real Estate.” *Housing, Theory and Society*.
<https://www.tandfonline.com/doi/abs/10.1080/14036096.2019.1670724>.
- Figlio, David N., and Maurice E. Lucas. 2004. “What’s in a Grade? School Report Cards and the Housing Market.” *The American Economic Review* 94 (3): 591–604.
- Foucault, Michel. 1990. *The History of Sexuality: An Introduction*, Volume I. Trans. Robert Hurley. New York: Vintage 95: 1–160.
- Friedman, Thomas L. 2005. *The World Is Flat: A Brief History of the Twenty-First Century*. Macmillan.
- Fu, Runshan, Ginger Zhe Jin, and Meng Liu. 2022. “Human Algorithm Interactions: Evidence from Zillow.com.” Working Paper Series. National Bureau of Economic Research.
<http://www.nber.org/papers/w29880>.
- Galiani, Sebastian, Alvin Murphy, and Juan Pantano. 2015. “Estimating Neighborhood Choice Models: Lessons from a Housing Assistance Experiment.” *The American Economic Review* 105 (11): 3385–3415.
- Galster, George, and Erin Godfrey. 2005. “By Words and Deeds: Racial Steering by Real Estate Agents in the U.S. in 2000.” *Journal of the American Planning Association*. *American Planning Association* 71 (3): 251–68.
- Gillespie, T. 2010. “The Politics of ‘Platforms.’” *New Media & Society*.
<https://journals.sagepub.com/doi/abs/10.1177/1461444809342738>.
- . 2014. “The Relevance of Algorithms.” In *Media Technologies: Essays on Communication, Materiality, and Society*. Ed. Tarleton Gillespie, Pablo J. Boczkowski, Kirsten A. Foot. MIT Press.
- Glegg, Stephanie M. N. 2019. “Facilitating Interviews in Qualitative Research With Visual Tools: A Typology.” *Qualitative Health Research* 29 (2): 301–10.

- Gordon, Aubrey, and Michael Hobbes. 2021. "The Body Mass Index." Podcast. *Maintenance Phase*. <https://www.maintenancephase.com/>.
- Gotcher, Sean (@seangotcher). 2021. "#housing." Video. TikTok. September 14, 2021. https://www.tiktok.com/@seangotcher/video/7007855978309848325?is_copy_url=1&is_from_webapp=v1&lang=en.
- Gottdiener, Mark, Claudia Collins, and David R. Dickens. 2000. *Las Vegas: The Social Production of an All-American City*. Hoboken, NJ: Wiley-Blackwell.
- Gupta, Rangan, and Stephen M. Miller. 2012. "Ripple Effects' and Forecasting Home Prices in Los Angeles, Las Vegas, and Phoenix." *The Annals of Regional Science* 48 (3): 763–82.
- Gyamerah, Akua O., Glenda Baguso, Edda Santiago-Rodriguez, Aria Sa'id, Sean Arayasirikul, Jess Lin, Caitlin M. Turner, et al. 2021. "Experiences and Factors Associated with Transphobic Hate Crimes among Transgender Women in the San Francisco Bay Area: Comparisons across Race." *BMC Public Health* 21 (1): 1053.
- Hacking, I. 1982. "Biopower and the Avalanche of Printed Numbers." *Humanities in Society*. <https://www.degruyter.com/document/doi/10.7208/9780226226767-005/pdf?licenseType=restricted>.
- Harshaw, Pendarvis. 2020. "Sometimes, It Takes Time': Erina Alejo, the Third-Generation Renter." KQED. September 4, 2020. <https://www.kqed.org/arts/13885733/sometimes-it-takes-time-erina-alejo-the-third-generation-renter>.
- Hasan, Sharique, and Anuj Kumar. 2019. "Digitization and Divergence: Online School Ratings and Segregation in America." <https://doi.org/10.2139/ssrn.3265316>.
- Holcome, Madeline, and Alec Snyder. 2020. "Warrant in Fatal Encounter between Breonna Taylor and Police Was Linked to Gentrification Plan, Family's Lawyers Claim." *CNN*, July 7, 2020. <https://www.cnn.com/2020/07/07/us/breonna-taylor-lawsuit-gentrification/index.html>.
- "Housing Precarity Risk Model." 2021. Urban Displacement Project. June 13, 2021. <https://www.urbandisplacement.org/maps/housing-precarity-risk-model/>.
- "Housing Discrimination under the Fair Housing Act." n.d. Hud.gov / U.S. Department of Housing and Urban Development (HUD). Accessed July 23, 2024. https://www.hud.gov/program_offices/fair_housing_equal_opp/fair_housing_act_overview.
- "How Much Is My House Worth?" 2021. Zillow. November 17, 2021. <https://www.zillow.com/how-much-is-my-home-worth/>.

