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Metrics, Locations, and Lift:
Mobile Location Analytics and the Production of Second-Order Geodemographics

Dr. Harrison Smith

Global Urban Research Unit, School of Architecture, Planning, and Landscape

Newcastle University, Newcastle Upon Tyne, United Kingdom

harrison.smith@newcastle.ac.uk

orcid.org/0000-0001-8144-5754

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This article examines the relationship between location data and geodemographic knowledge by focusing on the role of third party mobile location analytics companies that passively capture location data from mobile advertising exchanges to develop new approaches to audience measurement. It argues that in addition to segmentation, a key objective is to calculate the performativity of algorithmically targeted advertising by measuring its capacity to drive foot traffic to particular locations. This is known as measuring audience 'lift' and reveals how the value of location data depends on how metrics can be created to prove their ability to influence behaviour. 'Second-order geodemographics' is proposed as a concept for theorizing the relationship between location-based classification and measurement, and is grounded in a case study of one company to illustrate the ecosystem of mobile location analytics.

Keywords: Mobile Technology; Surveillance/Privacy; Geographic Information Systems; Mobile Marketing; Location Data

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Introduction

This article examines the emerging field of location based marketing by considering how location data is being used to produce geodemographic classifications and economic relationships between people, places, and algorithmically distributed media. Research into the intersection of location data and geodemographics is currently underdeveloped and present opportunities to synthesize theories of location analytics with existing studies on geospatial software that classifies and maps consumer lifestyles (Burrows & Gane, 2006; Barreneche, 2011). Existing literature in location based media focuses on user-centric studies of audience geo-coding, and concentrates the discussion around large developers of mainstream location based platforms such as Google Maps and Foursquare. This neglects the important but often invisible role of third party advertising servers and analytics industries that capture and analyze location data for a variety of political and commercial applications. As a result, there is a need to stimulate discussions that critically analyze emerging targeting and segmentation practices by marketers, and how they reconfigure the economic relations of data production and consumer surveillance.

The argument advanced here is that mobile location analytics extends beyond geodemographic segmentation and focuses on developing new metrics that quantify the performativity of algorithmically produced advertisements by assessing changes in observable

behaviour, particularly visit rates to specific locations. This is known in marketing as measuring consumer 'lift' and substantially informs the 'metric power' (Beer 2016) of location analytics because of how it contains human agency into a quantifiable object of marketing performance using controlled experiments directed on specific geodemographic segments. Measuring consumer lift has become a major point of interest for location based marketers engaged in targeting mobile audiences because it can be used to attribute location visits to exposure with media content. Measuring causation between advertising and sales is not new. However, applying this logic to mobile and geo-locative media is. It has captivated marketers, especially those targeting the fetishized 'millennial' market for their mobile and media saturated lifestyles, in order to perpetuate the ideological imperative that marketers must successfully engage their audience through personalized content in the pursuit of relevance and distinction (Turow & Draper, 2014).

For marketing applications, location data is significant because it reconfigures institutions of 'knowing capitalism' (Thrift, 2005) through metrics and 'big data' analytics (Beer, 2016, 2017a) to produce the conditions for geodemographic knowledge (Burrows & Gane, 2006). This paper explains some of these implications by drawing on a case study of key technologies, metrics, and patents developed by one specific company, PlaceIQ, who describes themselves as a pioneer in mobile location analytics.[1] It introduces the concept of 'second-order geodemographics' to theorize the mechanisms of measurement and classification through mobile location analytics. By building on emerging studies on data analytics industries (Beer, 2017b), this article specifically focuses on the impact of location data in relation to key institutional objectives in contemporary marketing, such as the intensification of geodemographic classification, and the ability to measure the economic performance of geo-targeted advertising

through new metrics such as audience 'lift'. As a case study into the 'ecologies of location' (Wilken 2015), this analysis of PlaceIQ presents an important contribution to understanding how location data will increasingly mediate the infrastructures of algorithmic media, and their processes of targeting and measurement.

Approaching Geodemographics: From Postal Codes to Geo-Codes

This section situates the production of geodemographic knowledge within a broader discussion of knowing capitalism (Thrift, 2005) in order to understand the impact of location data, algorithms, and analytics on the practices of market segmentation. It first unpacks the basic premises and implications of geodemographics and its implications for the socio-technical construction of space through software, then shifts to examine how the logic and practice of geodemographic knowledge production is being reconfigured by mobile media and new algorithmic approaches to identity construction and governance that characterize online platforms and social networks (Cheney-Lippold, 2011). This shift from segmenting lifestyles from postal codes to geo-codes is still nascent but has tended to focus on the role platforms and the direct geo-coded practices of users. While important, the purpose here is to demonstrate how this theoretical discussion can be further applied to emerging analytical practices that operate beyond the direct purview of users, and play a crucial role in the politics of classification (Bowker & Star, 1999).

