Proceedings of the Third International Symposium on Platial Information Science

# Places Across Cultures

Franz-Benjamin Mocnik and René Westerholt (editors)

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# EDITORIAL

# PLACE CHARACTERISTICS

# MEDIATION OF PLACES

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# MODELLING AND ANALYSING PLACES

# INVITED KEYNOTE PAPERS

# WORKSHOP REPORTS

# Introduction to the Third International Symposium on Platial Information Science

– Editorial –

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Symposia are like places – no two symposia appear to be alike. And PLATIAL'21 is, indeed, very different from its predecessors. This is despite the fact that the planning in 2020 was quite similar to previous years and the euphoria was great. After the COVID-19 pandemic unexpectedly emerged in the course of 2020, however, we followed the example of other conferences to postpone the event to 2021 and the familiar format was turned upside down. Instead of a face-to-face meeting that would have been in a *place* never visited before by the attendees, an online format became necessary. What a surprise, especially for a symposium dedicated to the theme of 'place'. For now it is devoid of a place, which is a little reminiscent of the concept of *placelessness* coined by Relph (1976).

New formats also open up new possibilities. Perhaps most striking is the geographical coverage of the participants. Although the symposium is organized from Europe, a majority of the participants are from other continents. There are participants from Asia, North and South America, Europe, and Australia and New Zealand. However, this diversity is a challenge for participation too, as time zones hardly allow for manageable global overlaps. Accordingly, we have chosen a format that allows both synchronous and asynchronous participation. It is also pleasing that there is no typical bias towards male presenters, as female presenters form a clear majority with more than 60 per cent.

We have chosen *Places Across Cultures* as the motto of this symposium. The multitude of continents represented in the contributions vividly demonstrates the importance and great value of a multi-cultural point of view, in contrast to the limitations to which one-dimensional perspectives would succumb. If science wants to approach universal principles of platial information, cross-cultural approaches seem indispensable. The contributions to the symposium consider such principles, e.g., in the cases of unsafe places in Ames (IA, USA); evocative places in Hamburg (Germany), Ames and Grinnell (IA, USA), and Vitória and Belo Horizonte (Brazil); favourite places in New Zealand; sports venues in the Ruhr (Germany); the Chicago neighbourhood South Shore (IL, USA); the much-changing Beyoğlu neighbourhood in Istanbul (Turkey); university campuses in Moscow (Russia); London's green belt; tourist attractions in Canada; use of platial language in Western Pantar spoken in eastern Indonesia, Yindjibarndi and Manyjilyjarra spoken in the Pilbara region (Australia), Tokelau spoken in Tokelauan (Polynesia), Lardil spoken in Mornington (Australia), ǂAkhoe Haiǁom spoken in Namibia; and the dispossession of the Wurrunjeri people of the Kulin nation in Melbourne (Australia). In this sense, the symposium can be considered a truly multi-cultural event.

The publications of PLATIAL'21 can be grouped into different themes. The first three publications following this editorial are dedicated to different characteristics of places. Kosacz et al. (2022) examine the emotions that respondents have about unsafe places in Ames (IA, USA) including underlying reasons. For this purpose, a community engagement festival was co-organized in conjuction with the local planning department, in the context of which surveys were conducted. Another publication addresses evocative places with their particular emotions, feelings, and memories. Poplin (2022)

thereby uses a cross-cultural approach to compare case studies in Germany, the US, and Brazil. This reveals significant differences in some aspects. Finally, with the help of a New Zealand-wide study, Richardson and Stock (2022) identify a range of reasons that make people describe a place as their personal favourite one. They report that the influence of attractiveness, the intrinsic value of a place, and feeling safe are among the most important reasons.

Another focus of the symposium is the mediation of places. Mocnik and Kühl (2022) use a case study of sport venues from two popular traditional football clubs to investigate the influence that the experience of a place can have on its representation in map data and how this experience can be represented accordingly. Conversely, this influence also allows conclusions to be drawn about how information about places can be extracted from existing maps. However, a mediation of places also bears the risk of bias, as Werner and Schwarze (2022) show using the example of the South Shore neighbourhood in Chicago (IL, USA). This neighbourhood is often stigmatized in the media and portrayed as one-dimensional, but actual perceptions on the ground often oppose this portrayal. This case study shows how different and controversial the various views of a place can be.

A third focus is on the cartographic mediation of places. Dolma (2022) takes a closer look at the example of Beyoğlu, a neighbourhood in Istanbul (Turkey). This neighbourhood is undergoing a strong transformation, and its character and public places have strongly transformed in recent years. In particular, she investigates the extent to which counter-maps can bring the narratives marginalized by this transformation as well as the forgotten memory places back to life. Taking a more spatial perspective, Glebova (2022) investigates the cartographic communication of the boundaries of places. For this purpose, participants of an initial study were asked to describe the core, the domain, and the sphere of three university campuses in Moscow (Russia) in more detail. From these descriptions, different variants of cartographic representations of these places were generated and then tested and compared for their effectiveness in a second study.

The last focus is on modelling and analysing places. Caton et al. (2022) investigate corresponding urban planning related possibilities using natural language processing and the example of London's Green Belt policy. They show that specific community interests can be revealed more effectively and minorities' issues can be identified more quickly. Another approach was taken by McKenzie (2022), who investigates the influence of the COVID-19 pandemic on the check-in behaviour of tourist attractions in Canada. The overall aim of his described project is to show how platial analyses, especially of user-generated data, can help to generate insights in the context of policies, but also to highlight existing limitations. Finally, Slivinskaya and Westerholt (2022) discuss possibilities for the inclusion of platial aspects in the study of urban form. It is proposed that the field of urban morphology should widen its scope towards subjective and idiosyncratic domains through a deeper incorporation of meanings, affordances, functions, and relations between places.

The proceedings are rounded off with invited papers of the keynotes and workshops. Continuing the ideas of his keynote, Palmer (2022) discusses how the physical environment, sociocultural factors, and language are interrelated. Based on five case studies, it is proposed to extend the theory of sociotopography to include the concepts of landscape and place. In doing so, however, not only these concepts themselves are addressed, but even more so the manifold relationships between them. Central to this is the observation that sociocultural factors mediate between the physical environment and its conceptualization in terms of landscape and place, thereby manifesting themselves in corresponding sociocultural practices including language use and repertoire; and that these practices, in turn, also influence conceptualization. The First Workshop on Cyber Ethics in Platial Research, organized by Zhang et al. (2022), addresses a very relevant and timely issue: how to establish a discourse in platial research to address the ethical issues related to the use of computer technology and the Internet. In particular, the workshop organizers address the questions of what characterizes cyber ethics in platial research and distinguishes it from a more general cyber ethics, and what role volunteered information can play in this.

We hope you enjoy reading the proceedings!

## Acknowledgements

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# Mapping Unsafe Places and Emotions: Study of Ames, Iowa

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This research concentrates on mapping places and emotions. The case study is focused on a small college town in Ames, Iowa. The research questions concentrate on the locations of unsafe places in the city, their characteristics, and the emotions felt at these places. The unsafe places were collected in a map-based experiment conducted at the 'Play Ames: Imagine your City' community engagement festival. While taking the survey, residents were asked to plot a point where their unsafe place was on the paper map and describe emotions they felt at this place. In this initial study 46 locations were mapped and visualized in a geographic information system. The results of the survey revealed common themes between their 'unsafe' places across the city such as high volume of traffic, being isolated, and not having enough lights. The most often mentioned emotions were: anxious, nervous, risky, concerned, agitated, stressed, insecure, and worried. In the future we will add a layer on favourite places and combine the data with data on evocative places.

## 1    Introduction and Research Focus

Places and emotions and mapping them in a geographic information system (GIS) represent intriguing challenges for geoinformation science. These challenges are related to the definition and formalization of places for the needs of information and geoinformation science (Goodchild, 2011; Purves et al., 2019; Winter and Freksa, 2012), questions related to the concept of a place and the difficulties associated with mapping places in a GIS due to their fuzzy borders (Burrough and Frank, 1996; Poplin, 2020). Similarly to places, emotions do not represent a typical geographic object and are therefore difficult to map in a GIS (Poplin, 2018). Nold (2009) has contributed greatly to the field of emotional cartography. Using technology similar to a lie detector, Nold invented a bio-mapping device that records a user's level of sweat which has been associated with intensity of emotions. The device also records the geolocation of the user, creating a novel method of exploring associations between physical space and emotion.

This research was also done in response to Poplin's article titled 'Exploring evocative places and their characteristics' (Poplin, 2020). In her research, she studies evocative places, places that evoke images, emotions, and memories and concentrates on places that evoke positive emotions. We are interested in exploring the opposite side by choosing places that evoke negative emotions, more specifically, unsafe places. Another aspect of this research that intrigued us was the concept of mapping emotions. According to researchers on places, emotions do not have set boundaries, nor do 'places'. Their boundaries are 'fuzzy' and cannot be identified at first glance. Where does a place end and another begin? Emotions have always been a concept that dealt with the human brain and internalizing those

emotions in order to make sense of life (Damasio, 2006). People express emotions in many different ways. That could be through agitation, anxiety, happiness, recklessness, etc. By having the participants physically pinpoint locations they do not like to visit, it can help them process those feelings and determine what exactly they feel when going to these places and why. We additionally wish to study problems related to the visualization of emotions on maps.

Our research aims to contribute to this fundamental research in geoinformation science by focusing on unsafe places. It is organized around the following research questions:

- Locations of unsafe places. Where are unsafe places located in the city?
- Characteristics of unsafe places. How do the residents describe the main characteristics of self-selected unsafe places?
- Emotions related to unsafe places. How do the residents feel at these places?
- Can a mapping experiment be used to engage residents in a discussion about safety in the city?

In order to study unsafe places, we concentrated on the small college town of Ames, located in Iowa, USA. Ames has 66,427 residents out of which 29,478 are students studying at Iowa State University according to US Census Data (United States Census Bureau, 2019, 2020). An increased knowledge about how residents perceive places can help urban planners and designers design better places in which they will feel appreciated and safer.

## 2    Research Methodology

The research methodology was based on a paper-map experiment conducted at the 'Play Ames: Imagine your City' community engagement festival. The festival was organized on 25 September 2021 in a collaboration of the City of Ames and the Community and Regional Planning Department, Iowa State University. A group of students from Iowa State University lead the paper-map experiment at the festival and engaged residents in a discussion about safety and unsafe places.

The materials for the paper-map experiment consisted of a paper-map of the city of Ames and a questionnaire. The map was a two-foot by three-foot map printed on paper. It was designed in a GIS application particularly for the purpose of data collection and included layers of roads, buildings, and labels of the most important points of interest in the city. The questionnaire consisted of the following main categories: location of the unsafe place self-selected by the participant; information about how unsafe this place is indicated on a Likert scale from 1 to 5; information about emotions felt at this place; accessibility of the indicated unsafe place; how frequently it is visited by the participant; and how important it is to the participant. We also included a question related to what problems they experienced there, e.g., high traffic, lack of lighting, abandoned buildings, and other phenomena that could contribute to a place lacking safety. Questions about gender, employment status, and age were added at the end of the questionnaire, as well as the question about the location of the residence of the survey participant.

In order to better guide the participants in selecting emotions they felt at their location, a feelings inventory was created based on the list of negative emotions found on the Center for Non-Violent Communication's website (Center for Nonviolent Communication, 2005) and originally compiled by Rosenberg (1999). Once the surveys and mapping were completed, the data was compiled in an ArcGIS 123 survey as well as in an Excel sheet to be able to view the distribution of the responses. Once that data was analysed, we then transferred it into ArcGIS Pro to create a final layout of all mapped unsafe places in Ames.

## 3    Research Results

Altogether, 46 participants responded to the survey contributing 46 locations of unsafe places. Most participants were either employed full-time (33%) or students (24%). About 51% identified as female, 38% as male, 9% as NA, and 2% preferred not to answer. Many participants were between the age range of 25–34 (24%) and 35–44 (20%).

**(a)** Individual locations
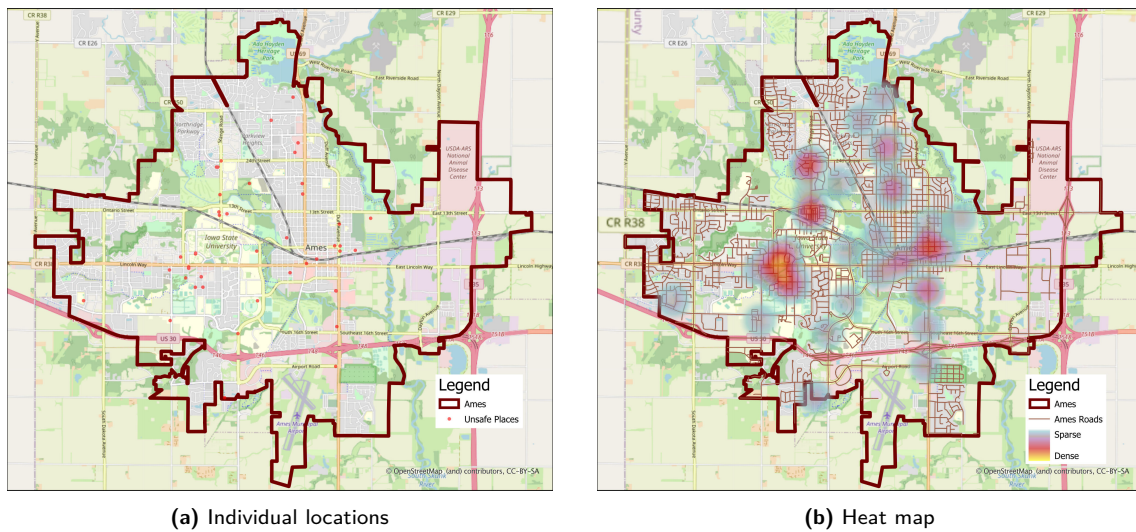


**(b)** Heat map

**Figure 1: Unsafe places in Ames, Iowa.** (a) Individual locations of unsafe places; (b) Their concentrations represented in a heat-map with roads

## 3.1 Locations and Characteristics of Unsafe Places

The survey and mapping activity helped to identify a few areas in Ames where the city residents felt unsafe[1]. Some common answers were the Dunkin Donuts on Lincoln Way, Stange Road, crosswalks across the Iowa State University campus, Knapp Street, Bandshell Park, and areas close to Northridge. Figure 1 shows the locations of the unsafe places indicated with a red point (left) and a heat map on the right visualizes high concentrations of unsafe places (indicated with yellow and red). The three areas where the highest concentrations of points were Stange Road, Duff Avenue, and the area around Dunkin Donuts on Lincoln Way. All these locations had one thing in common: heavy traffic. They were all worried that they could either be in a car accident or a pedestrian could get hurt for lack of signage because drivers were not paying attention. Figure 2 shows the main reasons for a place to be perceived as unsafe. The main reasons are heavy traffic, not enough lighting, isolated, and crime. Most of the participants expressed that the unplace safe inconveniences them as well as is important in their life, which suggests that this is a bigger problem than it may seem. The set boundary these emotions created were those of the roads themselves.

Once we collected a sizeable amount of data points, some trends started to emerge with mapping emotions and the meaning of a place. Mapping emotions on a single point may not be the best practice.
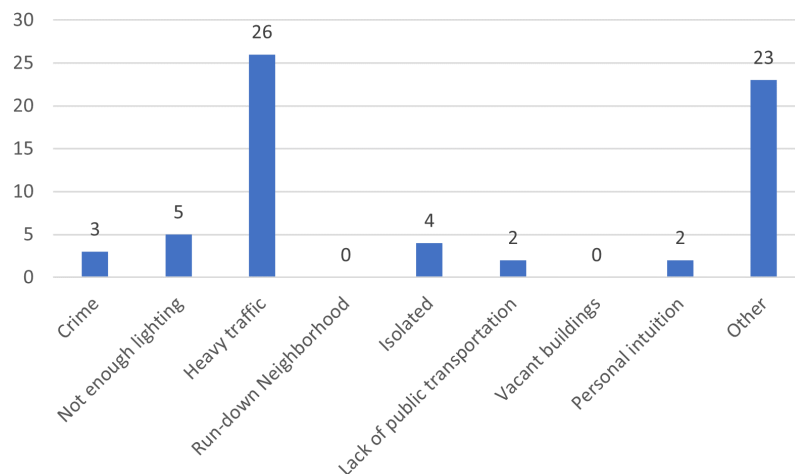


**Figure 2: What makes the usafe places in Ames, Iowa, unsafe?**

Table 1: The most often mentioned emotions felt at unsafe places in Ames, Iowa

| Emotion | Count |
|---------|-------|
| Anxious | 8 |
| Nervous | 7 |
| Risky | 5 |
| Concerned | 4 |
| Agitated | 4 |
| Stressed | 4 |
| Insecure | 4 |
| Worried | 4 |

As we only had the residents place a single point, the area in which they felt the emotion is reduced and potentially incomplete. However, as seen in Figure 1, hot spots were identified in which we were able to see areas in which groups were experiencing negative emotions. There was a high volume of *Other* responses in the study. They can be divided into the following three categories: *Bad Road Design* with 6 responses, *Bad Walkway/Trail Design* with 7 responses, *Other People* with 6 responses, and then the remaining *Other* with 4 responses. For example, the majority of the points presented were drawn because people felt as though there was a high volume of traffic. The points along the same road where they experienced an unsafe situation helped define the road itself as an unsafe place. These results made us think of questions we could ask future participants, e.g., does your attitude, or emotions, change once you turn onto this busy road, or get into a certain vicinity of the unsafe areas?

## 3.2 Emotions Felt at Unsafe Places

The most often mentioned emotions are compiled in Table 1. Beside these emotions, also feeling tense (3x), uneasy (3x), fearsome (2x), and uncertain (2x) was mentioned by the participants. Only once mentioned were the following emotions: fidgety, hazardous, precarious, shaky, uncomfortable, and vulnerable. How to visualize these emotions in a map represents a real challenge. Geoinformation science does not yet have an answer to that. The only idea that comes to mind is to visualize the emotions as an attribute to a place and analyse places based on the expressed emotions.

# 4   Conclusions and Further Research

Overall, we believe the festival was a huge success. The participants were very engaged in the activity and looked like they had fun plotting their points on the map. They were interested in seeing the final results to see if there are any big problem areas in the community. We learned that it takes multiple revisions to create a survey, and even then, there is not a guarantee that it will be flawless. We also learned that we need to have as many multiple-choice questions as possible, so we get the answers that we are expecting instead of answers that have nothing to do with the questions themselves.

The majority of the participants also said that their unsafe place was located close to them – less than two miles – and that they did not access it through public transportation. This could suggest that the public transportation in Ames possibly should be re-networked to provide better public transportation for those having to go through these unsafe places by car or bike. During the festival, some participants seemed confused about the idea of the activity. Some said they never felt unsafe in Ames; some simply said they could not think of any areas that needed work. The city officials also expressed interest in seeing the final results compared with the data they have collected.

This mapping experiment clearly demonstrated the issues of mapping places in a GIS. Currently selected representation in the form of a point is very limited. A place is more than just a point. When reducing it to a point it loses the concept of a place. Some of the places may have other forms and shapes, such as, e.g., lines or polygons. In our further research we aim to study the concept of a place from the perspective of the residents. The approach in mapping emotions as attribute to the location enabled by a GIS seems a rather simple solution. It allows to visualize places at which similar emotions are felt. However, a GIS does not offer solutions for the visualization of intangible objects such as

emotions. Emotions also change over time and do not stay fixed and attached to one particular place. They represent an intriguing challenge for mapping and geoinformation science. Some researchers represented emotions with the help of emoticons. Camara et al. (2021) used emoticons, or emojis, to map out emotions that participants felt during urban mobility. This approach is limited as one can only distinguish among a few emoticons, and clear linkage between the emotion and the emoticon is necessary for mapping. Emoticons also take quite a substantial space in the map and can only be located on a point basis. Pánek (2018) developed this idea further, collected emotions as pinned points, and used a hexagonal grid formed from aggregation of points and a heat map. This is a possible concept we may consider for the visualization of emotions. It shows a grid with different colours and intensity of emotions displayed in the grid.

Nummenmaa et al. (2014) created their own unique computer program titled *EmBody*. In this study, participants were shown stimuli such as words, images, or movies. They were then asked to colour in an empty silhouette of a body, using warm colours to signify movement or activity and cool colours to signify stillness or lack of activity. The results suggest that emotions are culturally universal and could be associated with specific parts of the body. In the future, we would be interested in adopting this bodily silhouette method to further explore the relationship between the body, emotions, and physical spaces. Tyrväinen et al. (2007) utilized a postal survey method to map the social values of urban woodlands in Helsinki, Finland. Results were compiled and visualized using colours to represent positive and negative values, as well as specific feelings such as 'the feeling of forest' and 'tranquility and peacefulness'. This research is specific to pre-defined areas, whereas ours is more open ended based upon the respondents' locations. In the future, it could be possible to work with more defined areas and to visualize our results accordingly.

Within the next two months, we will be conducting more research on mapping unsafe places in Ames as well as mapping favourite places. We will be utilizing a similar methodology in approaching both of these topics. A survey will be created for unsafe places and a separate one will be created for favourite places. After the data is collected, the results will be entered into a spreadsheet and then entered into ArcGIS Pro for further analysis of common clusters. The limitation of the current research is that we were only able to collect forty-six unsafe places. Since our last submission, we were able to collect fifty more points on unsafe places as well as fifty points for favourite places. Over the next few months, we will be analysing the new data in order to formulate more concrete results.

**Notes**

1. The collected data can be viewed following the link: https://arcg.is/1T1ajz0.

**Author Contributions**

T Kosacz and M Gula provided the main idea of the experiment as well as the methodology, results, and conclusion. A Poplin served as an advisor and contributed to the writing of all sections of this paper. T Tobin contributed to Section 4. F Nourin led the data collection group in the phase of the preparation and on the day of the festival.

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# Characteristics of Evocative Places and Emotions Felt at These Places: A Multi-Cultural Comparison

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This research concentrates on evocative places; places that evoke images, emotions, and memories. The main focus is on places at which people recharge and feel at peace. We study the locations of these places, their characteristics, and the emotions people attach to them. Paper-map and digital-mapping experiments were conducted in Hamburg (Germany), Ames and Grinnell (Iowa), Vitória, and Belo Horizonte (Brazil). Based on the data from all 804 collected places on three different continents we designed The Conceptual Model of an Evocative Place. The model structures the characteristics with which evocative places can be described into the four main categories: physical characteristics, experiences, senses, and values. We then discuss the differences in the locations of evocative places (outside vs. inside) and the differences in emotions expressed in different cities. In our further research we will explore the negative side of emotions and the deeper meaning of these differences.

