Place Meaning and the Visually Impaired: The Impact of Sound Parameters on Place Attachment and Identity

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Abstract. This paper outlines some theoretical considerations regarding the concept of place meaning as applied to populations of visually impaired users of mobile location-based applications. The concept of place meaning and its constituent elements, place attachment and place identity, are explored in detail and a research design on place meaning for visually impaired smartphone users is outlined as a first step toward the systematic investigation of the differences in the creation of place attachment and place identity between sighted and visually impaired individuals as a result of auditory stimuli emerging from the urban soundscape.

Keywords: Place meaning, affect, soundscape, location-aware applications.

1   Introduction

The perception of the urban environment is a multidimensional construct comprising sensory, cognitive, symbolic, and social aspects which contribute towards the generation of place meaning. While the term 'space' often refers to the invariant properties of the physical environment (e.g. geometry, color, lighting etc.) as perceived by the subject's sensory subsystems, the term 'place' is reserved for the interpretation of spatial properties with respect to subjective values, norms, attitudes, and predispositions. Place meaning is deeply subjective and is responsible for the wide variety of responses toward parts of the urban environment by the inhabitants of a city.

The generation of place meaning requires active involvement with a particular space. In the case of urban environments, this translates to navigating through various parts of the city, often for a significant amount of time. This process may be considerably difficult to some user groups with special needs, such as the visually impaired. For these users, the act of moving around in the city can be inherently dangerous due to their inability to perceive visual information. This inability also renders the environmental experience of visually impaired users radically different than the experience of sighted individuals. As such, it is expected that the parameters which account

for the generation of place meaning and the creation of the affective bond with the urban environment will be different for visually impaired users. Due to the lack of vision, audition becomes the most important source of information from the environment [1-2], possibly supplemented by tactile (e.g. the feeling of the ground and the detection of obstacles via distal perception) and, to a lesser degree, olfactory feedback.

This paper attempts to formulate a conceptualization of place meaning generation by visually impaired smartphone users in the city; more specifically, this paper deals with the affective and emotional impact of various characteristics of sound in the perception of the character of various parts of the city by visually impaired smartphone users. Essential sonic events which incorporate various types of categorized sound characteristics influence the type and intensity of one's affective response to places, as well as the extent of social activity that occurs therein. Smartphones are ideal for such a task due to their proliferation and the constant increase in their technical specifications.

Additionally, this paper describes an Android application, currently under development, that allows blind users to provide geolocated affective information. By means of this application, the meaning of place will be approached through practical research aimed at eliciting relevant affective responses by the users. Visually impaired and sighted individuals will be participating in the procedure so as to allow a direct comparison of the parameters that contribute to the generation of place meaning for these two categories of users.

The outline of this paper is as follows: first, "place meaning" and related concepts are outlined. Subsequently, the chosen methodology is explained and its merits and flaws compared to other methodologies are discussed, followed by a description of the application currently under development. Finally, the design of the experimental activity is described in detail.

2   The Concept of Place Meaning

2.1   Place and Identity

While the term "space" is primarily used to describe the objectively perceptible characteristics of an environment, the term "place" essentially refers to spaces endowed with value and/or subjective meaning, i.e. spaces of personal significance [3-8][1]. Place meaning comprises place attachment, an affective bond between the subject and the environment, and place identity, the reflection of a place's importance and congruence with one's self-identity. The most important component of the concept of place is the affective bond between the subject and a specific location [9].

Whether individually or collectively driven, the generation of place meaning necessitates a process of appropriation [9] whereby a place becomes integrated in a

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[1] These spaces need not be physical; various spatial configurations or locations that do not have a physical manifestation can attain place status, as evident in the game studies literature (e.g. [10-11]).

person's or a collective's identity [12]. At the individual level, indicative of this position is the view that places can be thought of as "extensions of the self", or as integral parts of one's self-concept and self-identity [7]. At the collective level, McCullough's [13] observation that cities function as "repositories of civilization", and the observation by Lentini & Decortis [14] that places can be accompanied by related social cues, thus functioning as a type of social affordances, are also in accordance with this process. Appropriation allows one to adapt a place to one's specific needs and goals [15], and effectively "dwell" in it. In a more ecological (as per [16]) approach, Droseltis & Vignoles [7] mention the notion of "environmental fit" as an undercurrent in the process of place meaning generation. Additionally, the concept of place could potentially be interpreted in evolutionary terms as a result of a process of environmental appraisal or preference [17].

