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Social shaping of mobile geomedia services: An analysis of Yelp and Foursquare

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Abstract

In their book, *Location-Based Social Media: Space, Time and Identity*, Leighton Evans and Michael Saker remark on the apparent 'death' of location-based social networks, suggesting that location-based social networks can now be understood as 'a form of "zombie-media" that animates and haunts other media platforms'. In this article, we use this perspective as a point of departure for a social shaping of technology-informed analysis of two key geomedia platforms: Yelp and Foursquare. With Yelp approaching its 15th year of service and Foursquare approaching its 10th anniversary, this article provides a timely opportunity to (re-)examine the significance of Yelp and Foursquare and the many reconfigurations both firms have made to their services since their launch. These include, most recently, Yelp's integration of artificial intelligence/machine learning techniques to parse, sift and order users' posts and Foursquare's development of its Pilgrim SDK (software design kit) to power the location services of other platforms, like Tinder and Snap. A social shaping-inflected approach is productive in this context in that it stresses how many of these developments and strategic reorientations are not just in response to shareholder and investor pressures, they are also fundamentally shaped by and made in response to the fluctuating demands of end-users within a complicated, competitive and continuously evolving geomedia ecosystem. Consequently, we draw from the work of Leah A Lievrouw to examine how dual tensions of contingency/determination shape how these applications are designed and used, and how both design and use continue to evolve in response to various external pressures.

Keywords

Determination/contingency, Foursquare, geomedia, locative media, Yelp

Introduction

In the conclusion to their book, *Location-Based Social Media: Space, Time and Identity*, Evans and Saker (2017) remark on the apparent 'death' of

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location-based social networks (LBSNs) (p. 88). Their argument is that, while stand-alone LBSN services have largely disappeared, the core features of these LBSNs have not, with the combination of location and sociability having now become 'stable parts of other, bigger social networks' (p. 96) and a 'normal, integrated aspect of [wider] social media use' (p. 95). In fact, as we discuss throughout this analysis, spatial data are more valuable than ever before. The ability to locate people and provide contextual information is now a multi-billion dollar industry that shapes how people navigate physical space in myriad ways.

In this article, we use the failure of the vast majority of locative media start-ups as a point of departure for an analysis of two key location-based services platforms that have managed to endure: Yelp and Foursquare. With Yelp approaching its 15th year of service and Foursquare celebrating its 10th anniversary, these two applications have become parts of the old guard in the mobile app ecosystem. Consequently, now that these applications have transitioned from exciting start-ups to established businesses, this article provides a timely opportunity to (re-)examine the significance of Yelp and Foursquare. Both services draw on a user's location and a range of other search criteria to return recommendations to that user. These recommendations still involve the capture and circulation of geodata, but now do so at a radically different scale, speed and level of complexity than these services did in the past. Indeed, geodata remains fundamental to the operation of Yelp and Foursquare, but is now integrated at both the front end (the interface) and the back end (algorithmic processing, use of machine learning, database population, monetisation efforts and so on). In this article, we analyse the substantial reconfigurations both firms have made to their services since their launch. These include Yelp's controversial algorithmic filtering of user posts and Foursquare's development of its Pilgrim SDK (software design kit) that has 'the ability to sense [whether a user's] phone has moved in or out of a place without someone having to press a check-in button' (Foursquare's Dennis Crowley, quoted in McCracken, 2019), and which now powers the location services of – and draws location intelligence from – other platforms, like Tinder and Snap. A comparative analysis of these two platforms, how they have changed over time and their respective points of comparison and difference, is valuable if we are to make clearer critical sense of what is involved – and at stake – in the move towards ubiquitous geodata capture, interpretation and commercialisation.

Our aim in this article is thus to provide a detailed (if not exhaustive) account of key factors and forces that have shaped the development and continued evolution of Yelp and Foursquare as contemporary mobile 'geomedia' platforms. Geomedia is a term that has come to refer to 'the fundamental role of media in organizing and giving meaning to processes and activities in space' (Fast, Jansson, Tesfahuney, Bengtsson, & Lindell, 2018, p. 4). For Scott McQuire (2016, pp. 1–7), geomedia involves a series of technological transformations that follow four trajectories, these being ubiquity, real-time feedback, location-awareness and convergence. Thus, geomedia forms a valuable term for orienting our discussion of Yelp and Foursquare as it can be understood as an umbrella concept that points towards and captures a set of larger urban, technological and social transformations while also referencing and encompassing specific 'locative media' or location-based services (Lapenta, 2011) that facilitate and feed these transformations.

The general framework anchoring this analysis of Yelp and Foursquare is that of the social shaping of technology (SST) (Bijker & Law, 1992b; MacKenzie & Wajcman, 1999; Russell & Williams, 2002; Sørensen & Williams, 2002b). Work on SST has long argued that all technologies 'are shaped by a range of heterogeneous factors', and that the development of technologies 'always embody compromise' and trade-offs (Bijker & Law, 1992a, p. 3).

