1 *Article*

2 # Care, indifference and anxiety – attitudes toward
3 # location data in everyday life

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10 **Abstract:** Modern mobile devices are replete advanced sensors that expand the array of possible
11 methods of locating users. This is often viewed in a positive light, as a tool to gather and use
12 spatial information, but it also brings with it the problem of "geosurveillance" in which the
13 "Location" becomes a product in itself. In the realm of software developers, this has been reduced
14 and discretized to a set of coordinates, devoid of human experiences and meanings. To function in
15 such digitally augmented realities, people need to adopt specific attitudes, often accompanied
16 with anxiety. We explored attitudes toward locational data collection practices using
17 questionnaire surveys (n=280) from Poznan and Edinburgh. The prevailing attitude is neutral with
18 a strong undertone of resignation, in which surrendering personal locational information is
19 viewed as a digital currency. A smaller number of people had stronger, emotional views, either
20 very positive or very negative, based on uncritical technological enthusiasm or fear of privacy
21 violation. Such a wide spectrum of attitudes is not only produced by interaction with technology
22 but can also be viewed as a result of different perceptions and values associated with space and
23 place itself.

24 **Keywords:** location-based services; geosurveillance; social media; location data; geoprivacy;
25 attitude; geolocation; geotagging

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1. Introduction

28   In a relatively short span of time location data have become an important part of our everyday
29 life. Advances in information and communication technologies (ICT) have introduced the
30 possibility of identifying one's position with almost pin-point accuracy with a simple mobile app. A
31 large part of the world's population have a high precision localization instrument with them almost
32 at all times – a smartphone or a similar mobile device. These devices are saturated with sensors that
33 expand the array of possible methods of locating users: from the obvious GPS chipset, to the much
34 more refined and sophisticated analysis of battery usage (see for a more in-depth discussion of this
35 topic). While these technologies are often perceived positively, as a tool to gather spatial
36 information and promote spatial knowledge [1,2], it is also clear that, simultaneously, they evoke
37 the specter of surveillance, which in this particular incarnation has been dubbed "geosurveillance"
38 [3,4]. As individuals we produce a constant stream of information that can be used to observe and
39 predict our spatial behavior. People have become human sensors [1] but often without their consent
40 or knowledge. We've become our own data brokers and we need to decide each and every time if
41 we wish to allow another shiny new mobile app to gather intimate data about our movement. It can
42 be assumed that the decision as to whether to permit "Access to information about location" for a
43 given piece of software is worth the price of privacy is beyond the technical knowledge or interest
44 of most users. The issue of privacy is increasingly complicated since it has become a network

45   phenomenon [5]. More often than not, users decide to give the permissions they are asked for [6]
46   and in doing so they are transformed into willing cogs in the geosurveillance machine [7]. The
47   incentives to opt-out, to boycott, to remove ourselves from this mechanism are very few and the
48   frequent examples of data-leaks and shadowy practices of giants such as Uber and Facebook [8,9]
49   strengthen the myth that in the world of big data everything is already in a database somewhere. At
50   the same time as users produce (or rather just provide) data, they also consume part of the stream
51   of geospatial information to fuel and inform they quotidian activities through location based
52   services (LBS) – which provide "geographically-oriented data and information services to users
53   across mobile telecommunication networks" [10]. Services that use location data in a variety of
54   applications are extremely popular among all mobile phone users [11] and sparked a wide interest
55   in the research community [12]. This technology is perceived as pleasurable [13] or even more
56   seriously as an immanent part of social life [14]. Users are increasingly aware that they live in an
57   omnopticon [15,16], but they do not want to change their behavior [17] – although some mechanism
58   to change this situation has been proposed – see [18].

59   As Thatcher [13] accurately notes, "Location" has become a product in itself, something that
60   can be stored and exchanged [19]. In the realm of apps and software developers, it has been more
61   than often reduced and discretized to a set of coordinates, devoid of the experiences and meanings
62   associated with the space and places of daily life. Such an understood location can be linked to
63   unique personal identifiers and then in this quantified state used as a basis for various services such
64   as navigation, mobile commerce, entertainment or social media. In this form, location is much more
65   susceptible to algorithmic sorting and processing. With this simplification, developers may avoid
66   problems with the digital representation of the world that have been the subject of critical
67   cartography and critical GIS inquiry in the fields of digital and internet mapping [20–27].

68   Location has become a valuable commodity that is sought after by large corporations as a
69   powerful tool for shaping consumptive behavior [28] – as the recent example of the acquisition by
70   Snap Inc. of "Placed" has shown [29]. This process reduces and redacts the world as it is seen by
71   force of capital. Experiences are homogenized and outliers removed. What is left are big sets of
72   spatial data with their own sets of problems that generate a large body of critical literature.

73   By allowing their location and associated experiences to become data points in privately
74   owned software systems such as Yelp or Tinder, people subject themselves to "data colonialism"
75   [30]. These colonial practices are aimed at the commodification of location data – a new area for
76   investment, ready to create value through the basic capitalist process of accumulation by
77   dispossession. This process is almost natural to the user and clicking "Yes" on an End User License
78   Agreement (EULA) without reading it is a common behavior [31] - the eventual benefits of
79   boycotting by choosing "No" are minimal for a single person and the possible negative
80   consequences are perceived to be much worse, with anxieties driven by Fear of Missing Out
81   (FoMO) [32].