Geodemographics classify populations into specific categories based on spatial and demographic attributes organized according to postal or ZIP codes. The guiding principle is typically expressed through the idiom that you are where you live. This is embodied in the

creation of geodemographic systems such as PRIZM and ACORN that attach specific cultural and economic qualities onto fixed spatial regions. Geodemographics are usually created and managed by institutions of marketing, however, sociologists have recently taken interest in critically understanding the significance of geodemographics in relation to the reproduction of socio-economic differences (Burrows & Gane, 2006).

The routine, and for some, 'automatic' production of space through software and its underlying code (Thrift & French, 2002) is now a central feature of the political economy of geospatial software. Producing space through software and code in effect reveals how spaces are now depend on the agency of particular kinds of software that operate by measuring, calculating, and classifying spaces in order to reproduce particular social and material conditions, and in turn specific cultural and economic arrangements of contemporary environments. As Dodge and Kitchin (2005) argue, this underlying substrate of code and software is often invisible but necessary for the routine functioning and more importantly the routine control of everyday spaces and flows such that, 'code, to varying degrees, conditions existence' (p. 164).

The application of software and code to condition existence is exemplified by the ways spaces are routinely 'software sorted' (Graham, 2005) in order to govern social and economic arrangements, particularly the distribution of resources and access, particularly in urban environments (Graham & Marvin, 2001). Cities are now increasingly 'sentient' whereby environments reflexively monitor the behaviour of populations (Crang & Graham, 2007). Of particular importance are when such urban arrangements are informed by market-led visions whereby the routine sorting of space exists in the service of maximizing capital accumulation through the intensification of classification systems. Burrows and Gane (2006) explain how geodemographic are significant because of its performative effect on sorting out populations

through geospatial software for commercial applications. Spaces and people are thus increasingly divided and segmented into discrete cohorts and assigned specific values of economic, political, and cultural value to intensify processes of accumulation and profit.

It is important to consider the relationship between the methodological application of geodemographics to produce space and the epistemological value it possesses to accomplish particular objectives. Expressed differently, there is a tautology inherent in the perceived usefulness of geodemographics and in the way such classification systems are deliberately constructed by the classifiers (Uprichard, Burrows, & Parker, 2009). This means that there are important ethical and political questions in addressing the construction of such classification systems in relation to their perceived usefulness and functionality, and how this relationship influences the classification techniques, methods of data capture, and the valorization of specific markets.

The classification of populations into coherent geodemographic segments is undergoing a re-imagination that corresponds with changes in mobile media infrastructures and location data production. How lifestyles are imagined and measured becomes a focal point for critically understanding what location data does to alter the constitution of geodemographic segments, but also the underlying cultural assumptions of consumer lifestyles and the ontological nature of space. For Phillips and Curry (2003), the 'phenetic urge' of geodemographics is moving away from segmenting people into fixed places towards a worldview of geo-clustering informed by the analysis of patterns:

> ‘lifestyle’ marketing has, in a sense, reached both the logical extreme and the antithesis of locational marketing. In carrying ‘you are where you live’ to its technological and analytic extreme, it has turned on itself. The spatial container is no longer recognized as

> the primary definer of its individual contents. In response, marketers and demographers have begun to understand regions themselves as constituted by the patterns of activity of individuals (Phillips and Curry 2002, p. 144).

The analysis of patterns of activity as the focal point for geodemographic production is perhaps most apparent when one considers the explosion of location based networking and the underlying cartographic power of interactive mapping technologies that place location as the organizing principle for algorithmically targeted content. Media content is now increasingly geographical in nature in that it can utilize location data and geospatial mapping to produce and deliver personalized content. This has culminated into new bodies of empirical research around mobile and locative media that investigate how users engage with these infrastructures and interfaces to create and sustain communicative practices, identities, and socially construct meanings of space and place.[2]

A major focus of research in mobile and location based media concerns the way it can affect users' perceptions of people, places, and privacy because of how location data augments the visibilities of urban flows and embodied social interactions (Bilandzic & Foth, 2012). This has engendered important discussions around the nature of mobile interfaces with respect to how they enable networks to flourish, and the growing recognition that it is impossible to maintain ontological or material distinctions between physical and digital spaces because they are increasingly co-constituted into ‘hybrid spaces’ whereby users are in a sense ‘always on’ through ubiquitous computing and mobile interfaces (de Souza e Silva, 2006). Hybrid spaces therefore problematize material distinctions of reality and representation typically invoked in philosophical distinctions of virtual networks, and requires a re-thinking of how to theorize how location-based

services re-mediate the lived experiences of users in spaces as well as the routine practices of urban sociality (de Souza e Silva & Sutko, 2011; Sutko & de Souza e Silva, 2010). They are important because of the ways that space is reintroduced as a key variable for structuring mobile media practices of communication and information seeking, meaning that the capacity for communication and information access can depend on the location of users in physical space. Frith (2017), for example, has examined the rise of ‘spatial search’ in order to show how search engines for mobile media may render certain locations invisible or underrepresented to specific users based on the ways the platform makes particular assumptions or calculations concerning the dispositions or socio-economic status of the user, in effect engendering critical questions around the supposed 'objectivity' of maps to simply represent spaces.