Much of the existing scholarship on mobile geomedia has focused on end-uses – or, to use the language of SST, the 'social appropriation' (Mackay & Gillespie, 1992, p. 698) – of these technologies and services. While this research emphasis remains important, rather than focus in detail on how end-users interact with Yelp or Foursquare here, we focus on an examination of how the developments and strategic reorientations that have characterised Yelp and Foursquare's operations are fundamentally

shaped by manifold factors. Our main argument is that understanding how people interact with various geomedia applications should take into account the various factors, whether internal or external and simultaneously technical and social, that shape the information being interacted with. After all, interface choices are not purely user-focused; they are shaped by a variety of factors outside the direct user experience, including (but not limited to) shareholder and investor pressures, public controversies related to business models, frustrations of use that have been expressed by the diverse 'social groups' (in Kline & Pinch's (1999) sense of this term) that engage with these services and fluctuating end-user demands that occur within a complicated, competitive and continuously evolving geomedia ecosystem. And the crux of our argument focuses on how these shifts do not happen in isolation. Instead, they occur because of multiple forces both internal and external to the platforms themselves. Understanding the complexity of these forces and shifts is crucial to understanding how these platforms work and why people continue to engage with and use them. As we show in this article, Yelp and Foursquare have managed to endure due to their ongoing evolution – an evolution that is still occurring, especially in the face of continued pressure from Google and Facebook (Fischer, 2011).

In exploring these issues, we draw on Leah A Lievrouw's (2010) argument that 'the development and use of new [geo]media technologies [… is] a process that involves a constant tension between *determination* and *contingency*' (p. 247), between the closing down and the opening up of choice and 'between the imposition of order and uncertainty' (p. 247). Lievrouw views this tension as a useful frame for understanding the 'complex, multilayered process [involving] many different groups and their interests' (p. 261) that feed the development of new (geo)media technologies. Her contention is that 'determination and contingency are interdependent and iterative, and that this relationship can be seen at several key junctures or "moments" in new media development and use' (p. 247). Lievrouw lists seven such key 'moments'. These include the earliest phase of product development (what she terms 'origin'), various intermediate facets ('actors', 'dynamics', 'choice', 'formal properties' and 'distributive mechanisms') and the later stages of technological take-up and use (what she terms 'consequences') (pp. 258–260). Lievrouw's seven-part model builds on related, earlier approaches, such as the 'circuits of culture' model (du Gay, Hall, Janes, Mackay, & Negus, 1997; Goggin, 2006), to provide a productive means of making sense of the manifold factors driving and shaping the development, take-up and use of complicated socio-technical artefacts and systems. Rather than examine Lievrouw's specific seven-part categorisation of 'moments of technology development' (p. 258) in detail here, however, or apply it to the letter in our analysis, which would be difficult to achieve in the space available, our concern is with the broader 'determination/contingency' tension that she identifies. This is for two reasons. First, it is this tension that underpins – is the glue that binds together – the seven key junctures or 'moments'. Second, it provides a clear and accessible means of grasping the complex of forces and factors that are at play in technology development, adoption and use, and, by accounting for these factors, Lievrouw's approach usefully sidesteps criticism that SST approaches tend to fail 'to take account of the appropriation of technologies by users' (Mackay & Gillespie, 1992, p. 685). Even so, in adopting this approach, we are conscious of Pablo Boczkowski's (2004, p. 255) argument that any engagement with the determination/contingency tension must recognise and give emphasis to 'the simultaneous pursuit of interdependent technological and social transformations, the ongoing character of this process, and the importance of the historical context in which it unfolds'. With all this in mind, in this article, we are interested in tracing empirically the corporate and strategic determinations of Yelp and Foursquare and the contingencies that have resisted and offset these determinations and which have essentially shaped Yelp and Foursquare into applications that serve entirely different purposes from their initial conception.

The article is structured in three parts. In the first, we trace the development of Yelp over the past 15 years. In particular, we examine how the algorithms deployed by Yelp filter and sort user-generated reviews, and consequently, manipulate the

information people receive about their surroundings. In the second part of the article, we examine a number of key developments that have marked the evolution of Foursquare over its decade of operation, where it has adopted a variety of approaches and strategies in order to build a viable and sustainable business model. In the final, comparative part of the article, we draw out some points of convergence between Yelp and Foursquare and the approaches they have taken in continually evolving their services, as well as other key points of divergence between these two key geomedia firms. Here, we return explicitly to Lievrouw's (2010) work to balance between the elements of contingency and determination in how these two major geomedia firms were shaped. Ultimately, through this three-part analysis, we hope to reveal how the success or failure of geomedia applications relies on the social shaping of a variety of complex factors, many of them buried many layers beneath the level of the interface.

Yelp: user-generated reviews and algorithmic filtering in hybrid space

Yelp is a spatial search application people can use to access information about nearby locations. At a more fundamental level, Yelp is a database of locations and user-generated information about these locations. People can access Yelp without a Yelp account, but they cannot rate and review locations without an account. Yelp also does not allow people to rate a location without writing a review. Other visitors then read the reviews and see the rating when they use the Yelp website or app to search for categories of businesses (e.g., Chinese restaurants). They can also use the locative aspects of the mobile app to retrieve lists of businesses near their physical location, and Yelp presents these businesses with additional information telling people how far the business is from their smartphone. The results returned in any search are ordered by Yelp's proprietary algorithm that sorts businesses based on how far they are from the user and the businesses' aggregated Yelp rating. People can then either interact with the information in list form or click on a map that spatially displays the nearby businesses. The interface ultimately focuses on two elements: displaying nearby locations and aggregating user reviews about these locations.