82   We consciously or unconsciously take part in the location-based culture that can be seen as
83   "the ultimate materialization of Foucault's [33] theories of subjection" [7]. We allow the creation of
84   the big spatial datasets that are the result of the big "data grab" [34] for a multitude of reasons,
85   seemingly without much thought and hesitation and even when users are not visibly compensated
86   for relinquishing their location privacy [35]. Behavior like this is consistent with the way software
87   functions are perceived – they hide from our conscious thoughts, retreating into the background
88   hum of the ever-present technology and become visible only in its brief moments of failure [36,37].
89   Only when the purpose-oriented nature of the algorithms is exposed do users see this as something
90   bad [38]. And there is no doubt that these digital technologies are increasingly permeating our
91   everyday lives. As people living in spaces constantly augmented by whole array of new
92   technologies we create and adopt strategies to cope with the ever-changing world. Location-based
93   services and location data production and consumption in general can be seen as one of such
94   technology.

95   We assume in the paper that strategies for dealing with the intrusion or introduction of new
96   technology are based on individual attitudes. In our research, we use the term "attitude" as one of

97   our main vehicles of explanation. Although it has been defined and re-defined a myriad times we
98   have opted to use one of the three classical component definitions [39] (p.6). We, therefore,
99   understood attitudes as "…enduring systems of positive or negative evaluations, emotional feelings
100   and pro or con actions tendencies with respect to social objects" [40] (p.139). Such defined attitudes
101   can in our view be used to describe the complex ways in which people perceive, feel about and use
102   location-based technologies. People's feelings toward the gathering of location data have been
103   described before, for example by Crawford [41] as 'surveillant anxiety' and by Leszczynski [42] as
104   'anxieties of control' - we discuss those propositions in the light of our results. The main aim of our
105   research is to further explore and expand the arsenal of human attitudes toward location data
106   collection and production. We see these attitudes as signs of location-based culture. Specifically, we
107   seek answers for the following research questions:

- RQ1: How much knowledge about location-based services and technologies do ordinary people have or rather think they have?
- RQ2: What is the main sentiment about the location data grab?
- RQ3: What are the attitudes that people adopt to cope with the pervasiveness of location-based technology?

2. Materials and Methods

114   The research was carried out according to a geographical and sociological theoretical model
115   [43–45]. On this basis, we constructed an off-line questionnaire survey with 16 detailed research
116   questions and 5 metrics questions (see link to the Supplementary material 1 at the end of the paper).
117   The survey consisted of three kinds of questions, different in both form and content:

- **Open** – familiarity with own mobile device, visual identification of activities associated with smartphone use, definitions of LBS and augmented reality (AR) and reflections on the digital divide;
- **Multiple choice** – LBS and AR use in everyday life;
- **Single choice** – filter or contingency questions that separated people with different experiences.

124   We gathered 278 responses from among sociology and geography (including geoinformatics)
125   students at Adam Mickiewicz University in Poznan and the School of Social and Political Science,
126   University of Edinburgh. This consisted of 30–35% Polish geography students and 60–65% Polish
127   sociology students and approximately 30% for both groups at the University of Edinburgh. In the
128   sample as a whole, there was an over-representation of sociology students (71.5%), women (70.1%)
129   and respondents from Poland (78.9%). It must be noted that our survey was designed to gather
130   information about the diversity of characteristics among the population and as such it was a
131   qualitative survey [46]. Therefore, representativeness was not our main aim for our sample
132   population – we rather opted for as many responses as possible. A student population is obviously
133   biased in some characteristics but at the same time, they provide us with a glimpse into the
134   everyday life and habits of a casual technology user. By splitting the survey between geography
135   and sociology students, we wanted to capture both more technologically oriented and socially
136   involved individuals.

137   In the next step, we grouped responses according to three dimensions, defined as follows:

- **Knowledge** – everyday use of LBS and knowledge of the possibilities of use and the underlying technology;
- **Emotions** – emotional attitude toward LBS and technology in general;
- **Reflection** – reflection about the societal implications of LBS and technology in general.

142   Each response was then evaluated in each dimension according to the criteria detailed in Table
143   1. For Knowledge and Emotion we used three levels (Y,0,N) and Reflection was treated as a binary
144   (Y,N), which gave us 18 possible outcomes. We also added the possibility of N/A code for each
145   dimension, when it was impossible to determine the level – this happened when responses to a
146   given set of questions were impossible to decipher, incomplete, or entirely missing. This increased
147   the number of possible types to 48.

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150   **Table 1.** Detailed coding criteria in three dimensions adopted in the study.

Dimension	Coding criteria	Levels and interpretation		
		Y	0	N
Knowledge	usage and knowledge about: geotagging/geolocation, AR and GPS; awareness of pervasiveness of LBS; effortless use of technical terminology	effortless use of technology and extensive knowledge	effortless use without knowledge or extensive knowledge with limited use	mechanical use of technology and lack of understanding
Emotions	conscious permission or refusal to give away personal location; attitude and sentiment in open questions – e.g., "useful" vs. "invigilation" and "practical" vs. "lacking privacy"	enthusiastic adoption of technology; technology perceived as having only positive influence; give permission for disclosing location	neutral emotional attitude – give habitual permission for disclosing location	negative attitude, anxiety, concerns about privacy; refuse location disclosure
Reflection	unique perception of digital divide; unique language used in describing photos; views on digital/material boundary; articulated individual views on technology	either positive or negative critical reflection	N/A	lack of reflection