- “How to Find Affordable Housing in Oakland.” 2023. *The Oaklandside*. April 5, 2023. <https://oaklandside.org/affordable-housing-guide/>.
- Howell, Junia, and Elizabeth Korver-Glenn. 2018. “Neighborhoods, Race, and the Twenty-First-Century Housing Appraisal Industry.” *Sociology of Race and Ethnicity* 4 (4): 473–90.
- Hsu, Angel, Glenn Sheriff, Tirthankar Chakraborty, and Diego Manya. 2021. “Publisher Correction: Disproportionate Exposure to Urban Heat Island Intensity across Major US Cities.” *Nature Communications* 12 (1): 4104.
- Humber, Nadiyah J. 2020. “In West Philadelphia Born and Raised or Moving to Bel-Air? Racial Steering as a Consequence of Using Race Data on Real Estate Websites.” *Hastings Race* 1 (17): 133–76.
- Humphries, Stan. 2019. “Introducing a New and Improved Zestimate Algorithm - Zillow Tech Hub.” Zillow. June 27, 2019. <https://www.zillow.com/tech/introducing-a-new-and-improved-zestimate-algorithm/>.
- Hupalo, Masha. 2021. “The Politics of Zestimate: Merging Technology and Real.” *Radical Housing Journal* 3 (2): 215–19.
- Immergluck, D., J. Ernsthausen, S. Earl, and A. Powell. 2020. “Evictions, Large Owners, and Serial Filings: Findings from Atlanta.” *Housing Studies*. <https://www.tandfonline.com/doi/abs/10.1080/02673037.2019.1639635>.
- Jerven, Morten. 2013. *Poor Numbers: How We Are Misled by African Development Statistics and What to Do about It*. Cornell University Press.
- Jiao, Junfeng, and Shunhua Bai. 2020. “An Empirical Analysis of Airbnb Listings in Forty American Cities.” *Cities* 99 (April). <https://doi.org/10.1016/j.cities.2020.102618>.
- Joh, Elizabeth E. 2017. “Feeding the Machine: Policing, Crime Data, & Algorithms.” *Wm. & Mary Bill Rts. J.* 26: 287.
- Johnson, Ian G., Aare Puusaar, Jennifer Manuel, and Peter Wright. 2018. “Neighbourhood Data: Exploring the Role of Open Data in Locally Devolved Policymaking Processes.” *Proc. ACM Hum.-Comput. Interact.*, 83, 2 (CSCW): 1–20.
- Joint Center for Housing Studies. 2022. “The State of the Nation’s Housing.” Harvard University. https://www.jchs.harvard.edu/sites/default/files/reports/files/Harvard_JCHS_State_Nations_Housing_2022.pdf.
- Kelly, Theresa C., and Lana Stermac. 2008. “Underreporting in Sexual Assault: A Review of Explanatory Factors.” *Baltic Journal of Psychology* 9 (1/2): 30–45.