## 1 Introduction

An evocative place is defined as a place that evokes emotions, memories, and images. Its definition is anchored in the classical literature on places. A place is defined as a physical location in a landscape to which people attach a meaning (Cresswell, 2004; Smaldone et al., 2008). Additionally, people may bond with these places emotionally/affectively which is often referred to as an attachment (Altman and Low, 1992; Low and Altman, 1992). A place can then be described with its physical characteristics, the person's individual perception including the memories, images and emotions attached to the place, and uses that occur at this particular location (Bott et al., 2003; Canter, 1977; Pretty et al., 2003).

In our research we concentrate on well-being evocative places. They are defined as places at which people can recharge and feel at peace. We then study the locations of these places in different cities, how people describe their characteristics using words, and how they express emotions they feel at these places. So far, we collected 804 evocative places conducting paper-map and digital-mapping experiments in Hamburg (Germany), Ames and Grinnell (Iowa), Vitória, and Belo Horizonte (Brazil). This contribution aims to overview the multi-cultural differences discovered in the collected datasets.

We are interested in this topic from the perspective of two disciplines. From a geoinformation science perspective it is intriguing to think about a place as an object and how can it be mapped in a GIS (Purves et al., 2019; Winter and Freksa, 2012). The same is valid for emotions which are not typical geographic objects and can change over time and place. From urban planning and design perspective it is beneficial to deepen understanding of places that can contribute to a more pleasant environments at which the citizens feel accepted, heard, and relaxed. Our research aims to contribute to both disciplines.

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**Table 1: Locations and data collected at these locations**

| Location | No of evocative places | No of characteristics | No of emotions |
|---|---|---|---|
| Hamburg, Germany | 191 | 595 | 339 |
| Ames, Iowa | 192 | 552 | 520 |
| Vitória, Brazil | 192 | 495 | 564 |
| Belo Horizonte, Brazil | 48 | 132 | 131 |
| Grinnell, Iowa | 184 | 527 | 542 |

## 2  Research Methodology and Results

The paper-map and digital mapping experiments used for the collection of data about evocative places are similar in their design and research methodology. They are based on a map and accompanied with a questionnaire. A map can be presented on a paper or digitally in the form of a digital interactive map. The questionnaire associated with the map contains categories including the location of an evocative place, descriptions of the self-selected evocative place, emotions felt at this place, questions related to accessibility of this place, its importance for the resident, and some basic data about the participant. The main question asked for the self-selected evocative places was: 'Select a place in the city at which you can relax, recharge and at which you feel at peace'. As people in general have difficulties finding expressions for emotions, we give them a list of emotions complied by Rosenberg (1999) so they can choose the words from the list. This is also practical as it enables to categorize the emotions based on this pre-defined taxonomy. In order to conduct the same experiment in three different languages; the questionnaire, originally designed in German language, was then translated into English and Portuguese. The list of emotions were translated from the original in English to German and Portuguese language. The participants were always able to respond to the survey in their native language. Table 1 presents the number of collected evocative places in each of the cities, the number of words collected describing characteristics of these places, and the number of words describing emotions felt at these places.

Based on this collected data, The Conceptual Model of an Evocative Place was designed categorizing the words collected for the characteristics of the self-selected evocative places (Figure 1). This model includes four categories with which all evocative places can be described. These four categories are: Characteristics, Experiences, Senses, and Values. The category Characteristics includes the physical characteristics of an evocative place. They can be: water, grass, benches, paths, or descriptions of the size, shape, and openness of the evocative place. Experience includes the active experience at this place that includes activities such as jogging, reading; healing experience and restoration such as meditation; emotions includes happy and relaxed; feelings of comfort or different external simulations. Senses include visual senses: a beautiful sunset, a view over the river; sounds, smells, tastes, and temperatures (cold air, warm temperatures). Values are composed of memories related to this place, attachments, stories, and images. The model is well described in the papers by Poplin and her colleagues (Poplin, 2020; Poplin et al., 2021).

## 3  Exploring Cultural Differences

One of the main noticeable differences that can be discussed in depth is the difference in location of an evocative place as found in Europe, Brazil, and the US. The majority of evocative places selected in Europe and Brazil are places that can be found outside. They include parks, beaches, parts of the roads, outdoor coffee places, recreational centres, golf places, farmers' markets. This aspect may be of a particular interest to urban planners and designers. The residents in European and Brazilian cities, those for which we collected data, tend to go out to explore and use public spaces. In contrast, the residents of the cities in the US, tend to spend much more relaxing time indoor. Table 2 summarizes the locations selected in Ames (Iowa) and divides them according to the outdoor or indoor places; 118 were
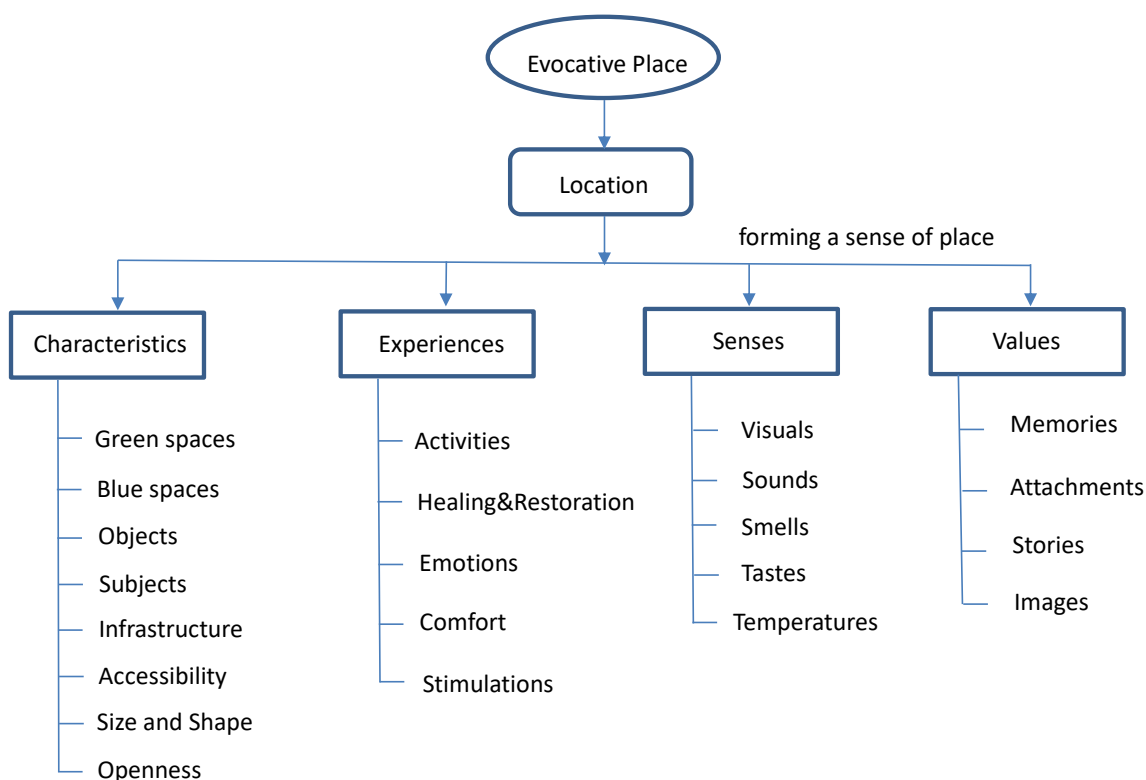
**Figure 1: The Conceptual Model of an Evocative Place** (Poplin, 2020)

located outside and 74 were located inside the buildings. This may have to do with the fact that these cities are car-oriented and enable or almost enforce the residents to move from one location to the other one by car. Moving by car somehow incorporates the philosophy of less walkability and less exploration of public spaces. Public spaces may not, except for organized parks, afford any particular experience and the residents will choose not to explore them. These differences should be explored more in depth in the continuation of this research.

Another noticeable difference is the difference in expressing emotions. Which emotions are selected in which city and how often is certain emotion used in that city. Can we discover some patterns particularly specific for the selected locations? Figure 2 shows the collected emotions presented on Russell's Circumplex Model of Affect (Russell, 1980). Emotions collected for Ames are on the left-hand side and emotions collected for Vitória are on the righthand side. The most often expressed emotions in Ames (Iowa, USA) are relaxed (35), happy (30), calm (21), and comfortable (18). The most often expressed emotions in Vitória, Brazil are energetic (22), open (21), invigorated (19), relaxed (19). It is interesting to observe that the majority of expressed emotions in Ames fall between the categories pleased – sleepy in the south-east quadrant of Russell's model. In contrast, the majority of emotions in Vitória, Brazil falls into the categories between pleased – amused, a more energetic part of the model located on the north-east.

**Table 2: Evocative places in Ames** (Poplin, 2020)

| Place/location | Includes (number of places) |
| --- | --- |
| Outdoor evocative places together (118) | Park (61), University campus (35), Avenue, road, street (13), Coffee place (5), Jack Trice Stadium (2), Recreation centre, golf (1), Farmers' market (1) |
| Indoor evocative places together (74) | University building, hall, home, library (60), Restaurant (9), coffee place (5), Recreation centre, gym (5) |

AROUSED

Energetic (12)
Alert (4)
Inspired (7)
Engaged (9)
Excited (7)
**EXCITED**
Empowered (9)
Eager (5)
Delighted (4)
Productive (5)
Optimistic (7)
Rejuvenated (11)
Loving (6)
Jubilant (5)
**MISERABLE** **PLEASED** Happy (30)
Appreciative (8)
Clear (13)
Friendly (14)
Mellow (11)
Warm (12)
Secure (11)
Quiet (13)
Serene (11)
**CONTENT**
Content (4)
Comfortable (18)
Peaceful (13)
Relaxed (35)
Calm (21)
Tranquil (9)
**SLEEPY**

**DISTRESSED**

**DEPRESSED**

**(a)** Ames, Iowa (Poplin, 2020)

AROUSED

Energetic (22)
Excited (29)
**EXCITED** Animated(11)
Giddy (16)
Amazed (10)
Enchanted(12)
Awed (10)
Inspired (11)
Invigorated (19)
**MISERABLE** **PLEASED** Lively (12)
Wonder (16)
Happy (15)
Joyful (15)
Amused (11)
Appreciative (13)
Open (21)
Friendly (10)
Headed (10)
Safe (10)
**CONTENT**
Serene (13)
Calm (31)
Thankful (16)
Comfortable (14)
Relaxed (19)
Peaceful (31)
**SLEEPY**

**DISTRESSED**

**DEPRESSED**

**(b)** Vitória, Brazil (Poplin et al., 2021)

**Figure 2: Emotions expressed in evocative plaes.** The emotions are organized according to Russell's 1980 Circumplex Model of Affect.

# 4  Discussion and Conclusions

Exploring evocative places in these multi-cultural environments demonstrates some intriguing results valuable for urban planning and design as well as for geoinformation scientists. Mapping evocative places and locations can give ideas to urban planners and designers about places that are comforting for the residents, places at which they can relax. Some of these places show patterns of high concentrations in particular areas of the city. Knowing the locations of these high concentrations may help urban planners and designers studying their specifics and the relation of their characteristics and emotions felt at these places. Additional research needs to be invested in an improved understanding of the physical characteristics of places and their effect on residents' perception and emotions.

Already in 1996, Burrough and Frank (1996) discussed the issues related to the objects with indeterminate boundaries. The problem of their representation in a geographic information science (GIS) has not yet been solved. About then years ago Goodchild (2011) opened up the discussion about the difficulties connected with attempts to formalize places in a GIS. His stimulating and intriguing contribution to the debate was followed by the attempts to define places for the needs and uses in information science and discussions of their main characteristics (Purves et al., 2019; Winter and Freksa, 2012). Research presented in this short paper additionally highlights the issue of the representation of places – in this case evocative places – in a GIS (Poplin et al., 2021). Currently they are represented by a single point, as a point object, which does not satisfy the needs of the visualization of such a complex construct as an evocative place. These places may come in different shapes and sizes and have fuzzy boundaries. An even more challenging task represents an attempt to visualize emotions on a map. Not only emotions do not have well determined boundaries, but they also change over time and place. They can be represented as an attribute of the self-selected evocative place and visualized with a colour as a symbol. Again, this is a very limited representation of emotions. In our further research we will explore different visualizations that can be possibly used for places and emotions. We are currently working on the validation of The Conceptual Model of an Evocative Place. We also plan on studying evocative places on the other, negative, spectrum of emotions. We hope that this research can inspire urban planners and designers to create more positive places at which residents feel happy and at peace.

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# My Favourite Place – Exploring Reasons for Place Preference

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In this paper, we investigate sense of place in the context of *favourite places*, exploring the reasons people give for preferring their favourite places over other places. We conducted an online survey in which we asked 114 respondents to tell us about their favourite places in New Zealand, through textual descriptions and specific, structured questions. Our results show that favourite places are most strongly preferred for their attractiveness, their intrinsic value, and the feelings of safety they engender. Economic value and genealogical links were least important in place preference. Beach environments were also given as common reasons for place preference, and activities were an important factor, with people mentioning friends and family, weather and recreational pursuits such as walking and beach activities. Our analysis also showed correlation between place attachment, identification and spiritual connection for favourite places.

## 1 Introduction

Increasing urbanization and climate change are impacting many of the kinds of environments that support mental and emotional well-being. The protection of favourite places is thus an important consideration for government, residents, policymakers, urban planning groups, and management organizations. A better understanding of the reasons people have for preferring some places over others can enable policymakers to make thoughtful decisions about the community and landscapes, as they consider people's sense of place values during urban planning and management.

Favourite places are places people prefer or like more than others (Korpela, 1992). Favourite places are often located in common areas such as parks, recreational facilities, forests, and in natural settings (Johnsen, 2013; Lecompte et al., 2017; Manzo, 2003; Sampson and Goodrich, 2009), and are liked for their scenic beauty, the activities they support (Brown and Raymond, 2007), or the goods and services they provide (Kantola et al., 2018). They may be visited for their restorative benefits (Korpela and Ylén, 2009), allow self-reflection and thought (Proshansky, 1978), and improve people's well-being, happiness, and enjoyment in life (Korpela et al., 2020).

In this paper, we describe the results of a study that collected data about favourite places in New Zealand from 114 respondents and the reasons for their preferences. We used a web application[1] called 'My Favourite Place' to collect responses to 16 place statements using a 7-point Likert scale; the name and location of respondents' favourite places and text descriptions explaining why they were important.

Our study addresses the following research questions:

1. Which are the most important reasons for place preference?
2. How are different reasons for place preference correlated with each other?
3. What kinds of activities do people associate with their favourite places?
4. How are favourite places geographically distributed?

## 2   Related Work

A number of studies have investigated people's attachment to specific places such as the Otways region in Victoria, Australia (Brown and Raymond, 2007); Brittany, France (Lecompte et al., 2017); Westland, New Zealand (Sampson and Goodrich, 2009); Bannockburn, New Zealand (Stephenson, 2008); Camden, England (Lai et al., 2020); Akaroa, New Zealand (Stephenson, 2008); the Kangaroo Islands, Australia (Brown and Raymond, 2007); and the Appalachian Trail in United States (Kyle et al., 2004). However, these studies focus on the locations chosen by the researchers and the values people attach to them, rather than specifically identifying favourite places.

A range of different aspects of people's experiences of place (Relph, 1976; Tuan, 1977), known broadly as sense of place, have been studied, including physical attributes (Kyle et al., 2004), social relations, recreational activities, background knowledge, ancestry, place attachment and place dependence (Brown and Raymond, 2007), pride (Magee et al., 2016), place identity (Brown and Weber, 2013), names and locations (Lai et al., 2020), occupation (Sampson and Goodrich, 2009), and landscape values (Brown and Brabyn, 2012). Again, these have not been connected to people's preference for particular favourite places, and our research addresses this gap.

The study of place has been previously investigated through the use of text, with methods including: extracting text from blogs or magazines that refer to activities, attractions, events, locations, and other miscellaneous topics (Adams and McKenzie, 2013); creating place profiles from geo-referenced Twitter tweets about users' activities and events they had attended (Lai et al., 2020); and extracting text descriptions attached to images for place information (Bahrehdar and Purves, 2018) or place description (Wartmann et al., 2021). We make use of similar analysis methods to some of this work (e.g., word clouds, part of speech tagging), but apply them to a new problem: the study of place preference.

## 3   Method

We created a web application that asked respondents to: identify a favourite place by clicking on a map; provide the name of the place as specifically as possible; explain why it was their favourite place, and answer the 16 statements shown in Table 1 using a 7-point Likert scale. The statements were designed to reflect different aspects of sense of place, and were extracted from the literature (see Table 1 for references). The order of the statements was randomized for each respondent.

Ethical approval was obtained[2] and participants for the study were recruited through social media postings on selected, relevant fora on seven different platforms (Facebook, Twitter, Instagram, LinkedIn, Reddit, Pinterest, and Tumblr). In the time period from the 6th of June 2020 to the 31st of December 2020, 114 responses were collected from 60 males and 54 females of which 104 were citizens or residents, while 10 were non-citizens or non-residents. 25% of respondents were between 20 and 29 years old, 21% between 30 and 39, 21% between 40 and 49 years of age and remainder were outside these age groups. COVID-19 movement restrictions were in place in New Zealand intermittently during that period.

## 4   Results

We analysed reasons for place preference in two ways. Firstly, we calculated the weighted mean Likert score (degree of agreement) for each of the 16 statements by weighting each response (from *entirely disagree* with weight 1 up to *entirely agree* with weight 7). Table 1 shows these figures in descending order, and indicates that across all favourite places, the *attractive* value had the highest weighted mean Likert score, indicating that attractive scenery, sights, smells, or sounds are key to people's appreciation

**Table 1: Place values.** Place value expressions and mean likert scores

| Statement (*Variable name used for later reference*) | Reference | Mean |
|---|---|---|
| I value this place for the attractive scenery, sights, smells, or sounds (*attractive*). | Brown and Raymond 2007 | 6.66 |
| These places hold their own value and deserve to be here, no matter what I or others think about them, or even if they are actually used (*intrinsic*). | Brown and Raymond 2007 | 6.04 |
| I feel safe at this place (*safety*). | Erdiaw-Kwasie and Basson 2018 | 5.95 |
| I like this place because of its recreational outdoor activities (*recreational*). | Brown and Raymond 2007 | 5.91 |
| I value these places because they provide a variety of plants, wildlife, and marine life (*wildlife*). | Brown and Raymond 2007 | 5.89 |
| I am very attached to this place (*attachment*). | Brown and Raymond 2007 | 5.67 |
| This place is valuable because it represents NZ identity (*identity*). | Brown and Weber 2013 | 5.61 |
| I get more satisfaction from visiting this place than any other place (*dependence*). | Brown and Raymond 2007 | 5.60 |
| I identify strongly with this place (*identification*). | Brown and Raymond 2007 | 5.30 |
| These areas are valuable because they are wild, uninhabited or relatively untouched by human activity (*wilderness*). | Brown and Weber 2013 | 5.18 |
| These places are valuable because they help produce, preserve and renew air, soil and water (*ecological*). | Brown and Weber 2013 | 5.00 |
| This place is valuable because it is a place where people can continue to pass down memories, wisdom, traditions or a way of life (*memorable*). | Brown and Weber 2013 | 4.52 |
| I value this place because it is spiritually special to me (*spiritual*). | Brown and Raymond 2007 | 4.46 |
| I like this place because of the stories and myths that links me to this place (*relationships*). | Stephenson 2008 | 3.94 |
| I value these places for economic benefits such as tourism, forestry, agriculture, or other commercial activity (*economic*). | Brown and Raymond 2007 | 3.51 |
| I like this place because of my genealogical links to the land (*genealogical*). | Stephenson 2008 | 3.17 |

**Figure 1: Place statement preference.** Percentage of responses for each statement by Likert Scale value

of the environment. *Intrinsic* value was second most important, followed by *safety*, *recreational*, and *wildlife*. Figure 1 shows the percentage of Likert scores for each statement, and indicates the relatively low importance of *economic* and *genealogical* values in place preference. However, the low importance given to genealogical connections in this data may be influenced by the mix of respondents in our survey, and in particular the high proportion of recent immigrants in NZ society (and note that 10 respondents were non-residents of NZ), meaning that few respondents have had the opportunity to form genealogical links to the land. Thus this finding requires more investigation, and in particular, examination of the connections between place preferences and ethnicity or historical/familial connections to land, particularly with respect to Māori, the indigenous people of New Zealand.

We also explored reasons for place preference through analysis of the textual descriptions given in response to the question 'Why is this your favourite place?' After using the Stanford Part of Speech Tagger[3] to identify nouns and adjectives, we generated the word clouds shown in Figure 2 using Ed Wordle (Wang et al., 2018). The words are sized according to word frequency (largest is most frequent). One of the most frequently mentioned adjectives refers to attractiveness (beautiful); confirming the Likert scale results. As well as value adjectives (great, amazing, special, nice, good); size descriptions were also important (long, small). The noun word cloud highlights the importance of specific environment types (beach, mountain, island); temporal aspects (summer, time); personal elements (family, fun, memories); and activities were mentioned frequently.

We further analysed and manually counted activities the respondents described as important for their place preference (again, through text analysis of the response to the question 'Why is this your favourite place?'). At 62 locations, people engaged in some 35 activities in their favourite places. The analysis showed that 18% engaged in walking activities, 11% beach activities, 4% bird watching, and 3% camping.