The model described above is completely different from what Yelp looked like when it was founded in 2004 by two former Paypal employees named Jeremy Stoppelman and Russel Simmons. The original idea was to create an email-based referral service that followed a basic question-and-answer format. One of the two founders – Simmons – argued for adding a small 'reviews' section and Stoppelman eventually agreed. They soon found that the question-and-answer section was floundering, but the review section that began as an afterthought was growing quickly. From there, the company repositioned itself, starting with a 2005 redesign, and the user-generated reviews that began as a last second add-on came to define Yelp's approach to local search (O'Brien, 2007).

Like the majority of successful digital media start-ups, Yelp raised a significant amount of venture capital funding (over US$50m) during its time as a private company (Austin, 2011). In 2009 and 2010, Google and Yahoo attempted to purchase Yelp, though both deals fell through (Arrington, 2010). In November of 2011, Yelp went public and filed its IPO. When the initial trading of the company's stock began in March 2012, Yelp was valued at US$898m, though it had yet to turn a profit or establish significant revenue. From there, Yelp continued to grow and began to expand to international markets (Sloan, 2012). That growth slowed with a downturn in 2016 because of the failure of attempted international expansion, and Yelp had to lay off 4% of its staff.

Following this stalled international expansion, Yelp regeared its model slightly to focus on the United States and Canada, and that refocusing has been largely successful. According to its Q1 2018 letter to stockholders, Q1 advertising revenue was US$214m, which was a 20% increase over the same time the previous year. The company's 2018 outlook is that they will produce US$933m in revenue, which is more than 10 times what it produced in 2011 and US$100m more than what it produced in 2018. Its current user base includes 69 million unique mobile users, which has remained roughly steady over the last few years.

Like many other social media firms, Yelp's main business model revolves around advertising revenue. The core value the company offers to users, however, is based upon user-generated content: namely, the reviews Yelp users write about locations. As of Q1 2018, Yelp features more than 155 million user-generated reviews. The majority of those reviews are of restaurants (more than half of the company's web and mobile traffic), but Yelp features other categories as well. They also incentivise users to review, and the company throws parties and reaches out to reviewers who wield influence on the site. As José van Dijck (2013) explored in her analysis of companies such as Facebook, Flickr, Twitter and Youtube, these companies create business models that rely on users to perform much of the labour. What makes Facebook valuable to advertisers is the content people produce and the time they spend on the site. Yelp is no different.

Yelp's reliance on user-generated content is not unique in the geomedia ecosystem. Almost all spatial search review sites, ranging from Zomato to Foursquare, rely on the volunteered labour of users. What is distinctive, though, is the maturity of Yelp's revenue model, which is well established compared to many competitors in the spatial search market.

One way that Yelp has strengthened its position in spatial search is through the establishment of strategic partnerships. A number of these have been struck in order to enable Yelp users to complete certain external transactions from within the Yelp app and include deals with Grubhub (to make it possible to order takeout and delivery), OpenTable (to enable people to make reservations) and Gather (to help people plan large events) (Kaplan, 2018a). These partnerships have expanded Yelp's capabilities and created new revenue streams. In the Q1 2018 letter to investors, the company stated that they made US$5m through transactions features and US$5m through 'Other services'.

Despite the growth of other revenue sources and company partnerships, advertising by far remains Yelp's most significant source of revenue (US$214m in Q1 2018). As part of its push for local advertising, Yelp's website has a detailed set of pages for how small business owners can use Yelp to advertise (https://biz.yelp.com/advertise). These pages include advice on how businesses can respond to reviews, warnings that businesses should not ask customers for reviews, and webinars and videos explaining how companies can build a positive Yelp presence.

There are clear similarities here with Google's search advertising system. When people search for a term on Google, they are often presented with sponsored links at the top of the results. Yelp follows the same model, allowing advertising partners to appear at the top of the interface's display of search results. Yelp's advertising model also offers businesses 'Premium placement on search and competitor business pages', meaning that Yelp will feature an ad for an Italian restaurant on the business page of a competing Italian restaurant. With the extensive resources devoted to advertising, Yelp's search advertising is a mature, profitable example of how location information can be turned into a valuable commodity. While Yelp features a few additional advertising opportunities, including Enhanced Profiles, the removal of competitor ads and 'check-in offers', the advertising approach described earlier makes up the vast majority of the company's revenue.

While successful, Yelp's advertising model has also attracted significant controversy. This criticism has come, in the main, from Yelp's most profitable customer market segment: small business. To understand the controversy surrounding Yelp's business model – and the role that algorithms play in the controversy – it is first necessary to understand why so many small businesses care deeply about how they are displayed on Yelp. The principle reason is that Yelp can play a crucially important role in driving local revenue. A research study from Michael Luca (2011) from the Harvard Business School showed that an improvement in Yelp reviews increases small businesses' revenue by 5%–9%. Another group of researchers found that an increase in positive Yelp reviews improves restaurants' chances of being full by 19% (Anderson & Magruder, 2012). For a small business, the difference between profitability and closing its doors might come down to that 5%–9% increase in foot traffic that can be the result of positive reviews. Consequently, some Yelpers have sought to exploit their supposed power with 'Yelp reviewer' cards they present at restaurants to demand higher quality service (Worstall, 2013). While these

cards were disavowed by Yelp, they have been adopted by some frequent Yelp reviewers who are fully aware of how influential a positive or negative Yelp review can be.