Although the genealogy of locative media begins as a niche movement embraced as a unique method of networking and art (Wilken, 2012; Zeffiro, 2012), the private sector has become a key player in the commercial development of location based smartphone applications that exploit personal data for geo-targeted advertising (Goggin, 2014, 2009, 2011). Of crucial importance is the intensification of algorithmically produced content that leverage personal data and location to deliver targeted content. Algorithms are significant not just because of the way algorithms mediate content, but also, following Beer (2017), it is the social power of algorithms to structure various rationalities and frames of perception to understand and value social phenomena. This includes the production and governance of 'algorithmic identities' to maximize the processes of audience commodification (Cheney-Lippold, 2011). Some highlight a cultural shift that algorithms now play in the social production of media content and its overall cultural impact with respect to the performativity of circulation and a classificatory imagination at work

(Beer & Burrows, 2013), particularly in media platforms that capitalize on user generated content (Beer, 2009).

The impact of algorithms on has been particularly evident in the field of social media analytics, where issues of logic and governance over the conditions of visibility become central for understanding the political economies of algorithms (Bucher, 2016). For Skeggs and Yuill (2015), data captured on social networks such as Facebook eventually operates independently of its source, such as within the infrastructures of targeted advertising, where personal data becomes 'partitioned, indexed, aggregated and disconnected from the labour of its producer before it is sold in a myriad of different ways' (p. 1368). This constant making and re-making of data as it is classified, sorted, and exchanged with various infrastructures is important because of how the algorithmic power of capital becomes deeply embedded in everyday sociality. Social networks such as Facebook can therefore extend their visibility far beyond their own domain through various 'data objects' and Application Program Interfaces (Helmond, 2015; Langlois & Elmer, 2013).

The commercial production of location data has now become a key strategy by which media platforms such as Facebook and Google maximize their capacities for targeting and delivering contextually relevant information. Barreneche (2012) analyzes Google's Places platform to reveal how the geocoded behaviours of users, such as their search patterns, are captured and stored for analysis by Google to track and predict mobility patterns for increasingly sophisticated forms of geodemographic profiling:

> a form of real-time geodemographics where every check-in, every review, every rating, every place recommendation represents a permanent survey and profiling of social

> spaces, algorithmically sorted in terms of heterogeneity rather than in terms of fixed ontologies. In this sense, the resulting spatiality is not only automated but also ontogenetic as it is in constant becoming (Barreneche, 2012, p. 339).

The changing nature of how space is made knowable by location therefore produce strong distinctions in how geodemographics are imagined, measured, and enacted by institutions of knowing capitalism. The logic of this shift in geodemographic production rests on how location data is assumed to intensify the precision of classification because of the ways it produces space as knowable through metrics captured from user practices of mobile communication, information seeking, and geocoding. However, it is also necessary to understand how these processes are being developed beyond the direct perception of users and interfaces, and how the business-to-business aspects of knowing capitalism leverage the production of location data, and the analysis of mobility to produce new kinds of classificatory knowledge, and more importantly, how this knowledge can be integrated with metrics that evaluate the performance of algorithmically distributed content to measure audience response.

Second-Order Geodemographics: Mobile Location Analytics and Lift

Segmentation is only one implication of mobile location analytics. It is also important to understand the power of location data to govern the conditions of possibility, and the ways that people and places become valued by metrics and key performance indicators. This section explores how marketers use location analytics not only to classify but also provide evidence that

geo-targeted marketing campaigns work to produce observable changes in behaviour. One metric in particular embodies this phenomenon: 'lift'[3]. Lift can be understood as second-order geodemographic impulse that has become a key metric in the creation of values in the field of mobile and location based marketing by establishing correspondences between algorithmically targeted content and the observation of changes in behaviour using location data and location analytics to organize consumer segments through inductive methods of analyzing location patterns. These second-order geodemographics are interested in measuring how the right message, delivered to the right kinds of people, and in the right place in the right time corresponds to observable changes in movements and place visitations, effectively meaning that segmentation becomes intensified by performative metrics. Here location data therefore becomes instrumental in organizing how algorithms distribute advertising, and subsequently can measure its impact. Market forecasters continue to predict surges in the market potential for location data for advertising and marketing applications. Typically, these are optimistic expectations for market growth, including as much as a fourfold increase in revenues to $18.2 billion USD by 2019 (MarketWatch 2014; Chamberlain 2015). With respect to the global location based services and real-time location systems, market analysts likewise predict the industry will enjoy promising growth, from $11.36 billion in 2015 to $54.95 billion by 2020 (Research and Markets 2015).