Our analysis showed that some of the statements were positively correlated (Pearson Product Moment Coefficient) with each other. The highest of these were: the *spiritual* and *identification* statements had a 0.64 correlation, *attachment* and *identification* had a correlation of 0.62, and *wildlife* and



**(a)** Nouns



**(b)** Adjectives
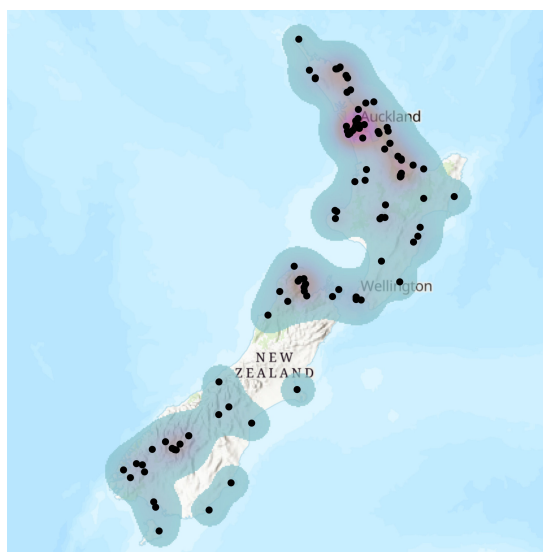
**Figure 2: Place preference words**

**Figure 3: Favourite places**

*ecological* had a correlation of 0.61, all of which are considered moderate levels of correlation (Schober et al., 2018). The first two of these indicates that respondents who valued their favourite place for spiritual reasons often also felt strongly identified with it, and those who strongly identified with their favourite place likely also showed strong place attachment. The third correlation confirms the strong association between wildlife and ecological value, but surprisingly both showed weak correlation with the intrinsic, wilderness, and aesthetic statements.

Favourite places were found in 15 regions across New Zealand as shown in Figure 3: 14% were found in each of Auckland (New Zealand's biggest city) and the Bay of Plenty, 11% in Northland, 10% in the Tasman region, and 9% in islands around New Zealand. The highest average Likert mean score (5.71) was in Northland, followed by Canterbury (5.56), indicating higher agreement with statements across the board. Five regions scored the maximum possible mean score (7) for the *attractive* statement: Marlborough, West Coast, Canterbury, Taranaki, and Manawatu, although these regions had low (2–4) response numbers. The West Coast also scored a high Likert mean score of 7 for the *safety* value.

## 5   Conclusion

This research has shown that participants valued places most importantly for being attractive, for their intrinsic value, or for feelings of safety associated with them, with comparatively low importance given to economic value or genealogical links. The emphasis on aesthetic beauty, recreation, activities, and wilderness values was also demonstrated with the word clouds, suggesting that favourite places are places of beauty, enjoyment, security, activity, fun, or to visit while on holiday. The results further indicate that walking, beach, and bird watching activities are important, and that beach environments are popular.

### Notes

1. https://myfavouriteplace.massey.ac.nz/favourite.html
2. Massey University, low-risk ethical approval, Number 4000022298
3. https://nlp.stanford.edu/software/tagger.html

### Author Contributions

J Richardson developed the website, performed recruitment, data collection, and data analysis, and wrote the first draft of the paper. K Stock initiated the favourite places idea, supervised the study, and revised the paper.

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# (Un)Represented Places – A Case Study of Two Sports Venues in Gelsenkirchen and Dortmund

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Maps represent a host of geographical features, but places are usually not among those depicted in detail. This is despite the various functions of a map, many of which refer to places as the common context in which geographical features are used, receive meaning, and even gain identity. Using the example of two sports venues, this paper explores the ways places implicitly influence what information is represented on a map and how it is represented, even if the places themselves are not represented. The findings presented suggest that the interpretation of maps rely partly on the way we perceive places and thus highlight the need for further research related to the interpretation of maps. This way of thinking may, in the long term, help to identify better ways in which places can be represented on maps.

## 1  Introduction and Related Work

Places are described by a variety of characteristics, many of which can hardly be directly represented in a map. For example, the experience of a place (Malpas, 1999) and the resulting place attachments (Agnew and Duncan, 2015; Low and Altman, 1992; Tuan, 1977) are difficult to represent, and the sense of place (Kyle and Chick, 2007; Tuan, 1977, 1979) is not easy to convey. Other qualities, however, such as the place ballet (Seamon, 1979; Seamon and Nordin, 1980) taking place, are far better represented, even if the complexity of the place ballet with regards to the habits, routines, and the environmental affordances that define it seems to exceed that of a map. An overview of the many qualities of places can be found in works by Cresswell (2004) and Hamzei et al. (2020).

As opposed to the view that places are difficult to represent on a map, Casey (2002) argues that maps relate to embodied experience and are more than collections of geometries, which is why they are capable of conveying places. In an extreme form, even odour can, e.g., be conveyed in addition to visual stimuli (McLean, 2013). The mediation of places is thereby supported by narratives, and narratives mostly presuppose places, according to Pearce (2008). To this end, it is advantageous to also employ paradigms beyond the traditional ones (Mocnik and Fairbairn, 2018). How particular characteristics of places can be conveyed has been studied in more detail by Glebova (2021) in case of potentially overlapping areas and their fuzzy boundaries; by Harvey (2020) in case of place ballets; and by Dolma (2021) in case of place identity. However, not only can places be represented in a map but our experience of places can potentially also be traced through map contributions (Mayer et al., 2020; Mocnik, 2020). Besides the descriptive qualities of maps, also the 'ability to change the way we think about and act upon places' and thus prescriptive and performative qualities have been discussed (Aalbers, 2014a,b,c).

In this paper, we use two traditional football clubs and their stadiums to study how qualities of places become manifest in the map, in our case OpenStreetMap[1] (OSM), and how places suggest different mapping behaviours. For this purpose, we focus on the venues of the *Fußballclub Gelsenkirchen-Schalke 04* (S04) and the *Ballspielverein Borussia 09 Dortmund* (BVB)[2], because they are mapped differently despite their spatial proximity in the Ruhr as well as located in a similar environment. The two clubs are also among the football clubs with the largest membership worldwide and convey correspondingly strong identities.

## 2   Two Examples of Places

In this section, we discuss two idiographic examples of places: the sports venues *Veltins-Arena* in Gelsenkirchen and the *Signal Iduna Park* in Dortmund (Figure 1).

**Veltins-Arena in Gelsenkirchen.**  The traditional football club S04 practices, plays, and 'lives' in the area *Arena Park* in Gelsenkirchen. This area houses several training grounds, car parks, the large stadium *Veltins-Arena* as well as a state school, a swimming pool, and further facilities. These geographical features are represented in OSM and shown on the map, but obviously the place is more than this set of physical features. The combination of the features on the map, their geometry, and their naming, however, gives us an idea of this place, as we will argue in the following.

The significance of the place for S04 supporters is enormous, especially as numerous supporters flock to their football club at the weekend. There are several references on the map that highlight the corresponding identity and significance, especially from days gone by. Although the *Parkstadion*[3], which shaped the experience of watching the club play for decades, has since been demolished and replaced by the Veltins-Arena, various streets still point to its former existence. The *Parkallee* and the *Stadionring* are both arranged in an elliptical shape around the former Parkstadion and point to its still identity-forming function, which has now been taken over by these two streets. Analogously, the *Arenaring* assumes this function for the new stadium. The street names *Ernst-Kuzorra-Weg*, *Stan-Libuda-Weg*, *Rudi-Assauer-Platz*, and further ones can be found on the map. They are also reminiscent of past times by carrying over the identity shaped by former players and managers into current times. In addition, four major streets border the Arena Park, as is clearly shown on the map, which suggests that when crossing these very streets, the sense of entering this place arises.

Not only the previously discussed identity-forming function can be discerned by the map. Also, the place ballet performed at every home game can be surmised. The parking spaces, many of which are mapped individually, can be understood in this context, as well as the several paths that lead radially to the stadium to direct the streams of visitors. This provides an idea of the way in which the football supporters who have travelled to the stadium move towards it in order to watch the game. Many further details are included in the map, especially in the immediate vicinity of the Veltins-Arena, such as artwork, benches, guideposts, surveillance cameras, ticket offices and gates, et cetera. These details may be missing on the map in other contexts but here they provide an impression of the environment in which the supporters wait for the game. Much of the infrastructure shown is focused on the accessibility of the stadium and barriers such as fences are completely absent from the representation. The geometry of the stadium is depicted in equal detail and provided with a correspondingly extensive semantic description by means of tags. It is thus apparent that the stadium has a special significance and therefore forms the highlight of the place ballet.

**Signal Iduna Park in Dortmund.**  As in the previous example, the map representation of the *Signal Iduna Park* in Dortmund (previously *Westfalenstadion*) and its surrounding area suggests a special meaning, various affordances, the taking place of a place ballet, and even an identity-forming effect. Immediately adjacent to the Signal Iduna Park, the venue for the home games of the BVB, is the *Stadion Rote Erde*, which was previously used by the BVB but is now a multipurpose sports facility.

The two stadiums strongly differ in their significance: one is the identity-forming home of the BVB as well as the pilgrimage destination for the fortnightly major football event for several tens of thousands of supporters, while the other is used by athletes to train and compete. This difference manifests itself in the way these stadiums are described semantically and geometrically as well as in very different mapping behaviour. The Signal Iduna Park is, for instance, semantically described by 23 tags, while the Stadion Rote Erde by only 6 tags in its entirety, the same number as the BVB training facility.
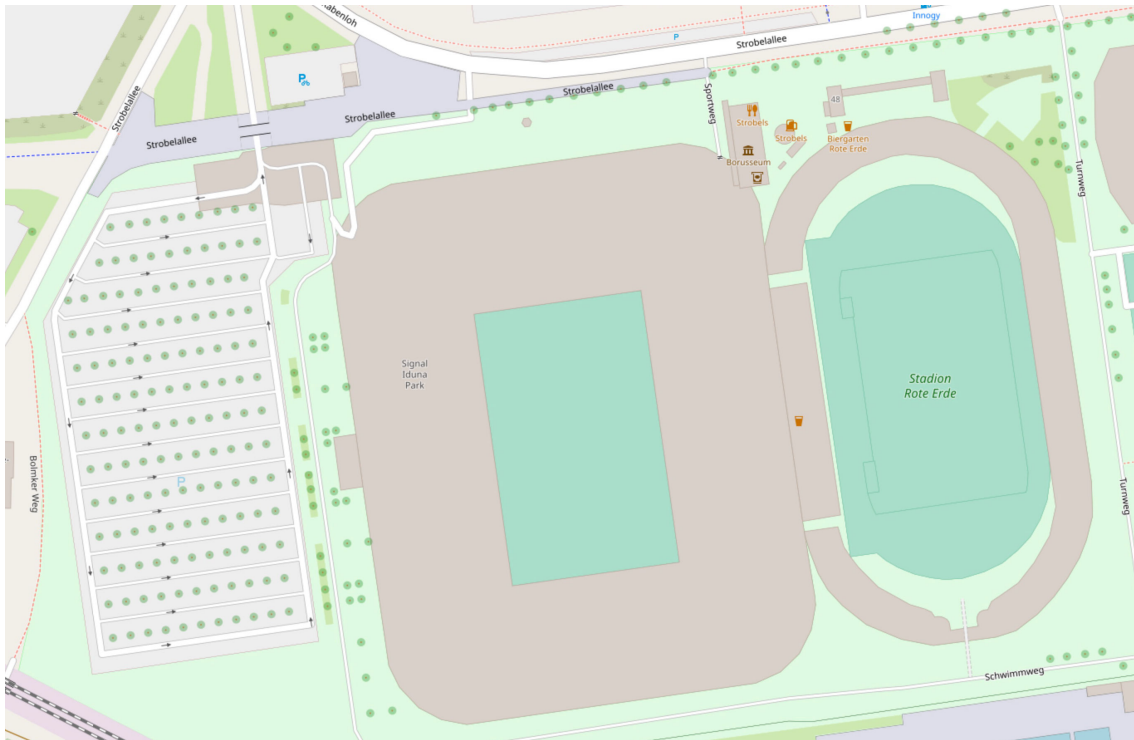
**(a)** Signal Iduna Park and Stadion Rote Erde, Dortmund
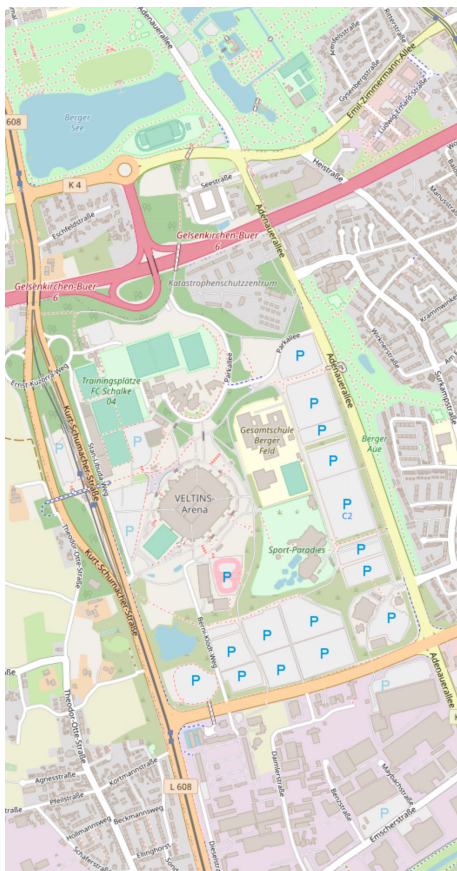


**(b)** Arena Park, Gelsenkirchen



**(c)** Veltins-Arena and former Parkstadion, Gelsenkirchen

**Figure 1: Two sport venues in Gelsenkirchen and Dortmund.** Copyright by OpenStreetMap contributors (cf., www.openstreetmap.org/copyright)

This is despite the fact that the spatial mapping context of both stadiums is identical and therefore both stadiums could potentially be described in a similarly differentiated way. Information about the address, the name in different languages, the building date, and other attributes are missing in case of the smaller stadium. In contrast, various features inside the Stadion Rote Erde are represented on the map, such as the football pitch, a grandstand, a beverage outlet, long jump facilities, and several running tracks; in case of the Signal Iduna Park, only the football pitch is drawn while the grandstands, beverage outlets, and further features remain unmentioned.

It is interesting to consider the mapping behaviour in the wider context of the area in which the two stadiums are located. The Stadion Rote Erde is primarily of interest for practical use as a sports facility and therefore mapped in terms of that function. The charged meaning of the Signal Iduna Park, which is reflected in the comprehensiveness of the semantic description, is also reflected in the level of detail of the surrounding area on the map. In contrast to the semantic description of the stadium, however, the focus here is on the representation of many individual features, such as various pubs to visit after the game, an information board about the place, more than 200 individual trees, and even 15 manholes. The geometric representation of the *Strobelallee* directly in front of the Signal Iduna Park is also detailed, as many supporters meet there before the match; however, this is not the case for many other streets in the area that do not have the same role in relation to the place ballet. As the example of the Signal Iduna Park, the Stadion Rote Erde, and their surrounding areas shows, not only can the place itself be inferred from what is represented but the place itself influences the way in which geographical features are mapped.

## 3   Discussion and Conclusion

Places are usually not explicitly represented on a map because it is unclear how to represent many of their qualities at all. However, as we have argued with the example of the two sports venues, both the mapped features themselves and the way they have been mapped are indicative of places as complex entities. The map readers can thus recognize the places and to some extent even construct them independently of their own experience. These examples also demonstrate how fluid the boundary is between how *what is mapped* conveys information about the place (e.g., the name 'Ernst-Kuzorra-Weg') and the conclusions we draw from the *mapping behaviour* (e.g., related to the semantic description and the geometric representation). It is impossible to clearly demarcate one from the other.

Although it is indeed possible to convey places by means of a map, the inclusion of idiosyncratic sensations is often not intended, as can be seen in the example of OSM and its folksonomy, because it can lead to ambiguity and misinterpretation of the map. Yet, the difference in meaning and size of the Signal Iduna Park and the Stadion Rote Erde can be meaningfully interpreted despite the unexpected non-uniform representation, in particular of the labels (cf., Figure 1a). Possible explanations for the interpretability are the important role of geometry in the representation and that the semantic information transported by tags is not immediately apparent on the map in its entirety. The coarse granularity of the OSM folksonomy and potential prior experience are further possible explanations (Mocnik et al., 2017).

In the two case studies of this paper, identity is largely conveyed through the history of the clubs and associated with the place. Many more examples would need to be studied in order to conclude how identities and mapping behaviour are linked in a systematic way. This would, in turn, lay the basis for exploring how identities and place ballets can be better represented on the map, such as in case of the place ballets taking place on a match day in Gelsenkirchen and Dortmund. In the long term, this could lead to more individual representations that adapt to the various map readers and points in time.

**Notes**

1.  It should be noted that OSM differs from many other mapping projects in that we can access the history of the data, which limits this case study. We refer to the status of 9 October 2021.
2.  The first author of this publication has first-hand experience with these places.
3.  The Parkstadion itself has replaced the *Glückauf-Kampfbahn* as the venue for home games.

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# From 'Hood' to Good – Dealing with Stigmatizing Spatial Representations in Everyday Life

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Media reports on everyday life in US-American under-resourced and racialized neighbourhoods predominantly cover one theme: violence and crime. The tragic occurrence of shootings, dead people, and gang crime are at the centre of news headlines. This singular perspective on such areas and their residents produces a stigma that affects people's everyday lives and yet does not cover what it means to live in such an area. By using qualitative interviews with residents and representatives of community organizations, we spotlight the daily practices that illustrate the contested symbolic meaning of the 'hood' and the potential redevelopment discourses of the Chicago neighbourhood South Shore. The data provide insights into the heterogeneity of the social groups that live in the area and execute practices of social distinctions attached to spaces, as they become apparent with our examples of busy corners at commercial strips and the planned Obama Presidential Center.

The South Shore community on Chicago's South Side carries a reputation of being a postindustrial urban space ridden by gang violence, shootings, and severe poverty. The media jumps on any incident of violent crime in their daily reporting, thereby constantly reproducing the stigma of a derived urban community. However, everyday life in communities like South Shore, which are portrayed as 'vortexes and vectors of social disintegration' (Wacquant et al., 2014, p. 1274) is more complex and complicated than it is often suggested in public imaginaries and media discourses. Besides residents' attempts to refute and resist such territorial stigma through everyday spatial practices (Sisson, 2021, for an overview), stigma and negative representations in news media are frequently internalized by residents and described as emotionally hurtful. Such diversity in dealing with and responding to the stigma often goes missing in media reporting and only becomes visible through conversations and interactions with locals. In other words, media discourses do not paint a picture of social heterogeneity and do not mirror what it means for the residents to live in an underresourced, defamed, and marginalized neighbourhood – an area to which residents refer to in the code of 'out here'. South Shore's residents are not a homogenous social group, as outsiders frequently imagine them in reference to 'black urban poor'. In order to be able to relate the multiple space constituents of South Shore that correspond with the heterogeneity of the population, we use the theoretical approach of Löw's Sociology of Space (2016). In her relational space concept, space is constituted by two analytically distinguishable processes: spacing and the operation of synthesis. 'Spacing [. . . ] means erecting, deploying, or positioning' (Löw, 2016, p. 134) social goods and people to create symbolic meaning over these elements and their arrangements. The latter makes it possible to combine ensembles of goods and people into one element. The second process is the 'operation of synthesis, [which] is required for the constitution of space, i.e., goods and

people are amalgamated to spaces by way of processes of perception, imagination, and memory' (Löw, 2016, p. 134). Operations of synthesis make connections of social goods and living beings to spaces. According to Löw (2016), divergent milieus attach symbols to the locale and synthesize spatial entities in their narratives accordingly. Depending on the milieu, people produce spaces and give meaning to spaces regardless of their emotional attachment to or alienation from these spaces. In light of these theoretical considerations, we will explicate the complexity and multiplicity of residents' lived everyday experiences in South Shore, demonstrating that South Shore's socio-spatial order is highly heterogeneous and determined by people's socialization backgrounds.

It is important to clarify in this respect that Cosima Werner and Tilman Schwarze did not approach the community as part of the same research study. Instead, research in South Shore was done separately, and only at a later research colloquium, similarities and differences in the data were analysed and compared. While Cosima Werner mainly interviewed people from low-income households whom she met during her ethnographic research on convenience stores, Tilman Schwarze talked to community activists and residents with stable social structures and regular income. His research included discourse analyses of media reports about South Shore as well as interviews with representatives of community organizations. We understand media reports as well as the narratives of the interviewees as platial information that we can use to analyse how these information are produced, shared, rejected, contested, and transformed. Our various interviewees have in common that they live in the same neighbourhood, interact in public spaces, and relate with one another in daily routines. They refer to similar social spaces in South Shore but constitute them differently – according to their lived realities. The differences are meaningful notions of social distinctions as they express invisible borders between one another. They distinguish between those who belong to the 'code of the street' and influence the image of the area as neighbourhood with high crime levels, and those who orient their lifestyle towards 'decency' (Anderson, 2000) and who have an interest in reframing the image of the neighbourhood from 'hood to good'.

It is this conflictual and complex configuration of different living conditions and socio-spatial associations and imaginaries with the South Shore community that we seek to untangle here. Our analysis focuses on different spatial locations and arrangements within South Shore to illustrate these configurational differences and conflicts. South Shore faces economic disinvestment alongside its major economic corridors, resulting in food deserts, a lack of employment opportunities, and higher crime levels. By the reference to 'out here', some residents view the neighbourhood as a socially neglected area beyond the influence of city authorities, their concerns, and services. In such an area, other rules apply that are deviant from general understandings and rules of society. One interviewee expressed: 'An accident will cover you in blood out here', referring to the high shooting rates that impact her practices of everyday life, perceived security, and general ability to trust.

What another interviewee mentioned as some would 'act like ghetto' included practices that correspond with living in an enclosed space where people face isolation, criminalization, and precarity they cannot escape from. Those people recode the stigmatizing image of 'ghetto' to what we code as 'South Shore as a hood', in refence to Richardson and Skott-Myhre (2012). 'Hood' addresses the sense of Black urban subculture with its symbols, legacies and realities with meaning for the individual identity. It is their lived reality as many are engaged in the street economy and as an accessible perspective. Living in the 'hood' is at the same time the result of the people's socio-economic precarity but also a way to reformulate the stigma into a more positive connotation with symbolic meaning. Therefore, references to 'life in the hood' become a discursive-symbolic strategy to mitigate and deal with the daily exposure to violence and crime. In contrast, others are exposed to their activities and gang-related crime.

