Zynga's Farmville, Social Games and the ethics of Big Data Mining

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The increasing necessity of engaging in social interaction through online commercial providers such as Facebook, alongside the ability of providers to extract, aggregate, analyse and commercialise the data and metadata such activities produce, have attracted considerable attention amongst the media and academic commentators alike. While much of the attention has been focussed on the data mining of social networking services such as Facebook, it is equally important to recognise the widespread adoption of large-scale data mining practices in a number of realms, including social games such as the well-known Farmville and its sequels, created by Zynga. The implicit contract that the public who use these services necessarily engage requires them to trade information about their friends, their likes, their desires and their consumption habits in return for their participation in the service. This paper will critically explore the realm of social games utilising Zynga as a central example, with a view to examine the practices, politics and ethics of data mining and the inherent social media contradiction. In determining whether this contradiction is accidental or purposeful, this paper will ask, in effect, whether Zynga and other big data miners behind social games are entrepreneurial heroes, more sinister FarmVillains, or whether it is possible at all to draw a line between the two? In doing so, Zynga's data mining approach and philosophy provide an important indicator about the broader integration of data analytics into a range of everyday activities.

Keywords: social games; big data; data mining; Facebook; Farmville; Zynga; social media

The increasingly complex intermingling of online social interactions and data mining that take place through social media, web search and online games necessitates further discussion and examination. Both activities – the increasing necessity of engaging in social interaction through online commercial providers such as Facebook, alongside the ability of providers to extract, aggregate and commercialise the outcomes of such activities as a result of the data trail that is produced – have attracted considerable attention amongst the media and academic commentators alike. The implicit contract that the public who use these services necessarily engage requires them to trade information about their friends, their likes, their desires and their consumption habits in return for their participation in the service. The release of Facebook's Graph Search functionality makes this trade off quite explicit, demonstrating how multifaceted data mining of social interactions creates complex, useful and importantly marketable information.

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The dramatic rise in the creation and exploitation of what is now called big data leads to a range of ethical questions, not least of all being the transparency of data mining operations (boyd & Crawford, 2012). While much of the attention has been focussed on social networking services such as Facebook, it is equally important to recognise the widespread adoption of large-scale data mining practices in a number of realms, including social games such as the well-known *Farmville* and its many sequels and clones, created by Zynga. In examining data mining in social games, the question must be asked as to whether users are making a fair exchange – trading a full record of their every choice, click and action for mostly free gameplay – or is this choice so occluded that users are insufficiently aware of the exchange they have legally agree to, usually via impenetrably dense Terms of Service? Moreover, is this example indicative of a broader social media contradiction which sees users largely focused on the *social* side, which is usually about ephemeral communication and sharing, while the online service providers tend to focus on the *media* side, which entails lasting, durable and minable information and data (Leaver & Lloyd, 2015; Leaver, 2013). This paper will critically explore the realm of social games utilising Zynga as a central example, with a view to examine the practices, politics and ethics of data mining and the inherent social media contradiction. In determining whether this contradiction is accidental or purposeful, this paper will ask, in effect, whether Zynga and other big data miners behind many social games are entrepreneurial heroes, more sinister FarmVillains, or whether it is possible at all to draw a line between the two?

The broader aim of this paper is not to single out Zynga because their approach to big data mining is unique, but rather to examine Zynga's practices as they exemplify the way analytics are being integrated into and utilised in a rapidly expanding range of fields. As those fields grow, the opacity surrounding the way individual data is used grows more and more problematic. For example, while personal fitness trackers such as Fitbit are ostensibly about self-tracking and self-improvement, insurance companies are already offering discounts to surveyed Fitbit users whose activities fall into a particular range that the company deems healthy (Bernard, 2015). Moreover, aggregated Fitbit activity has also featured in a recent course case, where a Fitbit user sought to demonstrate how their activity deviated from personal and statistical norms due to the severity of injuries they suffered (Crawford, 2014). Fitbit users may not necessarily know that their personal data is being aggregated to produce statistical norms, nor have necessarily consider the impact of having a health data trail on their insurance costs, but at least in using their devices and examining their own personalised data reports, they have clear indicators that their use generates data which is stored and analysed in a variety of ways. The importance of examining Zynga's approach to big data analytics is both due to the company's high profile, and their disingenuousness on the one hand purporting to be a games company while company executives openly touted that they were running an analytics corporation whose main product happened to be social games. In making more visible the data analytics driving Zynga, the company's dramatic rise and equally notable decline provides a useful indicator and warning about the use and ethics of big data mining.