This emphasis on measuring the impact of geo-targeted content is important because it acknowledges consumer agency as a variable that requires careful measurement and control in order to demonstrate the success of targeted advertising campaigns. This represents a shift in consumer classification from geodemographic profiling to that of Mobile Location Analytics (MLA), and furthermore shows how the logic of capital intensifies its efforts to attach value onto

every aspect of daily life, including mobility patterns. MLA measures location histories both to target audiences with specific attributes but also to measure how algorithmically produced geo-targeted advertisements can produce observable changes in consumer behaviour, specifically by seeing whether or not a targeted advertisement sent to a mobile device corresponds with observing that same device in a specific location. For example, a golf retailer could target golfing enthusiasts (whom are known because frequent golf courses) with an advertisement and then measure what percentage were later seen in-store.

To illustrate how MLA technologies work, this article will use PlaceIQ, a major provider of location based intelligence for marketing, as a case study to illustrate the ecosystem of location analytics. In 2016, Deloitte named PlaceIQ one of the fastest growing technology companies, highlighting their 1747 percent growth in revenue from 2012 to 2016 (PRNewswire, 2016). The company's CEO, Duncan McCall has likewise earned praise from the marketing industry having been named one of Advertising Age's top marketing technology 'trailblazers' of 2017 (AdAge, 2017). Both their client lists and their venture capital funding suggest it has strong market potential for growth (PlaceIQ 2017a; Crunchbase 2017).

By focusing the analysis on one company in this ecosystem, the objective is to theorize how this class of analytics technologies produce specific metrics and values that are shaping new marketing practices and applications for location data. Moreover, whereas monolithic publishers such as Facebook and Google tend to occupy the majority of existing discussions, the purpose here is to demonstrate how PlaceIQ and other companies like it operate in the nebulous realm of third parties that are typically obfuscated from the direct perception of users, although certainly not that of regulatory authorities, such as the Federal Trade Commission (2014, 2015, 2016),

who have taken interest in how these third parties passively collect personal data for emerging data brokerage markets.

PlaceIQ is important because they do not necessarily rely on location data produced by audience labour such as check-ins or geotagged content. Instead, location data is captured from advertising servers, often called advertising networks or exchanges depending on the methods used for purchasing advertising inventory from publishers, during routine advertising bids made by publishers (such as a smartphone application) or Supply Side Platforms (SSPs) (PlaceIQ 2017a). Ad requests pass unique identifier information from the device to the ad network, and in milliseconds an auction is conducted to determine the successful buyer. Their content is then passed back to the device and placed on the publisher's ad inventory, such as a mobile ad banner embedded inside an application. In the iOS platform, the unique identifier passed to ad servers is a string of 32 hexadecimal characters called the Identifier for Advertising (IDFA) that can uniquely identify the user to mobile ad servers. Android also employs its own advertising identifier, the Google Advertising ID (AAID).[4] Location data is likewise passed from the phone to the ad server and can therefore be collected and analyzed by third parties such as PlaceIQ. The variety of detail on the location can vary, including the city, the Designated Market Area, or the latitude and longitude co-ordinates of GPS targeting. The methods of capturing this data can also vary, depending on the permissions the user has given to the publisher.[5]

MLA techniques can therefore vary by method of sensing and mapping, but are governed by the imperative to know where audiences go in order to determine the impact of ad exposure. PlaceIQ measures the intersection of people and places to create dynamic spatial maps of audience attributes in order to measure the efficacy of geo-targeted advertising on mobile devices to measure audience lift (i.e. the success of an advert to drive in-store visitations). This is

accomplished through several key technologies, metrics, and patents that form their MLA ecosystem, and are connected to over 100 million mobile devices in the United States (Schiff 2015).