The residents have an understanding for which localities relate to gang activities. People use them, engage there with others, watch carefully the activities, or avoid them according to their perceptions. By using the example of a street corner at one of South Shore's commercial strips will allow us to demonstrate how this corner functions as the local "agora" in the 'hood', where formal (such as retailing, bus services, etc.) and informal 'infrastructures' (supportive people, information, etc.) meet (Simone, 2004). In that agora, people in severe poverty search for resources – such as social contacts, money or food, of the goodwill of anybody – anything that helps a bit to make it from day to day. However, those residents, who are economically more stable, view those corners as lawless, dangerous, and locations where 'you got the gang bangers standin' on these corners', as an interviewee said. Several of these street corners exist in the community, and residents can clearly demarcate their spatial

boundaries and delineate their socio-symbolic meanings. We show how such corners frequently become the battleground for gangs about their gang territory and power over the local drug market, which, in turn, reproduces the territorial stigma of South Shore as 'ganginfested'.

Gang shootings make it to the newsrooms of broadcasters and newspaper publishers, but their underlying circumstances do not. Depending on their lifestyle orientations and socio-economic milieus, residents relate to this street culture by either being part of it or rejecting it. Being part of it is living the 'hood lifestyle', whereas rejection takes place through various spatial and political practices, from avoidance of those spaces in daily spatial routines to political mobilization against them by demanding from local authorities to close liquor stores, which are blamed for encouraging street loitering and violence. Thus, 'corner spaces' become the frontline for residents over defining what makes South Shore the community it is and what socio-symbolic meanings are attached to the community. We, therefore, aim to explicate the contested symbolic meanings of the spatial stigma, its effects on the residents, and their responses to them in their daily practices.

Yet and despite racist and discriminating practices in housing provision and other forms of state spatial strategies (Brenner, 2004) such as political gerrymandering to redlining in the past that turned South Shore into an under-resourced neighbourhood, South Shore today remains an area that, in comparison to other Black neighbourhoods in Chicago, still has a stable level of homeowners, decent schools, and church organizations. South Shore continues to have a solid and still affordable housing stock for a lakeside community, a great public transport system to downtown Chicago, and multiple beaches and parks along Lake Michigan. South Shore constitutes a livable neighbourhood with nice amenities and a strong sense of belonging for some residents. South Shore comprises a centre for African-American culture and arts whose legacy and history of African-American empowerment and political activism remains an important lieu de memoire. The label of a 'hood' becomes a burden for those people who experience negative consequences of living there and who need to leave behind the image for personal interest. The stigmatizing image attached to South Shore is resisted and opposed because it further contributes to the marginalization and peripheralization of the community as under-resourced. As stated by one community resident: 'We need something to dispel the myth that we have some type of cultural deficit, that we have some type of social deficit, that we are social'.

It is these amenities that have recently put South Shore into the spotlight of urban redevelopment efforts. In 2016, the Obama Foundation announced that it would build the Obama Presidential Center (OPC) into a nearby park, Jackson Park, which borders South Shore on its northern end. The OPC will be an $830 million, 20-acres mega-infrastructural project, encompassing a 235 feet museum tower, a forum, several parks and gardens, and recreational facilities. There are plans to accompany the OPC with a Tiger Woods-designed golf course which would combine two existing golf courses in the area into one PGA-Championship course. While some residents hope the OPC will spotlight the area and turn it into a speculative investment hub, including new investments into vacant storefronts alongside its major economic corridors, others fear increasing property taxes, rents, and living costs, which would subsequently displace particularly low-income residents. The OPC development follows in the footsteps of a new wave of urban redevelopment and gentrification that is moving southwards in Chicago. This latest wave of redevelopment and gentrification has its own precursor with the goal to "bite the monstrosity" of the specter of ghettoization that masters the neglected areas for decades (Draus and Roddy, 2016). Sometimes the precursors are subtle as they appear in the upheaval of authentic blues bars (Wilson, 2018). Sometimes they generate massive media recognition, such as the opening of Whole Foods, a pricy organic supermarket, or the construction of the OPC. With them comes the discursive construction of legacies: commercial strips as striving areas in the past; Blues as an internationally rewarded music genre and its bars as little shacks where legacies once played; the Obamas – especially Michelle Obama – who made it from South Shore to the White House, like former mayors of Chicago who made it to the city hall without turning their back to their origin from the city's South Side.

Current redevelopment efforts near South Shore also speak to the conflict over the sociosymbolic meaning of space and place, which we explicate through our street corner example. The history and legacy of territorial stigmatization, advanced marginality, economic precarity, and racial segregation provide the groundwork for redevelopment efforts insofar as urban growth machines can build their growth narrative on the necessity for economic renewal of those spaces associated with danger, violence, and vice. Economic development is framed as the silver bullet for all problems in South Shore, from gangs, violence, loitering, unemployment, and vacant storefronts. Those residents for whom the street corner represents the 'ghetto' support the OPC to make the community safer and more prosperous.

However, the promise of the OPC growth machine to bring investment and renewal might not resonate with those for whom the street corner represents their 'hood' since, for them, everyday life in South Shore is less about the long-term economic and cultural development and opportunities but dealing with the daily struggles of violence and poverty in the here and now. Thus, we seek to explicate how social milieus determine spatial imaginaries and associations in the present, and how they inform people's expectations for the production of space in the future.

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# Reclaiming Place Through Marginalized Narratives: A Critical Geography and Humanistic Approach to the Cartographic Visualization of Beyoğlu, Istanbul

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There exists an increasing need and trend to visualize a collective sense of place based on personal experiences and memories. This is especially common among counter-mapping, whereby the mapmakers, whether an individual or a group, appropriate traditional tools to highlight otherwise marginalized narratives. There are multiple challenges of visualizing experiences and memories with GIS technologies and using conventional cartographic techniques. Experiences and memories are often expressed as text and are rich in information. However, they rarely provide spatially precise and logically consistent spatial data suitable for GIS technologies. Using the *Beyoğlu – I will survive* map as a case study and feminist visualization principles, I propose unconventional visualization techniques in this paper to address these challenges and present what is gained and lost when these techniques are used.

## 1   Introduction

It is increasingly acknowledged that maps are instruments of power and gain meaning recursively as they are produced and consumed in different contexts (Kitchin and Dodge, 2007). This realization is closely related to the practice of counter-mapping – the appropriation of the map as a tool to subvert the status quo and elevate marginalized narratives, which refers to the perspectives that are underrepresented, or not represented at all, in official maps (Peluso, 1995). Within counter-maps, there exists a need to collectively visualize a sense of place through mapping experiences; however, the existing conventional cartographic visualization techniques that serve this need have their limitations.

In recent years, telling stories with maps has been popular in both practice and research. Research has not only focused on how maps tell stories (Roth, 2021), but also on how *well* maps tell stories (Mocnik and Fairbairn, 2018). Specifically, when these stories are originally represented in text, to represent them using cartographic means, it is necessary to improve 'the spatial expression of time, emotions, ambiguity, connotation, scales, as well as the mixing of real and fictional places, dream and reality, joy and pain' (Caquard and Cartwright, 2014, p. 105). While some researchers have previously dealt with mapping place-based experiences and developed unconventional techniques (Kelly, 2019; Knowles et al., 2015), little research has been done on how these maps are perceived by the users.

The *Beyoğlu – I will survive* map (or 'the Beyoğlu map' in short) is a counter-map example that aims to reclaim Beyoğlu – a neighbourhood in Istanbul, Turkey – by highlighting memories and places that

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reflect the neighbourhood's character. Recent urban development projects have led to an increasing loss and transformation of small businesses and public spaces in Beyoğlu. To raise awareness about this loss and create resistance, the Center for Spatial Justice (MAD) asked the neighbourhood's aficionados which memory places – whether surviving or lost – give Beyoğlu its character and the experiences, feelings, and thoughts they associate with those memory places. In so doing, they aimed to present the neighbourhood from the people's perspective rather than that of the status-quo.

In an attempt to improve cartographic visualization of the memory places, I reimagine the Beyoğlu map in this paper[1] with both the feminist principles conceptualized by D'Ignazio and Klein (2020) and the content of the memories submitted to the project. Feminist literature is selected as a framework, because these principles are not solely concerned with issues of gender but are positioned against 'systems of oppression that cannot be reduced to a single structure or a source' (D'Ignazio and Klein, 2020). This is in line with the aims of counter-mapping in general as they are created against systems of opression.

To add to the discussion around using unconventional visualization techniques to convey a sense of place, I use a quantitative user study to evaluate visualizations developed with the feminist principles against their conventional conventional counterparts. Results show that although the unconventional visualization techniques are more difficult for the map users to understand, they are nonetheless more effective than the conventional ones in fulfilling the aims of the feminist visualization principles.

## 2   The Beyoğlu Map as a Counter-Map

In order to set appropriate goals for the visualizations, it is necessary to first understand the needs and characteristics of the Beyoğlu map. The mapping project is one of the many ways MAD engages with the neighbourhood and its afficionados. As such, counter-mapping is explored as a new tool and supplements the existing research, activism, and services the organization provides. The mapping process acts as a creative tool to gather opinions and raise awareness to the spatial injustices the contributors of the map disagree with and feel disempowered by.

The Beyoğlu map is an idea-driven counter-map, meaning that the data was specifically collected for this project. MAD used participatory methods and asked the neighbourhood's visitors and aficionados about which 'memory places' exist and memories, thoughts, and feelings people associate with these places. Depending on the method with which the data was collected, the format and the level of detail vary. At its least detailed, the data includes the name of a memory place, the rough address, and whether it is transformed, disappeared, moved, or surviving. At its most detailed, the data includes a story that the participant associates with the place of memory, in both English and Turkish, and historical facts about how and why the place has changed.

While for some counter-maps, it is a requirement to appear official enough to be recognized in court or be precise and accurate enough to aid in navigation, for the Beyoğlu map, there are no formal constraints. The final map(s) should highlight alternative perspectives and marginalized narratives that otherwise go unnoticed. Ultimately, the Beyoğlu map wants to bring attention to an issue that is not discussed on mainstream platforms and raise awareness to how this issue affects people. As such, there is a need to creatively reclaim place while encouraging the map reader to get involved.

## 3   Re-imagining the Beyoğlu Map

Three pairs of maps were created to visualize different aspects of the memory place data. A relevant feminist visualization principle was applied in each case. The maps are considered conventional when they follow cartographic tradition and use well established cartographic visualization techniques. These maps appear similar to the maps created by official mapping agencies or maps that serve to more practical purposes, such as navigation or locating a certain phenomenon. The maps are considered unconventional when they adopt visualization techniques from artistic maps and counter-maps that are more concerned with creative expression rather than aiding a certain task.

**Maps 1A and 1B.** The first pair of maps visualize the spatial distribution of memory places in Beyoğlu. They aim to convey relative importance of places by highlighting the memory places that were submitted to the *Beyoğlu – I will survive* project. Map 1A is a relatively typical depiction of

these memory places as point features, whereas Map 1B is an unconventional alternative that was created with the feminist principle 'embracing pluralism' and uses techniques such as distortions and an open-world assumption (Figure 1).

**Maps 2A and 2B1–4.** The second pair of maps visualize the four types of memory places and the associated memories. They aim to communicate the emotional aspects of memory places and the individuality of each submitted memory. Map 2A is a relatively typical depiction that uses colour hue to distinguish memory places and call-outs that lead to text boxes with associated memories. Maps B1–4 are a part of a series that is created with the feminist principle 'elevate emotion and embodiment' and experiment with the integration of text into the map, shapes, and composition of the map elements based on the content of the memories (Figure 2).

**Maps 3A and 3B** The third and the last pair of maps visualize the content of the memories that were submitted. These maps intend to reclaim and overwrite the dominant and top-down representations of the neighbourhood by centring people's experiences. Map 3A is a conventional map where points on the map are matched to the full text of the memories with a numbering system. Map 3B is an unconventional alternative that uses sketches of visual symbols and keywords inspired by the memories. Map 3B is also created with the feminist principle 'challenge power and aspire to empowerment' and adopts a sketch style that is common among counter-maps that are produced with participatory methods (Figure 3).

## 4   Evaluation

In order to evaluate the effectiveness of the visualizations, this research used a questionnaire which allowed for quantitative analysis. For each pair of maps, the users first read a brief informational text that prefaced the maps they were about to see and then were given as much time as they needed to view the maps. Afterwards, they were asked to rank several statements on a Likert scale. These statements were formulated to measure the aims of the project and the feminist principles with which the maps were created. Some statements were repeated in each section to assess the overall advantages and disadvantages of the proposed techniques. The questionnaire was completed by 103 respondents. The answers to the Likert scale statements were treated as ordinal and were evaluated by using the median and Wilcoxon Signed-Rank test for hypothesis testing. If a statistically significant difference was found between how the respondents ranked Map A and Map B, an effect size was calculated to indicate the direction and the strength of this difference. A higher effect size was associated with a stronger difference.



**(a)** Map 1A                                                    **(b)** Map 1B

**Figure 1: Location of memory places.** Map 1A visualizes the location of memory places using point symbology as a conventional technique, whereas Map 1B employs techniques such as distortions and an open-world assumption to fulfill the feminist principle 'embrace pluralism'.

**(a)** Map 2A



**(b)** Map 2B1



**(c)** Map 2B2



**(d)** Map 2B3



**(e)** Map 2B4

**Figure 2: Four types of memory places.** Map 2A visualizes the four types of memory places using colour hue and call-outs as conventional techniques, whereas the series of Maps 2B1–2B4 has its own layout for each category where opacity and text placement are explored as unconventional techniques to fulfill the feminist principle 'elevate emotion and affect'.

**(a)** Map 3A



**(b)** Map 3B

**Figure 3: Content of the memories and memory places.** Map 3A visualizes the content of the memories by using number matching as a conventional technique, whereas Map 3B uses sketching as an unconventional technique to fulfill the feminist principle 'challenge power and aspire to empowerment'.

**For Maps 1A and 1B,** neither map was successful in communicating a collective sense of place in a pluralistic way. Although Map 1A was more successful in communicating the more important places on the map, it was nearly as successful in communicating the less important places on the map. Therefore, its capability to visualize the relative importance of places could be further scrutinized and improved. Although the distortion and the open world assumption used in Map 1B did not meet their intended goals, future research could investigate whether the use of these methods in combination with other visualization techniques could better communicate a collective sense of place in a pluralistic way. A general take away for counter-mapping is that although unconventional methods can be tempting to use for their novelties, it is important that they remain understandable and engaging.

**For Maps 2A and 2B1–2B4,** the results reveal that the users considered Map 2A to be more objective, whereas Map 2B was ranked higher for helping the users understand how the changes in Beyoğlu affected each individual differently. For the case of the Beyoğlu map, appearing objective is not a priority, however elevating embodiment by highlighting individual experience is; therefore, Map 2B is the preferred alternative. Elevating emotional aspects of the memories were measured in terms of whether the maps triggered empathetic and emotional responses. Furthermore, the users were also asked to rate whether they found the layout to be particularly evocative. In all regards, Map 2B had a generally higher ranking.

**For Maps 3A and 3B,** while the users ranked Map 3A higher for appearing official and thereby supporting the status-quo, they ranked Map 3B higher for showing the neighbourhood from the people's perspectives. For the case of the Beyoğlu map, being official is not a priority, however highlighting marginalized narratives is; therefore, Map 3B is the preferred alternative. The map users also preferred Map 3B when they were asked whether they were encouraged to learn more about the memory places or take action to protect them.

**Regarding the general statements,** in all sections, the conventional maps were ranked higher for being easy to understand. Except for the first pair of maps, the users ranked the unconventional maps higher for being more memorable and also for wanting to spend more time with the maps. For the first pair of maps, the users ranked the conventional alternative higher for wanting to spend more time with the map and no significant difference was found for either map being more memorable.

## 5 Conclusion

To summarize the findings, counter-maps are highly diverse in nature and are created for specific purposes that come out of specific contexts. As such, a variety of techniques and approaches already exist within the body of literature. The intention of this research was not to propose a universal

solution for all counter-mapping purposes, but rather to document, display, and evaluate visualizations created for one particular case. This particular case was to reclaim place through marginalized narratives in Beyoğlu, Istanbul. However, many findings from this case can be relevant for several other contexts. First of all, the visualization techniques discussed and evaluated in this research can be most directly applied to neighbourhoods from around the world that are facing similar challenges and encourage counter-mapping initiatives. Secondly, while this research focused on visualization of place, the visualization techniques studied can be used to map other text-based data, such as oral histories, interviews, and fictional and cinematic narratives. Finally, the development and use of unconventional visualization techniques is a discussion relevant to the cartographic discipline as more diverse needs and new types of data arise.

This paper concludes with the overall finding that when maps are designed with feminist principles, a necessary condition is to innovate visualization techniques, because the cleanest, easiest, and most aesthetically pleasing option is not always the best option to achieve the intended aims. Inspiration for such visualization techniques can be found from existing counter-maps developed for similar purposes. Unconventional maps can be effective, however, when they employ techniques that are not familiar; they are not always easy to understand and interact with. When counter-mapping, it is necessary that goals and priorities are set from the beginning with the context and the use case in mind. A recommendation going forward is either to use unconventional methods that have been previously tested – like those used in this study – or to undertake a pre-test to assure that the needs and intentions of the case are met.

### Notes

1. This paper is a summary of an MSc thesis (Dolma, 2021).

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# Visualizing Fuzzy Boundaries of City Neighbourhoods

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This paper presents the outcome of the study attempting to improve the cartographic visualization of crisp and fuzzy boundaries and internal structure of neighbourhoods as placial features. In the study preceding this paper, a number of visualization techniques depicting neighbourhood structure were generated. The evaluation survey results indicated that vague segments are easier to identify in comparison to crisp ones; most successful are the techniques which clearly show internal subdivision of a neighbourhood and allow to see the basemap under the symbology layer.

## 1 Introduction

In everyday life, people use a wide variety of geographical terms. However, most of them are not a part of a formal geographical vocabulary. City dwellers, for instance, often use identifiers such as 'downtown' and, significantly less often, the names of official administrative districts. These unofficial names often identify the locations important for residents, carrying special meanings and associations, but most of the time they are left unattended since geography of perception is hard to capture and use.

Researchers working in this field refer to informal regions as vernacular regions or neighbourhoods. They both represent cognitive spatial objects of different scale. Vernacular regions tend to be large portions of countries united by cultural and geographical connotations (Zelinsky, 1980), while the term 'neighbourhood' is usually applied to areas within a city sharing some common stereotype and having a certain 'popular' name. This also applies to communication between residents (Galster, 2001). In the study preceding this article, the issue of neighbourhood boundary visualization was investigated at the example of three university neighbourhoods in Moscow: Lomonosov Moscow State University, Higher School of Economics, and Bauman Moscow State Technical University. These university neighbourhoods are an interesting spatial phenomenon since they all have their own spatial relationships with their surrounding area – from isolation to interweaving – due to geographical, historical, and institutional reasons. It is a challenging cartographical task to convey these complex relations in a clear way. This paper does not go into details of the study of university neighbourhoods per se, but concentrates on the outcome of the visualization of neighbourhood boundaries in general.

The current neighbourhood research is mostly lying on the cross section of human geography and social sciences. Published works demonstrate solid theoretical background and interesting semantic findings, but they lack proper visualizations. Applying cartographic methods to the visualization of neighbourhoods can be beneficial for human geographers and social scientists who work in the field and want to better represent the places they study cartographically.

How do then neighourhoods relate to place theory? It is widely known that Tim Cresswell describes place as 'a space with a meaning' (Cresswell, 2004). Yi-Fu Tuan pointed out that place does not have

a certain scale or size by providing the extreme examples of the favourite armchair by the fireplace and the whole Earth, two examples both of which can be treated as places (Tuan, 1977). Bearing this in mind, a neighbourhood can be considered a platial feature – it completely relies on feelings, associations, and the identity that connects people to certain places. It is a spatial feature in terms of geographic extent, and it is a place in terms of emotions that define it.

The general objective of this study is to develop suitable visualization techniques to convey how university neighbourhoods embed in the urban environment. This paper[1] focusses on the evaluation of how well these techniques convey information about the geography and and the sense of place of neighbourhoods.

## 2   How to Draw a Neighbourhood: Methodology

The first step prior to the visualization of boundaries is to identify the location of the neighbourhood boundaries in terms of the residents' perception. To do so, a pre-study online survey was conducted. The respondents were asked to outline the area they consider belonging to their alma mater.

A pile of overlaying polygons drawn by the participants was gathered during the survey. One of the ways to locate the boundaries of informal regions on the basis of this data is to divide the study area into cells and calculate for each cell a percentage of the respondents who claimed it their neighbourhood. To do so, an auxiliary polygonal layer of tiny square cells was created and each cell was assigned with the calculated number of intersecting polygons – identically to the raster calculator operations. The visualization techniques discussed below were applied to the resulting smooth surface created on this step. Adapting the terminology from Meinig (1965), three hierarchical levels of the neighbourhood were defined based on the results: the core (an area marked as a core – in a separate question – by more than 50% of the respondents), the domain (an area marked as a neighbourhood by more than 50% of the respondents), and the sphere (marked by 25–49% of the respondents).

When selecting proper cartographic means for vague regions, it is common to start with Bertin's visual variables (Bertin, 1983; Thomson et al., 2005). MacEachren et al. (2012) argue that the variables crispness and location are most suited for uncertainty depiction, followed by value, arrangement, size, and transparency. We can adapt their findings to fuzziness depiction, which is a concept closely related to uncertainly. The overview of the variables considered suitable for vague objects depiction is presented in Figure 1.

By applying various cartographical means, we can emphasize on either the inner of the neighbourhood or its boundaries. Figure 1 accordingly distinguishes between these different focuses. Also, assumptions regarding uncertainty are included in the set of visualizations. Not all of the theoretically possible techniques shown in the table can be applied to the considered cases. The techniques suitable for the depiction of the neighbourhoods are outlined with blue frames. We will compare the various combinations of these in the next section.

In the experiment, a set of twelve visualizations was created to test how well different visual variables are able to convey fuzziness and sense of place of the considered neighbourhoods. The tested visualizations are characterized by varying affordances. The variables most widely used are transparency, size, and texture, as well as location as 'indispensable' variable (Roth and MacEachren, 2016). Almost all the techniques visualize the place boundaries in a discrete way, because the explicit consideration of the three parts of the neighbourhoods (core, domain, sphere) was part of the assumed methodology. In rare cases of continuous visualizations, the boundaries between these parts are, however, blurred. Only a few techniques allow to still read the basemap by not hiding it, or only partially hiding it. Also, the visualizations are tested on individual isolated neighbourhoods, so not all of them can be used to visualize overlapping districts.