All the above point to the fact that any given spatial configuration may be appropriated by different persons or groups at different times, and thus attain different types of place status. Thus, the concept of place indirectly obtains a temporal dimension [4]. In light of the above, the stability of place meaning is not a given. To put it somewhat differently, a way of testing meaning stability or mutability as a function of physical elements is to systematically vary the configuration of physical environmental elements and determine whether place meaning remains the same or not [18].

It should be noted that spaces may fail to transform to places on account of not being related to subjective or sociocultural values and norms. In that case, that particular space has no distinguishing elements, whether tangible or intangible, and a state of "placelessness" ensues [19].

2.2   Place and the Concepts of Attachment and Belongingness

It should be stressed that sense of place does not ensue exclusively as a result of positive affective connotations; it is possible for a space to be evaluated negatively in terms of affect, but still be given place status. This type of place is exemplified by sites such as concentration camps or locations in which unpleasant events occurred, either at the individual or the collective level. According to Relph [19], the sense of insideness is what denotes a place with which the subject can be identified. Relph regards insideness as a continuum that ranges from existential outsideness to existential insideness:

- *Existential outsideness:* a conscious lack of identification with a place and any elements related to it.
- *Objective outsideness:* the voluntary dissociation between the subject and the place, during which the former views the latter in a more objective manner, essentially as "collections" of persons, objects, or other elements.
- *Incidental outsideness:* the involuntary perception of a space as neutral or devoid of meaning – essentially placelessness.
- *Vicarious insideness:* an indirect perception of a place (e.g. through narrative).

- *Behavioral insideness:* an objective conception of space and the activities performed therein without the dissociation that is present in the case of objective outsideness.
- *Empathetic insideness:* being emotionally invested in what transpires within a place.
- *Existential insideness:* a sense of total belongingness to a place, accompanied by the intuitive perception of the meanings with which it has been endowed.

In combination with other methods, the above categorization could be used for ascertaining the affective impact of a place and the extent of its compatibility with the subject's self-image.

Although places are not necessarily perceived as sources of positive affect, the concept of place attachment seems to imply the experience of positive affective reactions. Scannell & Gifford [8] propose a tripartite model of place attachment, according to which place attachment can be analyzed into three constituent elements: the individual, the place itself, and the psychological processes through which attachment is expressed. At a purely individual level, place attachment signifies the positively evaluated affective bond between the subject and the environment fostered as a result of events of high personal significance. The psychological processes that are involved in place attachment are affective, cognitive, and behavioral. It is clear from the use of the term "attachment" that the role of affective processes is the most important one. In other words, there is a clear tendency toward positive affect, which is the primary element that differentiates place "attachment" from place "meaning". In an investigation on the way the affective bond between children and space is formed, Morgan [20] concluded that this process is related to five affective states which can be seen as components of place attachment: pleasure (of various subtypes), security, love, grief, and identity. With the exception of grief, all other states are positively valenced, and even grief is described by Morgan in a way that emphasizes its positive aspects (i.e. when experiencing grief, the subject is thought to remember a more positive previous condition).

On a behavioral level, place attachment is manifest as a desire to approach a particular place, and entails certain aspects of territorial behavior; however, in contrast to true territorial behavior, the subject approaches a place not to defend or claim it, but to express and explore their identification with it [8]. Additionally, subjects tends to attempt to reproduce elements of the place they are attached to in other environments. This is one of the reasons for ensuring than an environment is malleable, i.e. the ability of the environment to change according to the needs and goals of its denizens. From a functional perspective, the desired degree of malleability for a given space partly depends on the number of functions this space will have to provide or support.