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152   **3. Results**

153   Our coding scheme allowed for 48 possible attitude types – including those formed by N/A
154   codes. Of these, 22 were identified in the survey results and a further 4 were excluded from the
155   analysis because they were represented by only a single occurrence. This gave us 18 attitude types
156   (Table 2) – which covers all possible options without N/A. It can be seen that in general positive and
157   neutral attitudes toward LBS are dominant (Figure 1), with the three most frequent types that
158   constitute almost half (48.6) of all types being marked as positive in the emotional dimension. It is
159   worth noting that the same types have a very low level of knowledge of the technological workings
160   and mechanism of location based services (LBS) and the data grabbing practices. This also
161   corresponds with the lack of reflection (Figure 2). The majority of the answers from people
162   belonging to this group paint a picture of technology being perceived as an almost invisible part of
163   everyday life. No second thought is given to the possible negative consequences and dangers of
164   disclosing one's location. What can be seen as surprising is the fact that the most frequent attitude
165   type that has a negative emotional attitude is also very similar regarding its lack of reflection
166   (Figure RN). Those people fear LBS, but this has nothing to do with any kind of deeper
167   understanding or a higher level of knowledge. When we compare people that show a high amount
168   of reflection (Figure 3) with those that do not (Figure 2), it seems that to possess reflection one must
169   also have at least some degree of knowledge. There is a strong positive and statistically significant
170   correlation between knowledge and reflection. Deeper reflection cannot, however, be associated

171   with negative emotions. Those with the most polarized views on the subject of LBS were almost
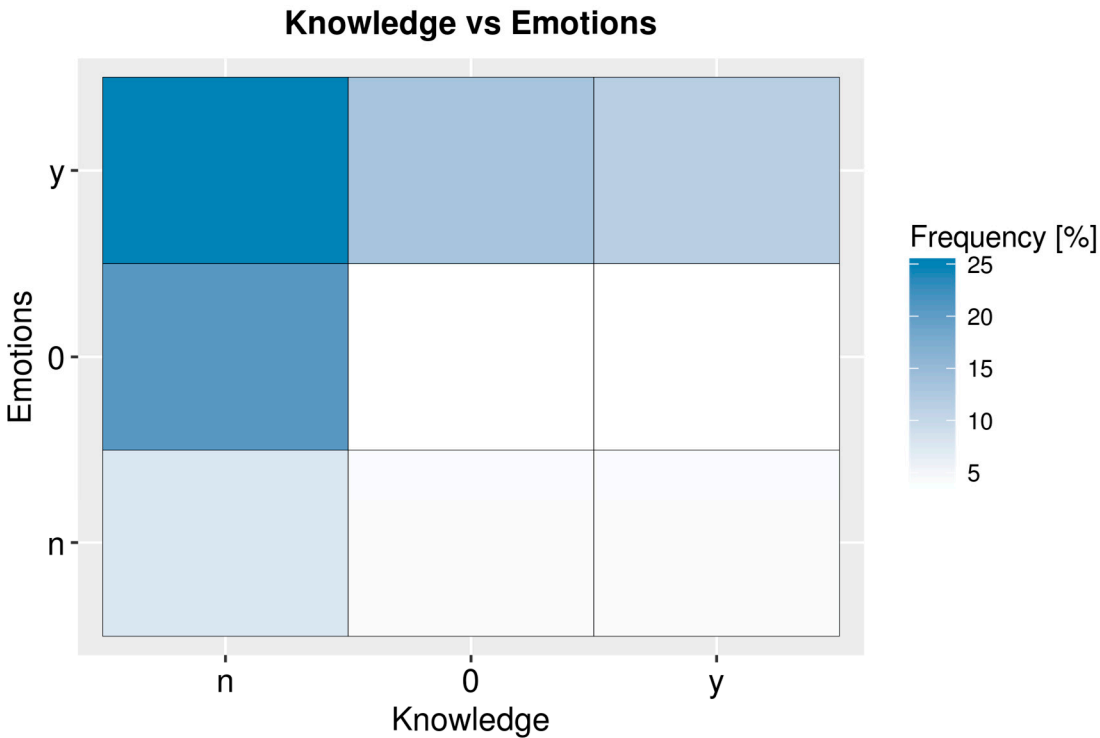172   equally distributed between positive and negative attitudes.
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175   **Figure 1.** Frequency of responses compared between Knowledge and Emotions dimensions – all
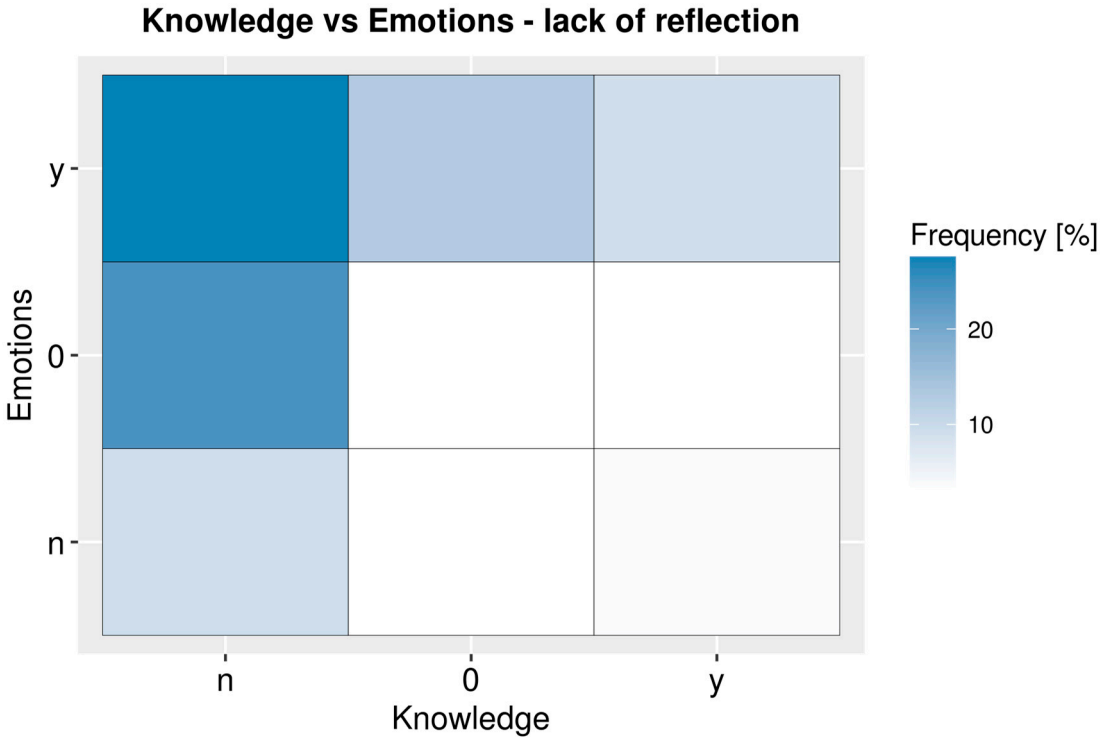176   users.

