Fearsquare: Hacking Open Crime Data to Critique, Jam and Subvert the 'Aesthetic of Danger'

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ABSTRACT

Digital media is increasingly seen as an important instrument in the delivery of public communication about health, environmental and technological risks. Drawing on research in risk communication, cultural studies, and methods of Critical Design we present the evaluation of a provocative digital hack, Fearsquare, which provides users with personally contextualized risk information drawn from UK government 'open data' crime maps cross-referenced with check-ins from the location-based social network Foursquare. Data collected from an 'in-the-wild' study is analysed via a corpus of Twitter discourse. We discuss how the strength and variety of public responses to Fearsquare show how the release of the application created an opportunity for people to publicly reinterpret and explore the aesthetic tensions between risk and fear, and reflect upon the possible uses of open data and social media by digital designers. We critically reflect on the concepts of users, technology, crime, danger and fear and conclude how these interwoven issues present an important challenge for researchers and designers wishing to engage in projects that involve the communication of risk.

Author Keywords

Risk communication; fear; Critical Design; culture jamming; open data; crime maps; locative media.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

The study of risk communication examines the interactive exchange of information, opinions and evaluations between official and public sources, across various media, that influence how people understand and make decisions in response to risk [20]; in practice risk communication is universally used by governments and other public and private bodies, to inform, educate and persuade people about health, environmental and technological hazards. The study of risk communication, as well as perception [28], is cross disciplinary and complex and involves challenges such as how to address scientific uncertainty, resolve ambiguity, and build trust in order to enhance informed debate and decision-making ability to safeguard citizen's health, safety and well-being. The emergent use of the internet, and especially social media, as a means to deliver computer-mediated communication of risk (CMC-R) by public and private bodies opens further new challenges [18, 31] around the understanding of interactions between technology and its users and how these might be best designed and utilized. Most notably, any public uptake and use of CMC-R significantly transforms the timeliness and availability of risk information, how it is created and circulated, how people might attend to or engage in dialogue about risk, and how risk bearers might be targeted or empowered [10]. This has given rise to warnings (see [4, 10] for instance) that CMC-R could become rife with rumour and false information following unconfirmed word-of-mouth, and that fear, anxiety and social fragmentation will inevitably be amplified by way of the inherent dynamics and features of new media.

In this paper we focus on one applied area of risk communication: exposure to crime. Recent engagement by the HCI community with issues around exposure to crime, as well as the design of interactive digital solutions that might communicate such risks of exposure, have typically been framed by relatively simple assumptions of technological and social determinism, and a focus on compliance with political projects (e.g. [2, 26]). In an attempt to deepen the understanding of, and generate further dialogue on, digital interaction design and crime risk, we present, in this paper, the design and evaluation of a CMC-R application, named *Fearsquare*, which creates an opportunity for both users, and the research community, to reinterpret and explore the aesthetic tensions between risk and fear, as well as the future political uses of public data and social media in risk contexts. Fearsquare employs principles of Critical Design, hacking and culture jamming in a purposefully provocative way and mashes government 'open data' crime maps with data from the social media service Foursquare to present highly personalized visualisations of crime risk to its users.

In the remainder of the paper we, firstly, present a contextual summary of previous research on fear of crime and the perception and communication of exposure to crime risks. We then discuss the social and cultural complexities surrounding the recent trend of government publication of 'open crime data' and the use of this data by researchers in the HCI community. We then introduce the concepts of Critical Design, hacking and culture jamming, and describe the design of Fearsquare, a hack designed to criticise and explore the role of digital crime maps in cultivating cultural fear of crime. We go on to present an 'in-the-wild' study of the application, and the analysis of a corpus of Twitter discourse that arose in response to its release, in order to explore public reception of the application, and its associations with risk and fear. Finally, we discuss implications of our study for the future design of digital interactions concerning risk and fear.

BACKGROUND

Crime Risk Fears, Perceptions and Digital Initiatives

The fear of crime is an ongoing risk communication and perception problem. In the UK, for example, crime risk fears and perceptions have risen persistently, irrespective of falls in reported crime rates [12]. Early research questioned why fears and perceptions were disproportionate and subjectively biased when compared to actual crime figures [15]. However, a broader view has emerged over time that recognizes that public responses are framed by a complex matrix of media representations of crime, and moral and cultural expectations, which resonate with personal experiences of law and order [15]. The propagation of crime risk fears and perceptions can thus affect anyone, thereby reducing people's quality of life by raising anxiety, restricting movement, eroding social and neighborhood ties and forming an obstacle to positive orientations towards the environment that are difficult to remove [15]. A number of police or law enforcement authority schemes have recently been piloted that aim to destabilize the propagation of fear by fostering public engagement with law enforcement. These initiatives (see ConnectedCops.net for an overview) include using social media, such as Twitter and Facebook, to better connect the public with community policing. This has enabled direct communications with officers, the real time provision of local and national crime updates, and more controversially the posting of images of suspected criminals online during their arrest and once convicted [6].