PlaceIQ currently holds three granted patents in the United States and nine published applications. Place IQ's first granted patent, Apparatus and Method for Profiling Users (Milton & McCall, 2013), is of particular interest because it provides insight of how the platform works to produce geodemographic segmentation by obtaining location histories and attributes, and creating a user profile based on this data. This patent is what informs Place IQ's analytical platform and its proprietary metrics, such as their Place Visit Rate (PVR) metric that allows advertisers to measure the 'offline impact' of advertising campaigns.[6] Figure 1 illustrates how it constructs user profiles based on several modules that ascertain location histories and attributes:

[FIGURE 1 NEAR HERE]

MLA can therefore analyze the relationship between advertisements sent to a device and corresponding movement patterns, and also with other third party data providers such as purchase data.[7] This assemblage of location data provided by advertising networks constitutes their proprietary PlaceIQ (PIQ) platform that:

> connects the physical world to the massive set of digital signals associated with mobile devices, providing marketers with a unique understanding of consumer activity. Yielding the purest indicators of real world behaviors, our technology performs 5 trillion

> computations daily, delivering unparalleled targeting and foot traffic measurement to marketers (PlaceIQ 2016).

PlaceIQ's approach to geodemographic segmentation depends on measuring the location histories of populations to establish profile attributes. This can be used in tandem with data provided by other third parties such as purchase history data to determine which geodemographic segments to target when designing media campaigns. For example, by combining third party purchase history data with location histories, PlaceIQ can target health conscious lifestyles or exercise enthusiasts with health-related products or recreational activities. Audience attributes can therefore be used to categorize various kinds of lifestyles and dispositions, or what Bourdieu (1984) calls the habitus of users because of the way spatial patterns can be used to infer embodied dispositions:

> The profiles may characterize a variety of attributes of users. In one illustrative use case, a location history may indicate that a user frequently visits geographic locations associated with tourism, and the profile of that user may be updated to indicate that the user frequently engages in tourism, which may be of interest to certain categories of advertisers. Or a user may spend their working hours in geographic areas associated with childcare and residences, and based on their location history, the profile of that user may be updated to indicate that the user likely engages in childcare for children younger than school age (Milton & McCall, 2013).

Geodemographic profiles can change over time based on new information provided by user attributes and location histories, including in order to profile their lifestyles or occupation. This applies both to people and the places they visit because the system for profiling and classification is rooted in ontogenetic correspondences between time and space for creating attributes and lifestyles:

> ... the attributes associated with geographic locations may vary over time (for example, an area with coffee shops and bars may have a stronger association with consumption of breakfast or coffee in the morning, an association which weakens in the evening, while an association with entertainment or nightlife may be weaker in the morning and stronger in the evening). User profiles may be generated in accordance with the time-based attributes that predominate when the user is in a geographic area. And in some embodiments, user profiles may also be segmented in time, such that a portion of a given user's profile associated with a weekday morning may have different attributes than another portion of that user's profile associated with a weekend night, for instance (Milton & McCall, 2013).

The construction of second order geodemographic profiles are governed by both spatial and temporal variability. A key distinction between traditional geodemographic systems and mobile location analytics concerns the methodology for spatial demarcation. Whereas geodemographics exploits postal codes for establishing territorial distinctions, MLA employs geographic information systems to partition space into uniformly sized tiles or 'hand drawn' polygons by PlaceIQ's cartographers.[8] Unlike traditional geodemographics that builds upon the existing postal infrastructure, PlaceIQ imposes a uniform grid onto a given territory and assigns specific attributes to tiles that can change over time based on the propensities of movement and

the inferred behaviours of users. Tiles are assigned scores based on the attributes of the people frequenting them, which is itself calculated by comparing people in that tile against their location histories:

> ...the geographic information system organizes information about a geographic area by quantizing (or otherwise dividing) the geographic area into area units, called tiles, that are mapped to subsets of the geographic area. In some cases, the tiles correspond to square units of area having sides that are between 10-meters and 1000-meters, for example approximately 100-meters per side, depending upon the desired granularity with which a geographic area is to be described (Milton & McCall, 2013).

Spatial profiling of geodemographic characteristics is done through a proxy of scoring uniform spatial tiles according to a density of attributes. Each tile can at any given moment in time possess particular attributes according to the kinds of people occupying it and the activities they might be engaged in:

> ... a query may be submitted to determine what sort of activities users engage in at a particular block in downtown New York during Friday evenings, and the geographic information system may respond with the attribute records corresponding to that block at that time. Those attribute records may indicate a relatively high attribute score for high-end dining, indicating that users typically go to restaurants in this category at that time in this place, and a relatively low attribute score for playing golf, for example. Attribute scores may be normalized, for example a value from 0 to 10, with a value indicating the

propensity of users to exhibit behavior described by that attribute (Milton & McCall, 2013).

PlaceIQ's platform divides space into specific tiles and assigns them specific attributes by the user's profile and time of day. This allows PlaceIQ to map correspondences between user activities and geo-spatial patterns, such that it could enable advertisers to target audiences through geodemographic and geopsychographic data, such as when and where users visit for leisure or work (Milton & McCall, 2016). This could be used to calculate the density of attributes in any given tile or spatial grid, and allow PlaceIQ to classify attributes using hierarchies (ibid.). What is of particular importance is how PlaceIQ scales geodemographic segmentation by organizing spatial maps into uniform grids. Each tile represents a container for measuring temporally fluid attributes that correspond to propensities of behaviour.