Zynga and social games

Our lives are increasingly enacted through technologies and systems capable of capturing, archiving, matching and analysing what we do and how we do it, producing complex and rich data sets that are seen as an extremely desirable resource in commercial, political and security realms. As the 2013 revelations about PRISM and the NSA surveillance practices demonstrate, this resource is

understood as capable of producing information about a customisable range of practices and also potential practices, built upon data matching, profiling, association rules and so forth (Lyon, 2014). Perhaps what is surprising is in fact, not that surveillance, data capture and analysis was taking place, but that people were so stunned at the revelations that the NSA was unable to ignore such an attractive potential resource. Yet while outrage that has been expressed about government agency practices, with occasional notable exceptions (Arthur, 2014) people seem disturbed but less concerned about the practices of the private sector which in many ways is less regulated and accountable than that of state agencies.

Perhaps one of the clearest instances where data mining by corporations is applied is the area of social gaming. Social games, which are games played via social networking platforms such as Facebook, are increasingly popular, with hundreds of millions of cumulative players. Game company Zynga, with a raft of well-known games including *Farmville* and *Mafia Wars*, boasted more than 300 million actively monthly users at the company's peak in the third quarter of 2012 (Statista, 2014). Despite making some of their profit via advertising – the default revenue stream for most online services – Zynga's profitability has rested on the sale of virtual goods within their games. In figuring out how to best position users to desire virtual goods, Zynga has been at the forefront of data mining: at a 2010 presentation, Vice President of Analytics and Platform Technologies Ken Rudin stated outright that Zynga is 'an analytics company masquerading as a games company' (Rudin, 2010). And it's a masquerade that is very successful, given that few *Farmville* players, for instance, are likely to consider how their every movement and mouse-click is being algorithmically studied and filtered to increase the odds that they will part with real cash for virtual goods in future gameplay.

Zynga was founded in 2007 by CEO Mark Pincus with the underlying goal of implementing profitable games using user-pays principles. However, unlike the more traditional subscription model used by game companies, Zynga's social games are free to play but offer the option of micro-transaction purchases within the games that can help with game progression, virtual good acquisition, decorative or personalised attributes and so forth. These micro-transactions involve relatively small sums of money, yet cumulatively, their revenue can be quite substantial. In December 2012, for example, Facebook which at that time took a percentage of revenue income from its third party users/developers revealed that Zynga accounted for 12% of Facebook total profits in 2011. According to Facebook, this amount "was comprised of revenue derived from payments processing fees related to Zynga's sales of virtual goods and from direct advertising purchased by Zynga. Additionally, Zynga's apps generate a significant number of pages on which we display ads from other advertisers." Facebook goes on to note, almost prophetically, "If the use of Zynga games on our Platform declines, if Zynga launches games on or migrates games to competing platforms, or if we fail to maintain good relations with Zynga, we may lose Zynga as a significant Platform developer and our financial results may be adversely affected" (Facebook quoted in Kain, 2012).

The "symbiotic relationship" between Zynga and Facebook in particular was vital for Zynga's initial success (Goggin, 2014, p. 11). According to Pincus, "Our games are instantly social because of Facebook. That's an amazing, magical thing that they provide" (Duryee, 2012). Zynga games utilise the resource that these SNS provide – access to people's social networks. In this way, Zynga are able to draw on ready-made, captive audiences and their networks of users who may be looking to

engage in additional activities amongst themselves. These ready-made networks also offer another element that has been vital for Zynga's success – virality or an effective means of word of mouth referral, with a range of different messaging and notification options allowing *Farmville* players to let their Facebook friends know they were playing the game, and would happily invite new players from their Facebook 'friends' to play, too (Kastensmidt, 2010, p. 198).