The HCI community has also experimented with the possibilities of using technology to reduce fear of crime, via such means as wearable technologies and the use of 'hazard tagging' to help alleviate fear experienced amongst older people [3] and children [36], and to promote a sense of personal security amongst citizens in urban settings. In [2] a mobile phone application, was designed to allow users to indicate where, on a shared city map, they felt safe, or unsafe, in a bid to help them better understand their personal safety in and to facilitate preventative measures

such as avoiding areas deemed to be unsafe. Subsequent work in [26] also highlighted the use of mobile technology to help users manage their personal safety concerns in urban contexts after dark, but also noted that security had to be balanced against privacy depending on the user.

Crime cartography has historically been employed as a policing tool to help identify crime patterns and target resources accordingly [6]. However, the public release of geo-tagged crime data is a relatively recent initiative, exemplified by the ongoing publication of monthly 'crime maps' by the UK Home Office (see Police.co.uk) beginning in January 2011. This initiative figures as part of the UK Government's 'open data' political program, and aims to make the occurrence of different crimes transparent and accessible for any given searchable location chosen by members of the public. Whilst the Police.co.uk website is not the first attempt to publish crime maps, it is the first to use standardized crime statistics gathered nationwide at street level granularity [6]. Supplementary information is provided to users via the website in the form of graphs and details about local police initiatives. In short, Police.co.uk is a major public exercise that provides a novel way for UK citizens to gain greater access to information about crime and crime control measures in their neighborhoods.

Uses and Gratifications of Digital Crime Maps

Upon its release, the Police.co.uk website drew immense national interest from UK citizens. This resulted in the site crashing on its first day after suffering technical difficulties due to the volume of people trying to access it [29]. Recent figures from early 2013 indicate that the site still generates around 17,500 unique visits per day [24]. From a user perspective, part of the appeal of the Police.co.uk site rests in providing those with a curiosity about local crime with the ability to quickly find and easily browse crime data. This is achieved via a simple website interface that allows users to pinpoint crime in areas of personal interest, such as the street on which they live, through intuitive visual navigation of neighborhood maps. This provides a more granular picture of different kinds of reported crime in local communities than was previously available. These crime maps arguably hold some significant advantages to interested citizens over conventional crime figure reporting, such as more generalized national or regional year on year statistical crime trends, as it is typically easier to extrapolate personal relevance and significance from the data.

However, the aims and objectives of releasing the digital crime maps online clearly went far beyond simply providing easy access to more detailed information about crime. In a statement of support, the UK Policing Minister claimed the website would give citizens *"the information and power to hold their local forces to account and ensure that crime in their neighborhoods is driven down"* [30]. Again, like the initiatives heralded on ConnectedCops.net, the site is intended to enhance the credibility of policing and empower the public by increasing the visibility of

police presence, law enforcement and criminal justice, facilitating greater public scrutiny, and engagement.

Lending some support to these views, ongoing research [22] by the National Police Improvement Agency, which was concurrently trialing different crime maps with the UK public, suggested that citizens were generally positive about digital crime maps which had no overall adverse effect on crime risk fears and perceptions. The public release of local digital crime maps has also been positively received elsewhere around the world, most notably in San Francisco where local residents used them to make the revelation that recorded incidents of prostitution said little about the time and locations in which prostitution occurred and much more about the systematic regularity at which police officers patrolled those locations [14]. Local residents were subsequently able to use this information to publicly challenge official police accounts of prostitution charges and convictions and leverage change in the way the policing of prostitution took place.

Digital Crime Maps and their (Dis)contents
Despite their popularity, and some early encouraging signs, the online release of digital crime maps has not passed without criticism. This criticism can be grouped according to 'pragmatic criticism', that is concerns about usability and efficacy for example, and 'cultural criticism', which reflects concerns about the aesthetics, social consequences and political utility of making digital crime maps public. From a pragmatic perspective a recent review in [6] argued that, to make crime maps a more effective risk communication tool for public engagement and empowerment, improvements are needed both in the content and precision of crime cartography employed as well as how this is tied to information about what people might do to minimize their risk of crime and engage with the police. The authors concluded that incorporating social media tools could offer one way to better enable dialogue and enhance the personal relevance of crime maps.

By contrast cultural critique notably focuses on the intrinsic aesthetic properties of digital crime maps and questions their political ends and purposes asking what the broader social consequences might be should they be successfully implemented. This critique starts from the observation that making digital crime maps public forms part of the broader social and political communication of risk and danger in modern life and its role in supporting a 'neo-liberalist' government agenda. In this view, visually locating the prevalence of crimes in certain areas actually cultivates an '*aesthetic of danger*' that attaches risk to visiting those locations and individualizes responsibility for crime prevention for those citizens who reside there [33].