The method of spatial organization to calculate consumer attributes is not the only purpose of PlaceIQ or the ecosystem of mobile location analytics. What is important is how these profiles can be valued through Key Performance Indicators (KPIs) that measure advertising success. Typically this is done by experimental or quasi-experimental research designs that purport to measure changes in observable behaviour, particularly measuring place visit rates known as 'lift' metrics, after exposing a specific geodemographic segment to a media campaign. PlaceIQ's proprietary metric, Place Visit Rate (PVR), and Enterprise Place Visit Rate for third party attributions, are proprietary metrics for quantifying the effects of targeted advertising to particular geodemographic segments on increasing foot traffic to corresponding locations. PVR can measure if a user who has been exposed to an advertisement is later seen in a target location such as a restaurant or retailer, in effect quantifying the return on investment of media

campaigns. This ability to develop location-specific instruments that situate audiences and media into location data is important not only because it reinforces existing theories of geodemographics in terms of how segments are built to work but also because of their power to potentially influence or discipline consumer subjectivities in terms of their propensities for movement and consumption. PVR is therefore unique in its ability to both typify and discipline consumer lifestyles by synthesizing geodemographic attributes with performance indicators that transcend online metrics such as counting clicks, and instead focus entirely on offline measures of visitation rates. It is the power to ascribe economic value not just to segments of the population, nor to the temporal attributes of spatial tiles on a grid, but the intersection of them in the form of movement patterns and location histories for measuring the efficiency of advertising that structures the economization of location data. Here, counting place visitation rates and movement patterns itself becomes the focal point of monetization, and drives the mechanisms of targeted advertising. This extends both the governance of geocoded data (Barreneche, 2012) and the logic of value that is increasingly applied to every aspect of market relationships (Skeggs, 2104) to maximize control over the production process. This can likewise be continuously monitored and scrutinized to further demonstrate the value of second-order geodemographic profiling. Lift is also calculated using routine testing of content (‘A/B testing’ as it is known in the field) of consumers' supposed responses to advertising exposure. This allows analytics companies such as PlaceIQ to demonstrate the causative effects of MLA targeting and accumulate economic and cultural capital over the field of mobile and location based marketing. PlaceIQ references the power of consumer lift through A/B testing to establish the validity of their platform. The logic of MLA appeals to an underlying formula of targeting the right consumers in the right time and in the right place with the right message. This formula is

quantifiable into a specific metric of consumer lift, and can be ‘proven’ with control and experimental groups that can be refined into A/B testing to assess which messages correspond best to particular geodemographics. For example, a 2017 case study details how the popular retailer Urban Outfitter used ‘dynamic audience filters’ to target female audiences who frequent bars and nightlife locations with a promotion for party dresses (Kirkpatrick 2017). This is interesting because unlike traditional geotargeted campaigns that target exact audiences that are in or near a particular location or geofence, the Urban Outfitters campaign identified relevant geodemographic segments based on their propensities for visiting locations that are not exclusively Urban Outfitters locations. Instead, the campaign applies a second-order geodemographic logic to target a particular kind of urban lifestyle that Urban Outfitters believes will correspond with their brand. The campaign subsequently claims a 75 percent conversion increase, and a 146 percent growth in revenue from using offline signals (Sterling, 2017).

The emphasis on measuring lift not only engenders many critical questions concerning the epistemological nature of such causal relations, but also because of how it embodies how institutions of knowing capitalism reproduce the world using quantifiable methods that reduce the complexities of media-audience relationships into simplistic behavioural metrics of audience performance to ascertain the cost benefit of media purchases in algorithmically distributed advertising ecosystems. This reveals an important aesthetic quality of the 'metric power' (Beer, 2016) of lift rates whereby complexity is reduced down to a simplified measurement that 'black boxes' the ecosystem of location analytics (Pasquale, 2015). It is therefore how such metrics influence theoretical discussions around the nature of agency and reflexivity in media environments governed by algorithms, and how these metrics ‘translate’ relationships between audiences and media infrastructures into coherent market frameworks that contain markets

agencies and exchanges into disciplined ‘calculative devices’ (Callon, 2005). In turn, this allows PlaceIQ to socially construct the economic value of algorithmically produced forms of segmentation and targeting by establishing correspondences between the economic and cultural relations of mobile geodemographics. In the case of PlaceIQ's A/B testing and lift metrics, consumer agency is in effect made to appear as ordered and disciplined as possible through a series of control modules that collectively comprise the MLA infrastructure (Figure 2).