- Kempton, Willett. 1986. "Two Theories of Home Heat Control." *Cognitive Science* 10 (1): 75–90.
- Khan, Hussain. 2024. "How Has Downtown Oakland's Population Changed? We Mapped It." *The Oaklandside*. April 8, 2024. <https://oaklandside.org/2024/04/08/downtown-oakland-population-housing-demographics-map/>.
- Kitchin, Rob, Tracey P. Lauriault, and Gavin McArdle. 2015. "Knowing and Governing Cities through Urban Indicators, City Benchmarking and Real-Time Dashboards." *Regional Studies, Regional Science* 2 (1): 6–28.
- Kneese, Tamara. 2023. *Death Glitch: How Techno-Solutionism Fails Us in This Life and Beyond*. Yale University Press.
- Koretz, Daniel. 2009. *Measuring Up*. Harvard University Press.
- Korver-Glenn, Elizabeth. 2021. *Race Brokers: Housing Markets and Segregation in 21st Century Urban America*. Oxford University Press.
- . 2018. "Compounding Inequalities: How Racial Stereotypes and Discrimination Accumulate across the Stages of Housing Exchange." *American Sociological Review* 83 (4): 627–56.
- Krysan, Maria, and Michael D. M. Bader. 2014. "Racial Blind Spots: Black-White-Latino Differences in Community Knowledge." *Social Problems* 56 (4): 677–701.
- La Ganga, Maria L. 2019. "Go Back to California': Wave of Newcomers Fuels Backlash in Boise." *Los Angeles Times*, November 10, 2019. <https://www.latimes.com/california/story/2019-11-10/go-back-to-california-wave-of-newcomers-fuels-backlash-in-boise>.
- Lareau, Annette. 2021. *Listening to People: A Practical Guide to Interviewing, Participant Observation, Data Analysis, and Writing It All Up*. University of Chicago Press.
- Lareau, Annette, and Kimberly Goyette. 2014. *Choosing Homes, Choosing Schools*. Russell Sage Foundation.
- Larson, Erik J. 2021. *The Myth of Artificial Intelligence*. Harvard University Press.
- Larson, Jeff, Julia Angwin, Lauren Kirchner, and Surya Mattu. 2016. "How We Analyzed the COMPAS Recidivism Algorithm." *ProPublica*. May 23, 2016. <https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm>.
- Le Dantec, Christopher A., Caroline Appleton, Mariam Asad, Robert Rosenberger, and Kari Watkins. 2016. "Advocating through Data: Community Visibilities in Crowdsourced Cycling Data." In *Bicycle Justice and Urban Transformation: Biking for All?*, edited by

- Aaron Golub, Melody L. Hoffmann, Adonia E. Lugo, and Gerardo F. Sandoval, 70–85. Routledge.
- Leszczynski, Agnieszka. 2020. “Glitchy Vignettes of Platform Urbanism.” *Environment and Planning. D, Society & Space* 38 (2): 189–208.
- Li, Hanlin, and Brent Hecht. 2021. “3 Stars on Yelp, 4 Stars on Google Maps: A Cross-Platform Examination of Restaurant Ratings.” *Proc. ACM Hum.-Comput. Interact.*, 254, 4 (CSCW3): 1–25.
- Li, Rena, Sara Kingsley, Chelsea Fan, Proteeti Sinha, Nora Wai, Jaimie Lee, Hong Shen, Motahhare Eslami, and Jason Hong. 2023. “Participation and Division of Labor in User-Driven Algorithm Audits: How Do Everyday Users Work Together to Surface Algorithmic Harms?” In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–19. CHI ’23 567.
- Light, Ben, Jean Burgess, and Stefanie Duguay. 2018. “The Walkthrough Method: An Approach to the Study of Apps.” *New Media & Society* 20 (3): 881–900.
- Lindner, Christoph, and Gerard Sandoval. 2021. *Aesthetics of Gentrification: Seductive Spaces and Exclusive Communities in the Neoliberal City*. Amsterdam University Press.
- Lloyd, Annemaree, and Jane Wilkinson. 2016. “Knowing and Learning in Everyday Spaces (KALiEds): Mapping the Information Landscape of Refugee Youth Learning in Everyday Spaces.” *Journal of Information Science and Engineering* 42 (3): 300–312.
- Madianou, M., and D. Miller. 2013. “Polymedia: Towards a New Theory of Digital Media in Interpersonal Communication.” *Journal of the International Society for the Study of European Ideas* / Sponsored by the European Cultural Foundation.
<https://journals.sagepub.com/doi/abs/10.1177/1367877912452486>.
- Maharawal, Manissa M., and Erin McElroy. 2018. “The Anti-Eviction Mapping Project: Counter Mapping and Oral History toward Bay Area Housing Justice.” *Annals of the Association of American Geographers* 108 (2): 380–89.
- Mallach, Alan. 2014. “Lessons From Las Vegas: Housing Markets, Neighborhoods, and Distressed Single-Family Property Investors.” *Housing Policy Debate* 24 (4): 769–801.
- Mapping Police Violence. n.d. “About the Data —.” Mapping Police Violence. Accessed July 24, 2024. <https://mappingpoliceviolence.us/aboutthedata>.
- Markley, Scott. 2024. “Federal ‘Redlining’ Maps: A Critical Reappraisal.” *Urban Studies* 61 (2): 195–213.

