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Bluetooth Enabled
Performative Interactions in Public Spaces

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ABSTRACT
Mobile phones have become ubiquitous communication tools and are often highly personal, enabling novel means of interacting with others when negotiating public spaces. These features, together with the partially embodied nature of Bluetooth, mean that mobile phone based Bluetooth provides unique affordances with which users can interact with one another. This paper summarises some of our research into users' active Bluetooth use, their Bluetooth naming and interactions with publicly visible Bluetooth visualizations, exploring how people appropriate the medium in performing interactions in differing contexts.

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Bluetooth, Performative Interactions, Urban Encounters, Digital Identity

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H.5.m Information Interfaces and Presentation: Miscellaneous.

General Terms
Human Factors.

INTRODUCTION
We live in complex societies within which communities develop with their own and shared cultures of practice. Therefore, the study of interactions necessarily provides insights into human behaviour and experience beyond that of individual action, as emphasized by, for example, Symbolic Interactionism and Activity Theory. Goffman [5] provided a dramaturgical explanation of such everyday interactions, proposing that these be viewed in terms of performance. He suggested that individuals manage impressions when interacting with others by adopting behaviour appropriate to their assumed role within the situation. In this way individuals are "actors" in a situation who perform interactions judged as being appropriate to their role in the setting; proposing and, through interactions with others, reinforcing situationally desirable aspects of their identity. How and what form these interactions take (and how "appropriate" they are judged to be) is influenced by the affordances of the space within which the performance takes place. Interactions are influenced by the people present, the nature of the space and the channels available through which to perform.

The ubiquitous, and indeed mobile, nature of mobile technologies allows us to make use of them as we negotiate public spaces. It has also led to such devices becoming highly personal in nature. These aspects, together with the partially embodied nature of Bluetooth [8], mean that mobile device based Bluetooth provides unique affordances with which users can perform interactions with one another. This paper explores how people appropriate Bluetooth in such performance.

SPACE & PLACE IN PERFORMATIVE INTERACTION
Philosophical and Critical approaches have described our experience as embodied: we exist within space and understand our experience through interactions within space [1]. Technological developments have augmented everyday interactions, enabling digital and virtual *presence*, *partial* and arguably *dis- embodiment* [7, 8, 12]. As we interact within a shared space or remotely between different spaces, we have shared experiences to differing degrees. Like technology, space and place can be viewed as mediating interactions. We exist in space, whether digital, virtual or, more traditionally, physical. Spaces have social, and indeed societal, purposes, formally designated or informally evolved. The kind of interaction that is deemed "appropriate" is defined by our socio-culturally based understandings of places and their social norms and cues.

This dynamic interplay of place and interaction inevitably shapes the way in which acts are performed and understood. It changes the context of communication and ways in which it is "suitable", or even possible, to act. Therefore, space and place play a significant part in the construction and communication of our experience and how we understand and perform it.

THE MOBILE PHONE AS PERFORMATIVE INTERACTION OBJECT AND MEDIATOR

Mobile devices allow us to take them almost anywhere including public spaces. Acts that were only possible in given fixed locations, often tethered by wired technology, can now be conducted within almost any space or on the move between them. New forms of, and channels for, interaction have emerged. For example, as users carry their personal mobile devices through public spaces, they encounter and interact with other features of the digital landscape, e.g. Bluetooth phones belonging to friends, colleagues and strangers [9]. Such devices dynamically create wireless interaction spaces through their encounters with similar devices and their subsequent interactions.

Such interactions are possible because the devices that enable them, the mobile phone in particular, have become intrinsically linked to our everyday lives, both physically and socio-functionally. This pervasiveness is possible because of the mobility of such devices, but they are not just portable, they are *personal*. We no longer contact the location; instead we contact the *person* [10]. The mobile phone in this sense is an extension of its owner and serves as a reminder of the individual's connectedness [11], reinforcing a sense of social identity. Yet, it has taken a step beyond enabling the "presence of absence" by providing a reminder of another person [4]; rather it enables the novel possibility of direct interaction almost anywhere by anyone at any time.

The combination of such devices' personal nature with their mobility and ubiquitous adoption has given rise to a blurring and redefining of public/private boundaries [6, 10]. Such mobile devices are arguably changing the rhythm of urban society [6]. They enable *ad hoc* contact, sometimes enabling roles and contexts to intrude upon other situations and challenging established social norms to evolve in new ways to cope with such "interruptions" and "inappropriate use" [3, 6, 10]. These interactions are enabled and shaped by the public nature of the spaces within which the devices are used.