[FIGURE 2 NEAR HERE]

The consequences of second-order geodemographics are only beginning to be understood. There are however important considerations for the ways that such analytical practices are designed to typify people and spaces as branded entities. For example, PlaceIQ prefers to describe geo-segments by their location propensities; a promotional infographic describes the propensities of geo-segments based on hotel preferences, including the kinds of retailers and airlines a guest of Marriott hotels might choose over those that prefer Comfort Inn (PlaceIQ 2017a). In another example, distinctions are made between Gap and TJMaxx shoppers to reveal what other locations each segment is more likely to visit, their affective dispositions (Gap shoppers are ‘sensible’, TJMaxx are ‘glamorous’), their age range, and so forth (PlaceIQ 2017b). Here, the logic of second-order geodemographics is based on correlating specific locations as branded spaces in order to construct profiles that translate the habitus of audiences into branded typologies by using clustering and regression analysis of location data. This begins to reveal the politics of such analytical constructs. For some, this can be understood as 'brandscapes' of marketing that orders people and spaces to intensify surveillance and control as part of a larger set of trends in the affective or experience economy (Wood & Ball, 2013). The

future of how 'brandscapes' and mobile location analytics will intersect is a matter of some speculation, however, there is evidence to suggest that urban spaces and media will become increasingly 'sentient' to further capture location data, including by augmenting existing media inventory such as billboards with various kinds of location aware sensing. In 2016, Clear Channel Outdoor Americas launched 'Clear Channel Outdoor RADAR' in partnership with AT&T Data Patterns, PlaceIQ, and another third party MLA company, Placed. RADAR aggregates location data from these providers in order to profile the geodemographic composition of audiences that pass billboards but also determine whether they subsequently visited a particular store (Ember 2016). This same approach is likewise being applied to measuring the efficacies of television advertising through a partnership between PlaceIQ and Rentrack, an audience measurement company (MarketWired, 2014). These convergences between media and analytics suggest that urban environments will continue to become increasingly sentient in their capacity to classify and measure, engendering important questions of the politics of visibility and the authority of analytics to ubiquitously track and trace consumer paths to purchase.

Discussion

There are several implications of mobile location analytics on the production of second-order geodemographic knowledge. By building on existing research into the sociological analysis of geodemographics (Burrows & Gane, 2006), a key point raised in this article is to show how the underlying spatial ontologies of geodemographics become disembedded from fixed spatial regions such as postal codes, and are instead grounded in new lines of sight that trace flows of

movement. Mobile location analytics therefore does not simply target particular audiences in specific locations in order to fulfil the imperative of relevance, but instead it is possible to identify new kinds of segments by clustering their location frequencies or propensities, particularly as they are known as branded spaces. New possibilities for segmentation emerge that build into the logic of measuring advertising success. The ideological imperative of distributing relevant content is further reinforced, and companies like PlaceIQ begin to play a powerful role in mediating mobile digital culture.

The politics of location data extraction must also acknowledge these third parties by moving beyond platform specificity to further understand the mechanisms that govern locative media (Barreneche, 2012; Barreneche & Wilken, 2015). PlaceIQ's capacity to passively capture and cluster location data through routine advertising requests reveals the complexities of location data as operating independently of specific platforms and geocoded information practices. Instead, there are important reasons to consider how location data is embedded in a larger ecosystem of mobile applications that routinely capture location data that is then passed on to a myriad of advertising servers and analytics companies.

Beyond segmentation, the logic of second-order geodemographics is performative. It calculates the efficiency of geo-targeted content by measuring audience lift, and can furthermore scrutinize the production process through routine testing to maximize the metric power of location analytics. This is important because of its implications for understanding the socio-technical constitution of markets, and the work that these metrics perform in reducing the complexities of economic relationships between media and audiences into simplistic measures of behavioural responses. In turn, it is interesting to see how the processes of valuation that govern marketing infrastructures are increasingly directed towards the intensive monitoring of

populations, including their movement patterns, in order to satisfy key performance indicators and other institutional pressures to empirically demonstrate the logic and value of geo-targeted adverts.

The ideological frameworks that govern how marketers rationalize the intensification of consumer surveillance to deliver personalized content become reinforced by metrics and narratives to demonstrate return on investment. The strategic work of 'marketing the new marketing' of geodemographic information systems (Goss, 1995) to potential clients becomes an important aspect of theorizing the value of location data. In turn, it explains the increasing investment into analytics providers such as PlaceIQ, including a strategic investment by Alibaba for an undisclosed amount (Sluis, 2016). This further demonstrates the power of mobile location analytics in influencing the future direction of mobile marketing and commerce, particularly as mobile advertising surpasses desktop based targeting (Interactive Advertising Bureau, 2016). As this nascent body of research into data analytics industries continues (Beer, 2017b), it is important to further understand the role location data will play in mediating the economic relationships between users, platforms, and analytics industries into ecologies of location (Wilken, 2015). This will allow for further critical reflection on the nature of knowing capitalism, and the underlying techniques of urban surveillance that govern mobile markets and lifestyles.