- Martin, Jeffery. 2019. "Activist Group 'Moms for Housing' Occupies Vacant Home in Oakland to Protest City's Homeless Crisis." *Newsweek*. November 18, 2019. <https://www.newsweek.com/activist-group-moms-housing-occupies-vacant-home-oakland-protest-citys-homeless-crisis-1472535>.
- McBride, Ashley. 2022. "Oakland Schools Are Facing \$50M in Cuts. Here Are Some Budget Basics." *The Oaklandside*. January 13, 2022. <https://oaklandside.org/2022/01/12/oakland-schools-are-facing-50m-in-cuts-here-are-some-budget-basics/>.
- McElroy, Erin. 2023. "DIS / POSSESSORY DATA POLITICS : From Tenant Screening to Anti-eviction Organizing." *International Journal of Urban and Regional Research* 47 (1): 54–70.
- McElroy, Erin, and Manon Vergerio. 2022. "Automating Gentrification: Landlord Technologies and Housing Justice Organizing in New York City Homes." *Environment and Planning. D, Society & Space* 40 (4): 607–26.
- McGlotten, Shaka. 2013. *Virtual Intimacies: Media, Affect, and Queer Sociality*. State University of New York Press.
- McKittrick, K. 2006. *Demonic Grounds: Black Women and the Cartographies of Struggle*. Minneapolis, MN: University of Minnesota Press.
- Mills, Charles W. 2014. *The Racial Contract*. Cornell University Press.
- Mock, Brentin. 2023. "Reforms to Home Appraisal Bias Target Algorithms and Tech." *Bloomberg News*, June 12, 2023. <https://www.bloomberg.com/news/articles/2023-06-12/biden-wants-to-regulate-home-appraisal-algorithms-to-reduce-bias>.
- Nagel, Emily van der. 2018. "'Networks That Work Too Well': Intervening in Algorithmic Connections." *Media International Australia* 168 (1): 81–92.
- Narayanan, Arvind, and Sayash Kapoor. 2024. *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference*. Princeton University Press.
- Neal, Michael, Sarah Stochak, Linna Zhu, and Caitlin Young. 2020. "How Automated Valuation Models Can Disproportionately Affect Majority-Black Neighborhoods." Washington, DC: Urban Institute, December. <https://www.urban.org/research/publication/how-automated-valuation-models-can-disproportionately-affect-majority-black-neighborhoods>.
- Neville, Stephen J. 2021. "The Domestication of Privacy-Invasive Technology on YouTube: Unboxing the Amazon Echo with the Online Warm Expert." *Convergence* 27 (5): 1288–1307.

- Nguyen, Tien T., Pik-Mai Hui, F. Maxwell Harper, Loren Terveen, and Joseph A. Konstan. 2014. "Exploring the Filter Bubble: The Effect of Using Recommender Systems on Content Diversity." In *Proceedings of the 23rd International Conference on World Wide Web*, 677–86. WWW '14.
- Nissenbaum, Helen. 2005. "Values in Technical Design." In *Encyclopedia of Science Technology and Ethics*, edited by Carl Mitcham, lxvi–lxx. MacMillan.
- Noble, Safiya Umoja. 2018. *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York, NY: NYU Press.
- Norman, D. 1987. "Some Observations on Mental Models." *Human-Computer Interaction*, December, 241–44.
- O'Day, Vicki L., and Robin Jeffries. 1993. "Orienteering in an Information Landscape: How Information Seekers Get from Here to There." In *Proceedings of the INTERACT '93 and CHI '93 Conference on Human Factors in Computing Systems*, 438–45. CHI '93.
- Office of the Comptroller of the Currency. 2023. Quality Control Standards for Automated Valuation Models. <https://www OCC.treas.gov/news-issuances/news-releases/2024/nr-ia-2024-78a.pdf>.
- Ogbonnaya-Ogburu, Ihudiya Finda, Angela D. R. Smith, Alexandra To, and Kentaro Toyama. 2020. "Critical Race Theory for HCI." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–16. CHI '20.
- Olson, Brent A. Esq, ed. 2023. "16B:69. CDA Immunity—Third Element of Barnes Test—'Information Provided by Another Information Content Provider.'" In *Business Law Deskbook, Advanced Topics In Business Law*. Minnesota Practice Series TM. Thompson Reuters.
- "Openigloo." n.d. *Crunchbase*. Accessed August 3, 2024. <https://www.crunchbase.com/organization/openigloo>.
- Oudshoorn, Nelly, Els Rommes, and Marcelle Stienstra. 2004. "Configuring the User as Everybody: Gender and Design Cultures in Information and Communication Technologies." *Science, Technology & Human Values* 29 (1): 30–63.
- Parker, W., and K. Putzier. 2021. "What Went Wrong with Zillow? A Real-Estate Algorithm Derailed Its Big Bet." *Wall Street Journal*, November 17, 2021. <https://www.wsj.com/articles/zillow-offers-real-estate-algorithm-homes-ibuyer-11637159261>.
- Pasquale, Frank. 2015. *The Black Box Society: The Secret Algorithms That Control Money and Information*. Cambridge, MA and London, England: Harvard University Press.