The mechanisms of these critical observations may be best understood following Wardman's 'risk government' model [34] which draws on Foucault's concept of modern governmentality [5] to elaborate on the wider political purpose and constitutive dimensions of risk communication. In particular, the risk government model demarcates how everyday risk knowledge, information transfer, transparency, and disclosure are underpinned by neoliberal 'relations of power' through which technologies of calculation inculcate new forms of reflexivity, prudent discipline, responsibility and control amongst citizens. As applied to digital crime maps the risk government model draws analytical focus to how the rendering of community and neighborhood crime into a calculable quantity makes it available to new disciplinary forms of state power that recast the associations of risk, responsibility and control for crime. That is, digital crime maps employ gathering, analyzing and giving 'objective' visual form to geo-spatial data. However, the spatial representations produced are not neutral because they generate particular modes of knowing, acting and interacting that prefigure certain kinds of movement, define and locate specific features of territory and open them up to instrumental forms of perception, occupation and use [33].

The public release of digital crime maps, as an apparatus of the state, can thus draw people into the net of the criminal justice system because the visualisation of crime blurs the perceived boundaries of public responsibility for crime and disorder control. In short, knowing that certain crimes have occurred within a particular area, as seen on a digitized neighborhood map, makes an association of risk that might act to incentivize people within that area to do something about it, and so responsibility for managing crime control becomes distributed amongst a wider number of stakeholders including local community members [27].

This is seemingly exemplified by the San Francisco case above where the visualization of crimes led to community pressure on local police to alter their crime control tactics for example. However, it remains open to interpretation whether this would be considered truly empowering, in the sense of improving self-determination and agency through greater knowledge and the development of capabilities and proficiencies, or in fact merely represents an instrumental means through which governmental authorities can pass responsibility for crime control to citizens by alerting them to risks they might face. The cultural aesthetic of danger critique therefore suggests that, irrespective of their popular early reception, the associations of risk to locations made by digital crime maps do not offer a non-problematic empowering solution for addressing crime.

PROSPECTS FOR REVERSE ENGINEERING THE 'AESTHETIC OF DANGER'
The critical observations made of digital crime maps suggest that efforts to empower citizens against crime might nonetheless further inscribe upon CMC-R and its users an aesthetic of danger which uncritically privileges certain kinds of political values and effects. This raises difficult questions for designers and researchers about the co-option of CMC-R into ideological political projects and if it is both

desirable and inevitable. However, contemporary digital media's popular appeal is often its affordances for fluid interpretation, manipulation, simulation and subversion, not merely passive use consumption [26]. This indicates some important scope for designers and users to play a significant role in reflecting upon and questioning the values that underpin and shape CMC-R design and its effects.

Critical Design

Within the HCI community, recognition of the growing cultural significance of technology has led researchers to acknowledge the importance of adopting a contextualised understanding of technology design, use, experience and its consequences [37]. This follows growing concerns that the focus of much previous HCI work has been conservative and limiting because it is designed "*to help produce more effective and efficient machines and perpetuate the social status quo, not find a more effective context for life*"[19].

In a break from this 'traditionalist' trajectory, HCI work from a 'Critical Design' perspective is envisioned as a means for "*exposing and exploring alternative assumptions about key relationships in our field – the user, the design, interaction, the business or home context, and quality of life now and in the future*" [1]. Critical Design research therefore recognizes that technology is not neutral or value free, but has a social impact that is inscribed with the values of designers and bears the imprints of political and commercial objectives, ideologies and privileges. Following key early thinkers (e.g. [9]) interaction design researchers have thus aimed to illustrate and explore these implications and insights, often proposing or undertaking radical and provocative work, which challenges orthodoxies in order to better understand the impacts of technology [19].

Hacking and Culture Jamming

Drawing on perspectives in cultural studies, the activities of hacking and culture jamming [7] share similarities to the principles of Critical Design. Hacking can be construed as the opportunistic appropriation, and 'mashing', of code, design or electronics [13] and we partially focus our own work on that definition. However, in, for example, Jordan's analysis [17] of hacking and its cultural implications, attention can also be drawn to how hackers, though subject to their own cultural rules, codes and markers of quality, embody an explicit denial of technological and social determinism that opens up a space for political resistance and social change. For Jordan, breaking into systems, and transgressing laws and conventions reflect the pursuit of creativity, value, difference leading to the production of new knowledge and experiences.

Likewise, 'culture jamming' is also recognized as a dissident media activity that aims to destabilize and challenge the social order through the transgression of cultural norms, rather than presenting rational opposition or forceful argument [35]. However, unlike hacking, culture jamming primarily involves playing with the aesthetic and emotional modalities of a medium/message and its targets, turning normal expectations, images and emotions back in on themselves through acts of rhetorical sabotage. Warner [35] highlights how laughter elicited via parody is one of the most powerful means by which to draw people into political engagement. The presentation of provocative counter images within an established media format, such as broadcast news or viral advertising for example, can jolt the viewer into re-examining the dominant branding and messaging of elite political discourse.