The power Yelp reviews have to influence people's mobility choices is a prime example of the social impacts of the hybridisation of physical space (Frith, 2017). Hybrid spaces are social spaces in which the digital, physical and social merge into a coherent entity (de Souza e Silva, 2006). In other words, digital information is not just an overlay on top of physical locations but actively shapes how people perceive these locations, just as location shapes the digital information people receive. Yelp, especially as accessed through the smartphone, enhances new forms of spatial legibility (Dourish & Bell, 2011) that enable people to access new forms of social, digital information about a location. They can essentially 'read' physical space in new ways by accessing traces (in the form of reviews) left behind by other Yelp users, which is similar to geotagged content found on other location-based services, like Foursquare and Socialight (Frith, 2015; Humphreys & Liao, 2011). The experiences people share in the forms of reviews do contribute to hybrid spaces, but as we discuss later, Yelp then becomes the gatekeeper that decides who is and who is not allowed to contribute.

Establishments are not powerless in hybrid spaces; they do have the power to respond to individual reviews on Yelp, though they cannot change the rankings. Businesses have also explored more extreme avenues for challenging Yelp reviews by creating contracts that directly forbid customers from posting negative reviews at all. For example, a New York hotel warned a couple booking the hotel for their wedding party that 'there will be a $500 fine that will be deducted from your deposit for every negative review … placed on any internet site by anyone in your party' (Griswold, 2014, n.p.). The hotel is far from alone in attempting to prohibit bad reviews, and companies such as the 'anti-review contract' business, Medical Justice, have sprung up to sell business contracts that attempt to restrict people's ability to write reviews on Yelp and similar sites like Angie's List ('Doctored Reviews', 2015). Other businesses have sued customers over negative Yelp reviews, including one Washington, DC, contractor that sued a client for US$750,000 over one negative review (Jouvenal, 2014). One case – *Hassell v. Bird* – made it all the way to the California Supreme Court, and the Justices ruled 4-3 that a company cannot force Yelp to remove a review.

The nub of the controversy between small businesses and Yelp, however, does not focus on individual reviews; rather, the key issue relates to how Yelp's algorithms filter, display and allegedly manipulate reviews for venues. Yelp is by no means the first or the only company to find itself embroiled in controversy concerning algorithmic manipulation and filtering. Indeed, there are numerous examples of such activity and the fall-out that has followed. Netflix, Google and Uber, to name just a few, have been accused of algorithmic manipulation that alters results. What all these examples point to is the increasing power of algorithms in our daily lives. As Latzer, Hollnbuchner, Just, and Saurwein (2014) point out,

> A wide range of our daily activities in general and our media consumption in particular are increasingly shaped by algorithms operating behind the scenes: the selection of online news via search engines and news aggregators, the consumption of music and video entertainment via recommender systems, the choice of services and products in online shops and the selection of status messages displayed on social online networks are the most prominent examples of this omnipresent trend. Algorithms suggest friends, news, songs and travel routes. (p. 1)

As this passage makes clear, one of the key functions of an algorithm is that it 'selects and reinforces one ordering at the expense of others' (Mackenzie, 2006, p. 44). It is this ability that is fundamental to the successful operation and success of social media and search companies. Ranking and filtering are what enable online giants like Amazon to 'aggregate millions of pieces of (meta)data – customer's profiling data, data about buying behavior, and content they bought – to calculate the relations between tastes and buyer's preferences' (Van Dijck, 2013, pp. 30–31). These processes enable Google, via PageRank, to analyse 'the links on a page, the anchor text around those links, and the popularity of the

pages that link to another page', and factor them together 'to determine the ultimate relevance of a particular page' to a search query (Battelle, 2005, p. 22). They permit Facebook to mediate user visibility (or its lack) via EdgeRank. And they provide local search and recommendation services, like Yelp (and Foursquare), with the ability to identify popular local venues based on masses of user tips and other interactions.

What is striking about Yelp in this context is not just its use of algorithmic sorting but also the persistent accusations of widespread review filtering and manipulation. Displaying user reviews could, in theory, be a relatively platform-neutral process. Yelp *could* just post all reviews of a venue and let the visitor decide which are genuine. Yelp, however, does not do that. Instead, what people see when they look up a location on Yelp is an algorithmically filtered display of user activity. In her ethnography of how developers use the Twitter API, Taina Bucher (2014) argued that researchers must attend to the ''platform politics' of social media'. Few examples of the 'platform politics' of social media have proven more controversial than Yelp's review system that determines which reviews are posted on a business' page.