- Payne, W. 2018. "Crawling the City." *Logic Magazine*.
- Peer, Firaz, and Carl DiSalvo. 2022. "The Work of Infrastructural Bricoleurs in Building Civic Data Dashboards." *Proc. ACM Hum.-Comput. Interact.*, 124, 6 (CSCW1): 1–25.
- Pierce, James. 2019. "Smart Home Security Cameras and Shifting Lines of Creepiness: A Design-Led Inquiry." In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–14. CHI '19. New York, NY, USA: Association for Computing Machinery.
- Plantin, J. C., C. Lagoze, and P. N. Edwards. 2018. "Infrastructure Studies Meet Platform Studies in the Age of Google and Facebook." *New Media & Society*, 20 (1). <https://journals.sagepub.com/doi/abs/10.1177/1461444816661553>.
- Porter, Theodore M. 1996. *Trust in Numbers*. Princeton University Press.
- Poulter, Amy. 2021. "Zillow Responds to Viral Tik Tok Video Claiming Housing Market Manipulation." *Yahoo Finance*. September 27, 2021. <https://finance.yahoo.com/news/zillow-tiktok-video-real-estate-housing-211403123.html>.
- Pulido, Laura. 1996. "A Critical Review of the Methodology of Environmental Racism Research." *Antipode* 28 (2): 142–59.
- Raji, Inioluwa Deborah, and Joy Buolamwini. 2022. "Actionable Auditing Revisited: Investigating the Impact of Publicly Naming Biased Performance Results of Commercial AI Products." *Communications of the ACM* 66 (1): 101–8.
- Raji, Inioluwa Deborah, I. Elizabeth Kumar, Aaron Horowitz, and Andrew Selbst. 2022. "The Fallacy of AI Functionality." In *2022 ACM Conference on Fairness, Accountability, and Transparency*. New York, NY, USA: ACM. <https://doi.org/10.1145/3531146.3533158>.
- Ramírez, Margaret M. 2020. "City as Borderland: Gentrification and the Policing of Black and Latinx Geographies in Oakland." *Environment and Planning. D, Society & Space* 38 (1): 147–66.
- "Realtor.com® Celebrates the Individuality of Buyers with Its New 'Homes for Every Home Buyer' Campaign." 2021. PR Newswire. May 10, 2021. <https://www.prnewswire.com/news-releases/realtorcom-celebrates-the-individuality-of-buyers-with-its-new-homes-for-every-home-buyer-campaign-301287090.html>.
- Redi, Miriam, Luca Maria Aiello, Rossano Schifanella, and Daniele Quercia. 2018. "The Spirit of the City: Using Social Media to Capture Neighborhood Ambiance." *Proc. ACM Hum.-Comput. Interact.*, 144, 2 (CSCW): 1–18.