Figure 2 allows to anticipate which of the techniques are able to successfully convey neighbourhood boundaries. The sections of the table clarify on which visual variables the techniques are based. According to the combination of the outlined formal criteria, the *contour lines* (#1) and *circles of varying size* (#9) techniques appear to be the most promizing, followed by the *layer tinting* (#2) and *varying contour weight* (#5) techniques. However, there is no way to theoretically estimate the intuitiveness of these techniques. The evaluation survey quantified this missing information and allowed to compare the 'predictions' collected in the pre-study with the final survey results.

| Visual Variables | Neighbourhoods' | | | Uncertainty |
| --- | --- | --- | --- | --- |
| | body and core | boundary as a line | boundary as a transit zone | |
| Location | | | | ✕ |
| Size | isolines width ~power | stroke width ~clarity | stroke width ~vagueness | ✕ |
| Size (II) | hex size ~power | ✕ | hex size ~power | ✕ |
| Orientation | overlayed patterns show the core | ✕ | lines length and density ~fuzziness | ✕ |
| Colour hue | different neighbourhoods | ✕ | ✕ | ✕ |
| Colour value | low value ~uncertainty | low value ~uncertainty | low value ~uncertainty | ✕ |
| Texture | density ~power | gap size ~vagueness | density ~power | |
| Colour saturation | ✕ | ✕ | ✕ | |
| Arrangement | ✕ | ✕ | variations ~uncertainty | ✕ |
| Crispness | crispness ~uncertainty | ✕ | crispness ~uncertainty | |
| Transparency | transparency ~power | transparency ~power | transparency ~power | |

**Figure 1: The visual variables considered in the maps design**

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| Visualisation technique | Visual variable employed | Continuous or discrete | Clearly differentiates between C, D, S | Allows to see the background | Allows overlap with neighbouring districts | Allows to increase the number of 'steps' | Allows to implement uncertainty information |
|---|---|---|---|---|---|---|---|
| #1 | location, size | D | ✓ | ✓ | ✓ | ✓ | ✓ (e.g., transparency) |
| #2 | transparency | D | ✓ | ⊙ | × | ✓ | ✓ (e.g., hatching) |
| #3 | crispness, transparency | D | ✓ | × | × | ✓ | ✓ (e.g., hatching) |
| #4 | texture, size | D | ✓ | × | ✓ | ✓ | ✓ (e.g., transparency) |
| #5 | location, size | D | ✓ | ⊙ | ✓ | ✓ | ✓ (e.g., transparency) |
| #6 | transparency, size, texture | D | ✓ | × | × | × | × (will look cluttered) |
| #7 | transparency, size, texture | D | ✓ | × | × | × | × (will look cluttered) |
| #8 | transparency, texture | D | ✓ | × | × | ✓ | ✓ (e.g., transparency) |
| #9 | size | C | ✓ | × | ✓ | ✓ | ✓ (e.g., layer of white dots of smaller size, etc.) |
| #10 | crispness | C | × | × | × | × | ✓ (e.g., hatching) |
| #11 | texture, size, transparency | D | × | ✓ | ✓ | × | ✓ (e.g., transparency) |
| #12 | size, arrangement | D | × | ✓ | ✓ | × | ✓ (e.g., transparency) |

**Figure 2: Formal affordances of the visualization techniques**

In the survey, one map randomly drawn from the set of twelve visualization styles was presented to the respondent, who was then asked to identify clear and fuzzy boundaries by placing markers from two corresponding sets along them. The maps were intentionally presented without a legend in order to test how intuitive the visualizations are. It was decided to show only one example (although it will obviously lead to a fewer evaluated techniques) since otherwise, by comparing different techniques showing the same phenomenon, the person would potentially and subconsciously perceive more information than he or she would do in both cases individually. In that way all visualizations have been tested.

## 3   Results and Discussion

By analysing the results of this task, we could estimate how successfully different visualization techniques provide information about boundary characteristics. Unfortunately, not all of the maps resultet in a sufficient amount of user data to allow for an analysis. Two maps from the set were either never drawn or ignored by the respondents. Most of the evaluated techniques allowed to identify fuzzy and crisp boundaries at least partly. The *contour lines technique* (#1) succeeded best in terms of providing the correct visual impression of crisp boundaries. This also applied to the fuzzy boundaries as conveyed by the *hexagons* (#8) and *circles* (#9) techniques, and a combination of *layer tinting with hatching* (#7).

To measure subjective opinions, the participants were asked to rank the visualization techniques. They were asked to choose three maps they like the most and one map which they find, on the contrary, the most unattractive. The respondents find the *layer tinting technique* (#2) the most appealing, and a low standard deviation also points out that this result somehow reflects common perception. The second most popular map is a variation of the first. It employs the same visualization technique supplemented with *solid and dashed lines* (#6). The third most popular choice, the *3D layers technique* (#3), demonstrates that among the most popular maps are also the most simple ones. Basically, they only represent three areas of the same colour yet varying transparency. The absolute outsider is the

*jagged line technique* (#12). Despite the fact that the users understand the zigzag line representing fuzziness, they also noted that the technique evokes stress and is not suited for the purpose. The technique so often used to represent fuzziness, *a heatmap* (#10), turned out to be the second least popular choice. Figure 3 is summarizing the results of the evaluation survey.

Related to the topic of geographical data uncertainty, a distinction is often made between vagueness caused by the lack of trustworthy data and vagueness reflecting unclarity of how to define or describe the objects. A similar terminological problem reveals itself with identifying crisp and fuzzy boundaries. It is easily understood by users when there is a long smooth transition from the core to the sphere (a typical case of a fuzzy boundary), or the contour lines of a domain and a sphere run along close to each other forming a clear boundary with no transition zone. But once we have a boundary of a sphere that has a distinctive geometrical shape, this can cause confusion. It is not absolutely fuzzy since we can determine, more or less, its location; but the 'expressiveness' of the neighbourhood is quite low in this part so it is not crisp either. It is not fully clear how to handle such situations, but it might be a good decision to emphasize the fuzziness in such cases more prominently.

In summary, fuzzy boundaries can more successfully be identified than crisp ones. Among the possible reasons might be a confusion created by the three-parts structure – the boundaries of the domain are often taken for the boundaries of the neighbourhood. The crispest boundaries can easily be recognized by respondents when they run along old and well-established borders of neighbourhoods where they duplicate physical or natural barriers, like roads or rivers. At the same time, streets can be both limiting borders and inner axes which the neighbourhood is strong on. Oddly enough, depicting the crisp segments with a separate symbol does not necessarily improve the situation. On the contrary, such techniques appear to be overwhelming and overloaded with unnecessary details. Ideally, when the difference is visible through varying transparencies and densities, it appears to be perceived subconsciously. The users can see and comprehend in this case the difference by themselves, instead of being presented with the information processed and highlighted for them. Also and beyond pure symbology, the geometry of a boundary contributes to its identification. People notice the shape of the boundary prior to its symbology – a rounded wandering line is more likely to be identified as a fuzzy boundary than a straight line.

According to the preferences of the respondents and their comments, the most important characteristics for the users are clarity, simplicity (a minimum number of colour/texture steps) and, last but certainly not least, the ability to see the basemap. The latter was particularly often mentioned as a positive feature of the preferred visualization and a common complaint about some of the unpopular techniques. It is possible to overcome this obstacle by changing the order of layers on the map and bringing, e.g., the streets network on top. Also, the maps most appealing for the respondents are not necessarily the easiest to work with. The techniques which demonstrated the best result in crisp and fuzzy boundary recognition had only average levels of appealingness in comparison to the other techniques tested.

Is it possible to predict how successfully the technique will convey fuzziness? According to Figure 1, which summarizes the formal characteristics of the various tested techniques, the potential favourite is a *contour lines method* (#1) as it differentiates clearly the core, domain, and sphere parts; allows to see the background; and is flexible with changing the number of internal steps and the overlapping with other neighbourhoods. This agrees with the findings of the evaluation survey, where the crisp and fuzzy segments were identified quite correctly on this map. Despite this, the technique is not amongst the most popular maps and not the easiest to work with, according to the Figure 3. The *varying contour weight technique* (#5) also looked quite promising in the visualization techniques table. Unfortunately, there is not enough data to confirm or deny that assumption. The next candidates – *varying circles* (#9) and *hatching* (#4) techniques – showed different results. The former performed rather well and was also evaluated as the easiest technique to work with, while the latter appeared to be quite confusing. With a limited amount of data, it could also be concluded with a certain degree of confidence that the contour lines and the circles of varying size techniques perform decently and can be employed for the representation of the fuzzy areas. *Heatmap* (#10) and *jagged line* (#12) techniques have both performed poorly.

Despite strong differences the performance of the various visualizations, it is hardly possible to name one clear one-fits-all technique. The answers demonstrated that the most important characteristics of a successful visualization technique are the ability to see a basemap, simplicity, and clarity. The techniques possessing these characteristics can be employed to the visualization of a neighbourhood

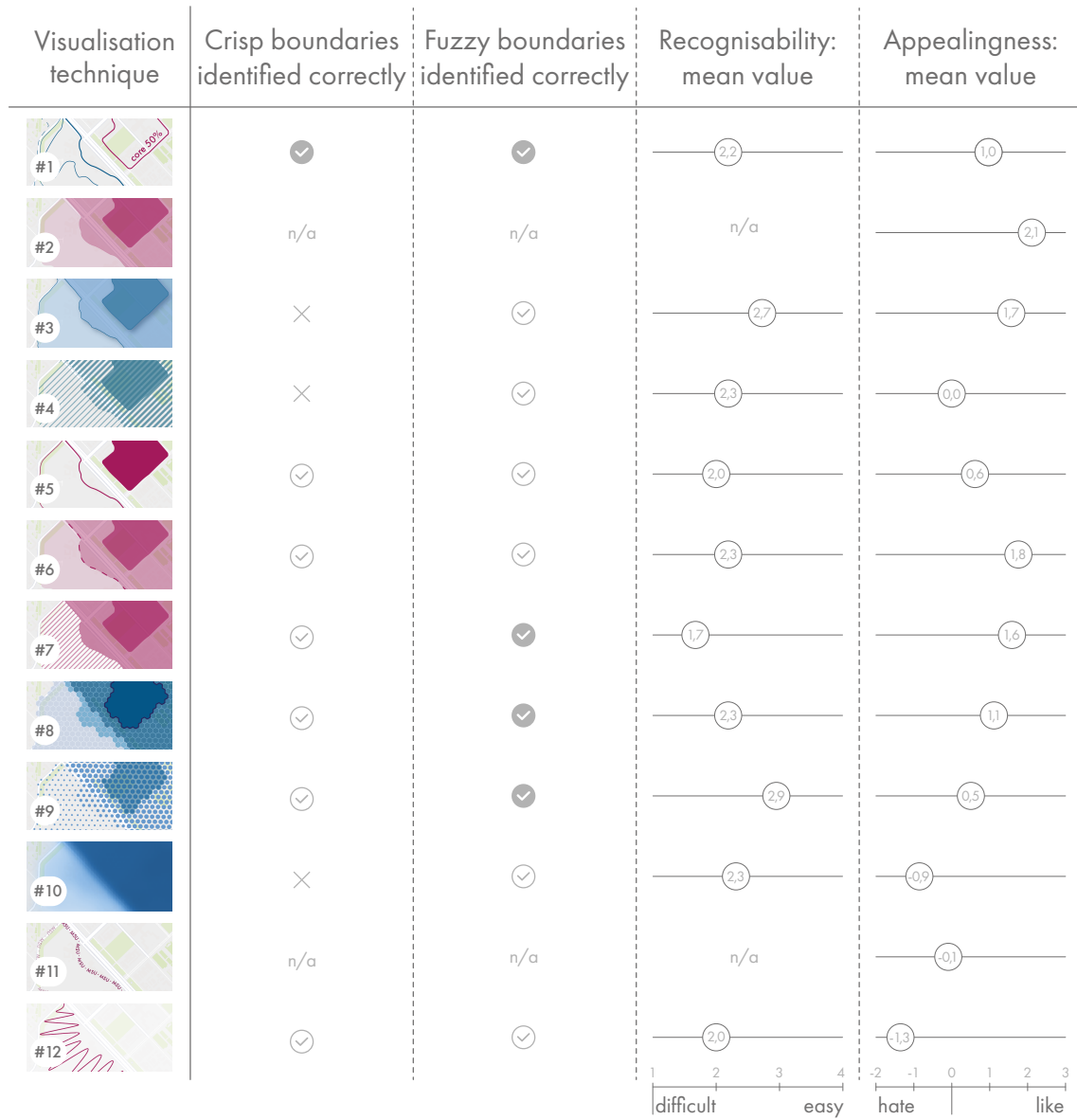| Visualisation technique | Crisp boundaries identified correctly | Fuzzy boundaries identified correctly | Recognisability: mean value | Appealingness: mean value |
|---|---|---|---|---|
| #1 | ✓ | ✓ | 2,2 | 1,0 |
| #2 | n/a | n/a | n/a | 2,1 |
| #3 | ✕ | ✓ | 2,7 | 1,7 |
| #4 | ✕ | ✓ | 2,3 | 0,0 |
| #5 | ✓ | ✓ | 2,0 | 0,6 |
| #6 | ✓ | ✓ | 2,3 | 1,8 |
| #7 | ✓ | ✓ | 1,7 | 1,6 |
| #8 | ✓ | ✓ | 2,3 | 1,1 |
| #9 | ✓ | ✓ | 2,9 | 0,5 |
| #10 | ✕ | ✓ | 2,3 | -0,9 |
| #11 | n/a | n/a | n/a | -0,1 |
| #12 | ✓ | ✓ | 2,0 | -1,3 |
|  |  |  | 1  2  3  4 difficult      easy | -2  -1  0  1  2  3 hate              like |

**Figure 3: Performance of the tested visualization techniques**

and are able to successfully convey both crisp and fuzzy boundaries. Apart from that, it is beneficial to know how the city dwellers perceive the urban area to then employ a corresponding technique for its visualization. This can help researchers working in the field to better convey their findings to a broader audience.

## Notes

1.  This paper is a summary of an MSc thesis (Glebova, 2021).

## Acknowledgements

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# Evaluating Public Consultation in Urban Planning via Neural Language Models and Topic Modelling

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Urban planning has the fundamental role of managing the cooperative development of ever bigger cities and the community's cultures inhabiting those places. To make the best decisions, urban planners need to analyse relevant data and community responses, spread through abundant reports. This process can be labour intensive and might lead to overlooking less prominent but still relevant concerns of minorities. In this study, we present a Natural Language Processing framework to assist the analysis of consultation reports. The framework leverages state-of-the-art techniques that enable the urban planners to easily describe the issues of interest in free text and, as a result, to accurately identify the emerging concerns from different stakeholders. A first assessment of the London Plan's Green Belt policy has shown the capability of detecting specific community interests about urban planner problems, allowing quick identification of minorities' issues, otherwise overlooked due to the vast amount of data.

## 1   Introduction

Urban planning is an fundamental process in which cities and urban areas are constructed based on several aims defined by the government in conjunction with local councils. This process affects the whole infrastructure of a city, such as: transportation, layout, housing densities, and culture. Without such planning, cities are bound to become less sustainable, efficient, and create more urban environments riddled with social inequalities. Urban planning aims to assure that all people have access to good quality living environments and sufficient housing in attempt to tackle the challenges of social inequity in cities (Smit et al., 2011).

The role of the urban planner is to identify requirements of specific communities and devise a plan in addressing these requirements, through development, expansion or refurbishment in specific areas (Park and Lee, 2009). To identify such requirements, planners need to analyse relevant data and community responses which they might gather through an abundance of reports. This process can create difficulties for planners as it requires them to deal with many long, detailed reports that can be considered very labour intensive, and thus, result in a potential lapse in identification of less prominent minorities. This creates the issue of planning discourse not considering the different perspectives emerging from multiple stakeholders or communities around a particular issue; enhancing the concept of barriers and segregation within communities and minorities where people might feel ignored (Higgins et al., 2005).

To assist this process, natural language processing (NLP) is a promising field of artificial intelligence (AI), developing computational techniques for learning, understanding, and producing human language content (Hirschberg and Manning, 2015). Cai (2021) conducted a systematic literature search highlighting the recent and growing interest in NLP among urban researchers, arguing that the application of NLP in urban research has its advantages of raising new research questions, improving the use of big urban data, and reducing research costs. In this way, the collection of big data regarding public responses can have an impact on environmental characteristics through the policy-maker decisions and each response can be different amongst people; culture, background, and context can all play a part through the community responses, altering the space people reside in (Klettner et al., 2013).

In this study, we propose a new NLP framework, tailoring the recent advances in language and topic modelling to assist the urban planner in analysing consultation reports and ease access to concerns and perspectives about urban issues of interest. As a case study, we focus our analysis on extracting interests of different stakeholders towards the Green Belt policy (Greater London Authority, 2021, Chapter 8), a set of guidelines part of the broader London Plan aiming at preventing the urban sprawl of Greater London. The proposed framework first extracts the numerous topics discussed within the consultation reports via topic modelling (Blei et al., 2003). Then, the relevant topics are matched via clustering (Pergola et al., 2021) with the urban issue of interest (e.g., Table 2), whose description is provided as input to the framework and encoded using a contextualized neural language model (Reimers and Gurevych, 2019). The outcome of this process is a concise description of the main concerns and perspectives of different stakeholders (e.g., business, borough, local communities, etc.) about problems of interest for the urban planners.

To the best of our knowledge, this is the first attempt to combine contextualized language models and topic modelling in the context of urban planning, easing accurate access to concerns of urban communities that could be easily neglected in the vast amount of text. This approach could be one of the key tools in aiding urban planners in making better decisions and easing their involvement for future planning discourse. In the following, we first introduce the Green Belt consultation reports in more detail (Section 2). Then, we provide an overview of the framework and a more technical description of how we adapted the NLP methodologies to the problem (Section 3). We conclude with an assessment of the preliminary results showing the proposed framework's potential and accuracy, and a discussion about future works and new promising applications (Section 4).

## 2   Case Study and Datasets

The London Plan is a statutory spatial development strategy for the greater London area in the UK, prepared and published by the mayor of London (Greater London Authority, 2021, Chapter 8). The objectives are to ensure London is a city that can meet the demands of population and economic growth, exist as a successful competitive city internationally, improve the environment, provide easily accessible, secure, diverse and well-built neighbourhoods, and offer safe and easy opportunities for people to access public facilities and jobs. Since 2011, the overall strategic plan for London sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years (Greater London Authority, 2021).

This study explores the draft of the new statutory spatial development strategy for Greater London, particularly focused on the Green-Belt area. This project took place between December 2017 and March 2018 and received many consultation responses from various sources, categorized into eight main consultation groups: London Borough, Authorities outside London, Professional Bodies, Campaign Groups, Government and Agencies, Community Groups, Business, and Individuals. The consultations are publicly accessible online (London Assembly, 2017), and each group offers a wide variety of social-demographic response data, with responses for each group ranging from 40 to 1000. Table 1 summarizes the statistics on the consultation data collected.

## 3   Framework to Assist Urban Planners

The overall framework consists of the following steps: (i) framing of the urban issues of interest, (ii) collecting and preprocessing the textual data, (iii) extracting topics from the consultation re-

**Table 1: Data statistics for the documents of each consultation group**

| Consultation Group | Number of Documents | Avg. Number of Word Tokens | Number of Tokens | Vocabulary Size |
|---|---|---|---|---|
| Authorities outside London | 54 | 1667 | 90,022 | 478 |
| Borough | 40 | 14,954 | 598,145 | 1468 |
| Businesses | 363 | 5047 | 1,832,125 | 2557 |
| Campaign Groups | 134 | 3755 | 503,132 | 1691 |
| Community Groups | 135 | 2791 | 376,746 | 1431 |
| Government and Agencies | 77 | 4754 | 366,066 | 1103 |
| Individuals | 958 | 262 | 251,112 | 981 |
| Professional Bodies | 72 | 6321 | 455,091 | 1465 |

**Table 2: Identified topics regarding the urban planners' issue 'levels and scale'.** Communities can encounter Green Belt policy when planning applications are submitted for site, which presents a lack of understanding of how places and people are directly affected at a local level or village/town. For a given issue described by the urban planner (e.g., *levels and scale*), the table reports the topics extracted from two consultation groups, encoded by neural language model, and matched to the issue.

| Consulted Groups | | Topics of Interest |
|---|---|---|
| Businesses | B.1 | centre town area office use caz support growth development business |
| | B.2 | policy, development, use, plan, support, land, space, site, area, need |
| | B.3 | cost, value, development, profit, finance, disposal, plan, fee, rent, build |
| | B.4 | housing, plan, home, need, rent, market, year, student, target, delivery |
| Campaign | C.1 | space, venue, child, play, biodiversity, area, include, site, sport, community |
| | C.2 | woman, food, sector, issue, community, year, centre, work, organisation, area |
| | C.3 | com, city, science, health, www, poverty, inequality, job, document, report |
| | C.4 | people, gender, woman, community, feel, year, lgbtqi, experience, queer, identity |

**Table 3: Example of topics extracted from the *campaign* group**

| # | Topics |
|---|---|
| 1 | space, venue, child, play, biodiversity, area, include, site, sport, community |
| 2 | tree, cent, exhibition, product, policy, court, page, borough, forest, woodland |
| 3 | woman, food, sector, issue, community, year, centre, work, organisation, area |
| 4 | com, city, science, health, www, poverty, inequality, job, document, report |
| 5 | people, gender, woman, community, feel, year, lgbtqi, experience, queer, identity |
| 6 | land, bed, flat, site, use, value, child, nhs, development, number |
| 7 | policy, plan, support, development, need, space, community, use, infrastructure, transport |
| 8 | housing, home, rent, need, build, plan, policy, target, year, income |
| 9 | energy, building, carbon, use, heat, emission, design, development, network, policy |
| 10 | policy, planning, plan, development, land, area, building, site, exist, protect |

sponses, (iv) matching the issue of interest with the most related topics. The process is graphically synthesized in Figure 1.

**Framing the Planner Issues.** First, we provide a concise description of the urban issues as input to the framework, analogously to what an urban planner would do when interested on specific problems related to the Green Belt. As a case study, we consider the problem of *level and scale*, arising when stakeholders submitting applications for site, without taking into account the Green Belt policy on small and large communities and places. The description used is reported in Table 2.