The basis for our approach

Following principles of Critical Design, hacking and culture jamming, we thus sought to inquire how a crime map application might be developed which breaks with traditionalist imperatives for research, and design, that prefigures the CMC-R, technology, and users, in complicit support of political and commercial needs and values. In particular we were interested in exploring how such an application might be designed to expose, and draw into question, the role of CMC-R and digital technology in empowering users by cultivating an aesthetic of danger.

Whilst there is some clear conceptual coherence to the central premises and ideas of Critical Design there is no widely accepted theory or prescriptive methods for conducting Critical Design research in practice. Rather, researchers have tended to utilize insights drawn from a variety of critical and social theories and adopted a broad range of perspectives to inquire into the co-construction of technology design, user experience and society relations. The principles of Critical Design have also been articulated materially through attempts to configure technology and users in ways that might be variously considered 'human centered', '*spaceful*', '*oblique*', '*playful*', '*provocative*', and '*serendipitous*' [9]. In this way technology that is shaped by Critical Design can be seen to be underpinned by ethical considerations which uphold the agency of individuals to negotiate their relationship and conduct with technology rather than moralistic considerations that aim to impose certain requirements and restrictions which limit the latitude for interpretation and interaction [19].

Likewise a technique employed in culture jamming to similarly provoke interpretative reflection is the use of a 'Socratic' rather than a 'didactic' style of presentation whereby questions are asked of the 'audience' rather than making an explicit statement of intent concerning how something ought be understood and appraised. Culture jamming often makes use of parody to provide an added interpretative dimension to public appraisal of the object of concern. This is achieved by creating a tension between what is said, and how it is presented, that calls into question the substantive claims being made, rather than directly opposing them. Warner [35] argues that effective parodies provide a provocative counter image by playing on and often plagiarizing the aesthetics of a particular media, but in a way that is juxtaposed to the dominant brand or message.

This might include using the same format or approximate layout familiar to the user/viewer for example, so as to initially engender a sense of legitimacy and respectability, but which is then interfused with incongruous words and images that intentionally misuse the format.

The effective use of parody therefore requires the sharing of 'cultural capital' in the sense that one needs to 'know the rules' in order to break them and to recognize that they have been broken. This process can be aided [35] by presenting 'matter out of place', that is placing obviously incongruous things side by side, back to back, or out of time. This strategy does however involve walking a fine line between being provocative and simply sermonizing or moralizing. Culture jams thus aim to expose underlying politics, strategies or assumptions through stealthy disruption and ambiguity rather than through open hostility.

The remaining sections of this paper detail how we utilized principles of Critical Design, hacking and culture jamming, to realize the application Fearsquare, and how cogently the application operated as a modality of cultural critique and public reflection on CMC-R and digital crime maps.

FEARSQUARE

In this section we first briefly describe the Fearsquare application in functional terms from a user perspective. We then explain what, drawing on insights and techniques from 'critical design', 'hacking' and 'culture jamming' literatures respectively, makes the Fearsquare application necessarily 'critical' rather than merely an instrument of commercial and political value and how this figures in its design.

Fearsquare from a user perspective

Fearsquare is a web application which, first and foremost, incorporates social media functionality into the presentation of crime map data made available by the police.co.uk website. This is primarily achieved by cross-referencing the longitude and latitude of the ten most recent user "check-ins" to venues on the popular location sharing social network site "Foursquare" (retrieved with the Foursquare developer API) with street level crime statistics for those locations (retrieved from the police.co.uk developer API).

Once users have signed into the Fearsquare application, with their Foursquare account, details of the crime statistics associated with each check-in are presented in a simple visual format (see Figure 1). Users are then able to 'click through' to the police.co.uk website via a link from the Fearsquare application to examine the crime maps for those specific locations if they wish. The higher degree of personalization that the social media functionality of Fearsquare offers might therefore be considered in a certain sense as a 'hack', but one which offers a complementary service to both users of the police.co.uk website and of Foursquare, which had approval and so would be considered legitimate. In other words, Fearsquare augments and extends the services provided by Foursquare and Police.co.uk in an innovative way, creating a novel experience valued by both the original services and by users. The personalization of digital media is also considered as one means by which to empower users [23]. However, these were not the primary objectives, or the only way that Fearsquare might be interpreted.

Figure 1. Fearsquare shows recent crime data about each location that users have checked into.

Fearsquare as an implementation of Critical Design, hacking and culture jamming

Location-based social network sites such as Foursquare in particular have previously been subjected to openly hostile criticism over privacy and safety concerns (see for example pleaserobme.com); our aim was for a more subtle Socratic style of critique. Fearsquare purposely incorporated design elements that were clearly drawn from Foursquare and police.co.uk. However, there are also some clearly contrasting design elements and juxtapositions that work against the normative conventions of both Foursquare and police.co.uk. These are in part directly attributable to the Fearsquare application primarily functioning as a 'mash-up' of the two original data sources. That is, certain dynamics and trajectories were necessarily introduced which did not exist before as an inevitable consequence of providing an interactive interface between the two data sets.