Yelp's stated reason for adopting a filtering algorithm is to improve the quality of user-generated reviews and to make it harder for businesses to manipulate the system. The veracity and quality of user reviews was a problem long before Yelp became popular. Research has repeatedly shown that positive online user reviews boost sales (Jiang & Benbasat, 2007; Litvin, Goldsmith, & Pan, 2008). However, research has also pointed to weaknesses in online review systems:

- Reviews tend to follow a U-shape distribution in which they congregate at the extreme high end and extreme low end (Hu, Pavlou, & Zhang, 2006).
- Many reviews are written poorly, which affects the usefulness of the reviews (Korfiatis et al., 2012).
- People attempt to game the system by posting false reviews on these sites (Mayzlin, Dover, & Chevalier, 2012), throwing into question the usefulness of socially networked feedback; in fact, likely the most common form of computer science research regarding online reviews is that which has focused on identifying fake and unhelpful reviews and automatically removing them from sites (Wu, Greene, Smyth, & Cunningham, 2010).

Yelp has had many problems with fake reviews. The company has run 'sting operations' to catch companies writing fraudulent reviews ('Yelp reveals how it catches phonies', 2012), has filed lawsuits against marketing companies that post fake reviews (Pimentel, 2013) and was a key part of an investigation from the US Attorney General's office that fined 19 marketing companies for review fraud (Gara, 2013). However, problems with reviewer fraud remain, and a 2013 working paper from the Harvard Business School identified 16% of Yelp's published restaurant reviews as fraudulent (Luca & Zervas, 2013).

Yelp has obvious financial pressure to combat reviewer fraud and has developed a proprietary algorithm that filters out as many as 20% of a location's user reviews, a filtering system that shares some similarities with those used by other companies, such as Amazon and Tripadvisor (Newcomb, 2015). Yelp's algorithm also determines which reviews are 'featured' and appear at the top of the list when someone accesses a location's page. Yelp's CEO Jeremy Stoppelman argues that the algorithm makes Yelp more usable by deleting fake and low-quality reviews and instead focusing on higher quality contributions (Van Grove, 2010), and New York's Attorney General claimed that Yelp has the 'most aggressive' review filter of the many sites he researched (Roberts, 2013).

Others, however, have questioned how Yelp uses its review filtering algorithm. Namely, some small businesses have explicitly accused Yelp of extortion. These businesses claim that Yelp's advertising team told business owners that, if they agree to the advertising partnerships discussed in the previous section, Yelp would make negative reviews disappear. Without this agreement, Yelp would emphasise the bad reviews and filter out good reviews. Stories of Yelp telling businesses they must pay to have negative reviews disappear go back to at least 2010, when

a group of small businesses filed a class-action lawsuit with the following accusation:

> Yelp runs an extortion scheme in which the company's employees call businesses demanding monthly payments, in the guise of 'advertising contracts', in exchange for removing or modifying negative reviews appearing on the website. The plaintiff, a veterinary hospital in Long Beach, California, asked that Yelp remove a false and defamatory review from the website. In response, as set forth in the lawsuit, Yelp refused to take down the review. Instead, the company's sales representatives repeatedly contacted the hospital and demanded a roughly $300 per-month payment in exchange for hiding or removing the negative review. (Van Grove, 2010, n.p.)

Yelp responded quickly to these accusations, with CEO Jeremy Stoppelman claiming publicly that

> the reason 29 million people used Yelp last month to find a great local business is because of the trust they place in the reviews on our site. The entire value of the Yelp community to consumers and businesses hinges upon that trust – and we would never do anything to jeopardize it. Simply put, Yelp does not remove or hide negative reviews in exchange for money and Yelp salespeople do not offer to do so. Additionally, Yelp treats review content equally for advertisers and non-advertisers alike. Advertisers pay for advertising and enhanced listings, and nothing more; and businesses are not penalized for declining to advertise. (Van Grove, 2010, n. p.)

The original class-action lawsuit was eventually joined with two similar lawsuits filed against Yelp. However, in 2011, US District Judge Edward Chen dismissed the lawsuit because he believed reviews were protected speech and there was no evidence that Yelp was manipulating reviews. Even so, the controversy over Yelp's practices did not die with the dismissal of the original lawsuit.

In May 2013, the rumours and accusations became loud enough that Yelp (2013) posted a refutation on the company blog. The refutation included a link to a study from the Harvard Business School that suggested that Yelp did not treat advertiser's reviews more positively (Luca & Zervas, 2013). The post also included the point that businesses who had brought Yelp to court over review extortion all had their cases dismissed. Finally, the blog post included some basic instructions to users to Google Yelp small business customers to see that plenty of advertisers have worse Yelp ratings than non-advertisers.

This particular blog post was far from Yelp's only public refutation of the accusations of review manipulation. CEO Jeremy Stoppelman also gave multiple interviews refuting the idea that Yelp manipulates reviews to favour advertisers, including one occasionally contentious Reddit AMA. The plaintiffs in the 2010 class-action lawsuit also filed an appeal in Federal Court, which in part kept the accusations in the news. Then, in September 2014, the Ninth US Circuit Court of Appeals once again dismissed the case, this time ruling that, even if Yelp did use its algorithm to manipulate reviews in favour of advertisers (and the court found no evidence that was the case), it would still not fall under the court's definition of extortion (Reyhle, 2014). Finally, in 2015, the Federal Trade Commission (FTC) informed Yelp that they would take no action against the company in relation to complaints filed by small businesses (Yelp, 2015).