**Topic Extraction.** Simultaneously, we collect and provide the model with the textual data to be analysed. In particular, we employ the aforementioned consultation responses on the Green Belt, organized by sources. For each consultation group, we extract the main topics discussed by means of the Latent Dirichlet Allocation (LDA; Blei et al. 2003). This process allows the exploration of different concepts being discussed within each of the responses of the consultation groups. For example, Table 3 reports ten topics generated for all the responses in the campaign group consultation, highlighting concisely the main concerns of this group (e.g., child playing, biodiversity, poverty inequality, community space, etc.). To extract the topics, the LDA's hyperparameters (i.e., iterations $i$, number of topics $k$, learning decay $\lambda$) vary depending on the size of the response group and the theme redundancy across the documents. Thus, they were determined by grid search, comparing the perplexity (inverse of log-likelihood) on small held-out sets of responses. Standard preprocessing steps have been performed to remove the most frequent and rare words, along with English stop words. The top-10 words of each LDA's word-topic distribution are considered representative of a topic.

**Encoding and Clustering.** In the final step of the framework, we aim at matching (i) the issues of interest described ideally by the urban planner with (ii) the topics pointing out the different concerns raised from various stakeholders (e.g., businesses, local communities, and so on). To perform the matching, we encode into the same mathematical space the issues of interest and the topics via a methodology commonly denominated as *topics* or *sentence embedding*: both the topics from the responses and the sentences of the issues of interest are encoded into vectors of a high-dimensional geometric space using a language model, namely Sentence-BERT (Reimers and Gurevych, 2019). Finally, in this geometrical space of sentence and topic vectors, we run an unsupervised clustering algorithm, namely k-means (Garbade, 2018), to match the issues of interest with the most related topics. The result is a set of matches between the issues of interest and the topics from different consultation groups, similar to the one reported as an example in Table 2, concisely highlighting the most relevant concerns of consultation groups regarding the particular issue of interest.

**Qualitative Analysis.** Table 2 showcases the LDA topics generated from the *campaign* and *businesses* groups responses, and clustered around the *levels and scale* urban planner issue. For the *campaign* group, the main concerns regard community spaces/venues for children to play, biodiversity, health, inequality regarding jobs, experiences for different gender, sexual identity, and sexuality. This suggests
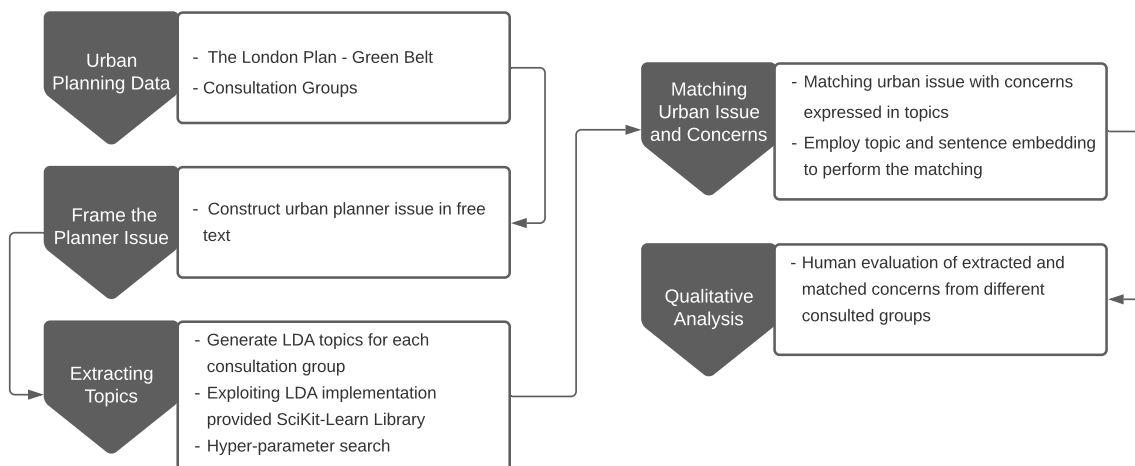


**Figure 1: Diagram synthesizing the main steps of the framework**

that campaigns' responses are considering those from a 'smaller scale': it appears that the discussions around this issue are themed around diversity problems about their neighbourhood, jobs and community, such as poverty, inequality, and community charities, such as LGBT. On the other side, from the *businesses* group, the main themes clustered around the urban planner issues regarding growth and development for businesses, offices and usage of town centres, cost and profit, need to provide care, student accommodation and making housing targets. These themes suggest that the responses from the businesses consultation group are focused less at a local level, and rather focusing on how Green Belt policies affect people on a larger scale.

## 4   Conclusion and Future Work

In this preliminary study, we presented an NLP framework in the context of urban planning to assist the exploration and analysis of consultation reports. The framework employed state-of-the-art techniques in NLP, enhancing the accurate identification of stakeholders' concerns about urban issues of interest for the urban planners. We focused our pilot analysis on the Green Belt policy, one of the most relevant ongoing guidelines for the cooperative development of urban spaces and communities in Greater London, UK. A first qualitative analysis has shown the possibility of detecting specific community concerns about urban planner issues described in free text, endowing the planner to quickly detect problems related to minorities, otherwise overlooked due to the vast amount of data.

We conclude by highlighting some of the potential extensions and research lines developing from the presented study:

**Perspective Analysis.** A first extension to the framework would consist of exploring marginalized groups in more detail by drawing attention to conflicting perspectives that even the same community might have on the same urban planning issues. In particular, we plan to reveal the different perspectives using a Latent Argument Model (LAM) model (Vilares and He, 2017) and perform hierarchical clustering.

**Quantitative Evaluation.** The consultation responses for the Green Belt policy were manually examined by experts of the council (Greater London Authority, 2017), producing structured reviews of the main themes in them. For example, their reports made available a column denominated 'Topics' that could be directly used to compare the automatically extracted topics of interest. Overall, this structured data could serve as a gold standard to evaluate the results generated automatically by our framework using the human-produced analysis, providing more fine-grained feedback on the effectiveness of the proposed process in easing the urban planner examination.

### Author Contributions

C Caton contributed the core paper concept. G Pergola, T Novack, Y He, and C Caton contributed to the paper methodology.

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# Leveraging Place Reviews to Identify the Effects of COVID-19 on Canadian Tourism

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The emergence of the COVID-19 pandemic disrupted travel world-wide and substantially impacted tourism in most countries. Though many governmental agencies and tourism boards have published data on the impact of the pandemic, in Canada, the vast majority of these data are reported at the national level or sparsely within individual regions. In this preliminary work, we leverage user-contributed tourist attraction reviews to better understand the nuanced changes in travel behaviour resulting from the COVID-19 pandemic. We examine the regional impacts as well as the effects on different categories of tourism within Canada. The purpose of this short paper is to demonstrate the value of analysing place-based user-generated tourism data and highlight some of the ways it can be leveraged by policy experts and tourism agencies.

## 1 Introduction

In 2019, Canada's tourism sector generated an estimated $104.4 billion dollars in revenue, contributing roughly 2% of the country's gross domestic product (GDP; Transport Canada 2021). In late 2019, the SARS-CoV-2 virus emerged and by early 2020, the COVID-19 pandemic was disrupting virtually every sector of the Canadian economy. By the end of 2020, tourism in Canada had dropped by 48.1% with the tourism contribution to the GDP falling to just 1.1% (Statistics Canada, 2021). Canadians were not alone in this experience. Many countries were similarly affected as international borders were closed, businesses shuttered, and lock-down policies enacted.

While COVID-19's impact on tourism has been well documented at a national level, data and spatial analysis comparing the effects of the pandemic *between* sub-national regions in Canada has been limited. For instance, Nhamo et al. (2020) investigated the impact of travel advisories related to COVID-19, but only at the national level whereas Lapointe (2020) discussed the pandemic's effects on tourism in the province of Québec. In fact, much of the research in this domain has focused either at the global level (Gössling et al., 2020), nationally (Liu, 2020), or within individual subnational regions (Roy et al., 2021). Similarly, little research has comparatively investigated the pandemic's impact on categories of tourism (e.g., Transportation, Shopping, Sight-seeing, etc.). Some studies have highlighted opportunities for sub-sectors of the tourism industry to reduce the impacts (Dube et al., 2021; Sigala, 2020), but little comparative analysis has been done. Much of this is likely owing to the fact these types of data are often collected by local tourism boards, municipal government agencies, or commercial companies. The heterogeneity, varied-resolutions, and accessibility of these data, make it difficult to compare across regions and tourism categories.

To address these limitations and investigate the effects of the COVID-19 pandemic on Canadian tourism at a higher spatial and categorical resolution, we leverage tourism review data contributed

to the travel platform TripAdvisor[1] (TA). TripAdvisor is an American-based online travel platform that operates globally. It's primary draw is that visitor's to physical tourist attractions contribute reviews, photos, and recommendations through the online platform, allowing readers to make informed decisions on where to travel. The company claims to have more than 859 million reviews on 8.6 million establishments world-wide (Tripadvisor, 2021). These data have been used in previous spatial analyses to identify similarities between tourist attractions (McKenzie and Adams, 2018), understand individual hotel preferences (O'Connor, 2008), and for sentiment analysis tasks (Valdivia et al., 2017). These data offer an unprecedented opportunity to understand tourism behaviour, and specifically investigate how this behaviour changed with the emergence of COVID-19. With this in mind, we aim to address the following research questions (RQ):

**RQ1.** *Tourism in which provinces has been most affected by the COVID-19 pandemic? Furthermore, visits from which country were most impacted by the pandemic?*

**RQ2.** *Which categories of tourist attractions were most affected by the pandemic? In addition, did these impacts vary by province?*

While the primary goal of this work is to address both of the research questions above, this short paper is a report on our preliminary analysis. Our intention is that this whets the reader's appetite, facilitates discussions, and sparks ideas for future work. Our secondary goal, is to briefly highlight the value of place-based user-generated content and demonstrate some of the analytical possibilities in working with tourism reviews.

## 2   Data and Analysis

In October 2020, attractions (places of interest) and reviews were accessed through the TA web platform. In total, 19,831 attractions from across Canada and 1,309,204 reviewers were accessed contributed by 479,062 unique users. Each attraction consists of a name, geographic coordinates, category label, and list of reviews. Each review consists of a unique user identifier, the location of the reviewer, the date of the review, the date of experience, and the review text itself. Reviews were accessed for the English and French version of the platform[2]. All reviews between January 2015 and September 2020 were used in this analysis. The vast majority of reviews report temporal resolution at the level of month and year. We use *date of experience* when available and *date of review* in the 2.7% of reviews where date of experience was not provided. A reviewer's location is manually entered by the review contributor. The means by which this information is entered changed over time with early users offered free-text entry and recent users being limited to selecting from a predefined set of places around the world. Google's Geolocation API was used to successfully identify the home country of 79.3% of users. A total of 213 unique home countries or territories were identified.

### 2.1 Reviews as a Proxy for Visits

In this work, we argue for using reviews as a proxy for physical visits. We acknowledge that most tourists do not post on TA but make the assumption that on aggregate, the count distribution of reviews mirrors the distribution of physical visits. In analysing our data, the volume of reviews between 2015–2019 were averaged by month to produce a robust *baseline* on which to compare the first nine months of 2020 data. Figure 1a shows a comparison of the monthly review contributions nationally split into 2020 and pre-2020 (4 year average). Error bars show standard error. At the national level we clearly see that 2020 visits experienced a significant decline. Up to September, review volume in 2020 was 18.7% of the average review volume over the previous 5 years with May 2020 being just 4.4% of the previous May average.

To support our argument that user-contributed reviews are a suitable proxy for tourist visits, we compared our review counts to the national-level, international traveler data as reported by Statistics Canada. Reviewers that listed a home location in Canada were removed, since Statistics Canada does not report this information. Furthermore, only travel data between January–August were reported from Statistics Canada, therefore our review data were restricted to the same period. Figures 1b and 1c show a comparison between 2020, and pre-2020 travelers to Canada and the same two time periods for TA reviewers. Notably, the data from Statistics Canada represent people enter the country for a variety of reasons, only one of which is tourism.
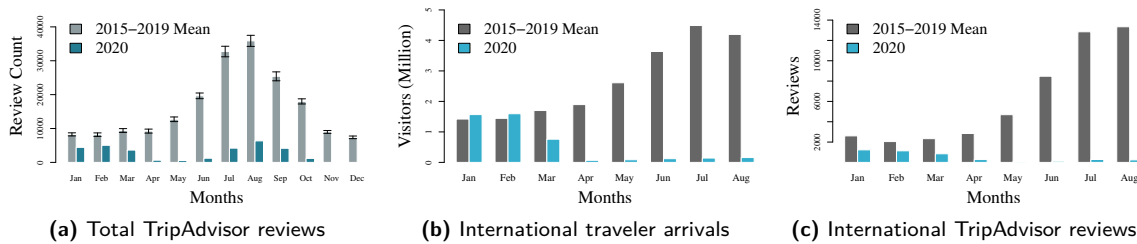
**(a)** Total TripAdvisor reviews          **(b)** International traveler arrivals          **(c)** International TripAdvisor reviews

**Figure 1: User-generated reviews contributed to Canadian attractions on the TripAdvisor platform.** (a) Total numbers split by month; (b & c) Comparison of international traveler data from Statistics Canada to international TripAdvisor reviews over the same time period

We subtract the yearly distributions from one another within each dataset to produce a *difference distribution* for each. We then calculated the similarity between the two difference distributions using both the *Jensen–Shannon distance* and *cosine similarity*. The results were 0.0397 (0 is identical) and 0.9725 (1 is identical), respectively indicating a high degree of similarity over the 8 month time period. This suggests that the TA data does reflect actual international travel mobility.

To further demonstrate the validity and value of these TA data, we compared review data to visitor data at a city level. Destination British Columbia (2021) reported the volume of visitors to the city of Vancouver per month by country of origin for the same time period as our TA data (2015–2020). While not all countries were reported, we aggregated visitors into three groups, namely Canada, United States, and Other. We compared the averaged 2015–2019 Destination British Columbia (BC) data to the same averaged time period of TA review volume for all attractions in Vancouver and did the same for the 2020 datasets. As shown in Figure 2, there is a high degree of similarity between the two datasets. Notably, Destination BC reported a higher percentage of Canadian visitors as compared to TA reviews in 2019, with TA reporting a higher percentage of international reviews. This is likely due to the fact that Destination BC primarily reported on visitors, not tourists and therefore included those traveling to visit family, for business, etc. By comparison, TA exclusively reports tourist activity.

## 2.2 Regional Variations

Though national level travel and tourism data is published by Statistics Canada, these data are not available at the provincial level, nor do they report the home country of the tourist. Our TA data, however, allows us to analyse review volume at varying spatial resolutions as well as by the home country of the reviewer. We grouped all attractions by their province and then calculated the average number of reviews for each province for 2015–2019 and 2020 independently. We then calculated the percentage change in number of reviews split by province (Table 1). Reviews contributed by all visitors are shown as well as being split by the top home countries of reviewers. Notably, data on Canada's northern territories of Nunavut, Yukon, and Northwest Territories are not reported due to lack of data.



**(a)** Destination BC (2019)          **(b)** Destination BC (2020)          **(c)** TripAdvisor (2019)          **(d)** TripAdvisor (2020)
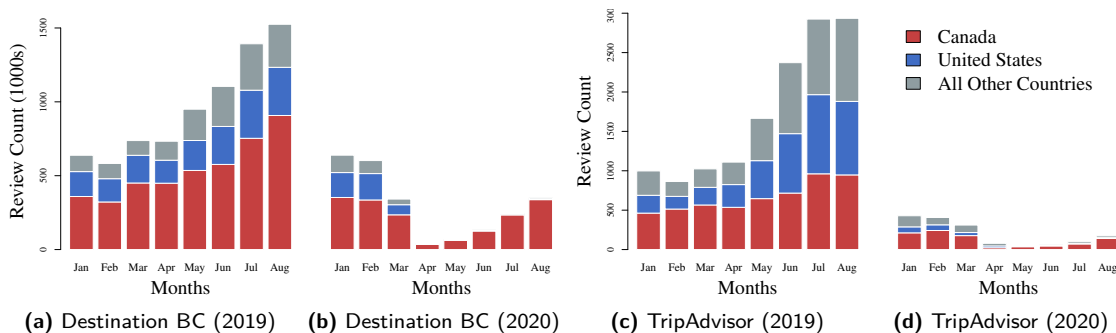
**Figure 2: Comparing visitor and review volume by country of origin in Vancouver, British Columbia, split by year.** Note that only data for January–August 2020 were reported by Destination BC at time of analysis.

**Table 1: Percentage change in number of TripAdvisor attraction reviews between 2015–2019 (average) and–2020.** The data is split by province of attractions and home country of reviewer. Values for Yukon, Nunavut, and Northwest Territories are not reported due to data sparsity.

| Province | All | Canada | USA | UK | Australia | France | Others |
|---|---|---|---|---|---|---|---|
| Alberta | -77.6% | 32.2% | -16.9% | -8.5% | -4.8% | -1.1% | -0.9% |
| British Columbia | -78.3% | 28.4% | -14.7% | -6.8% | -2.9% | -0.8% | -3.2% |
| New Brunswick | -84.7% | 23.6% | -20.5% | 0.7% | 0.2% | -2.2% | -1.8% |
| Newfoundland and Labrador | -89.8% | 15.1% | -6.4% | -3.8% | -1.6% | -0.3% | -3.0% |
| Nova Scotia | -86.1% | 26.5% | -18.6% | -5.3% | -0.3% | -0.5% | -1.7% |
| Manitoba | -72.1% | 12.8% | -8.6% | -2.8% | -0.5% | -0.3% | -0.6% |
| Ontario | -76.3% | 21.8% | -14.5% | -4.0% | -0.7% | -1.0% | -1.7% |
| Prince Edward Island | -91.6% | 13.6% | -10.0% | -2.5% | 0.2% | -0.2% | -1.2% |
| Quebec | -80.7% | 30.0% | -16.9% | -2.9% | -1.1% | -4.9% | -4.1% |
| Saskatchewan | -77.7% | 6.9% | -6.8% | -1.3% | 0.9% | -0.1% | 0.5% |

In a typical year, tourists visiting the provinces of Ontario, British Columbia, and Québec account for roughly 75% of all tourism in Canada. On average, these provinces reported a 78% decrease in tourism. While the smallest province, Prince Edward Island, contributes a much smaller percentage to the Canadian GDP, tourism accounted for roughly 3.5% of its local GDP pre-pandemic (Statistics Canada, 2021). The province experienced the largest decrease of all provinces with one of the smallest increases in percentage of tourism attributed to domestic travel. This can partially be attributed to the establishment of the *Atlantic Bubble* where the Atlantic provinces barred entry to visitors from all other provinces. Alberta and Québec saw the largest increases in percentage of domestic tourism with Québec seeing a notable decrease in visitors from France. Alberta and British Columbia saw their largest non-US decreases from the United Kingdom and Australia. The percentage of visitors from the United States, the largest source of international tourists, decreased substantially across all provinces.

## 2.3 Category of Attraction Variations

We were also able to use the review data from TA to identify changes in tourism behaviour towards different categories of tourist attractions. The number of reviews were counted and split by the category of the attraction to which they were contributed. This, again, was done for 2015–2019 and 2020 independently. We then calculated the percentage change in number of reviews between the two datasets. The results are shown in Figure 3. The category *Other* showed the largest decrease with *Transportation*, *Sights & Landmarks*, and *Museums* showing similarly large decreases, all above 80%. The category *Spas & Wellness* presented the smallest decrease of 35.0% followed by *Outdoor Activities* (48.5%) and *Food & Drink* (58.4%).
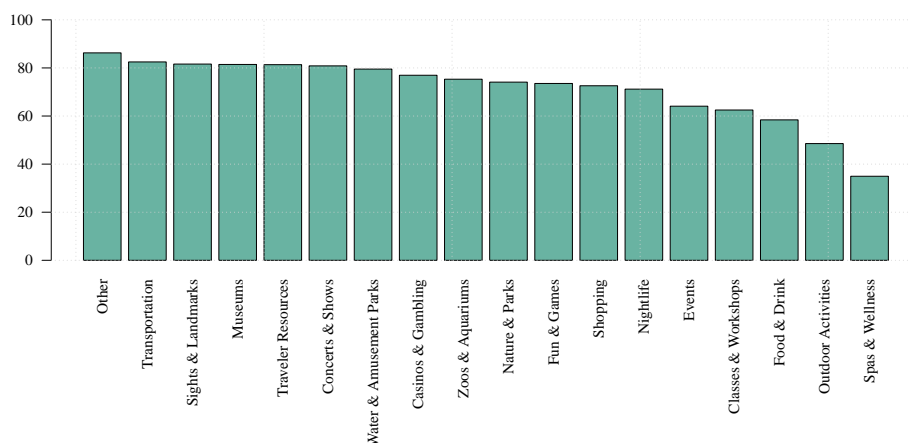


**Figure 3: Percentage change in number of TripAdvisor attraction reviews between 2019 and 2020, split by category of attraction**

Exploring this data by province we found that *Outdoor Activities* had the largest variance in percentage change across all provinces with Prince Edward Island seeing the largest change (96.8%) and Saskatchewan experiencing the lowest (12.5%). *Nightlife* was another notable category with decreases of over 85% in Ontario and Nova Scotia but under 50% for Québec and British Columbia. Categories that showed the highest percentage decreases such as *Transportation*, and *Museums* also showed the lowest variance across provinces.

## 3   Discussion

In this short paper we highlight the value of place-based user-generated content in understanding nuanced regional and categorical impacts due to the COVID-19 pandemic. This initial analysis demonstrates that tourism reviews can be used (within reason) in place of authoritative data when such data is not available at the required resolution. There are a number of limitations to using such data. For instance, there is a significant bias towards affluent and English-speaking populations. Since TripAdvisor is a US-based company, it's largest user base is also in the United States with many other Western nations contributing large amounts of reviews. While contributions from inhabitants of smaller, developing, and non-English speaking nations are present on the platform, they are undoubtedly under-represented. Fake contributions are also a concern in analysis of any user-generated content and while efforts are made to reduce these contributions, their presence must be acknowledged.