In order to maximise their game revenue, Zynga has been involved in extensive data mining of player activities in games as well as their social network interactions. Data mining involves the extraction of information on the basis of individual's personal information as well as on user behaviour patterns: whether users and social groups are more likely to engage in some sorts of practices, whether they are more likely to refer to others under particular circumstances, whether they are more likely to be induced to spend money under particular circumstances. Data mining, in association with the expanding abilities of technologies and processes to rapidly match, compare and calculate large data sets opens up a Pandora's box of possibilities previously unknown or impossibly time consuming to undertake (Leaver, Willson, and Balnaves, 2012). Data mining is undertaken to identify patterns and associations that can be used to help guide game design in order to enhance playing experience (Ansari, Talreja, and Desai, 2012), and it can be used to identify and harness player desires and wallets. Aggregated data containing personal information and social practices can also be a valuable source of income when sold to those who make their business out of the on-sale of tailored data sets (e.g. companies such as Axciom). Increasingly, the challenge is in ensuring consumers, users and players recognise their value to these companies:

> we must come to terms with our own online activities feeding the appetites of algorithmically-driven machines designed to facilitate the expansion of profit and power by quantifying and modulating our desires. We've become more valuable to the Internet and its scanbots as aggregate data inputs than we ever were as consumers of banner ads. (McKelvey, Tiessen & Simcoe, 2013)

Indeed, in social games, the value is not just derived from each player, but also from the reach of their existing social networks:

> Every mouse click aggregates onto a wider body of data that is stored indefinitely, to be queried and analyzed to ends that are boundless at most, and vague at the very least. A social network game can take advantage of a user's extant network to send invitations to join him or her by signing up for the game, thereby authorizing the application to access the user's information. The data from those interactions can be an alternative to straight monetization, as users can receive virtual goods when they invite friends who sign up. (Chow-White, P., Chee, F., & Smith, R. 2011, p.18)

The Contract

Unlike the NSA capturing and using personal information, which has been illicit and largely undertaken without direct consent from the sources of that information, social game users do accede to their information being accessed. At least, they might click on a box saying they agree to the Terms of Service and privacy policy of the provider, or that proceeding after being notified

implies consent. Thus in principle, it can be argued that they are fully cognisant and indeed complicit in these activities.

But are the realities quite as straightforward as this? Terms of Service are lengthy, often full of complex detail and also, in the case of their being situated within other platforms that have their own Terms of Service (as Facebook does), then almost impossible to decipher what this cross relationship might mean in terms of user data (DeNicola, 2012). It is worth quoting some extracts from Zynga's Terms of Service at length, both because they make obvious the impossibility of deciphering exactly what they mean but also because though they are not easily accessible, it is clear that they claim the right to do anything with the material that users provide both now and also any possible future uses yet unknown. This latter inclusion means that they effectively grant an open licence to yet unknown data matching and data mining possibilities indefinitely:

> You own your User Content. You hereby grant Zynga and its Affiliates a perpetual and irrevocable (other than as provided below), worldwide, fully paid-up and royalty free, non-exclusive, unlimited license, including the right to sublicense and assign to third parties, and right to copy, reproduce, fix, adapt, modify, improve, translate, reformat, create derivative works from, manufacture, introduce into circulation, commercialize, publish, distribute, sell, license, sublicense, transfer, rent, lease, transmit, publicly display, publicly perform, or provide access to electronically, broadcast, communicate to the public by telecommunication, display, perform, enter into computer memory, and use and practice, in any way now known or in the future discovered, your User Content as well as all modified and derivative works thereof in connection with our provision of the Service, including marketing and promotions thereof. To the extent permitted by applicable laws, you hereby waive any moral rights you may have in any User Content. The license you grant Us to use user posted content (except any content you submit in response to Zynga promotions and competitions or any other content specifically solicited by Zynga) ends when you delete your User Content or you close your Account unless your User Content has been shared with others, and they have not deleted it. However, you understand and accept that removed content may persist in back-up copies for a reasonable period of time. (http://company.zynga.com/legal/terms-of-service)

When faced with whether to acquiesce to Zynga's Terms of Service including its privacy policy, users are given a stark choice – either they acquiesce in total and give away access to the requested information and any further information as to their in-game and across-platform activities or they don't play the game; the game many of their friends may be playing. Without even going into the issue of the degree to which users may understand the implications of giving away their data for playing privileges, they must also reconcile their ability to be part of a group and a conversation about shared activities, or to be excluded. Indeed, they cannot even look at the game in order to determine whether they are interested without agreeing to a data trade-off.