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178   **Figure 2.** Frequency of responses compared between Knowledge and Emotions dimensions – users
179   without Reflection (N).

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Figure 3. Frequency of responses compared between Knowledge and Emotions dimensions – users with Reflection (Y).
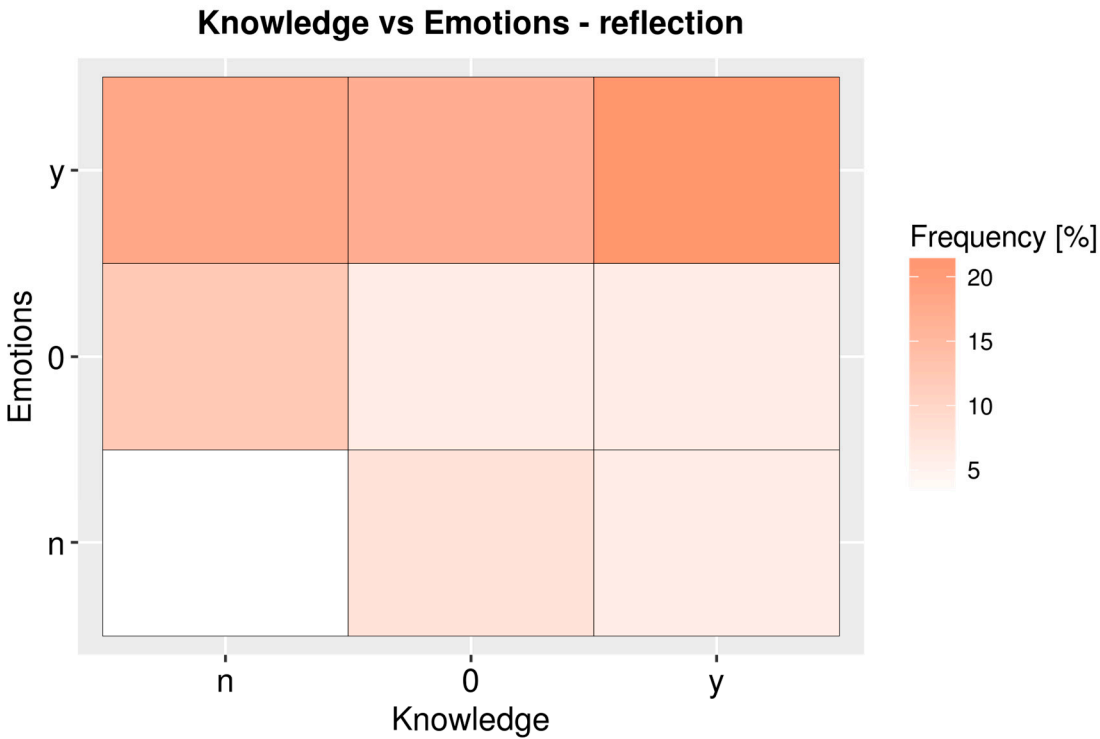
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182   **Figure 3.** Frequency of responses compared between Knowledge and Emotions dimensions – users
183   with Reflection (Y).

184   **Table 2.** Attitude types used in the analysis.

Knowledge	Emotions	Reflection	Frequency [%]	Cum. sum [%]
N	Y	N	20.7	20.7
N	0	N	18.2	38.9
0	Y	N	9.6	48.6
N	N	N	7.1	55.7
Y	Y	N	7.1	62.9
Y	Y	Y	5.4	68.2
N	Y	Y	4.3	72.5
0	Y	Y	3.9	76.4
N	0	Y	2.9	79.3
Y	N	N	2.9	82.1
0	0	N	2.5	84.6
0	N	N	2.5	87.1
Y	0	N	2.5	89.6
0	N	Y	1.8	91.4
0	0	Y	1.4	92.9
Y	0	Y	1.4	94.3
Y	N	Y	1.4	95.7