To date, no one has proven, one way or the other, whether or not Yelp manipulates reviews to favour advertisers. Yelp denies doing so, but multiple small businesses have written about calls from Yelp's advertising staff that suggest otherwise. And the controversy has not disappeared. Yelp's 'Advertising FAQ' page is devoted almost entirely to refuting the idea that advertisers buy inappropriate influence. The header for the page is 'Money doesn't buy anything but ads', and the banner includes a list of questions about whether businesses that advertise get higher ratings, get negative reviews removed and gain the ability to recommend positive reviews. The questions are followed by bolded text that says, 'No. No. And … No'. Clearly, the combination of algorithmic filtering, search and monetisation raises controversy around how spaces are portrayed and experienced through geomedia platforms.

The controversy surrounding Yelp's algorithmic filtering and influence of advertising on results is a reminder of the need to attend to the social shaping of geomedia technologies. These technologies use location information to impact spatial legibility and

influence mobility patterns. However, the information people retrieve through the mobile interface is influenced by a variety of factors, many of them related to monetisation, that impact how data are ordered and displayed. Yelp provides a vivid example of how and why the social shaping of geomedia by economic pressures can be controversial and consequential.

Foursquare: the location layer of the Internet

Foursquare is a location-based mobile social networking and, more recently, search and recommendations service. It rose from the ashes of Dodgeball, the pioneering mobile service that New Yorkers Dennis Crowley and Alex Rainert created in 2000 and subsequently sold to Google in 2005, which Google then closed. Determined to continue developing the Dodgeball concept, in 2009 Crowley and Naveen Selvadurai founded Foursquare, with Rainert joining soon after. Foursquare grew to become a key player in the area of location-based mobile social networking, with the company reporting they had attracted in excess of 40 million users by 2013 (Foursquare, 2013a), up from 10 million in 2011 (Gobry, 2011). Those users checked in over 4.5 billion times (Foursquare, 2013a), up from 1 billion in 2011 (Shontell, 2011). By 2018, the number of users of its apps is said to have surpassed 50 million per month, with 12 billion total check-ins (Foursquare, 2018).

What set Foursquare apart from its competitors when it first launched, and was of particular appeal to its early adopters, was the emphasis it gave to its various gameplay elements. These gameplay elements enabled each Foursquare user to collect badges for venue check-ins, compete with friends over a check-in leader board and compete to become 'mayor' of venues. Foursquare's gamification integration was so successful that it was rapidly replicated by numerous other companies (Mishra, 2014), including Yelp, which soon introduced a 'royalty' system of its own (Siegler, 2010).

In 2013, however, Foursquare Labs Inc. made a much-publicised strategic shift in direction that took it away from its prior emphasis as a location-based mobile social networking app driven by game dynamics. This was a decision generally regarded as a response to persistent questions the company faced by industry analysts questioning the long-term sustainability of its business (Isaac, 2013). It was also a result of reported slowing in user growth, including in key emerging markets outside of the United States (Evans, 2013).

Faced with these challenges, the company radically rethought its corporate strategy much as Yelp had back in 2005. Foursquare Labs built a range of merchant platforms and services to cater for business (Chang & MacMillan, 2011; Foursquare, 2013b, 2013c; Isaac, 2012, 2013; Kelly, 2012 Van Grove, 2013, 2011), and it struck strategic business partnerships, including as a US$15m deal with Microsoft that saw the software giant making 'substantial' additional regular payments to Foursquare for access to its proprietary location data (Tate, 2014).

In addition to the introduction of merchant services, the company also dramatically redesigned and unbundled its services, offering end-users two apps: Swarm and Foursquare. Swarm was focused on check-ins and social networking and included all the gameplay/check-in elements – badges, leader boards, mayorships – that were previously associated with Foursquare. With subsequent updates to Swarm, however, many of these elements – once synonymous with Foursquare use – were significantly reshaped: mayorships were restricted to competition within a user's social circle, badges were replaced by 'stickers' and so on (Zeckman, 2014). However, in 2015, following pressure from the company's most highly engaged end-user social groups (so-called 'super-users'), Foursquare Labs Inc. reintegrated global mayorships within Swarm (Hardawar, 2015; Lee, 2015). Then, in 2017, Swarm underwent a further revamp to accommodate 'lifelogging' and the recording of one's everyday personal locational traces (Crook, 2017b), an adaptive practice that is well documented in empirical studies of Foursquare end-use (Frith & Kalin, 2016; Humphreys, 2012; Özkul & Humphreys, 2015).

The original Foursquare app, meanwhile, underwent a dramatic 'metamorphosis' (Mosendz, 2014) and was redesigned as a dedicated search and recommendation service, known as Foursquare City Guide,

becoming, in the words of one commentator, 'a mobile-first Yelp app' (Shontell, 2014). This redesign was done, Dennis Crowley argued at the time, in response to extensive user-experience (UX) research that revealed a decline in check-ins by Foursquare's users:

> People are using the app, but they're not checking in. […] I asked myself: did we break something? But in fact, it's because people are using Foursquare to look for where their friends are, to find things, and as a recommendation service. It's almost like it doesn't occur to them to check in. (Crowley quoted in Lunden, 2012)

But another, larger business ambition was also at play. As Foursquare's then head of business development, Holger Luedorf, put it at the time, 'we're positioning ourselves as the location layer of the Internet' (quoted in Panzarino, 2014).