In particular, by way of Foursquare check-ins, Fearsquare re-routes the police.co.uk data towards more mobile and fluid representations of crime prevalence that reflect day-to-day movement. Specifically, Fearsquare incorporates the same categories assigned by the police.co.uk site, but focuses only on those crimes against a person, that is the three crime categories of 'Anti-social Behaviour', 'Theft' and 'Violent Crime' rather than those that by their intrinsic nature could only take placed at a fixed location such as 'Burglaries' for example. In this way Fearsquare initially exposes crimes to scrutiny that are most associated with the routine and transient nature of mobile day-to-day movement not easily ascertained from the police.co.uk site.

Foursquare was considered to be an appropriate platform to utilize in this way because members already commonly employ it as a 'life-logging' tool to create a diary of their

everyday movement patterns and comment on locations to be shared with 'friends' [21]. As users are free to check-in to and publicize whichever location they might wish there is also no obligation to use the site in a particular way. This therefore affords agency to the user concerning how and when they would like to identify their movement and associated crime levels to others.

Most Dangerous People

Position	Name	🍺	🔪	🔫	FearPoints
1st	Arthur Nudge	96	25	25	9523
2nd	Luigi Vercotti	75	23	46	8734
3rd	Eric Praline	283	0	3	8510
4th	Spiny Norman	119	14	45	7784

Figure 2. Leaderboards implicitly challenge users to visit "dangerous" places.

Aside from this, and perhaps most notably, by using the provocative name "Fearsquare" the application is suggestive of a parody which contrasts directly with the sober way that crime data is presented by police.co.uk. and concerns about using locative media. The name Fearsquare is intentionally affect laden by mischievously transgressing across the norms of how the serious subject matter of crime is reported. Further provocation is built into the application by introducing a somewhat playful aesthetic orientation and sense of reward. This is achieved by incorporating the ludic qualities of Foursquare, such as points and leaderboards for check-ins, which can be shared and invite playful competition through comparisons with friends. This primarily operates through the contrivance of "fearpoints", which are awarded to "players" based on the frequency and severity of crimes committed at the locations they had visited, thus adding a gameful element [8] to to the non-game nature of crime data. The intention is to foster longer-term engagement and social sharing with users who may 'compete' via the leader board to see "who lives the most dangerous life".

As Fearsquare 'rewards' users with points for levels of danger (i.e. crime) in their life (i.e. crime incidents associated with their check-ins) the application thus allows for an inversion of the normal preferences that are associated with crime exposure. This incongruity in the associations that might typically be formed between danger, fear and reward is key to the consideration of Fearsquare as a parody, but whether this is something that is 'good' or not is left open to interpretation. However, because Fearsquare could hypothetically be interpreted indirectly as challenging users to visit places they perceive to be more dangerous in order to score more Fearpoints to climb the leader board, a degree of opaqueness intentionally surrounds how points are awarded to particular crimes and places relative to others. The awarding of points is also retrospective which limits the possibility for 'gaming' the application directly.

EVALUATION OF FEARSQUARE

We released Fearsquare (at Fearsquare.com) so that it was free to use by any interested person, in order that an 'in-the-wild' [25] evaluation of people's natural inclinations and dispositions towards the application could be undertaken. To raise awareness of Fearsquare the release of the application was publicized through the authors' private twitter accounts and through contacting popular technology news sites and blogs, many of which found the application interesting enough to feature in articles and commentaries. We also provided social network "widgets" on the Fearsquare site that enabled users to share opinions, start conversations and spread word of the service to others.

Data collection and analysis

To support our evaluation, data on the access and usage of the Fearsquare site was first recorded via the server activity logs between 31 March 2011 and 29 August 2012. Secondly, and more substantively, we logged Fearsquare related mentions on the micro-blogging social media site *Twitter* for the period beginning April 2011 and ending August 2011, as a useful way to sample and record general public sentiment towards the application at its release. This generated a corpus of 3,522 tweets containing the word "Fearsquare" which concurrently featured as a "top tweet" on Twitter. These data were filtered in order to remove a large number of simple re-tweets and tweets generated from widgets on news and blog articles. The data were further filtered to remove all tweets not in the English language, and any which directly involved the developers and researchers working on the project. A final data set of 589 unique user-generated tweets formed the basis for analysis.