In this preliminary work, we did not discuss the political or social factors contributing to a change in tourism behaviour during this time period. For instance, provincial and municipal lock-downs, business closures, and travel advisories all varied in severity and temporal duration. Fear of virus transmission, case counts, and media coverage also play an important and complex role in tourism and travel behaviour. All of these aspects, while significant, were outside the current scope of this paper and will be investigated in future work. Next steps will also involve comparative analysis with other countries and datasets. Our overarching goal is to leverage these types of user-generated data to provide actionable insight to policy experts, tourism boards, and public health agencies.

### Notes

1.  https://tripadvisor.com
2.  https://tripadvisor.com and https://tripadvisor.fr

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# On the Integration of Place and Urban Morphology

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This paper offers an initial discussion on the nexus of place conceptualization and urban morphology. An attempt is made to work out how taking into account the concept of place, which is difficult to grasp formally but essential for us as humans, would change the study of urban form. This is done from three different perspectives: the understanding of place as a part of the earth's surface imbued with meaning, the idea of place as functional and action-related, and from a relational perspective. It is shown how the inclusion of place can expand the existing focus of urban morphology on rigid, formal, geometric forms of the built environment to include other types of more 'fluid' morphologies. The overview offered highlights possible pathways to redefining our understanding of urban form and invites further reflection on this.

## 1   Introduction

Our conceptual understanding of space and place often remains tacit in our research. On the one hand, places are linked to geographical experiences (Relph, 1976), memories (Malpas, 2018), and routine bodily mobilities (Seamon, 1980), among other things, and can thus be experienced very concretely by us humans. On the other hand, operationalizing such complexities is not an easy task, which is why Seamon (2018) describes places as complex fields that collect and connect things, people, meanings, etc. Correspondingly, the mentioned tacitness about place is often true even for the traditional spatial sciences such as geography, regional studies, and spatial planning. However, the implicitness mentioned applies at least as much to the current discourse around platial information (i.e., representations of meaningful places in information structures), as it is conducted in the field of GIScience (see Hamzei et al., 2020; Merschdorf and Blaschke, 2018; Purves et al., 2019; Tang and Painho, 2021, for recent overviews of the place discourse in GIScience including functional, relational, and affordance-based approaches). Often, the understanding of space and place used is the container notion familiar from the field of geographic information systems (GISs). Supposedly even more frequently, however, eclectic concepts of space and place are employed, which are fed from various strands (see Wagner et al., 2020). Rarely though is the applied conceptual apparatus concretely explicated. In addition to the human geographical view of place (which we make use of), this paper is dedicated to the field of urban morphology. As in GIScience, place concepts are still rare in urban morphology, or are only used implicitly. Rather than presenting finished results (which do not even seem tangible yet), this paper seeks to initiate and inform a discussion and interdisciplinary dialogue on the nexus of place and urban morphology.

This paper discusses some of the implications of the use of 'place' in the field of urban morphology. Urban morphology is the study of human settlements, their structure, and the process of their formation

and transformation (Kropf, 2018). With its focus on the built urban environment, urban morphology plays an important role also in relation to the concept of place. In addition to the fact that places are predominantly mental entities, the built environment feeds into place studies through, among other things, the notion of locale, which refers to the physical environment for social interaction (Castree, 2003; Stedman, 2003). However, the non-explication of the concept of place obscures important conceptual assumptions that shape our understanding of urban phenomena. It seems fairly obvious that urban form can hardly be separated from spatial and platial concerns. But it is precisely because of this apparent triviality that it is important to expose the applied concepts of space and place as a basic premise for urban studies and to reflect on other possible readings of our results obtained. The following contribution highlights implications of the inclusion of place on investigations of urban form. Ultimately, this discussion is also an impetus for the formalization of place, as locale is part of such a formalization (see Zhang et al., 2018, for a recent attempt to formalize the concept of locale).

Integrating the concept of place with the field of urban morphology poses challenges and entails changes. In the further course of this article, we will highlight three main facets of this integration, which are oriented along fundamental conceptions of place: place as space endowed with meaning; functional readings of place; and places as collections of relations. The perspective of ascribing meaning is borrowed from humanistic geography and describes how people experience and live places. The perspective of functional understandings of place, on the other hand, foregrounds the functionalities offered by places in the context of the wider urban fabric. This second perspective thus abstracts more from the level of the individual than the humanistic perspective. The third perspective takes a more abstract standpoint and makes stronger ontic assumptions. It conceives of place as a collection of relational bundles and thus goes strongly beyond the understandings of space applied in urban morphology research so far. The present synopsis does not claim to be a comprehensive one. Rather, it aims to contribute to the clarification of terms and concepts in order to better embed the discourse on the built environment in the discourse on platial information, e.g., with regards to formalizing locales.

## 2    Space and Place in Urban Morphology

The spatiality inherent to urban morphology, and our perspective on space, determine how we conceive of urban forms. Urban morphological studies in major part rely on geographical notions of space and in particular those that view space as a naturally given 'container'. The historical-geographical school of urban morphology, which is concerned with the development of town plans based on their respective historical and regional contexts, treats space in its material and territorial manifestation (Whitehand, 1977). Some theories of change that deal with the formal conditions of transformations of urban form further ascribe a structuring role to urban form that emanates from processes that space itself undergoes. The latter occurs through the division of space by plots, such as in the theory of the burgage cycle by Conzen (Whitehand, 2001). However, space itself is thereby still understood as a homogeneous, naturally given surface that is merely subdivided and commodified. An important advance in the theorization of space in the field of urban morphology comes from space syntax's authors Hillier and Hanson who in their seminal book 'The Social Logic of Space' attempt at developing a comprehensive social theory of space that allows the material realm of physical space to be linked to the abstract realm of social relations, assuming that there are meaningful correlations between social and spatial structures (Hillier and Hanson, 1984).

Conceptualizations of place, on the other hand, have not been widely used to study urban form to date. We argue that place can be of great use as a tool to capture other features of urban form beyond material ones. These features may include, e.g., human perceptions, cognitive attributes, cultural perceptions, and subjective attributions of meaning. All of these aspects also constitute morphological features of a city, though in more abstract ways, and often interact with the built environment. So far, in the field of urban morphology, the terms 'space' and 'place' are often used interchangeably, without clear distinction or reference to a specific definition (Peterson and Littenberg, 2020). The introduction of the term 'place' as a loci for an immaterial, intangible dimension that can be projected onto space (or has a localization) could be a valuable addition to the conceptual toolkit of urban morphology. Some possible implications of the additional focus on place in urban morphology are discussed below.

# 3 Implications of Place Concepts for the Study of Urban Form

The following subsections discuss the implications of considering place in urban morphology. The breakdown into subsections follows three different established place readings.

## 3.1 Place Understood as Space Endowed with Meaning

The concept of place used in this subsection designates a part of space that is charged with meaning (Cresswell, 2014). Such a definition allows taking a human-centred position, but also offers an intersubjective perspective on spatiality when examining the collectively produced meanings associated with places. A major challenge that arises from such a broad and general definition is the need for a precise formalization of the concept of place, e.g., by identifying the particular meanings that go into the formation of places, the processes by which the association of such meanings with places occurs, etc. These epistemological choices need to be made explicit, including for any attempt to operationalize such a notion of place to the study of urban form. The extensive application of GIS in urban morphology has driven many of its studies towards quantifying urban form based on formal geometric properties. An example of this is the rapid spread of urban morphometrics, which aims to objectively represent and measure the physical form of cities in order to support evidence-based research (Fleischmann et al., 2020), while less tangible features tend to be overlooked, not least because of the difficulties in capturing them with existing formal means mentioned above.

Such epistemological bias that is implicit in GIS as a core tool for processing spatial data dictates a certain view of urban form. The latter then behaves to a large extent as a self-replicating geometric pattern subject to an autopoietic logic that can be quantified and modelled, without taking informal features into account. An example of the elaborated inability to include place meanings is the recent attempt to introduce an objectively defined spatial unit for land plots, based on a morphological mosaic (Fleischmann et al., 2020). While this method offers an objective, universal way of dividing space, it does so at the expense of neglecting all other features except the formal geometric and therefore easily quantifiable properties of abstract space and building floor plans. And while, e.g., the aforementioned theory of the burgage cycle includes land plot patterns, certain institutional (practices of cadastral surveying), economic (land tenure structures) and social relations, up to and including historical and regional features that feed into the resulting plot patterns, these are omitted in morphological mosaics. This illustrates the direction in which urban morphology is moving, driven by the advances and quantitative capabilities of data processing through GIS.

The conceptual combination of place-based GIS with the extensive body of research and theory on the meaning of built environments in architecture and urban planning will be needed to expand the methods and interpretations of urban morphology towards taking into account the meanings generated by configurations and combinations of built forms and open spaces. The promise of such an endeavour is that in the nexus of place and urban morphology, the possible connections between meaning and form of even challenging housing typologies, may be better understood. Consider, e.g., prefabricated housing estates, which are generally perceived as places devoid of symbolism or epitomizing a purely technical mode of production. The reality, however, is that even prefabricated housing estates possess a range of meanings that are linked to or shaped by the everyday practices of their inhabitation. Complex questions of this kind regarding structural properties of meanings written into the urban landscape could be addressed by linking place and urban morphology.

## 3.2 Place Understood as Activity, Function, Use

The spatial turn has brought spatiality to the forefront of a number of social sciences, far beyond the traditionally spatial disciplines. Together with changing perspectives on space and the further development of relational conceptualization (see below), the consideration of space and place as outcomes of particular productive, formative actions has underpinned their relevance for sociology and other related disciplines. By the very nature of its subject matter, any sociological study of place is designed to capture social relations, practices, and actions (individual and collective) that contribute to the creation, existence, and maintenance of places. Even if urban morphology retains its distinct object of study, separate from the wider social sciences, it could and should be concerned with social processes that are in turn relevant to and applied to urban form.

The ways in which urban forms (and spaces) are appropriated through uses, activities and the general practice of inhabiting them could provide a point of contact here. This is all the more true as the above questions have long been a concern of urban morphology, albeit from its own angle. The functional features of urban form have not lost attention. However, what may be overlooked in such attention to functionality is the distinction from use, i.e., possible incoherences, divergences, or even contradictions between the formally designated intended function of urban form and its actual use through collective or individual practices. Such concerns should be taken into account in any attempt to create function-based models of a place in the context of a place-based GIS agenda (Papadakis and Blaschke, 2017). In doing so, one should avoid getting into a self-confirmation loop by relying on representations and abstracted features while excluding references to the actual 'lived' reality, which inevitably deviates from the former.

The challenge of deriving actual uses in the absence of concrete manifestations in the built environment can be illustrated by the case of prefabricated housing estates outlined above. For a long time, poor design solutions and failures to satisfy human needs were blamed for the lack of an acceptable quality of life in these. An example of this is the lack of differentiation of spaces due to the abandonment of traditional design elements such as courtyard and street frontage, which led to a placeless image of housing estates. However, if places are considered as a practice of appropriating space for everyday use that takes place within certain material constraints but does not fully condition them, this could offer insights that go beyond the scarcity of programmed function and allow for a variety of uses. This is another area where the morphological view combined with place-based GIS can contribute in the future, supporting the proverbial reading of uses without concrete manifestations.

## 3.3 Place Understood as a Set of Relations

Defining place in relational terms is, in a sense, inherently conflicting. Declaring a place to be a loose structure, a network of ever-changing relationships that defy fixation and strict definition of content (Massey, 2005), sounds like a very challenging undertaking. At the same time, such a dynamic or even ambiguous view, however challenging it may be to formalize, opens up a significant avenue for overcoming the reification of place and the critique brought against the so-called essentialist conceptions of place. This critique, which opposes the notion of place based on certain, exclusive, fixed essences rooted in traditional, natural identities tied to closed communities, etc., aims at phenomenological perspectives on space and place (Bachelard, 2014; Norberg-Schulz, 1980). The latter are criticized as advocating outdated categories of the archetypal, rootedness in territory, centrality (even normativity) of the experience of a Western (typically male) subject, at the expense of all possible experiences of otherness that come to the fore under contemporary conditions of ceaseless mobility, constant flows of migration and changing patterns of belonging, and the increasing disembedding of place.

In the case of urban form, essentialist readings of place are those that assume a certain genius loci of place; vernacular archetypal building forms that are rooted in the natural conditions of place and determine 'the true essence' of place. A turn to relational readings of place could therefore help to overcome this critique while reconciling conceptual framings with contemporary conditions. As a result, a better understanding of the changing nature of belonging tied to places could be achieved. It could also challenge the common narrative of the fragmentation of urban space and form. The argument about the fragmentation of space presupposes the notion of a certain pre-existing and eventually disintegrating unity of space as a premise, i.e., a certain holistic, homogeneous understanding of spatiality. Such a holistic understanding of space underlies, e.g., the distinction between the aforementioned duo of 'space and anti-space' by Peterson and Littenberg (2020). In both readings, space is conceived as a particular, naturally given or formed container that absorbs urban form, but in each case strives for unity. What if, however, instead of admitting the crisis of the unity of urban form, one could take a different path that allows for heterogeneity, a multiplicity of configurations and compositions that are not seen as deviations but as the current state of affairs? A relational reading of place could offer a path to such a reconciliation.

Place understood as a complex system of interlocking relations in a morphological sense might offer insights into the hierarchy of places within the city. This perspective draws attention to the scope and boundaries of places and their built forms, which are defined by what lies outside no less than by what encloses them. Recognizing the nested nature of places could be consistent with the established hierarchy of urban elements within the city (from home to neighbourhood to city itself), with gaps in

any of these elements leading to a disturbed legibility or sense of belonging and connectedness to the city. This could also be observed in the case of housing estates, as they seem to omit an intermediate step in the interlocking sequence of urban scale between the private space of the home and the public space of the city, denying their inhabitants a meaningful transition.

## 4  Conclusions

The above account based on three key concepts of place offers insights that can deepen our understanding of urban form. At the same time, they present us with new methodological challenges that force us to rethink and reconfigure how we view our objects of enquiry. Four concluding statements may summarize these. (i) The need to introduce places as a possible conceptual tool to reflect subjective, immaterial features of urban form does not aim to override advances in quantification or morphometric modelling. The two research directions complement each other and should be advanced hand in hand. We need to ensure that this is not done in parallel, i.e., without overlapping their research agendas and methods, or at the expense of each other. The neglect of intangible features that feed into urban form should not be sidelined because of difficulties in formalizing or capturing them with available tools. Complex entities such as urban areas can only be understood by taking into account tangible and intangible features alike, even structurally as urban morphology aims to do. (ii) Adopting insights and conceptual frameworks of places based on actions, practices, uses, and functional dimensions from the broad field of social sciences could help urban morphology overcome a possible dependence on formally defined, abstractly determined functions. The latter often only apply to plans and diagrams. Instead, a stronger inclusion of place could bring the 'lived' urban world into focus, as it is produced and reproduced through actions. Similarly, this may avoid disadvantages and limitations arising from the inherent limitations of extracting data from highly abstracted representations. (iii) The relational approach to place, which poses most difficulty for unambiguous formalization, could provide conceptual support for a considerable reshaping of our understanding of places in a new light as arrangements, configurations, mergers of entities, and relationships between them. In this way, many crucial features of the dynamically changing nature of places and their emergence could be captured, including the notion of the multiplicity of places that localities share. (iv) The present discussion considers the field of urban morphology. However, since platial GIS also has a formal focus, both fields share some characteristics. Advances in the field of urban morphology can thus also directly inform research on the broader notion of platial GIS. Thus, the present work also contributes to the latter and analogously to similar efforts in terms of statistical analysis (Westerholt, 2019), visualization (Bleisch and Hollenstein, 2018), or ontological framing of places (Scheider and Janowicz, 2014), among others.

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# Terrain, Topography, Landscape, and Place: The Interplay of Environment, Culture, and Conceptualization

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The theory of sociotopography has attempted to model the complex relationship between the topographic environment in which humans live, sociocultural factors, and language. This paper takes some first steps towards extending this to landscape and place. It argues that the human environment comprises terrain (raw landforms) and topography (terrain plus human modification), and that humans construct conceptual representations of this environment in the form of landscape (a mental representation of topography, its chunking into features, and the categorization of those features); place (regions or features of landscape assigned an individual identity); and geocentric relations (the representation of spatial relationships anchored in landscape). The paper presents five case studies exemplifying the role of sociocultural factors in mediating between topography and conceptualization: where affordances and characteristics of the topography motivate landscape categorization and notions of place; where social beliefs and practices are mapped on to motivating aspects of topography, underpinning categorization of landscape and place; where sociocultural structure is mapped onto topography without apparent motivation from within the topography; and where conceptual representations appear to respond to the environment directly via perception without sociocultural mediation. The paper presents a tentative expanded sociotopographic model including conceptual representations of landscape, place and geocentric relations, and a more fine-grained model of environment as terrain and topography.

**Keywords:** sociotopography; landscape; place; terrain; language; sociocultural practices and structures; ethnophysiography

## 1 Place, Landscape, and Language

Places are not objective entities in the world, and references to place with toponyms or by other means are not neutral locators. They are instead dependent on perspective and filled with individual and group meaning (Dingemanse et al., 2017, p. 129). They are intersubjective, but not merely as bundles of shared meanings – they are constructed in part through the referential choices made by individuals in interaction (Enfield and San Roque, 2017, p. 584f). Places may be attached to features in landscape. However, landscape features themselves are not objective. Although landscape is anchored in actual topography, it is a conceptual representation of that topography, and conceptualizing the environment appears to have no universal ontological foundations (see Burenhult and Levinson, 2008, p. 137f). As a conceptual representation, landscape is constructed by individuals and communities, to a large extent driven by the affordances of the environment (characteristics of an object or an environment

that relate to the potential for an organism to interact with it; Gibson, 1977), and by the nature of each individual and group of individuals' engagement and interaction with that environment. The relationship between the environment on one hand, and landscape and place on the other is mediated by sociocultural practices, structures, and meanings.

The theory of sociotopography has attempted to model the complex network of factors at play in the relationship between the environment, human behaviour, and language (Palmer et al., 2017). However, so far sociotopography has not explicitly attempted to build in conceptual representations of space, landscape and place. This paper takes a tentative step to develop the sociotopographic model in this way.

Section 2 of the paper outlines sociotopography. Section 3 extends this with consideration of the role of human modification of the environment, and conceptual representations in the form of landscape and place. Section 4 considers the role of language and sociocultural mediation in conceptual representations of the environment, and Section 5 takes a tentative first step in exploring integration of conceptual representations of landscape and place into the sociotopographic model. Finally, Section 6 presents five case studies exemplifying construals of landscape and the extent to which they are motivated by environmental features, socioculturally mediated: landscape categorization and social organization motivated by features of the topography; social organization associated with topography but without an apparent topographic motivation; and landscape categorization apparently responding to perceptually accessed features without apparent sociocultural correlates.

## 2   Sociotopography

Languages differ widely in the ways they encode both spatial relations and landscape. Strategies for encoding spatial relations have been shown to typically correlate with strategies used in non-linguistic spatial behaviour (Levinson, 1996, 2003; Pederson et al., 1998), although recent work has shown that mismatches do occur (Bohnemeyer et al., 2022). Widespread cross-modal correlations in strategy preference across domains such as language, gesture, memory, and inferential reasoning have led to ongoing debate. On one side are those who argue that these cross-modal correlations provide evidence for linguistic relativity – the influence of language on cognition (Bohnemeyer and Levinson, 2011; Dasen and Mishra, 2010; Levinson, 2003; Levinson et al., 2002; Majid et al., 2004; Pederson et al., 1998). This argument has attracted criticism and counter-evidence (e.g., Gallistel, 2002; Li et al., 2011; Li and Gleitman, 2002; Newcombe, 2005), which in turn has been criticized. Other work has explored the possibility that linguistic spatial representations are not arbitrary but are shaped at least in part by the topographic environment in which a language is spoken, suggesting that the environment underpins both linguistic and non-linguistic spatial behaviour (Palmer, 2015).

Recent work has shown that diversity in spatial language and behaviour exists not only between language communities, as has been the traditional research focus, but also within communities. The extent to which this is also true of landscape is as yet unknown. Languages make a range of spatial referential strategies available to their speakers, but speakers vary in which strategies they prefer, and in which contexts (Lum et al., 2022; Palmer et al., 2017). Some community-internal variation correlates with environment: urban versus rural (Dasen and Mishra, 2010; Lum, 2018; Pederson, 1993, 2006); coastal versus inland (Ameka and Essegbey, 2006); island versus suburban (Schlossberg, 2019); and grid versus irregular road and boundary patterns (Lawton, 2001). Individual humans may also employ different strategies depending on the nature of the specific task (Bohnemeyer, 2011; Mishra et al., 2003; Senft, 2001; Tenbrink, 2022; Wassmann and Dasen, 1998). However, other variation correlates with individual demographic variables such as occupation (Bohnemeyer, 2011; Lum, 2018; Shapero, 2016, 2017), gender (Bohnemeyer, 2011; Bohnemeyer and Stolz, 2006; Danziger, 1999; Lawton, 2001; Le Guen, 2011; Lum, 2018), age (Cerqueglini, 2022; Dunn et al., 2021; Edmonds-Wathen, 2012, 2022; Lum, 2018; Meakins, 2011; Meakins and Algy, 2016; Meakins et al., 2016; Robbers, 2022; Turk, 2020, p. 124; itself in part epiphenomenal for generational lifestyle changes, bilingualism and cultural contact), and other such variables. Different communities speaking the same language may vary according to dominant subsistence mode (e.g., fishing communities versus communities dominated by indoor work and small scale farming; Lum, 2018). However, it is possible that sociocultural variables such as gender, occupation, and subsistence mode may themselves relate to the environment: they may be epiphenomenal for the nature and degree of interaction with topography engaged in by individuals and groups within communities (Lum et al., 2022; Palmer et al., 2018a,b, 2017). The interplay
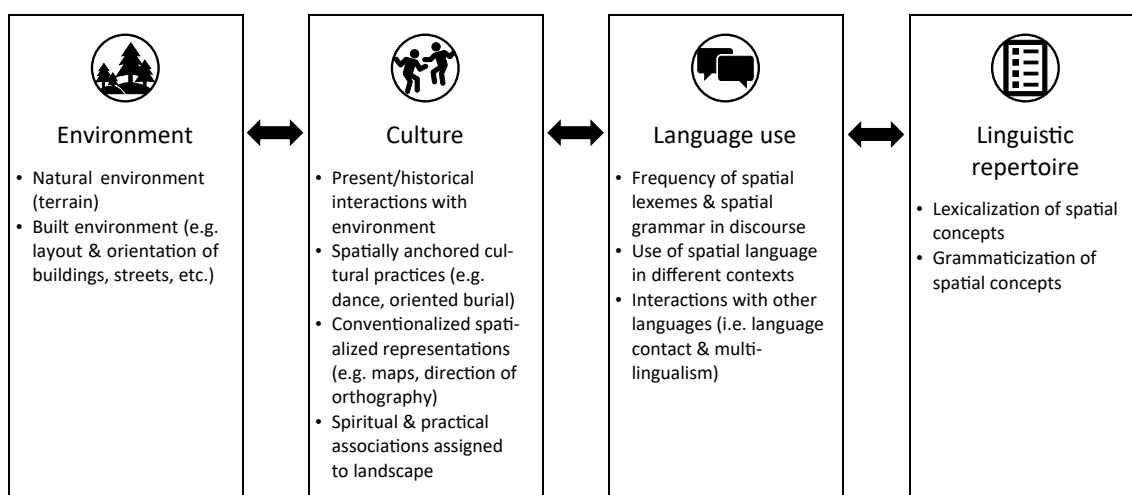
**Figure 1: The Sociotopographic Model (STM) as previously proposed.** Adapted from Lum et al. (2022) and Palmer et al. (2017).

of environmental, social, cultural, and linguistic factors is much more complex than traditionally recognized (but see Bohnemeyer et al., 2015, 2014; Dasen and Mishra, 2010).