N	N	Y	1.1	96.8
all other types – single occurrence or not present				

Our next step was to aggregate attitude types into more general themes that could more clearly describe tendencies seen in our data. Our procedure resulted in 5 themes that were characterized by common similarities and differences between the types that we used to form them. The main two axes that separate our themes are position in respect to knowledge and emotion dimensions and the amount of geolocated content that is being produced by people belonging to a given group. Our aim was to construct themes that would cover as many potential attitudes as possible. We did not use any weights that were dependent on type frequency. This would also not have been practical because of the nature of the data we had gathered – qualitj survey design prohibits this and the sample was not representative. The resulting themes can be described as follows:

- **POP-UTILITY** (Figure 4) – this theme describes attitudes that are positive and enthusiastic toward LBS. People belonging to attitudes types that form this theme have very little general technological knowledge and know almost nothing about the role of location in mobile services or of the data grab phenomenon. They do not care about the consequences or dangers of sharing personal location. In their view, technology brings only advancement and utility and they do not see reasons to reflect on the subject. Opinions expressed are stereotypical – e.g., associating digital exclusion with older and poor people. They happily use and frequently produce geolocated social media content whenever possible.
- **PROGRAMMABILITY** (Figure 5) – this theme is dominated by a neutral emotional attitude. Similar to Pop-utility, people in this group do not fear the consequences of disclosing location but at the same time they much more rarely feel the need to use this possibility. They perceive LBS as just another technological innovation that they have at their disposal – a tool not a toy. They do not play with geolocated content in social media. If they use LBS it is for a very specific, down-to-earth purpose, e.g. navigation. They do not reflect on the role of location data grab and they possess very little knowledge about technology. Not surprisingly, they almost never consciously produce geolocated content.
- **HEART & MIND** (Figure 6) – in this theme we grouped people that show a positive emotional attitude but also possess a much higher level of knowledge than is the case in the previous two themes. They also much more often reflect on the role of location-based services in the society. This reflection can be described as cautiously optimistic with location technology being perceived as problematic but rather promising. This point of view does not lead them, however, to participate in geolocated content production.
- **AGENCY** (Figure 7) – in this case, the production of content forms the main axis around which this theme is created. People in this theme have a predominantly positive emotional attitude and a mixed but mainly high level of knowledge. They have a good understanding of the mechanism of location-based services and use them for their own specific purposes. This theme is markedly different from Programmability because there is an emotional aspect involved in the equation – the connection with LBS. These services and applications perform a very important role in the quotidian activities of these people. They have the knowledge to use LBS for their own goals and they feel that they have everything under control. Reflection is present, although not in all attitude types that form this theme, and it is not associated with a particular emotional attitude.
- **PRIVACY** (Figure 88) – this theme is drastically different from the other four, because it consists solely of attitudes that are emotionally negative toward LBS (Figure X8). People in this theme do not consciously produce geolocated media content and they actively opt out from services that allow or require personal location sharing. Their also fear what can be done with data they unwillingly provide. This anxiety is mainly associated with the lack of knowledge about the technical workings of location services and the business practices of