2.3   Categorizing Affective Behaviors and Responses

There are two main types of approaches to categorizing emotion and affect: categorical and dimensional [21]. Categorical approaches propose sets of "basic" emotions, which are thought to be expressed similarly across various cultural contexts. The most

prominent advocate of this approach is Paul Ekman, who has proposed a number of basic emotions, the most widely adopted being sadness, disgust, anger, fear, surprise, and happiness [22]. Dimensional approaches, on the other hand, seek to break down discrete emotions into easily identifiable and quantifiable components. The most influential dimensional model of depicting emotional and affective responses is Russell's circumplex model of affect [23-24]. This model classifies emotion along two axes, arousal (activation level) and valence (essentially pleasure derived from a stimulus)[2].

Categorical and dimensional approaches are not necessarily at odds; discrete categories of emotion can be mapped onto a dimensional model of affect, as shown in fig. 1, which depicts the circumplex model subdivided into eight zones.
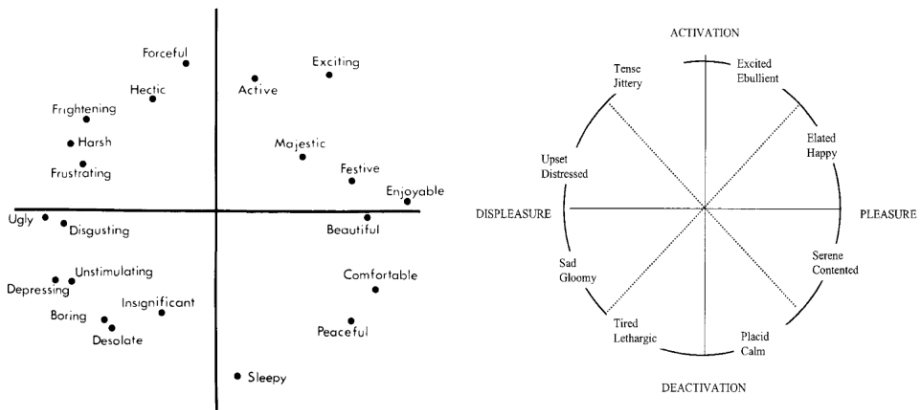
Fig. 1. The circumplex model of affect, with descriptive terms (left) or clusters / zones (right) around the primary axes of deactivation – activation (arousal) and displeasure – pleasure (valence) ([24], p. 312 and [23], p. 148 respectively)

An advantage of dimensional approaches is their analytical character, which results in a more manageable set of quantities to be measured or identified. The circumplex model of affect has been used for the classification of affective responses to places in the application described in another section.

3   Sound and the Urban Environment

3.1   The Importance of Sound in the Perception of the Urban Environment

An important distinction in the literature on sound is the one between listening and hearing [25]. Truax has defined hearing as 'sensitivity to both the detail of physical

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[2] The PAD (Pleasure – Arousal – Dominance) model, a three-dimensional conceptualization of emotion that is the precursor to the circumplex, also featured the dimension of dominance (the degree of control one can exert on the manifestation of affect), but Russell excluded it from the circumplex because it accounted for only a small percentage of the total variance observed [24] (p. 313).

vibration within an environment and its physical orientation as revealed through its modification of those vibrations' [25] (pp. 15-16). Along with the definition, he has claimed that hearing is able to make someone comprehend, although with not many details, his/her entire environment in all directions at the same time. Indeed, the sense of hearing helps people to evaluate their environment, and adapt themselves into it. However the main concern of hearing remains the actual physical interaction between the human ear and the sound waves, while the process of listening concerns a completely different, more composite concept of communication.

The Soundscape. The term soundscape refers to the acoustic field that is defined taking the position of the listener into account, and its examination should include all interactions between him/her and the sound. Every sonic event that happens and exists in one's audible area is part of a space where a soundscape creates the sound field and involves multi-leveled interactions. Schafer [26] had introduced this notion in the middle of 70s in an effort to raise the world's attention towards the acoustic environment, and also raise awareness, as industrialization was resulting in noisier ambiences and a dangerously rising loud way of life. Thus, it has been important that even if the sound environment acquires compositional properties and is likewise approached as being independent from our actions, we listeners should pay more attention to our behavior regarding sounds – both the ones we produce and the ones we receive. All these lead to a reconsideration of the way people connect to the urban environment through the soundscape. The term 'soundscape' was coined so to describe a sound environment, exactly as 'landscape' describes a visual environment. Other scholars or researchers have broadened its meaning. Regarding one's relationship with the soundscape, Truax indicates 'a tacit knowledge that people have about the structure of environmental sound, knowledge that manifests itself in behavior that interprets such sound and acts upon it' [25] (p. 50). In a contemporary urban environment, the soundscape has been characterized as 'urban soundscape', and its characteristics have been similar throughout the short history of the soundscape studies.