The Terms of Service noted above come from Zynga.com, the website established by Zynga as a way to bypass the need to access their games through a SNS, a need which became pressing when the relationship with Facebook soured in 2012 and Zynga lost their unofficial status as Facebook's preferred social games network ("Facebook and Zynga to end close relationship," 2012). As

suggested above, the matter of transparency and Terms of Service is even more complex when an app is nested within another provider with their own Terms of Service. In the case of Facebook, when accessing Farmville via Facebook, users are not required to read either the Terms of Service, nor the Privacy Policy from Zynga, but can get straight into the game after clicking a single confirmation screen. When accessing an app on Facebook, therefore, users do not even have to click that they agree, but simply push the 'Play Game' button; access is thus read as consent:
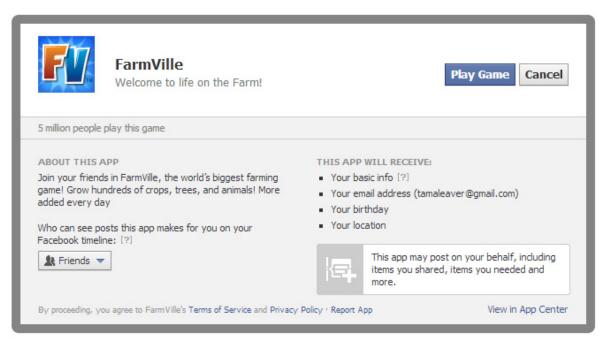

Figure 1. Farmville Terms of Service and Privacy Policy consent button on Facebook.

As with most Facebook apps, the confirmation screen to access Farmville and other social games outlines what Facebook data will be shared with the makers of the app, and what permissions the app will have to post material to the user's Facebook timeline, but the actual information regarding the data that will be shared, stored and mined by Zynga are carefully occluded, appear in fine print – a tiny font – on a click-through style screen that most users habitually ignore or agree to with minimal cognitive engagement, if any. These Terms are examples of what Lane DeNicola (2012, p. 274) describes as a "cultural opacity" where the combination of the legal terms, the way they are positioned (basically near-hidden), and the platform context all work against a user ever seriously engaging with, or even reading, the impenetrable legal terms which bind their use.

Recent research investigating data sharing and mobile applications has demonstrated that even when a user is conscious of the likelihood of their personal data being mined, they have rarely considered the full range of ways in which data they have generated is being stored, aggregated and analysed. For example, surveyed users of the popular casual mobile game Angry Birds who had thought themselves well informed about privacy were surprised just how much data Rovio collected about them in order to target advertising in the free versions of these popular games (Balebako, Jung, Lu, Cranor, and Nguyen, 2013). Given that Zynga have consciously and publicly styled

themselves as an analytics company, extrapolating various forms of value and currency from aggregated user activities, the absolute paucity of the notifications about the sort of material collected, stored and analysed is highly questionable.

In Benjamin Burroughs' (2012) examination of types of play in Farmville, he concludes that for most players: "The combined space of Facebook and FarmVille is perhaps best described then as a liminal space where players engage with a low-level of entry for the purposes of decompressing and transitioning from the complexities of modernity" (Burroughs, 2012, p. 19). If social games really are the equivalent of crashing on the sofa and channel surfing, the lack of information about Zynga's data analytics are even more likely to slip under the radar. Moreover, if the motivators for joining Farmville or another game are social, then a user will likely be focused on the communication and competitive elements of a game, often to the exclusion of any meaningful consideration of the generative labour (i.e. the creation of minable data) they are enacting on Zynga's behalf (Terranova, 2000). And while the exchange of an initially free game app may imply that some sort of exchange must be taking place in terms of user activity, Zynga never explicitly acknowledges to players that the recording and analyzing of player activity is building an ever more complex and vast amalgam of big data that is being used to refine the games both to attract ongoing player interaction and position those users as more likely to part with real money to purchase gameplay enhancing virtual goods.

Questionable practices: Zynga and its relationship with (personal) data

Zynga's reputation in relation to its use of information and its commercial practices has been questioned many times. Indeed, CEO Mark Pincus acknowledges that the company has engaged in dubious practices. According to Pincus,

> So I funded the company myself but I did every horrible thing in the book to, just to get revenues right away. I mean we gave our users poker chips if they downloaded this zwinky toolbar which was like, I don't know, I downloaded it once and couldn't get rid of it. *laughs* We did anything possible just to just get revenues so that we could grow and be a real business (Arrington, 2009, Nov. quoting from the Mark Pincus talk at *Startup@Berkeley*, 2009).