- “RentHop.” n.d. *Crunchbase*. Accessed August 3, 2024.
<https://www.crunchbase.com/organization/renthop>.
- Rhodes, Anna, and Stephanie De Luca. 2014. “Residential Mobility and School Choice among Poor Families.” In *Choosing Homes, Choosing Schools*, edited by Annette Lareau and Kimberly Goyette, 137–66.
- Ribeiro, Manoel Horta, Raphael Ottoni, Robert West, Virgílio A. F. Almeida, and Wagner Meira. 2020. “Auditing Radicalization Pathways on YouTube.” In *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*, 131–41. FAT* ’20. New York, NY.
- Richardson, Rashida. 2022. “Racial Segregation and the Data-Driven Society: How Our Failure to Reckon with Root Causes Perpetuates Separate and Unequal Realities.” *Berkeley Tech. LJ*.
- Robinson, Cedric J. 2020. *Black Marxism, Revised and Updated Third Edition: The Making of the Black Radical Tradition*. UNC Press Books.
- Rosen, Eva. 2020. *The Voucher Promise: “Section 8” and the Fate of an American Neighborhood*. Princeton University Press.
- Rothstein, Richard. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America*. Liveright Publishing.
- S&P Dow Jones LLC. 2024. “S&P CoreLogic Case-Shiller NV-Las Vegas Home Price Index.”
<https://fred.stlouisfed.org/series/LVXRSA>.
- Sadowski, Jathan. 2020. “Cyberspace and Cityscapes: On the Emergence of Platform Urbanism.” *Urban Geography* 41 (3): 448–52.
- Safransky, Sara. 2020. “Geographies of Algorithmic Violence: Redlining the Smart City.” *International Journal of Urban and Regional Research* 44 (2): 200–218.
- Sanders, Rebecca L., and Robert J. Schneider. 2022. “An Exploration of Pedestrian Fatalities by Race in the United States.” *Transportation Research Part D: Transport and Environment* 107 (June): 103298.
- Sandvig, C., K. Hamilton, K. Karahalios, and C. Langbort. 2014. “Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms.” *Data and Discrimination: Converting Critical Concerns into Productive Inquiry* 22: 4349–57.
- Saxenian, Annalee. 2006. *The New Argonauts: Regional Advantage in a Global Economy*. Harvard University Press.
- Schaul, Kevin, and Jonathan O’Connell. 2022. “Investors Bought a Record Share of Homes in 2021. See Where.” *The Washington Post*, February 16, 2022.

<https://www.washingtonpost.com/business/interactive/2022/housing-market-investors/>.

Schneider, Jack. 2017. *Beyond Test Scores: A Better Way to Measure School Quality*. Harvard University Press.

Seaver, Nick. 2017. "Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems." *Big Data & Society* 4 (2): 2053951717738104.

Scott, James C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. Yale University Press.

Self, Robert O. 2005. *American Babylon: Race and the Struggle for Postwar Oakland*. Princeton University Press.

Sengers, Phoebe, and Bill Gaver. 2006. "Staying Open to Interpretation: Engaging Multiple Meanings in Design and Evaluation." In *Proceedings of the 6th Conference on Designing Interactive Systems*, 99–108. DIS '06. New York, NY, USA: Association for Computing Machinery.

Shami, N. Sadat, Jeffrey T. Hancock, Christian Peter, Michael Muller, and Regan Mandryk. 2008. "Measuring Affect in Hci: Going beyond the Individual." In *CHI '08 Extended Abstracts on Human Factors in Computing Systems*, 3901–4. CHI EA '08. New York, NY, USA: Association for Computing Machinery.

Shaw, Joe. 2020. "Platform Real Estate: Theory and Practice of New Urban Real Estate Markets." *Urban Geography* 41 (8): 1037–64.

Shelton, Taylor, and Thomas Lodato. 2019. "Actually Existing Smart Citizens." *Cityscape* 23 (1): 35–52.

Shilton, Katie, Jes A. Koepfler, and Kenneth R. Fleischmann. 2014. "How to See Values in Social Computing: Methods for Studying Values Dimensions." In *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing*, 426–35. CSCW '14. New York, NY, USA: Association for Computing Machinery.

Sinha, Charu. 2021. "Home Ownership Is Better than Sex in SNL Zillow Ad." *Vulture*. February 7, 2021. <https://www.vulture.com/2021/02/watch-snl-parodies-zillow-in-skit.html>.

Small, M. L., and J. M. Cook. 2023. "Using Interviews to Understand Why: Challenges and Strategies in the Study of Motivated Action." *Sociological Methods & Research*. <https://journals.sagepub.com/doi/abs/10.1177/0049124121995552>.