Users take their mobile phones through differing situations made up of differing social and physical space, and the roles and norms associated with these. Mobile devices act as props in these situations and have been appropriated as performative tools across a range of interactions, from implicit to explicit. They enable (inter)actions to be performed, and associated information to be communicated. Previous work [e.g. 3, 10] has addressed the role of these devices as performative interaction objects, and the discourses enabled accordingly (e.g. owning a particular phone implicitly communicates identity discourses and group/role affiliations such as wealthy businessman, takes an interest in technology, likes a particular type of music, etc). However, mobile phones also utilize wireless networks and services. They are therefore especially interesting as they enable multiple dynamics of interaction. As well as enabling implicit discourses associated with the device as an object, they also enable explicit communication (e.g. voice calls, text messages and Bluetooth transmissions).

BLUETOOTH & PERFORMATIVE INTERACTION

As Bluetooth has a relatively short range (around 10-100m), users must be in relative proximity to sense and interact with each other's devices. Despite this proximity, a degree of anonymity is associated with such interactions. The protocol allows each device a customisable "name". When a person with an enabled device moves into range of a Bluetooth sensor such as another Bluetooth enabled phone, her digital presence can be sensed and this digital identity can be communicated. Users must scan for nearby enabled devices even if they are aware a given device is nearby so it may or may not be apparent to whom a given Bluetooth name belongs, even if the owner is close by. Thus, Bluetooth interactions lie somewhere between wholly embodied face-to-face interactions and the wholly disembodied medium of internet exchanges between remote strangers [8].

Bluetooth Use as Explicit Performative Interaction

Although it is rarely directly linked to specific locations, in ongoing research we found that the type of space within which mobile Bluetooth-based interactions occur was often raised as a salient factor. Users often expressed privacy and security concerns over enabling Bluetooth on their devices in public spaces. However, it was also in public spaces that users generally reported actively using Bluetooth on their mobile devices, as this was where the "need" arose. This was usually reported as either performing the role of "voyeur" amongst strangers or more direct social interaction with known others. The voyeur role involved users scanning for other Bluetooth devices "just to see what names were about" when bored (commonly at train stations or similar public spaces). Some users reported changing their Bluetooth name to something provocative "to see people's reactions", requesting interaction. This sometimes also extended to direct interaction, such as sending pictures or messages, often to see others' reactions, occasionally resulting in interactive changing of Bluetooth names, as if messaging or conducting a conversation. Interactions with known others were generally reported as stemming from more traditional social contexts (generally involving content sharing, e.g. photographs, around an event that had just occurred or was being discussed in conversation). In this way the Bluetooth interactions reinforced group bonds and individual status/roles within the group.

Bluetooth Naming as Implicit Performative Interaction

Our ongoing research shows that users choose names according to the context of their Bluetooth use and the kind of identity they wish to portray in this context, and that people also interpret Bluetooth names in accordance with these factors [e.g. 2]. The personal nature of mobile devices and the customizable nature of Bluetooth names enables the action of Bluetooth naming to be performed in

anticipation of interaction with others. In this way the act of Bluetooth naming can be viewed as a performative interaction in itself.

Bluetooth users are able to exploit the anonymity afforded by the medium while performing such interactions. Our ongoing research shows that at times users utilize this anonymity to express provocative statements in their Bluetooth name with less fear of being personally identified outside of their social group. At other times they choose not to reveal their real names in favour of expressing something that represents them as a person, e.g. a personal characteristic, interest or something they are associated with. Using Bluetooth naming to express a more "personal" pseudonym in this way serves to reinforce the individual's (and social group's) sense of identity, particularly if the Bluetooth name is something associated with the person by others who know them (e.g. a reference to a shared event or "in-joke") but would not be clearly linked to them by others outside their group. They use the medium to obscure their identity *from those they do not wish to know it*, through performing an act of personal and social identity projection, *reinforcing this identity with those to whom they wish to disclose it*. Thus they perform this aspect of their identity, reinforcing it through the implicit interactions enabled by the technology.

The close coupling of mobile communication device and owner means that a Bluetooth name becomes a pseudonym used in contacting the individual; representing *the person* rather than just her device [8]. Thus, the customised Bluetooth name becomes a mode by which the individual performs her "digital social identity", communicating it to others in the shared space. It enables the device to be identifiable to in-group members as belonging to its owner, without it becoming obvious to others who this is. In this way we can draw a distinction between physically and digitally visible interactions. This is exploited by users in order to perform and reinforce their social identity through anticipated interactions with other Bluetooth users. Users appropriate the way in which Bluetooth operates as a "partially embodied" medium to project their digital identity, making it a unique paradigm of socially and physically embedded performative interaction.