In late 2009, Journalist Michael Arrington, writing for *TechCrunch*, posted a series of articles on a topic that he referred to as 'scamville' or a 'scamville ecology', that highlighted how the three most popular Facebook gaming companies (Zynga, Playfish and Playdom) were making money off their customers in unethical ways. He described what he refers to as a typical scam that was being offered within these social games:

> users are offered in game currency in exchange for filling out an IQ survey. Four simple questions are asked. The answers are irrelevant. When the user gets to the last question they are told their results will be text messaged to them. They are asked to enter in their mobile phone number, and are texted a pin code to enter on the quiz. Once they've done that, they've just subscribed to a $9.99/month subscription. Tatto Media is the company at the very

end of the line on most mobile scams, and they flow it up through Offerpal, SuperRewards and others to the game developers. (Arrington, Oct 31, 2009)

By November that year, following the series of Scamville articles, Zynga removed all "lead generating" ads, turning exclusively to virtual goods for revenue. However their problematic relationship with third parties and related data practices did not stop there. In October 2010, Zynga was sued in relation to Facebook privacy and user data. According to Paul (2010), "The company … was roped into a class-action lawsuit on Tuesday. The suit alleges that Zynga collected and shared the data of 218 million Facebook user IDs with advertisers and data brokers. The class-action lawsuit alleges that Zynga violated federal law and its contract with Facebook by sharing user data with third parties." This is even more problematic than it seems at first glance. For while a user may have knowingly agreed to share their own personal data, in that process, they also granted access to many of their friends and acquaintances details – people who had made no such agreement with Zynga. This meant that not only were Zynga potentially violating the agreement they had with those with whom they had negotiated a direct contract according to use of data, it also included information about those who had not agreed to any such relationship.

The above details problematic relationships for Facebook and Zynga with third parties and their gathering and sharing of personal data. However, the other side that proved problematic for Facebook, and in turn Zynga was their use of viral marketing methods. Social networks of users were spammed repeatedly by posts generated by Zynga games being placed on their (non-player) Facebook pages. Each time a quest was achieved, a purchase was made, a task completed by a user (as well as just a simple notice that a user had joined a game), posts were made on the users' social connections sites. This was a highly productive way for Zynga to cross-market their various games as well for player (and potential consumer) recruitment purposes (Kastensmidt, 2010, p. 202). However, it also generated a backlash amongst Facebook users. According to Helft (2010) after millions of users complained, "Facebook started restricting the messages, and Zynga's traffic dropped sharply. For instance, FarmVille had a 26 percent drop, to 61 million monthly users, in July from a peak of about 83 million in March [2010] … Zynga investors say the drop in traffic had little effect on revenue because many players who dropped out didn't buy virtual goods" (Helft, 2010). Yet in the longer term, as Facebook distanced themselves from Zynga in part because of the backlash, and in part in order to encourage new game developers to populate Facebook's app library, Zynga's numbers have radically declined both via Facebook and via their own company website. As recently as 2015, Zynga investors sued the company claiming they failed to disclose the upcoming changes in their relationship with Facebook which was known to Zynga at their initial public offering (Geuss, 2015).

Regardless of whether players enter via Facebook or Zynga's own online properties, significant questions remain about the transparency of the exchange players are making in order to access these games. Though this has obvious commodification ramifications there are also potential ethical implications. How might one understand data trails, patterns and so forth that can be both uniquely personal but also broadly aggregated and depersonalised? What might the responsibilities and also the capacities be of those who offer services to people as a commercial endeavour seemingly for free but with the trade-off of the release of personal and network information without a clear understanding of what will happen to this (personal) information?

Equally important is how exactly aggregated data from player activity is covered by the Terms of Service: is each and every click 'user content', or does this refer to larger items? Following this question, if this aggregated activity is amalgamated with other users' actions and insights produced, how meaningful is Zynga's assertion that user content can be deleted if a Zynga account is deleted? Does user information get removed from the data analytics, or has it been so transformed and integrated that it is essentially part of Zynga's commercial property for perpetuity? Even if it were possible to disaggregate a single player's data, would this remove the insight (and value) already produced from analytics performed on the amalgamated data? While this sort of transaction is by no means unique (Google's search engine learning from users' search terms is comparable) the lack of acknowledgement about the nature and extent of this activity – and the value of player data – situates social games of this sort as, at the very least, disingenuous.