- Small, Mario Luis, and Jessica McCrory Calarco. 2022. *Qualitative Literacy: A Guide to Evaluating Ethnographic and Interview Research*. Univ of California Press.
- Smith, Catherine. 2022. "Automating Intellectual Freedom: Artificial Intelligence, Bias, and the Information Landscape." *IFLA Journal* 48 (3): 422–31.
- Sparks, Sarah D. 2017. "School-Rating Site GreatSchools Expands Its Measuring Stick." *Education Week*, November 2, 2017.
- Spears, Darcy. 2022. "Fees before Keys: Las Vegas-Area Renters Overwhelmed by Application Fees." Channel 13 *Las Vegas News KTNV*. February 21, 2022. <https://www.ktnv.com/13-investigates/fees-before-keys-las-vegas-area-renters-overwhelmed-by-application-fees>.
- Srnicek, Nick. 2017. *Platform Capitalism*. Polity Press.
- Stors, Natalie, and Sebastian Baltes. 2018. "Constructing Urban Tourism Space Digitally: A Study of Airbnb Listings in Two Berlin Neighborhoods." *Proc. ACM Hum.-Comput. Interact.*, 166, 2 (CSCW): 1–29.
- Suchman, Lucy A. 1990. *Plans and Situated Actions: The Problem of Human-Machine Communication*. Vol. 103. University of Illinois Press.
- Surfpunk, Yoga. 2014. "Las Vegas, NV #1." *Judgmental Maps: Your City. Judged*. 2014. <https://judgmentalmaps.com/post/82916342074/lasvegas1>.
- Taubman, Christian. 2021. "Neighborhood Crime Data Doesn't Belong on Real Estate Sites." Redfin Real Estate News. Redfin. December 13, 2021. <https://www.redfin.com/news/neighborhood-crime-data-doesnt-belong-on-real-estate-sites/>.
- Taylor, Candace. 2021. "Real-Estate Frenzy Overwhelms Small-Town America: 'I Came Home Crying.'" *The Wall Street Journal*, May 20, 2021. <https://www.wsj.com/articles/real-estate-frenzy-overwhelms-small-town-america-i-came-home-crying-11621511972>.
- Taylor, Keeanga-Yamahtta. 2019. *Race for Profit: How Banks and the Real Estate Industry Undermined Black Homeownership*. UNC Press Books.
- "The 17 Goals." n.d. United Nations Department of Economic and Social Affairs. Accessed July 28, 2024. <https://sdgs.un.org/goals>.
- Thind, Maninder P. S., Christopher W. Tessum, Inês L. Azevedo, and Julian D. Marshall. 2019. "Fine Particulate Air Pollution from Electricity Generation in the US: Health Impacts by Race, Income, and Geography." *Environmental Science & Technology* 53 (23): 14010–19.

- Thompson, Cheryl W. 2021. "Racial Covenants, a Relic of the Past, Are Still on the Books across the Country." *NPR*, November 17, 2021.
<https://www.npr.org/2021/11/17/1049052531/racial-covenants-housing-discrimination>.
- Tobias, Manuela, and Liam Dillon. 2022. "Why L.A. Apartments Don't Come with Fridges?" *Gimme Shelter*. CalMatters. Cal Matters.
<https://calmatters.org/housing/2022/06/california-housing-fridges/>.
- . 2022b. "What does new California housing leader want to do?" *Gimme Shelter*. Podcast. Cal Matters. <https://calmatters.org/housing/2022/01/california-housing-crisis-podcast-new-leader/>.
- Tramble, Thompson, and Wilma Tramble. 2007. *The Pullman Porters and West Oakland*. Charleston, SC: Arcadia Pub.
- Tufekci, Zeynep. 2017. *Twitter and Tear Gas: The Power and Fragility of Networked Protest*. Yale University Press.
- Vinsel, Lee. 2021. "You're Doing It Wrong: Notes on Criticism and Technology Hype." Medium. February 1, 2021. <https://sts-news.medium.com/youre-doing-it-wrong-notes-on-criticism-and-technology-hype-18b08b4307e5>.
- Wachsmuth, David, and Alexander Weisler. 2018. "Airbnb and the Rent Gap: Gentrification through the Sharing Economy." *Environment & Planning A* 50 (6): 1147–70.
- "Walk Score Methodology." n.d. Walk Score. Accessed July 24, 2024.
<https://www.walkscore.com/methodology.shtml>.
- "What Is a Neural Network?" 2021. IBM. October 6, 2021.
<https://www.ibm.com/topics/neural-networks>.
- "What Is a Zestimate?" 2020. Zillow. November 11, 2020.
<https://www.zillow.com/z/zestimate/>.
- "Where Does Trulia Get Crime Information?" 2020. Trulia. April 14, 2020.
<https://support.trulia.com/hc/en-us/articles/115001564128-Where-does-Trulia-get-crime-information>.
- Weber, Max, ed. 2016. "The Definition of Sociology and Social Action." In *Basic Sociological Terms*, 4–26. Social Theory Re-Wired.
- Wilkerson, Isabel. 2011. *The Warmth of Other Suns: The Epic Story of America's Great Migration*. Vintage.