Performative Bluetooth Interaction with Public Displays
Device to device Bluetooth communications enable performative interactions as described above. However the ability to view this information, and thus also perform interactions based on it, is limited to those with enabled Bluetooth devices. In contrast, Bluetooth activity displayed on local public displays can enable others to view this information. It thus breaches the Bluetooth norms of visibility and widens the reach of digital co-presence to include more of those physically co-present – encouraging further novel forms of interaction to be performed.

In an intervention study, we projected locally-sensed Bluetooth names in public spaces in real time [2], shifting Bluetooth from its usual partially embodied status (although still not to the extent of explicitly associating a given Bluetooth name with an identifiable person), making interactions more explicit in their performance. The dynamic visualization of Bluetooth names encouraged interaction amongst those in the space, both between Bluetooth users and the system and amongst members of the public.

In addition to sensing and displaying Bluetooth names in the locale of the screen, the system assigned a "tag" to each displayed Bluetooth name (e.g. an expression or social description such as *Hey!* or *is looking good!*). This triggered varying reactions amongst those in different spaces. Questionnaires showed that people varied in how comfortable they were with the projection, for example being less comfortable with it in a café space than in a nightclub. During the projections, people were more receptive to the projection in the nightclub than in the café where people's reactions were more reserved and the social interaction evoked by the intervention was very limited. It seemed that having the projection of Bluetooth names in such a space was unexpected and to some extent regarded as intrusive. In the nightclub when people were faced with the visualization of Bluetooth names of other people present in the space, various social interactions were triggered.

Members of the public interacted with the system through altering their Bluetooth name, which was redisplayed accordingly. Many users reported turning their Bluetooth to "on"/"visible" just so that they could see their names on the screen and try to interact with it. Those with Bluetooth already set to "on" and "visible" often seemed surprised when they realized their name was displayed on the screen, however, in the club space this rarely prompted people to turn their Bluetooth off. It was more usual for them to play with the appearance of their name on the screen, e.g. repeatedly changing their Bluetooth names and waiting to see the results on the display. For example, *Davey-G* changed his (or her?) name twice; from *Davey-G* to *Everyone wants lonsdale!* and then to *Pete has ten inches?*

This visibility also enabled users to use their Bluetooth devices to interact with each other via the display, using the visualization as a digital message board. For example, users were observed changing their name to be more situationally relevant, e.g. *Optimus prime* changed her/his name to *Hi camera lady* – referring to our researcher who was capturing the interactions with her camera – suggesting playful performance with the system and a wider desire to interact. Social group members played out jokingly toned exchanges via the screen using Bluetooth names, as a performance of group roles reinforcing membership and group strength, as well as potentially "staking a claim" to the space. Other people present but without enabled devices were able to observe the public display, prompting them to interact through embodied action with others in the space including those using Bluetooth devices, thus interacting directly with others and indirectly with the

technology via others.

In general, the Bluetooth visualisation was found to encourage wider social interaction and could be observed as reinforcing social ties through Bluetooth name related performances. Despite breaching Bluetooth visibility norms, and the privacy or security concerns expressed by some Bluetooth users in regards to naming, we found that many of those who experienced it – both those whose name appeared on the display and those who observed others' names there – were very happy to utilize the system to perform a variety of interactions. However, this was found to differ according to the nature of the place, i.e. the type of activities occurring in that space and whether it was night or day time. Club-based users were keen to be able to expand the range of ways in which they could interact – indicating a desire for novel ways to perform interactions with others.

CONCLUSION

Mobile devices, particularly mobile phones, have become highly personal and offer an opportunity for users to utilize the services they afford in performing interactions in public spaces, explicitly through direct interactions or implicitly, e.g. though social role performance.

The Bluetooth functionality of such devices provides unique affordances for performance and interaction in public spaces as users appropriate it as a partially embodied medium – making it a unique paradigm of socially and physically embedded performative interaction.

Users engaged with the technology in performing interactions (with each other and it) and expressed wishes for this to be expanded further, indicating a desire to perform and interact in novel ways. The public display of one's partially embodied digital identity can trigger various types of interactions, not only unintentional but also as performance of consciously intentional interactions. The nature of these interactions and their appropriateness are tied to the nature of the space as well as the affordances offered by the technology. Factors include the nature of the Bluetooth names, who is involved, time of the day etc. Going forward, we wish to examine in greater detail which factors influence people's perceptions and actions and how they do so in relation to their spatial context, and evaluate the degree to which this approach might provide a motivation for people to change the ways they communicate and interact with others in various settings.

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