Social media contradictions

The exchange of user information, activity or attention for the provision of free platforms, applications and services is a widespread online business model. In this respect, Zynga's activities might be considered comparable to many of their commercial peers. However, underneath the cute farms and growing crops, Zynga's games appear to deliberately exacerbate the worst excesses of a cultural opacity, where the letter of the law might be followed – in making Terms of Service and Privacy Policies in some fashion available – but the way these are situated ensures that an incredibly low proportion of players will ever read or even think about these policies. As Leaver and Lloyd have argued (2015, p. 162):

> a *social media contradiction* may arise where users focus on the *social* elements – often acts of communication and sharing which are thought of as ephemeral and in the moment, comparable to a telephone conversation – while the companies and corporations creating these apps are more focused on the *media* elements, which are measurable, aggregatable, can be algorithmically analysed in a variety of potentially valuable ways, and can last indefinitely.

Zynga typifies this contradiction, outwardly providing a social gaming experience whilst operating as an analytics company, attempting to extract revenue-generating patterns and predictions from every click and choice players make within their games. The front-facing experience of Zynga's games encourages players to focus on the social side: the play, the competition, and social interaction. Yet, paradoxically, for Zynga these elements are secondary to the data collection, aggregation, analytics and monetization of player activity either to refine the replayability of the games, to increase the potential for users to pay for virtual goods, to refine other approaches to monetisation player activity. It is not so much the business model, but the way it is effectively hidden from players, that makes the social media contradiction in Zynga's games so insidious.

Moreover, as boyd and Crawford (2012) have argued, big data is not just a technical system of computational tools, nor just a series of analytical processes which potentially produce useful insights from data at a large scale, but it also as it circulates in contemporary culture is a mythological process. The myth is largely that big data can, and does, produce objective truthful information about the present and can thus predict future activities across a range of fields. Yet, as Andrejevic (2014, p. 1677) aptly critiques this mythos, "Predictive analytics is not, despite the hype,

a crystal ball". Rather, Andrejevic argues further, big data perpetuates a further divide: not just a division between those who focus on games as play and communication, on one hand, and companies focusing on these activities as data or media generation on the other; but a further divide between those who have the computational and analytical tools and resources of sufficient scale to even attempt to analyse such vast pools of raw data, versus those who – regardless of access – lack the infrastructure needed to 'ask' big questions of it. The crystal ball of big data analytics, as it were, requires computational power of such a large scale, that only large companies are in a position to even attempt gaze into it for whatever answers they might be able to conjure.

Conclusion

Zynga's empire peaked with 311 million monthly active users across all of their games the third quarter of 2012 but by the first quarter of 2014, however, the monthly active users was less than half at 123 million users (Statista, 2014). Zynga's waning fortunes and revenues are, in part, a reminder of McCosker and Wilken's (2014) important point that big data is far from self-explanatory, and that amassing gigantic datasets and figuring out how to analyse these for any purpose, including profitability, is still an extremely imprecise exercise. Regardless of success, though, the argument made here remains equally valid: companies whose business model relies on data mining and big data analytics are doing nothing intrinsically wrong if they are being transparent, or at least honest, about their operations, and allowing users or players to make an educated choice about whether to exchange the trail of their use and activity for free access to the game or service. Zynga, in deliberately hiding their business model from players, whilst openly touting themselves as an analytics company masquerading as a games developer to the business world, and investors, perpetuate a social media contradiction that continues to widen a divide in literacy, and trust, between users or players and the companies behind those games and services.

The successor to Zynga's crown in Facebook's gaming options, as well as on the apps that populate a huge number of mobile devices, is *Candy Crush Saga* from King which has its own complex data analytics operation, but has managed to find a more sustainable business model, leveraging access to players' social network connections, and cash, in exchange for more rapidly progressing through various levels. Notably, *Candy Crush* has been linked to the mechanics of gambling (Gardner, 2014; Smith, 2014) while gambling is also one of Zynga's largest current areas of development (Albarrán Torres and Goggin, 2014). Zynga, King and other social and casual games developers continue to leverage complex data analytics to refine their offerings to sustain player interest and to maximise the odds of them parting with money to further their progress. However, as this article has demonstrated with the example of Zynga and Farmville, there is an onus on companies to be more transparent about their practices, to explain how individual data might be used and ensure players can make an informed choice about whether they wish to trade a complex history of their every click using a game for access to it. Beyond the realm of gaming, big data analytics have become increasingly core elements and drivers for decisions about everything from fitness to transport and a hundreds of other fields, often in extremely useful ways (Mayer-Schönberger and Cukier, 2013). Yet if the aggregation of individual activity is so often going to be recorded, encoded, aggregated and analysed, the individuals generating that big data should, at the very least, have a right to know that their actions are being utilised in such a manner.