An inductive thematic analysis was then conducted on the data set following the method in [16]. Specifically, 294 of the 589 tweets were read in-depth by one researcher, and category codes were initially identified. These codes were refined upon further reading producing 25 categories, which, together with a description and examples of each code, were given to two other researchers. Two further codes were identified by the other researchers and included in the final agreed coding scheme. All three researchers used this coding scheme to independently code the remaining 295 tweets that had not been used to generate the coding scheme. A consensus was reached on the majority of the tweets. The coding categories were then examined and cross-referenced with the data and further analyzed for overarching themes, which were identified and reviewed by all three researchers and refined by the lead researcher. A number of tweets (n = 8) were deemed too ambiguous to code. A further number (n = 17) were in languages other than English and not included.
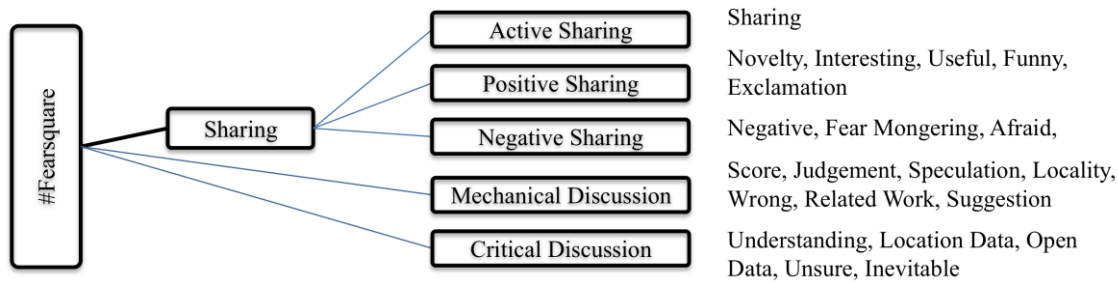
		Sharing
	Active Sharing	Novelty, Interesting, Useful, Funny, Exclamation
Sharing	Positive Sharing	
	Negative Sharing	Negative, Fear Mongering, Afraid,
#Fearsquare	Mechanical Discussion	Score, Judgement, Speculation, Locality, Wrong, Related Work, Suggestion
	Critical Discussion	Understanding, Location Data, Open Data, Unsure, Inevitable

Figure 3. Hierarchy of Themes and Categories used in inductive thematic analysis.

Interpretation of results

During the nine month study period, FearSquare received 24,290 unique visits; 2,371 Foursquare users logged into the application with their Foursquare details. Users accessed the site from 136 countries, which suggests that the application generated popular interest not just in the UK (n=4,420) but also internationally. In particular Fearsquare received a large number of unique visits from people in France (n=6,560), USA (n=4,163) and Brazil (n=2,340); this was despite the application only being fully functional in the UK where the open data crime maps were relevant. Of those that accessed the site a total of 2,371 users with valid Foursquare accounts logged into Fearsquare with 77.4% male, 20.4% female, and 2.23% undisclosed.

A broad range of reactions to Fearsquare were clearly observable in the corpus of tweets collected. Many tweets were positive about the prospect of engaging with government data through the novel visualisations provided by Fearsquare. Other tweets expressed concerns however over communicating risk through opening up government crime data and personalizing it in this way. Yet others still posted genuinely thought-provoking and insightful comments about Fearsquare. To gain a more rigorous insight into this data an inductive analysis of the corpus of tweets collected was undertaken through which three main themes were identified. These themes, shown in Figure 3, were assigned the labels 'Sharing' (n tweets=210), 'Mechanical Discussion' (n tweets =32), and 'Critical Discussion' (n tweets=28). The themes are expanded upon below; where tweets are employed to illustrate a theme, the original spelling and grammar is retained whilst usernames have been removed.

Theme 1: Sharing

The first theme, Sharing, contained three distinct sub-themes termed Active Sharing, Positive Sharing, and Negative Sharing. This theme describes more tweets than the other two themes combined. Tweets included in this category involve participants simply sharing the existence of Fearsquare and making exclamations, or comments regarding liking or disliking the application. It is particularly interesting that so many tweets fall into this category, since the filtering process specifically involved

the removal of a large number (2,000+) of tweets that simply shared either the project URL, or one of the many blog posts that people wrote about the application. While the very fact of sharing provides some indication that users found Fearsquare interesting or useful, or that they thought their followers would find it of interest without necessarily endorsing it, simple sharing of tweets without additional comment does not necessarily allow us to understand further their views or experience of the application. The following sections discuss the public appraisal of Fearsquare as identified in more detail through sub-themes.

Subtheme 1: Active Sharing

Over one third of all tweets analysed (n=118) fell into the sub-theme of Active sharing which describes tweets that contained some identifiably user-generated content that went beyond simply a link to the project URL, or a related blog URL, but was neither obviously positive nor negative, and did not describe the project in any great detail. For example: *"First there was Foursquare, now, Fearsquare"*, *"Foursquare + crime = Fearsquare"*, *"Read this tweeps!"* and *"What does everyone think of Fearsquare?"*. As with simple retweets it might be assumed that the act of sharing in itself is an indication of interest or engagement with the project, but it is difficult to discern anything beyond this.