235   their creators and providers. However, in this theme we also find people that do have
236   moderate or even advanced technical knowledge. People that use geolocation APIs
237   (Application Programming Interfaces - such as Google Maps API) in their everyday life and
238   have firsthand experience with GIS (Geographic Information Systems) can also belong in
239   this group. If they have a negative attitude, it is motivated by their experiences with data
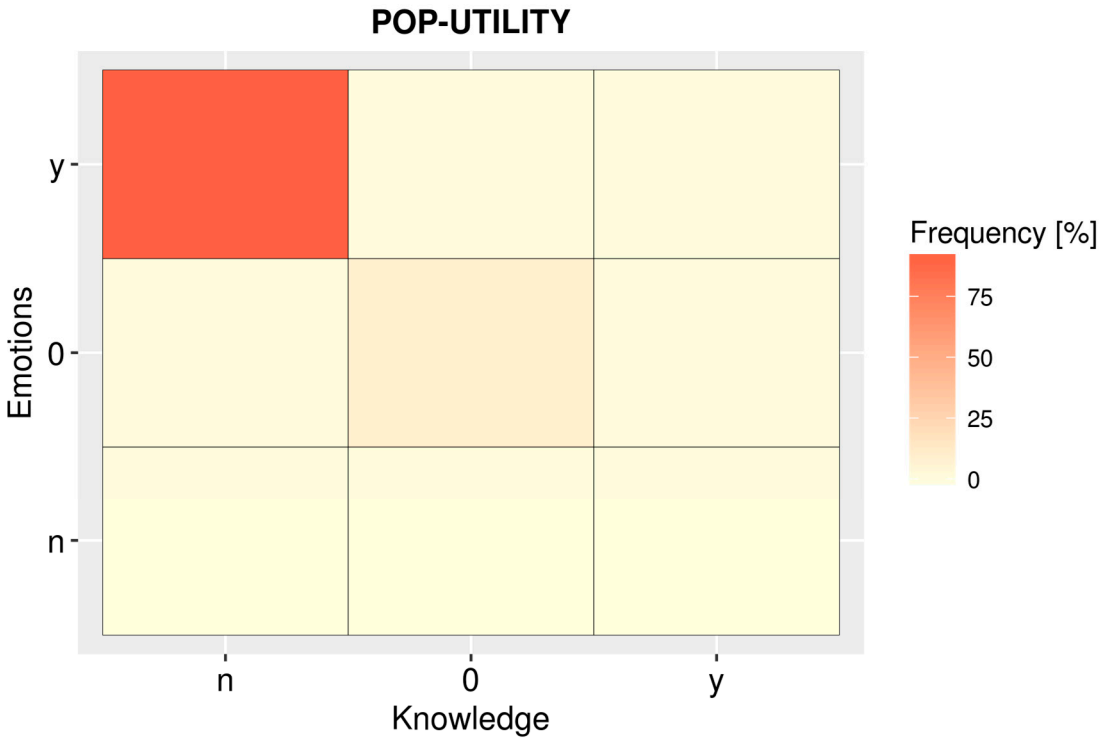240   grab practices.
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245   **Figure 4.** Frequency of responses compared between Knowledge and Emotions dimensions – Pop-
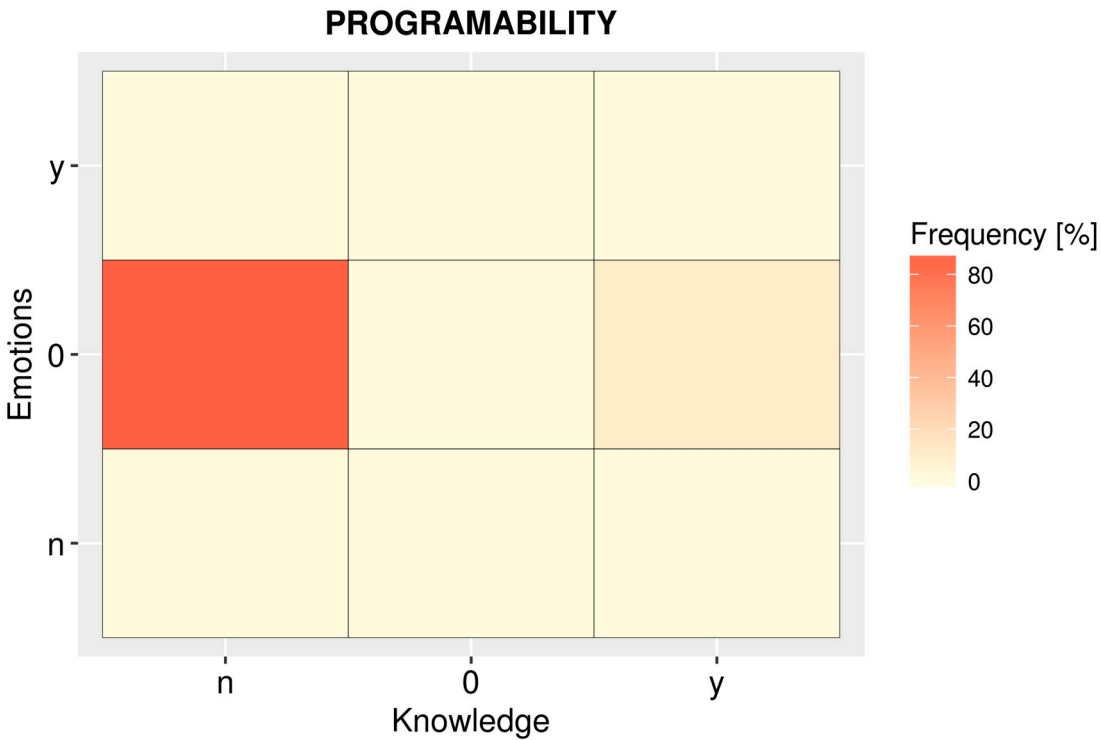246   utility theme.

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Figure 5. Frequency of responses compared between Knowledge and Emotions dimensions – Programmability theme
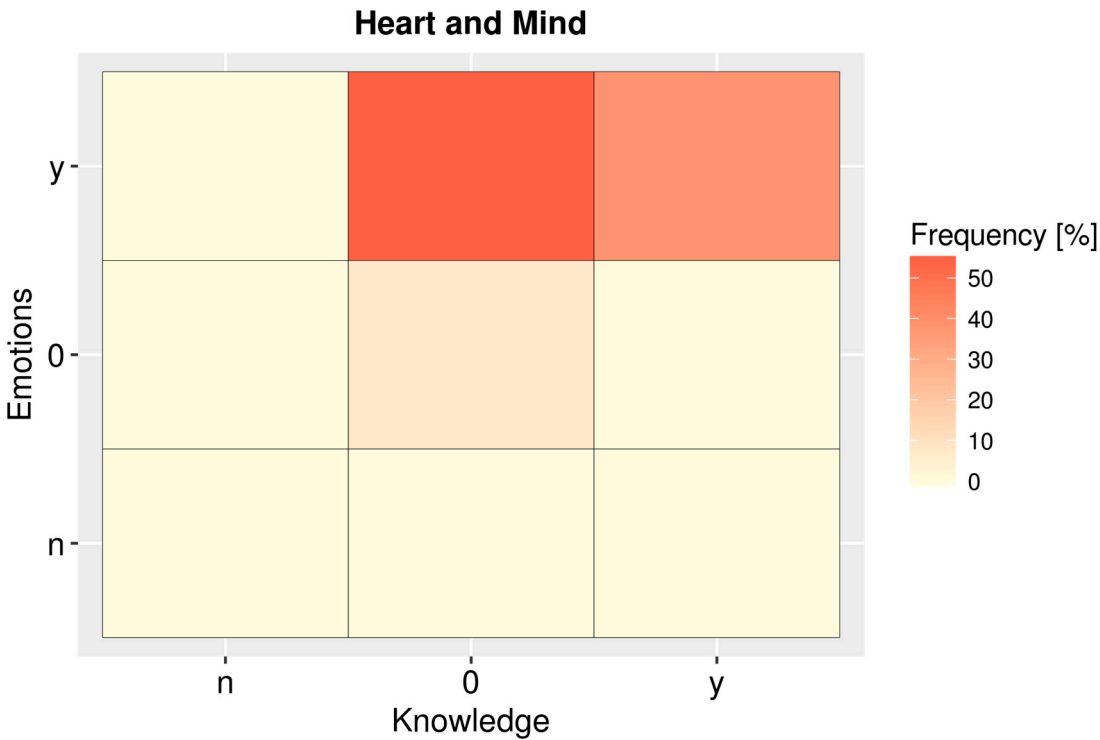