Key to the success of its merchant initiatives, and the realisation of this corporate ambition, was a major redesign of the Foursquare app, Foursquare City Guide, to incorporate two features. The first of these was 'Explore', which functioned as a recommendations and ratings system that utilised a series of metrics drawn from each user of the app and their social network history, including tips, likes, dislikes, popularity, local expertise and so on (Kerr, 2012). This information was then targeted back to that user, in Foursquare's words, in the form of 'recommendations for places that you would probably like to visit based on your profile and check-in history' (Goldman, 2012). The second of these was the addition of 'super-specific search' to Explore (Welch, 2013), which applied a range of filters to search results that combined common queries (such as price, opening hours and so on), with additional information drawn from check-ins and user data; by September 2013, restaurant menu search capabilities had also been added (Sterling, 2013).

Foursquare's ambition is to combine two datasets – its social data (its 'social graph') and its location- or venue-related data (its 'places graph') – and use them to develop responses to queries generated via the Explore feature. These responses are created in order to produce for users 'real time recommendations from signals [that combine] location, time of day, check-in history, friends' preferences, and venue similarities' (Shaw, 2012). As a result of all of these developments, Foursquare Labs Inc. has both consolidated its position in the location-based services landscape, and its identity as a firm and its business and revenue models are starting to come into sharper focus (Gobry, 2012).

How Foursquare is understood, however, depends on the social groups involved. For consumer end-users, Foursquare Labs Inc. can now be understood in two ways. On one hand, it continues to provide a gamified location-sensitive mobile social networking and check-in (or 'lifelogging') service (Swarm app). And, on the other hand, it also provides a search and recommendations service through its flagship Foursquare City Guide app – one that is now in direct competition with Yelp and Zomato.

For the tech industry, Fourquare Labs Inc. has evolved to become an important software as a service (SaaS) firm, providing location intelligence for other tech companies and developers. This SaaS takes the form of two offerings: its Pilgrim SDK (software design kit), proprietary software that is said to be able to sense when phones stop at or enter a venue (Crook, 2017a; Flynn, 2017; Johnson, 2018; Rosenblatt, 2017; Yeung, 2017), and its Places API, which provide other platforms and developers with access to its points-of-interest database. In the past, Places has provided location data for Yahoo!'s Flickr, Evernote, Kakao's Path, Twitter's now discontinued Vine and, very early on, for Google's Waze and Facebook's Instagram (Button.com, 2015; Calore, 2013; Carr, 2014; Dash, 2013; Foursquare, 2013). Now, Places is said to 'power location data for Apple, Uber, Twitter, Microsoft' (Foursquare, 2018), as well as Mapbox (Gundersen, 2018), Tinder (Kaplan, 2018b), Snap, Instacart and Lonely Planet (Fingas, 2018), a host of car companies (Foursquare, 2018), and, allegedly, '100,000 other developers' (Foursquare, 2018).

And, for wider industry, Foursquare is increasingly understood as a location analytics and ad platform. With respect to its ad offerings, Foursquare provides two services: Pinpoint, a location-based targeted advertising tool (Lopez, 2015), and, Attribution, a location analytics tool for measuring foot traffic and the impact of online and traditional advertising

(Sterling, 2016) so as to determine 'LROI', or location return on investment (Sterling, 2015). Consequently, Foursquare is a Janus-faced application in some sense, pulled in different directions because of monetary and user pressures. The next section links that development to the issues of contingency and determination to better situate Foursquare and Yelp's occasionally tortuous path towards becoming established pieces of the geomedia ecosystem.

Contingency and determination along the developmental paths of Yelp and Foursquare

In the previous two sections, we looked at how various forces, including market forces, design decisions and various social groups, among other influences, have shaped the evolution of both Yelp and Foursquare, two important and enduring corporate entities within a changing mobile geomedia ecosystem. In the final section of this article, we wish to return to the issues of 'contingency' and 'determination', which Leah A Lievrouw identifies as a productive tension for making critical sense of the 'complex, multilayered process' (Lievrouw, 2010, p. 261) – the heterogeneous factors and innumerable compromises (Bijker & Law, 1992, p. 3) – that contribute to and shape the development of new (geo)media technologies.

Through examining the development of Yelp and Foursquare, we can see how this tension has played out in different ways for each firm. Both firms, for example, underwent subtle yet quite significant shifts in design direction early in their development. Yelp moved from providing users with a Q&A section *and* a review section, to making the determination to focus their efforts on the latter. Foursquare revamped their offerings, splitting their service into two connected yet stand-alone apps. The contingency/determination tension did, however, play out differently across the two cases. Yelp's determination to focus on reviews, thereby limiting choice within their application, was driven by increased consumer engagement with this facet of their service. Foursquare's decision to create dual application offerings (Swarm and Foursquare), which carries the appearance of offering greater consumer choice ('contingency'), was driven by a perception of declining consumer engagement with the gamified, check-in facets of their service; as Foursquare's Dennis Crowley puts it, 'There was a moment where Foursquare and the idea of checking into places was becoming less relevant to people because of things like Instagram and the likes of Twitter and Snapchat. There was sexier things to do' (Crowley in McCracken, 2019). And yet, as we have seen, Foursquare's negotiation of this tension at the application level has been rather more complicated. Swarm has undergone a series of contingency-determination-contingency 'moments' – thus highlighting Leah A Lievrouw's (2010, p. 247) and Lucy Suchman's (1987) point that technology design continues in use. In addition, at the software development and corporate strategy level, there is a marked shift in focus around their determination to build their enterprise and merchant (rather than geosocial media) offerings.