Subtheme 2: Positive Sharing

This category describes tweets (n=63) that shared links to, or information about, Fearsquare in an overtly or explicitly positive manner. Many of these tweets emphasized the novelty, creativity and fun of the application: *"Now here's a creative use of the @foursquare API: identifying dangerous check-in locations"*, *"Brilliant idea!"*, *"This looks pretty cool"*, *"Genius"*, and *"Brilliant fun! How ghetto are your fave spots"*. Tweets in this category emphasize approval of the concept of Fearsquare regardless of whether they had used the application or just read about it: *"This looks pretty cool……I don't have a foursquare account to check it out tho"*. A number of posters specifically mentioned that they found the application interesting: *"Fearsquare - interesting mass participation study into perception of crime"*, *"Way more interesting than Foursquare"*, *"Lateral use of two location data sets - very interesting"*. On face value, these tweets imply a positive reaction on the part of users, but it

is difficult to understand more fully what particular aspects users liked or found interesting. However, a small group of tweets did focus on the potential usefulness: *"Just when I thought #foursquare was annoying, this might prove useful"*, *"fearquare looks like a useful service"*, *"great 4 #olympics"* and *"Well that actually sounds useful"*. These posters were clearly positive about the utility that the application promises with respect to the opportunity to see crime statistics for the places that they commonly visited. Indeed, one tweeter commented: *"Fearsquare just makes me want an app that maps me a "path of least robberies" for walking home at 2 a.m"*. This suggests that some people do find the development of crime safety applications to be useful at face value without seemingly paying due concern to any potential undesirable consequences. A number of people also posted tweets that specifically identified the humorous aspect of the application: *"I wonder if the criminals get badges too :-)"*, *"Check in and never check out, brit humor at his best"*, *"LOL can't wait to use it"* and *"Brian became mayor of the Compton Meth Lab"*. These tweets suggest that some users noticed elements of the humour and parody that were employed in the design.

Subtheme 3: Negative Sharing

A group of tweets (n=29) expressed a generally negative sentiment towards Fearsquare: *"Its called Fearsquare, not a nice name"*, *"'Fearsquare' doesn't really create a helpful impression"*, *"lets see that death and carnage on our streets. Sheesh"*, *"Fearsquare? "Sounds more like a social media horror movie to me..."*, *"Do we really need this?"*, and *"Has it really come to this?"*. Similar to the tweets in which users described the project as interesting, it is difficult to discern what aspects of the application these participants specifically objected to. However, some tweets were more specific. For example, some negative tweets explicitly expressed reservations about the effects of seeing the crime data provided by the application: *"If I was using Fearsquare, I don't think I'd go anywhere"*, *"I don't think I want to know"*, *"I was afeared of this"*, *"Maybe I'll stay in tonight"* and *"think i'd rather forgo how many crimes have taken place where i check in"*. These tweets validate concerns over the potential for "safety" applications built on open government data to essentially increase users' fear of crime. Indeed, another group of tweets criticize Fearsquare for doing exactly that: *"More fuel for paranoia"*, *"Just to make you more paranoid here's Fearsquare"*, *"Is aptly named Fearsquare the start of a darker, antisocial media?"*, *"Infusing a daily dose of fear into your social media"*, *"Go fear culture, go!"*, *"Another possibility to waiste your life being scared"* and *"This.....makes me an anthropophobe"*. The observations and fears expressed here indicate clear concerns held by some over 'irresponsible' application development and potential downsides to making government crime data public.

Theme 2: Mechanical Discussion

Tweets understood as 'mechanical' (n=32) discuss features of the application, how it works, and personal experience of using it. A number of users simply shared their score with their twitter followers: *"I just scored 868 FearPoints"*, *"I scored 2682 fear points on Fearsquare :/"*, and *"Hey, I scored 2303 FearPoints!"*. The sharing of that score suggests that users at least found the application and its scoring system engaging or informative. In other tweets people infer judgment on their own lives from their experience of using Foursquare: *"I should check-in in less scary places!"*, *"Ah thanks, most dangerous place I've checked in is... my house"*, *"According to Fearsquare, there have been 2 violent crimes at [blanked for anonymity]"*, *"According to Fearsquare.com, the most dangerous place I've been is [blanked] in London"*, *"Oh dear. I scored 1416 FearPoints on..... All future social engagements are now cancelled"*. These tweets suggest that participants attained a new perspective or some deeper understanding of the crime statistics through the use of Fearsquare. Interestingly, a number of people also speculated over what they would learn from using Fearsquare were it to be available in their own locality: *"Wonder how this'll work in HK"*, *"System will EXPLODE in the Phils"*, *"Glad I don't "check-in" often in Wilmington. Potentially depressing..."*, and *"the stats will prob b off the charts in South Africa if we get it HAHA!"*. Another group of tweets more explicitly expressed the wish to have use of the application: *"Wish they had this in the US!"*, *"wish I was across the pond to try it!"*, *"U.S. NEEDS this for the safety of all you geo-locating fiends"*, *"UK based only"* and *"its UK only"*. These tweets focus on the desirability of the application beyond its use in the UK.