Figure 6. Frequency of responses compared between Knowledge and Emotions dimensions – Heart and Mind theme.
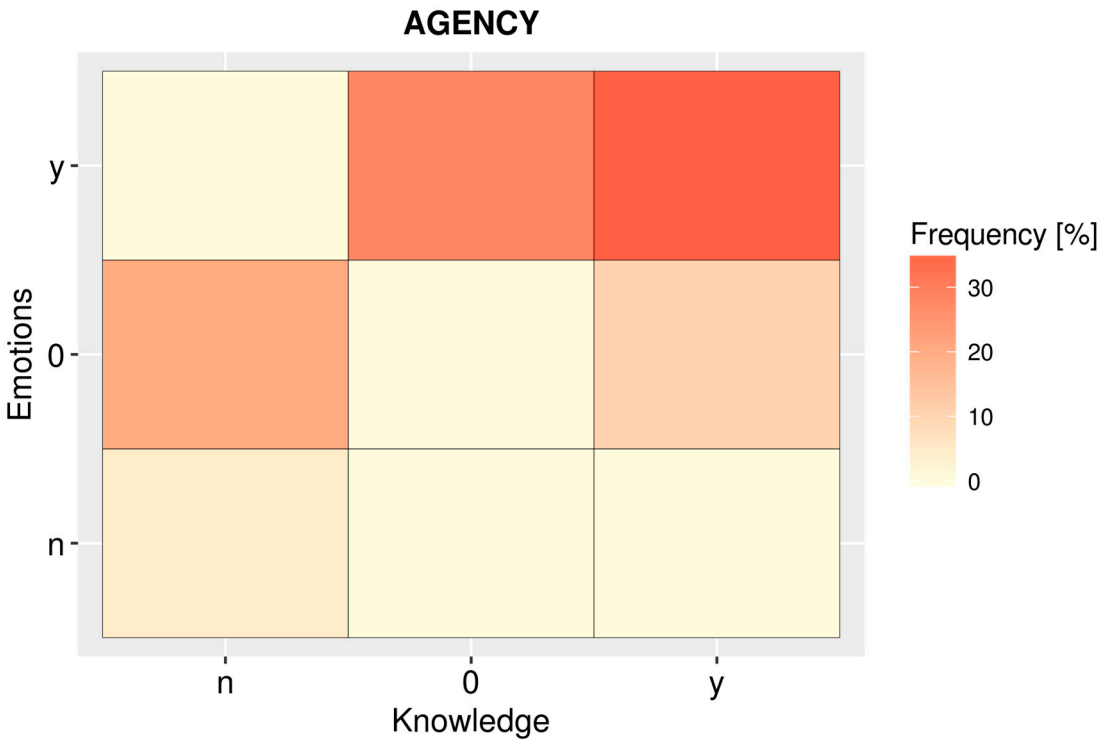
AGENCY

255   **Figure 7.** Frequency of responses compared between Knowledge and Emotions dimensions –
256   Agency theme.
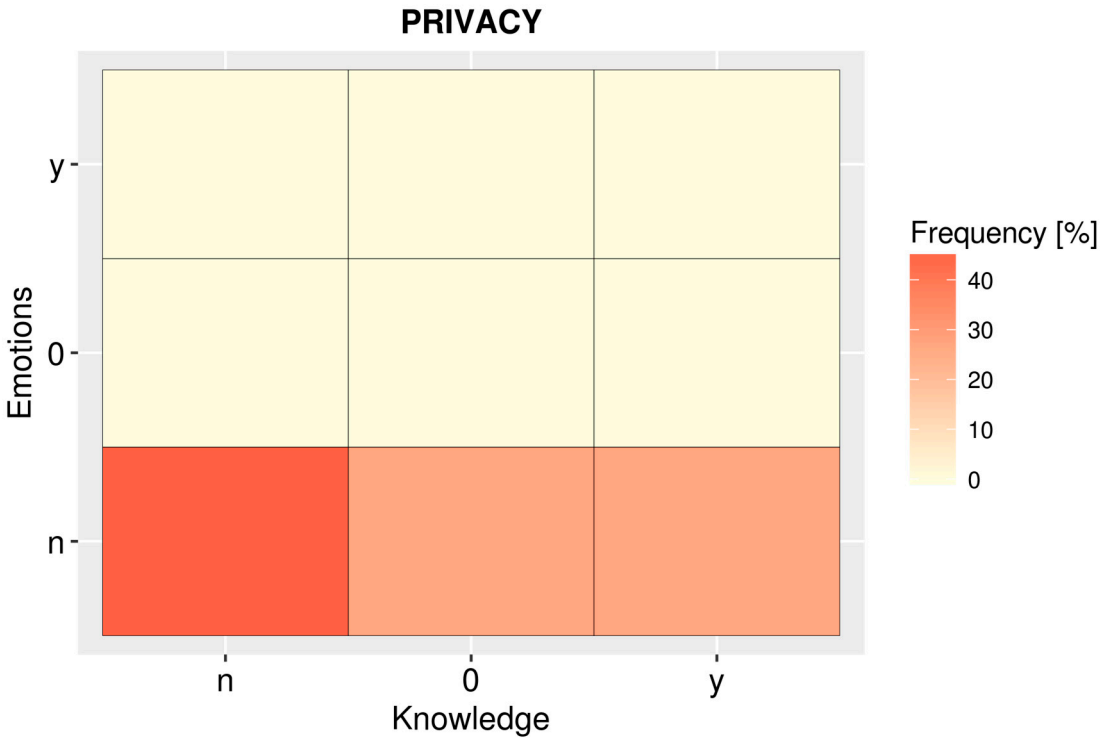
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PRIVACY

258   **Figure 8.** Frequency of responses compared between Knowledge and Emotions dimensions –
259   Privacy theme.