Acknowledgment

References

Albarrán Torres, C., & Goggin, G. (2014). Mobile social gambling: Poker's next frontier. *Mobile Media & Communication*, *2*(1), 94–109. doi:10.1177/2050157913506423

Andrejevic, M. (2014). The Big Data Divide. *International Journal of Communication*, *8*, 1673–1689.

Ansari, N., Talreja, M., & Desai, V. (2012). Data Mining in Online Social Games. In A. K. M, S. R, & T. V. S. Kumar (Eds.), *Proceedings of International Conference on Advances in Computing* (pp. 801–805). Springer India. Retrieved from http://link.springer.com/chapter/10.1007/978-81-322-0740-5_95

Arrington, M. (2009, November 6). Zynga CEO Mark Pincus: "I Did Every Horrible Thing In The Book Just To Get Revenues"| TechCrunch. *TechCrunch*. Retrieved June 27, 2013, from http://techcrunch.com/2009/11/06/zynga-scamville-mark-pinkus-faceboo/

Arrington, M. (2009, October 26). Social Games: How The Big Three Make Millions | TechCrunch. *TechCrunch*. Retrieved May 28, 2013, from http://techcrunch.com/2009/10/26/social-games-how-the-big-three-make-millions/

Arrington, M. (2009, October 31). Scamville: The Social Gaming Ecosystem Of Hell | TechCrunch. *TechCrunch*. Retrieved June 27, 2013, from http://techcrunch.com/2009/10/31/scamville-the-social-gaming-ecosystem-of-hell/

Arthur, C. (2014, June 30). Facebook emotion study breached ethical guidelines, researchers say. *The Guardian*. Retrieved from http://www.theguardian.com/technology/2014/jun/30/facebook-emotion-study-breached-ethical-guidelines-researchers-say

Balebako, R., Jung, J., Lu, W., Cranor, L. F., & Nguyen, C. (2013). "Little Brothers Watching You:" Raising Awareness of Data Leaks on Smartphones. Presented at the Symposium on Usable Privacy and Security, Newcastle, UK. Retrieved from http://research.microsoft.com/apps/pubs/default.aspx?id=194401

Bernard, T. S. (2015, April 8). Giving Out Private Data for Discount in Insurance. *The New York Times*. Retrieved from http://www.nytimes.com/2015/04/08/your-money/giving-out-private-data-for-discount-in-insurance.html

boyd, danah, & Crawford, K. (2012). Critical questions for big data. *Information, Communication & Society*, *15*(5), 662–679. doi:10.1080/1369118X.2012.678878

Burroughs, B. (2012). Facebook and Farmville: A Ritual Analysis of Social Gaming and Community. Presented at the International Communication Association Annual Conference, Phoenix, AZ. Retrieved from http://citation.allacademic.com/meta/p_mla_apa_research_citation/5/5/6/4/0/p556401_index.html

Chow-White, P., Chee, F., & Smith, R. (2011). *Data Mining User Generated Content: Transforming Play and Leisure in Online Social Gaming into Business Analytics* (SSRN Scholarly Paper No. ID 1926437). Rochester, NY: Social Science Research Network. Retrieved from http://papers.ssrn.com/abstract=1926437

Crawford, K. (2014, November 19). When Fitbit Is the Expert Witness. Retrieved November 19, 2014, from http://www.theatlantic.com/technology/archive/2014/11/when-fitbit-is-the-expert-witness/382936/

DeNicola, L. (2012). EULA, Codec, API: On the Opacity of Digital Culture. In P. Snickars & P. Vonderau (Eds.), *Moving Data: The iPhone and the Future of Media* (pp. 265–277). New York: Columbia University Press.