Theme 3: Critical Discussion

This theme describes tweets (n=28) that either discuss how Fearsquare has facilitated wider reflection or prompted introspection about crime, including issues and concerns about open government data and location based services. For instance: *"Been thinking about the unintended consequences of crime stats lately. Fearsquare is a brilliant project about that"*, *"Glad I'm not living in neighbourhood with lot of reported criminal acts according to #Fearsquare, and have to apply for a job"*, and *"Despite the name, #Fearsquare emphasizes the rarity of crime"*. Some tweets specifically reflected on the type of data made available through the crime API, suggesting that the very release of this data demonstrates a discriminatory bias against lower classes: *"Nice service would #Fearsquare be, when it made public 'white collar' crime -> discriminating, only visualising 'street crime'"*, and *"Ethical question about #Fearsquare - certain crimes are made public via awesome apps, a lot of crimes stay hidden"*. Other tweets expressed critical reflection on the provision and use of location based services suggesting that foursquare in itself is potentially problematic: *"While I never get it why unrelated others need to know where we are, this one's interesting"*, *"if this*

get more popular, i can see crime stats including GPS and social media in their reports. ARGHHH!", and *"Ironic really with checkins publicising your absence"*. Some tweets further demonstrate unease at the aims of Fearsquare and uncertainty over its value or contribution: *"Not sure this is the best example for open data, but it's amazing what public data allow"*, *"Tool or Terror? #BeingAware"*, *"uh WOW. Just wow"*, *"Cool but scary"*, *"Creepy but good"*, *"Hhmm... *thinking of signing up* »»"*, *"Haha! Wait...creepy"*, and *"not sure the British Crime Survey people will like the title"*. This evidently demonstrates that the application has provoked some critical reflection for some users on the use of open crime data in this way.

DISCUSSION

Two emerging digital initiatives: (i) the growing momentum behind the release of government open data, and (ii) the increasing adeptness of developers at exploiting technologies to personalize CMC-R tailored to people's environments and interests, provided us with an important opportunity for critical inquiry and timely reflection on the public reception and appraisal of CMC-R as an instrumental political tool. Our study calls to attention the need to evaluate, and critically reflect upon, aspects of the social and political imperatives and consequences of interaction design, experience and public appraisal more generally.

Reflection on international public engagement with Fearsquare, and qualitative analysis of related discussion on Twitter, highlighted the dominant narrative of users sharing the idea of the application to their followers. Further, many people who tweeted seemingly had not yet used the application, but had clearly formed an impression of Fearsquare from what they had read on news articles and blog posts or viewing the application via the website. This appears to be a growing trend as researchers release digital applications, featuring deliberately provocative design, for general public use and appraisal (see [32]). This is also, perhaps, in part a reflection of the common form and function of the medium of Twitter as a broadcast tool. One simple interpretation might then be that this merely illustrates the popularity of using risk and fear as contextual frames in order to gain the attention of networked publics, and thereby further cultivate a generalized state of fear and anxiety [4]. If interpreted in this way the use of risk and fear might attach stigma or reinforce stereotypes of people and places by acting to strip out the further social context, as has been suggested of crime maps. Conversely, however, one particular attraction of Fearsquare was the apparent utility that it provided to users through personalizing interaction with crime data. Rather than stripping context away from crime, as is typical of crime map visualizations, which can act to reinforce stereotypes of people and places, Fearsquare infused crime maps with the rich personal context of biography based on the places where people had already visited.

More importantly, Fearsquare was successful in engaging users for a variety of reasons, including, humour and novelty as well as provoking reflection on important societal issues regarding ethical, social and psychological questions underlying interaction with technology and open government data. Our observations of tweets of this, more critically engaged, nature demonstrated that some users were prompted to think and reflect more deeply and concertedly about the wider issues resulting from use of Fearsquare, digital crime maps and CMC-R. We believe that the incorporation of Critical Design, hacking and culture jamming in the design was helpful to people in enabling them to form these associations.

CONCLUSION

We conclude that our experience with Fearsquare clearly indicates that it is important for designers to recognize that whilst CMC-R design must necessarily embody certain assumptions about the causes of threat and harm and about the ability of those whom might be exposed to their consequences to do something about it, that the uses and impacts of CMC-R are highly contingent, strongly shaped by the aesthetic dispositions and context in which it is embedded. This study illustrates the growing complexity of CMC-R for designers, in the face of new tools and practices and the fluidity of interaction design and its interpretation by users, and how they might have to balance oppositional tendencies and tensions which emerge between competing aesthetic and political preferences. This observation highlights the need to further consider in what way CMC-R is assumed to be truly empowering and the role of interaction design in opening up, or closing down, opportunities for critical engagement about risk.

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