260   These five themes can be considered to provide an almost complete set of possible attitudes
261   toward LBS. Although we admit the shortcomings of our sample – its low representativeness with a
262   bias toward younger people – we think at the same time that it is sufficient for our aims. We did not

find significant gender differences in our results. The part of the sample that was from Edinburgh showed similar trends and frequencies of types but we found only 15 of the most popular – this is related to our exclusion of single occurrences and the much smaller number of respondents. A surprising difference we found between Edinburgh and Poznan was that, in the first former, a significantly lower number of people were able to state their phone model. This could mean that they did not care as much as their Polish counterparts – technology had become less visible and more ingrained in their life.

Conclusions and Discussion

Our analysis shows that there is a wide array of attitudes adopted by people in response to the emergence of what can be described as a location-based culture that is created by LBS. In this digitally augmented environment, we are constantly forced to make decisions on what to do with our location data and, at the same, we are constantly fed location data that is generated by others. Each mobile device user has, therefore, potentially two roles to fulfill – consumer and producer. The balance between the two and whether either of these roles will be adopted depends, in large part, on an individual's attitude. The themes that we have identified in this study are mainly created by the differences in the amount of production of geolocated content, because consumption is present in every one of them. Even people that are very concerned about their location privacy have no such reservation when it comes to using services based on the information provided by others. There is very little reflection on this in our respondents answers. However, differences emerge in the way location data and services are used and these correspond to anxiety level. While people that are very concerned about privacy issues still use LBS, they do it rarely and more consciously. Among the majority of people that declared the almost daily use of LBS, there is also a divide between those that see this as a tool that is used for a specific purpose and those that use it playfully, without thinking. This divide can be seen as a much deeper chasm separating two perceptions of the relation between space/place and the digital (in the broadest sense). From this point of view, the first group sees LBS as a vehicle for changing the material world, while for the second group LBS are an inseparable part of the world. In this second group, people from our *Pop-utility* and *Heart&Mind* themes, we can see "playeurs" [47] that are playing the game of a digitally augmented reality.

On the production side of the equation the differences are much more pronounced, while still being created by the same driving forces – anxiety and perception of space/place. Fear of the data grab and LBS, when it is present, leads to a complete withdrawal from the production of geolocated content. This is exemplified most clearly by the people in the *Privacy* theme. However, even when people do not openly declare their anxiety, they are still reluctant to create geolocated content. This behavior is seen in the *Heart&Mind* and *Programmability* themes, in which people declare that they do not see the need to create such content. It seems that there are two driving forces for producers. The first one - present in the Pop-utility theme – is the allure of play, when everything is done for fun, sharing of the location is natural, and the consequences are far away and seen as insignificant. The second one is agency – when there is a specific purpose for the location sharing, which can often be associated with an attempt to increase individual social capital, a mechanism described by Evans [48], using examples from Foursquare. However, apart from being a consumer or producer, there is also a third role that is not so obvious and rarely advertised by LBS providers – we are the source of the data and subjects of the data grab. Surprisingly, only in the *Pop-utility* theme does there seem to be a large level of ignorance of this phenomenon. And apart from the Privacy theme, the common feeling is that there is nothing an individual can do to prevent this.

Ultimately, our analysis shows only the array of possibilities. Due to the nature of our research design, we cannot provide an empirical basis upon which to draw a conclusion on the prevalence of any given attitude. To do this, we designed another set of quantitative surveys and experiments that are currently being processed and the results will be published as part of our ongoing project. In addition, we think that the events of 2018 – specifically Mark Zuckerberg's testimony before the US Senate Commission and the introduction of the European GDPR directive – will inevitably

314 change the landscape of attitudes toward LBS. However, as this change will most likely change the
315 balance between themes we have identified and not their internal characteristics, the following
316 general conclusions will still be valid.
317   The prevailing attitude toward LBS and data grab seems to be neutral, with a strong undertone
318 of resignation. This neutrality stems from the point of view that there is no direct viable opt-out
319 option from the digital realities of the modern world and surrendering personal locational
320 information is just a new form of digital currency. Indirectly, this view is also present in the
321 responses to our questions regarding the digital divide and exclusion. People that had some
322 reflections on the subject often described the digital divide not as exclusion from ICT and mobile
323 services but rather as separation from the "real world" caused by the constant use and reliance on
324 digital technologies. A smaller number of people had stronger, emotional views, either very
325 positive or negative, based on uncritical technological enthusiasm or fear of privacy violations.
326 Such a wide spectrum of attitudes is not only produced by interaction with technology but can also
327 be viewed as a result of different perceptions of the relation between space/place and the digital.
328 This relation is an unavoidable condition of modern life and influences people's behavior and
329 choices in everyday life and their attitude toward LBS and data grab is just one of these.
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