- Wikipedia contributors. 2024. "Subprime mortgage crisis." Wikipedia, The Free Encyclopedia. July 24, 2024.
https://en.wikipedia.org/wiki/Subprime_mortgage_crisis.
- Winner, Langdon. 1980. "Do Artifacts Have Politics?" *Daudalus* 109 (1): 121–36.
- Wissinger, Elizabeth. 2018. "Blood, Sweat, and Tears: Navigating Creepy versus Cool in Wearable Biotech." *Information, Communication and Society* 21 (5): 779–85.
- Woodruff, Izzy. 2022. "National Fair Housing Alliance and Redfin Agree to Settlement Which Greatly Expands Access to Real Estate Services in Communities of Color." NFHA. April 29, 2022. <https://nationalfairhousing.org/national-fair-housing-alliance-and-redfin-agree-to-settlement-which-greatly-expands-access-to-real-estate-services-in-communities-of-color-%ef%bf%bc/>.
- Yosso, Tara J. 2005. "Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth." *Race, Ethnicity and Education* 8 (1): 69–91.
- Zaimi, Rea. 2020. "Making Real Estate Markets: The Co-production of Race and Property Value in Early 20th Century Appraisal Science." *Antipode* 52 (5): 1539–59.
- Zillow Group. 2021. "Zillow Group Reports Third-Quarter 2021 Financial Results & Shares Plan to Wind Down Zillow Offers Operations." Zillow Group. November 2, 2021.
<https://investors.zillowgroup.com/investors/news-and-events/news/news-details/2021/Zillow-Group-Reports-Third-Quarter-2021-Financial-Results--Shares-Plan-to-Wind-Down-Zillow-Offers-Operations/default.aspx>.
- . 2022. "Annual Report 2021." Zillow Group.
[https://s24.q4cdn.com/723050407/files/doc_financials/2021/ar/Zillow-Annual-Report-\(2021-hyperlinks\).pdf](https://s24.q4cdn.com/723050407/files/doc_financials/2021/ar/Zillow-Annual-Report-(2021-hyperlinks).pdf).
- "Zillow Launches New Neural Zestimate, Yielding Major Accuracy Gains." 2021. Zillow MediaRoom. June 15, 2021. <https://zillow.mediaroom.com/2021-06-15-Zillow-Launches-New-Neural-Zestimate,-Yielding-Major-Accuracy-Gains>.
- "Zillow Prize Winners." 2020. Zillow. May 26, 2020. <https://www.zillow.com/z/info/zillow-prize/>.
- "Zillow Starts Making Cash Offers for the Zestimate." 2021. Zillow MediaRoom. February 25, 2021. <https://zillow.mediaroom.com/2021-02-25-Zillow-Starts-Making-Cash-Offers-For-the-Zestimate>.
- Zuboff, Shoshana. 1988. *In the Age of the Smart Machine: The Future of Work and Power*. USA: Basic Books, Inc.

- . 2019. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Public Affairs.
- Zukin, Sharon. 2010. *Naked City: The Death and Life of Authentic Urban Places*. Oxford University Press.
- Zukin, Sharon, Scarlett Lindeman, and Laurie Hurson. 2017. "The Omnivore's Neighborhood? Online Restaurant Reviews, Race, and Gentrification." *Journal of Consumer Culture* 17 (3): 459–79.