The Urban Soundscape. 'Urban soundscape planning and design' has quickly become an issue of a great importance for a city environment. Areas such as parks, churches, avenues, noisy or quiet streets, playgrounds or alleys create a unique sound environment in cities, although with similar elements to other contemporary cities' identity.

The urban soundscape is a sound environment that includes a lot of information that is also rich in sound variety and acquires a strong 'urban' identity. Already, from the cities from the past, every city had its distinctive sounds: certain animals, the quality of the roads and its crossers, peoples' voices (quarrels or laughs), language, or water crossing the area would be an important element (what later has been called 'sound signals') of a city's soundscape. Also musical and industrial sounds used to be present in such places, and its qualities were different enough to separate the one area from another: 'The shared experience of local 'soundmarks' created what Barry Truax had called an 'acoustic community'. In an urban environment it created overlapping

acoustic communities in the same way that visual landmarks and local interaction helped to define overlapping neighborhood communities. Those who belonged to a particular neighborhood recognized its sounds and responded in ways that outsiders did not. Any interruption to the normal local sounds immediately put them on the alert, even if they were not consciously listening: a sudden silence, the clash of swords, or the tramp of marching feet brought everyone to their windows' [27] (p. 10). In modern cities, the inhabitants sound their own unique way: existing in a place where natural sound sources are suppressed or rarely present, people are used to mechanical and/or technological sounds in an impressive way: If an urban inhabitant would be challenged to recall the first sounds that come to his/her mind when thinking of the 'city's aural environment', 'cars' or 'noise' would have been amongst the first responses – and noise would be the sound that was meaningless and/or undesirable. These kinds of sound characterize the urban soundscape to a great extent, as they often dominate it.

Space, Place and the Soundscape. The relative direction from where a sound comes can 'change' in the listener's perception by turning his/her head. Soundscapes create spatial impressions: they have the ability to deliver a sense of size (volume) and distance and due to this function they can define the auditory space, and consequently place. In space, the volume of spaciousness is determined by the senses and thus it becomes evident that 'sound dramatizes spatial experience' [28] (p. 16).

According to Schafer [26] (p. 214), the acoustic space of a sounding object is that volume of space in which the sound can be heard. A variety of qualities of acoustic spaces has been observed, however a basic separation in two levels can facilitate the study of the factors related to the acoustic space.

- On a first level, a house is a concrete acoustic space that deteriorates the sounds coming from the inner space with its walls and prevents them to be heard outside, while at the same time the same walls prevent a considerable amount of sound to enter the house and be audible to the people that live in there. Complex interactions evolve there, as the limits of the acoustic and visual space are set by human construction.
- A second level is the outdoor space, where the conditions of sound existence change. Sound is free to expand in a greater space, where it acquires the potential to be noticed in a large scale; both natural and mechanical sounds that are loud enough to be able to dominate vast outdoor acoustic spaces exist.

The sound environment of outdoor spaces has been, and still is, the principal field of soundscape studies. These sounds, as they flow in the acoustic space, are always dependent on each space's physical characteristics. Acoustic boundaries should be the ones to define the soundscape, placing the listener and his/her subjectivity a primary role. Thus, the trajectory of soundscape differs from the property lines of landscape. Also, sound travels and defines its own acoustic space. However, the physical environment always inevitably defines the form in which sound will reach to the human ear, and space affects sound not only in a physical way, but it can also affect the

characteristics of sound production [26]. Thus, the quality of the soundscape also depends on architectural characteristics.

Truax [29] has defined acoustic space as 'the perceived area encompassed by a soundscape, either an actual environment, or an imagined one' to focus on the relationship between sound and space in terms of information exchange: 'every sound brings with it information about the space in which it occurs (for environmental sound) or is thought to occur (as with synthesized sound). With environmental sound, loudness and the quality of reverberation mainly determine the kind of space that is perceived, enclosed or open, large or small'.