Duryee, T. (2012, May 30). Zynga's Mark Pincus Talks About His Management Style, Acquisitions and Mobile. AllThingsD. Retrieved April 22, 2013, from http://allthingsd.com/20120530/mark-pincus-at-d10/

Facebook and Zynga to end close relationship. (2012, November 30). *BBC*. Retrieved from http://www.bbc.co.uk/news/technology-20554441

Gardner, J. (2014, April 24). *Could Candy Crush Saga be a gateway to gambling? The Sydney Morning Herald*. Retrieved August 8, 2014, from http://www.smh.com.au/digital-life/games/could-candy-crush-saga-be-a-gateway-to-gambling-20140424-zqyj7.html

Geuss, M. (2015, March 30). Zynga investors can sue FarmVille creator for alleged IPO fraud, judge says. Retrieved April 14, 2015, from http://arstechnica.com/business/2015/03/zynga-investors-can-sue-farmville-creator-for-alleged-ipo-fraud-judge-says/

Goggin, G. (2014). Facebook's mobile career. *New Media & Society*, 1461444814543996. doi:10.1177/1461444814543996

Helft, M. (2010, July 24). Will Zynga Become the Google of Games? The New York Times. Retrieved from http://www.nytimes.com/2010/07/25/business/25zynga.html

Kain, E. (2012, February 1). Betting On FarmVille - Facebook IPO Reveals How The Social Media Giant Makes Money. *Forbes*. Retrieved May 29, 2013, from http://www.forbes.com/sites/erikkain/2012/02/01/betting-on-farmville-facebook-ipo-reveals-how-the-social-media-giant-makes-money/

Kastensmidt, C. (2010). The Communication Channels of Farmville. In *Proceedings of SBGames 2010* (pp. 196–204). Florianópolis, SC. Retrieved from http://sbgames.org/sbgames2010/proceedings/culture/full/full22.pdf

Leaver, T. (2013). The Social Media Contradiction: Data Mining and Digital Death. *M/C Journal*, *16*(2). Retrieved from http://journal.media-culture.org.au/index.php/mcjournal/article/viewArticle/625

Leaver, T., & Lloyd, C. (2015). Seeking Transparency in Locative Media. In R. Wilken & G. Goggin (Eds.), *Locative Media* (pp. 162–174). London & New York: Routledge.

Leaver, T., Willson, M., & Balnaves, M. (2012). Transparency and the Ubiquity of Information Filtration? *Ctrl-Z: New Media Philosophy*, *1*(2). Retrieved from http://www.ctrl-z.net.au/articles/leaver-willson-balnaves-transparency-and-the-ubiquity-of-information-filtration/

Lyon, D. (2014). Surveillance, Snowden, and Big Data: Capacities, consequences, critique. *Big Data & Society*, *1*(2), 2053951714541861. doi:10.1177/2053951714541861

Mark Pincus talk at Startup@Berkeley. (2009). Retrieved from http://vimeo.com/3738428

Mayer-Schönberger, V., & Cukier, K. (2013). *Big data: a revolution that will transform how we live, work, and think*. Great B: John Murray.

McCosker, A., & Wilken, R. (2014). Rethinking "big data" as visual knowledge: the sublime and the diagrammatic in data visualisation. *Visual Studies*, *29*(2), 155–164. doi:10.1080/1472586X.2014.887268

McKelvey, F., Tiessen, M. and Simcoe, L. (2013, June) We are what we tweet: The Problem with a Big Data World when Everything You Say is Data. Retrieved from http://culturedigitally.org/2013/06/we-are-what-we-tweet-the-problem-with-a-big-data-world-when-everything-you-say-is-data-mined/

Paul, I. (2010, October 20). Zynga Hit With Lawsuit Over Facebook Privacy Breach. *PCWorld*. Retrieved April 12, 2013, from http://www.pcworld.com/article/208267/Zynga_Hit_With_Lawsuit_Over_Facebook_Privacy_Breach.html

Rudin, K. (2010). Actionable Analytics at Zynga: Leveraging Big Data to Make Online Games More Fun and Social. Presented at the 2010 TDWI BI Executive Summit, San Diego, CA. Retrieved from http://tdwi.org/videos/2010/08/actionable-analytics-at-zynga-leveraging-big-data-to-make-online-games-more-fun-and-social.aspx

Smith, D. (2014, April 1). *This is what Candy Crush Saga does to your brain*. *The Guardian*. Retrieved August 8, 2014, from http://www.theguardian.com/science/blog/2014/apr/01/candy-crush-saga-app-brain

Statista. (2014, August). *Zynga games - monthly active users 2014*. *Statista: The Statistics Portal*. Retrieved August 8, 2014, from http://www.statista.com/statistics/273569/monthly-active-users-of-zynga-games/

Terranova, T. (2000). Free Labor: Producing Culture for the Digital Economy. *Social Text*, *18*(2), 33–58.