Thus, while both companies featured major redesigns that fundamentally shifted the purpose of their services, these redesigns were shaped by range of external social shaping pressures – some shared (investor pressure, for instance), some not. Over the course of their development, Yelp and Foursquare's respective negotiations of these shaping influences and contingency/determination tensions have led them to forge two quite distinct developmental paths.

Yelp focused on internal shifts with how the application worked. Yelp has worked more or less constantly over the last 8 years to evolve its algorithm to improve the display of user reviews. Their work on algorithmic filtering was also undertaken in order to address the contingencies that were arising as a result of proliferating fake reviews and manipulation of the reviews process by businesses, end-users and various 'bad actors'. As discussed above, this evolution to their service has been accompanied by considerable controversy, with businesses raising questions about how Yelp's algorithm works. Meanwhile, Foursquare focused significant resources on the external rather than the internal; to no small degree, the monetisation of Foursquare has become geared around the provision of data, data analytics and location services to other companies more than advertising to users directly through the Foursquare application.

Foursquare's apparent shift away from gaming and check-ins also shows the myriad, often hidden ways in which geomedia applications influence how people know and experience a place. In Yelp's case, the influence comes in the algorithmic sorting of search results and reviews. In Foursquare's case, the influence may also come directly through the app, but it may also come in the data shared in the attempt to be the 'location layer of the Internet'. Many apps now rely on Foursquare's location data, so the tendrils of that data have spread throughout the geomedia ecosystem (Barouch, 2013); Foursquare's Pilgrim software and Places API are integral parts of 'tens of thousands of apps, sites, and interfaces', making Foursquare Labs Inc. a 'location-data giant' (Martineau, 2019).

We opened this article by noting Leighton Evans and Michael Saker's (2017) provocation that what we have witnessed over the past 5–7 years is the 'death' of location-based mobile geosocial networks (p. 88). In making this claim, their point is not that location will no longer be significant, but, rather, that it is 'stabilising' as a normal, everyday, integrated aspect of other geomedia services, applications and enterprises (pp. 95, 96). Adding to this understanding, what we have sought to argue in this article, is that Yelp and Foursquare have thus far avoided the fate of 'dead' or 'zombie media' (Hertz & Parikka, 2012) in no small part due to the evolutionary adaptability of these two firms, and their ability to negotiate successfully the manifold contingency/determination tensions that tend to accompany the technological development of mobile geomedia and their various social appropriations.

Conclusion

In this article, we have drawn on Lievrouw's productive tension between determination and contingency to argue that geomedia platform shifts and changes over time are not the result of design decisions that happen in isolation, nor are they solely the result of end-user appropriation. Instead, they occur because of multiple forces both internal and external to the platforms themselves. A focus on the determination/contingency tension usefully draws attention to how the shaping of artefacts, including mobile geomedia platforms, is and 'should not be seen as disconnected from how their diffusion is intended to unfold and how it actually occurs' (Boczkowski, 2004, pp. 255–256). This tension also highlights how their diffusion ought not be 'examined in isolation from processes of technical construction', as these processes 'do not stop when artifacts are adopted' (p. 256). Tackling the complexity of these forces and shifts is crucial to understanding how geomedia platforms work and why people continue to engage with and use them. In the two cases we have examined, we found that the types of communication that are made possible on Yelp and Foursquare are shaped significantly by the necessity of evolving business models. Yelp focused on reviews because of initial failures, and user preference for what was at the time a relatively minor feature (venue reviews); Yelp also developed complicated ways to filter reviews because of pressures to improve and monetise the service. Foursquare moved check-ins and gaming to a separate application in part because those elements were difficult to monetise and because of shifting end-user interest in and engagement with features; they focused more energy on search and the 'licensing of data, tools, and technology' (Crowley quoted in McCracken, 2019) as a new business model. All these decisions, forces and factors have shaped what the applications now look like and, in a mutually implicated process that is ongoing, how end-users interact with them; they have also shaped the position that these two major firms hold, and the role that they play (and are likely to continue to play), in the contemporary geomedia ecosystem.

Lievrouw's tension between contingency/determination thus enables one productive avenue to explore in developing deeper analyses of how geomedia are socially shaped beyond the level of design or user appropriation alone. The analysis of this article is only one step along this path; furthermore, detailed analyses of the external pressures that shape major geomedia firms are required if we are to fully understand the role and impact of these platforms in the broader geomedia and communication landscape, and the 'complex processes and forces of coding, transcoding and decoding' (Fast et al., 2018, p. 8) these 'geomediatization' processes (p. 8) involve that work to configure and reconfigure

hybrid social spaces and the public that form around and through them.

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