According to Blesser and Salter [2] (p. 2), 'a real environment, such as an urban street, a concert hall, or a dense jungle, is sonically far more complex than a single wall'. This is obvious, as sound objects and sound sources are constantly present, and keep changing: Along with them, the sonic field and the listener's soundscape change too. Continuing this thought, the writers support that 'the composite of numerous surfaces, objects, and geometries in a complicated environment creates an aural architecture.' [2] (p. 2). Objects or surfaces clearly create a particular resonance of the existing sounds in the area; but also aural architecture acquires a social meaning. Cultural and social functions are determined by the nature of a sonic experience in a certain place. Also, concerning the cultural context, one must study the acoustic parameters that are involved. The listener, the conditions of his/her situation, the purposes and the meanings are parameters that define the relationship between the listener and the sound object in this context. It is also through the architectural structures, aural and visual, that people can develop cognitive procedures towards a place. 'Visual and aural meanings often align and reinforce each other. For example, the visual vastness of a cathedral communicates through the eyes, while its enveloping reverberation communicates through the ears. For those with ardent religious beliefs, both senses create a feeling of being in the earthly home of their deity' [2] (p. 3).

4   Research Design

4.1   Description of the Application

An Android application that will assist the measurement of the users' affective response to places is currently under development. This application will also be providing navigation assistance functionality to visually impaired users.

Affective Response Logging. Users will be given the option to record their affective state at various points along their route. Sighted users will manipulate two sliders perpendicular to each other, one for each dimension of Russell's circumplex model. Visually impaired users will be entering this information by sliding across the screen, horizontally for one dimension and vertically for the other. Each dimension will comprise a 3-point or 5-point scale.

Trajectory Logging, Audio Recording, and Geolocation. The user's movement will be tracked throughout the activity and their aggregated affective impact ratings will be displayed on a map in numerical or color form. Thus, a mapping of place meaning for various parts of the city of Limassol will be produced. In addition, users will be able to provide short (< 7.5 sec.) voice annotations anywhere along the route. This will result in additional, unstructured content to be subjected to qualitative analysis in order to complement quantitative data analysis.

4.2   Description of the Application

A mixed methods approach will be adopted, employing both quantitative and qualitative methods, chief among them being the soundwalk method. A soundwalk proposes a way of exploring the surrounding acoustic space by careful listening while walking, and a manner of being exposed to detailed sounds, especially the ones that people are not aware of during their everyday activities. The fact that the experience of soundwalking is so subjective is expected to appear useful, as individual discussions and conclusions will evolve regarding the place and its meaning by the participants. Also the flexibility of the method, as it can be done in various hours and days of the week will provide safer information regarding the interactions that happen between the users and the place. Respectively, a variation of the method of the soundwalk is used in this case:

The participants will follow a route specified in advance while carrying a smartphone running the application described in the previous section. At specific, predetermined locations, the participants will stop and be prompted to indicate the affective impact of sounds directed towards them, providing quantitative data by means of the application. The prompt will be either visual (in the case of sighted users) or auditory (in the case of visually impaired users). Even if soundwalk as a method requires a continuous and silent – on behalf of the participant – walk, it will be necessary for the objectives of the research to pause the procedure so that data in situ are obtained. Qualitative data will also be gathered so as to supplement quantitative data analysis. Qualitative data will be obtained primarily through semi-structured interviews featuring questions about the meaning of the experience of the soundwalk as a whole, the emotions participants experienced during the walk, and the relative importance of the locations in which participants provided feedback via the application.

4.3   Summary and Future Work

In this paper, a research design with the objective of ascertaining the affective impact of auditory cues originating from the environment for sighted and visually impaired users was outlined, accompanied by the description of an Android application to be used for that purpose. As evident from the theoretical discussion presented herein, the concept of place meaning is a multidimensional and inherently subjective process that rests on parameters pertaining to the environment, to the user, and the system. Despite its somewhat rigid nature, the soundwalk methodology, if properly implemented, is useful in highlighting the parameters of sound that influence the process of place

meaning generation. In the immediate future, the experimental investigation described in this paper will take place, and a concrete theoretical framework of the role of auditory stimuli in the production of place meaning in urban settings will be synthesized.

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