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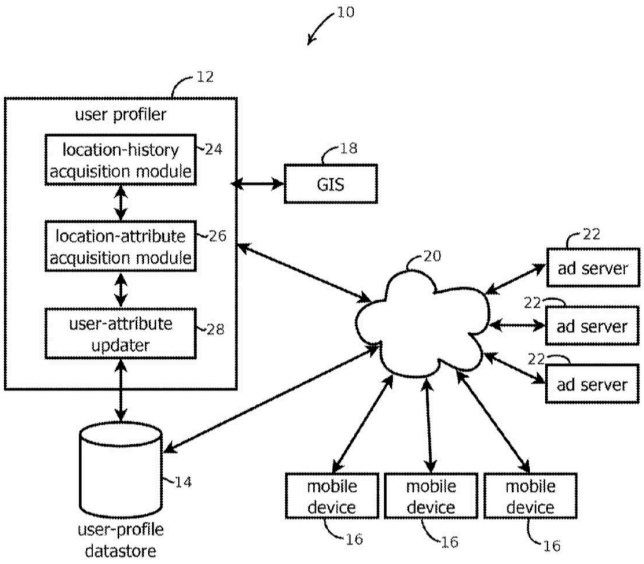

Figure 1 - Place Visit Rate Ecosystem (PlaceIQ Patent #8489596 B1)

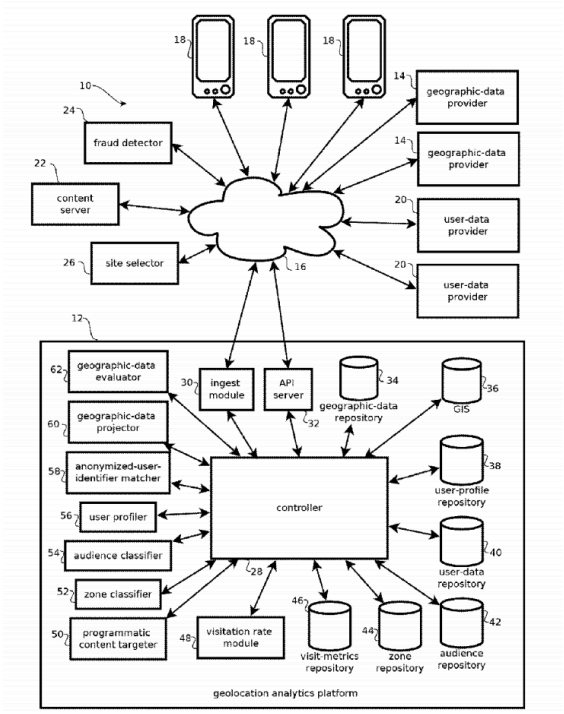

Figure 2 - Geolocation Analytics Platform (US Patent Application #2016/0019465A1)

[1] https://www.placeiq.com/who-we-are/

[2] The extent to which this approach to mapping is entirely new is subject to some scrutiny; for example, Charles Galpin's (1915) *The Social Anatomy of an Agricultural Community,* details an early instance of ecological mapping in Walworth County, Wisconsin, whereby maps were created to measure how far residents had to travel to access particular resources such as a bank, grocery store, or library.

[3] Sometimes, marketers also use the term 'conversion' to describe audiences that were successfully converted into buyers or some other desired objective. Lift is based on using an experimental or quasi-experimental research designs whereby a portion of users are assigned into a treatment or control group in order to better understand what effect geo-targeted content had on changing behaviour.

[4] For a more detailed explanation of the Android's Advertising API, see: https://developers.google.com/android/reference/com/google/android/gms/ads/identifier/AdvertisingIdClient

[5] See the Interactive Advertising Bureau's Mobile Location Working Group's (2016) white paper on collecting and using location data for further details. Available at: https://www.iab.com/wp-content/uploads/2016/04/IAB_Mobile-Location-Data-Guide-for-Publishers_Feb2016-Revised.pdf

[6] https://www.placeiq.com/measurement/

[7] PlaceIQ boasts many partners in their network, including companies that deal in selling purchase history, and TV viewership data. In 2016 PlaceIQ partnered with Nielsen Catalina for measuring the purchase histories, retail visits, and recreational activities of the consumers for the Consumer Package Goods (CPG) market. See https://www.placeiq.com/partners/ for a list of Place IQ's third party data partners

[8] https://www.placeiq.com/technology/