Sociotopography seeks to understand this complex interplay of factors in shaping representations of space (Lum et al., 2022; Palmer et al., 2018a,b, 2017). It proposes that environment and language both play a role in shaping conceptualizations, but neither is deterministic, and the influences are multidirectional. Spatial behaviour, both linguistic and non-linguistic, results from the complex inter-action of factors of all types, from perceptually salient topography and affordances of that topography, through sociocultural practices and cultural associations assigned to aspects of the landscape, to the nature of each person's individual engagement with their physical environment. Culture is embedded in landscape, and landscape is permeated with cultural knowledge, to the extent that it is construed in diverse ways by different communities. Figure 1 shows key interactions and relationships in the existing Sociotopographic Model (STM) as developed so far, prior to the integration of conceptual representations.

Environment and culture interact as follows. The environment (terrain, topography) shapes culture, through affordances, and individual and shared experiences of interaction with the environment. Conversely, cultural practices shape the environment, through settlement patterns, the built environment, modification of terrain with gardens, farmland, hill terracing for rice cultivation, irrigation channels, land reclamation, etc.

Culture and language use interact as follows. Cultural concerns, practices and beliefs shape language use by prompting use of the available linguistic resources that most effectively express those concerns, practices, and beliefs. Language use in turn shapes culture through the choice of linguistic expression, and frequency with which particular expressions are deployed, drawing speakers' attention to those aspects of culture and the environment that they express.

Finally, language use interacts with the linguistic repertoire itself. The lexical and grammatical resources of a language shape language use by providing its speakers with the resources for expression. However, over time language use also shapes the lexical and grammatical resources available in a language through the conventionalization of frequently used and effective expressions, and the abandonment of unused forms.

## 3 Landscape and Place – Conceptual Representations of the World

Sociotopography recognizes four levels to the environment, in part inspired by notions employed in ethnophysiography, an approach to the study of human conceptualization of landscape and landscape features (Mark and Turk, 2003, 2016; Turk, 2016, 2020; Turk et al., 2011). Ethnophysiography principally distinguishes between 'terrain' (raw land forms, ecology, climate, etc.) and 'landscape' (a

human construct of relationships with terrain). It excludes consideration of the built environment, but includes toponyms, so includes landscape as place (Mark and Turk, 2016; Turk, 2020, p. 45f).

From the perspective of sociotopography, aspects of the physical world resulting from human activity (the built environment, settlement patterns, modification of the terrain, etc.) are as much part of the environment with which humans interact as the natural terrain. In early work on ethnophysiography (Mark and Turk, 2003; Turk et al., 2011), the term 'topography' was used to refer to what they subsequently defined as 'terrain'. Turk (2016) explains this terminological shift as due in part to 'topography' incorporating 'artificial ('man-made') features' (p. 374)[1], in the context of ethnophysiography's initial focus on 'the physical shape and texture of land, including vegetation, at landscape scales' in this complex area of research (Turk, 2016, p. 369). The distinction between the raw physical world and the environment modified by human activity is important and is recognized in sociotopography, even though the boundary between the two is fuzzy (grasslands resulting from regular burning; hillside terracing for rice cultivation; erosion caused by farming; diverted rivers; reclaimed wetlands; etc.). The environment humans inhabit is in part their own construction, and any attempt to model human interaction with the environment, and the cognitive consequences of that interaction, must incorporate the physical results of human activity. Sociotopography therefore adopts 'terrain' for the raw naturally occurring environment, and 'topography' for terrain plus the effects of human activity. All terrain is topography, but only naturally occurring topography is terrain. Both are aspects of STM's environment module.

Ethnophysiography regards landscape **as** place, because landscape is constructed on the basis of human relationships with terrain. However, landscape and place are not synonymous. The notion of landscape includes landscape categories, such as 'mountain' or 'river', individual instances of which may be places, but the category of which is a class of feature, not an individual instance. In sociotopography, place is defined as a landscape feature or region with an individuated identity. Places are part of landscape, but landscape is a conceptual representation of topography constructed by human relationships with that topography, and places are conceptual entities within that.

Both landscape and place are conceptual representations of the environment. However, the sociotopographic model as developed thus far lacks a component for conceptual representations. So far, the model has focused on the relationship between language and the environment, mediated by sociocultural factors (Lum et al., 2022; Palmer et al., 2018a,b, 2017). It has focused on the bidirectional relationship between topography and culture, the role of language use in mediating between linguistic forms and sociocultural practices, the role of culture and language use in mediating between the language a community uses and the environment in which they live, and so on. The present paper extends the existing model by adding a module for conceptual representations of the environment. Topography is conceptually represented as landscape, and as places within that landscape. The classification of features of the physical environment into landscape categories is a process of constructing a conceptual representation of those features. The notion of landscape proposed here is therefore a conceptual representation of topography (not terrain), and landscape belongs to a module of conceptual representation.[2]

On the basis of the above, the following four levels of environment are employed by sociotopography, including terms adapted from ethnophysiography as outlined above. Each is shown relating to STM's environment or conceptual module:

| **Environment** | |
| --- | --- |
| Terrain | raw natural environment (physical shape and texture of landforms, vegetation, ecology, winds, tides, path of the sun, climate, weather, etc.) |
| Topography | terrain plus human shaping, including artificial constructed features (built environment, settlement patterns, modified terrain, etc.) |
| **Conceptual representations** | |
| Landscape | conceptual representation of topography incorporating the meanings, associations and relationships (physical, utilitarian, social, cultural, spiritual and ethical) that individuals and groups assign to topography |
| Place | features or regions of landscape assigned individual identity |

Terrain and topography interact with culture as shown in Figure 2. Terrain has a unidirectional relationship with culture. Sociocultural practices and structures may respond to terrain, but by definition cannot shape it, as terrain shaped by human activity is topography. Terrain may influence
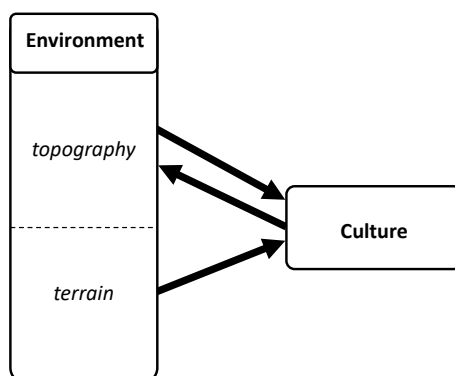
**Figure 2: The relationship between terrain and topography and the culture module of STM.**

culture, with culture in turn shaping the environment as topography. The relationship between topography and culture is bidirectional, as culture may respond to the modified environment as well as conversely shape it.

# 4 Landscape, Place, and Language

The forms of expression used to describe landscape and place in a language reveal underlying concepts held by the language's speakers and speaker communities. These include lexicalizations (the semantics of individual terms), and grammatical structures (such as the grammatical behaviour of a specialized class of terms that encode spatial information). It is assumed here that these lexicalizations and grammatical structures reflect conceptual representations of landscape. However, linguistic forms do not merely encode landscape and place in isolation. They reflect their relationship to individual and communal practices, concerns, and beliefs (Turk, 2016, p. 370). Language use also plays a role. Frequency phenomena reflect sociocultural practices, concerns, and beliefs. Terms for important and common practices and prominent concerns and beliefs are used more frequently than those referring to issues of less importance to speakers.

Landscape and place are expressed in several ways in languages. '[L]andscape [. . . ] has deep cognitive underpinnings, and two linguistic manifestation: landform terms, and place names' (Burenhult and Levinson, 2008, p. 139). This omits a third linguistic manifestation: geocentric spatial relational systems (e. g., geomorphic systems such as upriver-downriver axes, landmark-based systems such as mountainward-seaward axes, etc.; see Bohnemeyer et al., 2015; Lum et al., 2022). The three are exemplified by English in (1). This paper is concerned with diversity in landscape language, as context for notions of place. In terms of the linguistic expression of place I follow Mark and Turk (2016, p. 3) in treating toponyms as symbolic references for particular places. In this paper toponyms are treated as a proxy for places.

| (1) | a. | *mountain* | landscape |
|-----|----|-----------|-----------|
|     | b. | *Mount Kosciuszko* | place |
|     | c. | *mountainward* | geocentric direction |

Considerable cross-linguistic and cross-cultural diversity exists in landscape terminology (Bromhead, 2018; Burenhult, 2008; Mark et al., 2011; van Putten et al., 2020). This diversity in ways of talking about and naming landscape features reflects differing ways of conceptualizing landscape in different language communities and cultures (Turk et al., 2011, p. 36). Turk et al. regard diversity in the **conceptualization** of landscape features as including: ways of cutting up landscape into features (see, e. g., Smith and Mark, 2003); the conceptualization of landscape features as objects versus fields; and the spiritual significance of landscape features (Turk et al., 2011, p. 36). Diversity in the **naming** of landscape features includes: what types of features are given proper names; relationship of toponyms to landscape terms; and the cultural significance of naming practices (Turk et al., 2011, p. 37). The
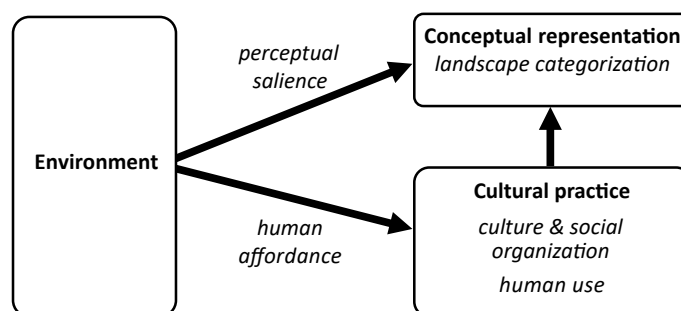
**Figure 3: Mark and Turk's motivating factors mapped onto STM's environmental, cultural, and conceptual modules.**

Topographic Correspondence Hypothesis (Palmer, 2015) postulates that similar topography will be referred to in similar ways across communities – e.g., languages spoken next to large rivers are predicted to employ an upriver–downriver axis. This presupposes that diverse humans will conceptualize similar topography in uniform ways. The fact that spatial and landscape terminology across and even within language communities varies within similar environments or even the same environment suggests that this is not necessarily the case (Lum, 2018; Lum et al., 2022; Palmer et al., 2017; Schlossberg, 2019). Assuming that the linguistic expression of space and landscape reflects speakers' conceptual representations, this presupposes diversity in the way humans conceptualize landscape.

Mark and Turk recognize three factors motivating landscape categorization: 'perceptual salience, human affordance and use, and culture and social organization' (Mark and Turk, 2016, p. 4f). These fit into an expanded sociotopographic model in several ways. Affordance is a feature of the topography, while human use is a sociocultural response to topography. Affordances in the environment therefore shape sociocultural use. It is the uses that emerge in response to affordances, in the context of other sociocultural practices and beliefs, that in turn shape categorization of landscape as a conceptual representation. In other words, sociocultural practices mediate between environmental affordances and landscape categorization. These interactions are represented in Figure 3.

The way in which perceptual salience influences landscape categorization is less clear and approached tentatively here. On the face of it, categorization motivated by the perception of, e.g., visually prominent features does not seem to be mediated by sociocultural factors, but directly, via perception. This is tentatively assumed to be the case here, but the role of perceptual modalities in mediating between topography and conceptual representations of landscape requires further consideration in the sociotopographic model.

Turk et al. (2011, p. 39–41) identify a set of factors they argue influence the way a language expresses landscape, grouped together as physical environmental factors, social environmental factors, and linguistic factors. These largely align with modules of the sociotopographic model. The STM module of language use is largely absent from Turk et al.'s discussion, as their linguistic factors are largely confined to the resources available in a language for expressing landscape (Turk et al., 2011, p. 41). The role of language use in mediating between the linguistic repertoire on the one hand and sociocultural factors and conceptual representations on the other is not prominent in the ethnophysiographic approach.

Turk et al.'s physical environment correlates to STM's environment module, although their factors encompass only terrain in the sense adopted here, and not also topography, as settlement patterns fall within their social environmental factors. Some aspects of their settlement patterns belong in STM's sociocultural module, e.g., whether settlements are permanent or nomadic, while others involve the effect of sociocultural practices that physically shape the environment, in 'the way in which buildings and/or gardens/fields interact with the natural landscape to produce settled places' (Turk et al., 2011, p. 40). This is because Turk et al.'s factors are grouped in thematic types, whereas bidirectional interfaces between modules are central to the notion of sociotopography: sociocultural practices relating to settlement patterns have a physical effect on the terrain through the built environment and modification of the terrain, resulting in topography as defined here. Their physical environment factors include 'topography' subsequently 'terrain'; (Mark and Turk, 2016; Turk, 2020), climate (including weather), and vegetation, all also belonging in STM's environment module (Turk et al., 2011, p. 40).
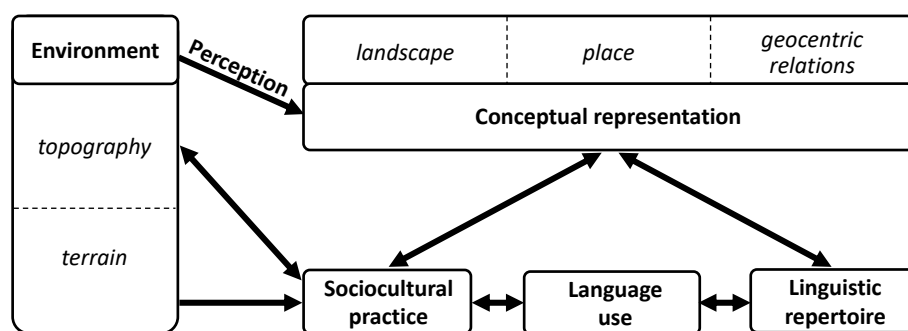
**Figure 4: A tentative expanded sociotopographic model.** The role, if any, of language use in mediating between linguistic repertoire and conceptual representations is not central to the issues discussed here, and is ignored for the purposes of this diagram.

Their social environment factors largely align with STM's sociocultural module, and include 'lifestyle and traditional economy' (i.e., subsistence mode), settlement patterns (settlement practices, as well as the built environment), religious beliefs or spiritual concerns linked to landscape, and historical factors (Turk et al., 2011, p. 40f).

A number of important differences exist between sociotopography and ethnophysiography. Ethnophysiography is concerned with the role of sociocultural factors in shaping notions of landscape and place. Sociotopography is concerned with the bidirectional relationships that exist between the various factors at stake – environmental, sociocultural, linguistic, and conceptual. Sociotopography is concerned with modelling these relationships, including the relationship between language and environment, language and conceptualization, and environment and conceptualization, and the role of sociocultural factors in mediating in all these relationships. Crucially, while ethnophysiography focuses on the environment as terrain, without the impact of human activity, sociotopography is concerned with human relationships with, and conceptualization of, their entire physical environment, of which the effects of human activity are an inseparable part.

# 5 Conceptual Representations of Landscape and Place in the Sociotopographic Model

On the basis of the discussion above, a revised sociotopographic model includes conceptual representations of landscape, place, and spatial relations, although spatial relations are not the focus of the present paper. This revised model incorporates notions of terrain, topography, landscape, and place, as defined above. A tentative revised form of the model is outlined in Figure 4.

In addition to shaping conceptual representations of landscape in the form of categorization, as Mark and Turk propose (see Figure 3), sociocultural practices are also shaped by landscape categories and by conceptual representations of individuated places, in a bidirectional relationship. It is assumed here that a similar bidirectional relationship exists between language and conceptual representations. Landscape categories are encoded by lexical items (terms) and by grammatical factors, such as a term's membership of a lexical class of spatial, landscape, or platial terms with specialized grammatical behaviour. Places are encoded by toponyms. In turn, the existence and use of these linguistic resources maintains the landscape categories and places to which they refer. The extent to which this relationship between linguistic repertoire and conceptual representations is mediated by language use is important but not explored further here.

# 6 Construals of Landscape

Three logical possibilities exist for the role of sociocultural practices and beliefs in shaping conceptual representations of landscape and place. First, the environment shapes sociocultural practices, which in turn shape conceptual representations (sociocultural practices involving interaction with diverse

environments with their own diverse affordances). Second, conceptual representations may be shaped by sociocultural practices and beliefs (social structure, cosmology, etc.) that are assigned to the environment without being motivated by it. Third, conceptual representations may be shaped by environmental features with no apparent analogue in sociocultural practice. These possibilities in motivating conceptual representations may be schematized as in (2), where the arrows represent direction of motivation.

| (2) | a. | environment | → | sociocultural practice | → | conceptual representation | Section 6.1 |
|-----|-----|-------------|---|------------------------|---|---------------------------|-------------|
|     | b. |             |   | sociocultural practice | → | conceptual representation | Section 6.2 |
|     | c. | environment | → |                        |   | conceptual representation | Section 6.3 |

Examples of each are presented below as shown.

## 6.1 Cultural Practices and Beliefs Motivated by Topography

### 6.1.1  Cultural Practices Motivated by Topography

**Water potability: hydrological terms in Western Pantar.**  Hydrological terms in the Western Pantar (WP) language of eastern Indonesia (Holton, 2011) provide a useful case study of the environment shaping cultural practices in turn shaping conceptual representations, due to the exception nature of the topography in which WP is spoken: 'the landscape of Pantar is [. . . ] an outlier in the extremes of human habitation' (Holton, 2011, p. 144). Pantar island is volcanic. All surface water is sulfurous and not drinkable, although some is suitable for washing. All subsurface water is contaminated with sulfurous brines to varying degrees (Holton, 2011, p. 145, 160f), in some cases still able to be consumed, with the WP-speaking community having a high tolerance for brines and seawater in their drinking and cooking water (Holton, 2011, p. 160).

Unlike English, WP has no term corresponding to *water*, a superordinate for all the relevant liquid types (Holton, 2011, 158–161). Some naturally occurring liquids in WP can be used for drinking, others are too acidic to drink but can be used for washing, while others are too corrosive even for washing clothes. In addition, seawater is also treated lexically as a separate category. Each of these four types is referred to by a separate term, as in (3), with no lexical superordinate, and may therefore be interpreted as representing separate conceptual categories. Moreover, WP has no terms that refer to bodies of water categorized by shape, such as 'stream' or 'lagoon', or by flow (flowing versus still; Holton, 2011, p. 161). Hydrological classification is therefore determined solely by the affordances of liquid types and the cultural practices that respond to those affordances: WP-speakers drink and wash with *halia*, wash with but do not drink *matá*, and completely avoid *masi*. Holton's description of the situation neatly expresses precisely what the sociotopographic model is attempting to capture: 'landscape classification in WP is driven largely by cultural factors, namely the human experience of landscape and the cultural construction of that experience' (Holton, 2011, p. 144).

| (3) | a. | *halia* | water (potable, from any source), body of potable water of any size or shape ('water, spring, well, lake, lagoon, etc.') |
|-----|-----|---------|------------------------------------------------------------------------------------------------------------------------------|
|     | b. | *matá*  | acidic supersaline brine (suitable for washing but not drinking) |
|     | c. | *masi*  | highly corrosive highly acidic supersaline brine |
|     | d. | *tawá*  | seawater |

The importance of potability and classification of liquid types is evident in WP notions of place as well as landscape. WP toponyms typically comprise an (exophoric) generic element and a non-generic element (Holton, 2011, p. 150). Of 74 toponyms identified by Holton containing a generic, the largest category contains the generic *habbang* 'village' (24 = 32%). However, the largest category with a terrain generic contains *halia* 'fresh water' (14 = 19%), e.g.: *Halia Bakurang* 'a lagoon at the mouth of the Wassir Valley'; and *Halia Kabbarung* 'a hot spring on beach south of Puntaru village'. *Matá* and *masi* also occur in toponyms, e.g.: *Matá Masigai* 'a sulphurous creek location'; and *Masi Salamang* 'a highly sulphurous creek location'.

In terms of the environmental, sociocultural, and conceptual modules of the sociotopographic model, the WP terrain shapes cultural practice through the functional affordances and effects of physical

contact determining the use to which each liquid type is put. These cultural practices then have a bidirectional relationship with a conceptual representation of landscape. The functional uses to which each liquid type is or is not put, the avoidance of contact with some types, etc., shape and reinforce the conceptual classification of liquid types and bodies of liquid. Conversely, the conceptual classification of liquid types reinforces their differential uses, contact avoidance, etc. Conceptual representations of place are also shaped by cultural practices, as liquid use, contact avoidance, etc., shape characterization of specific locations by liquid type and the uses to which they are put.

**Water access: hydrological terms in Yindjibarndi.** Issues relating to water use also motivate conceptual representations of landscape and place in the Yindjibarndi language of the Pilbara region of Western Australia (Mark and Turk, 2003; Turk, 2020; Turk et al., 2011), not due to potability, but simply access. Yindjibarndi country is dry. All available water can be drunk, but water is scarce, and awareness of its location is critical. 'There are no permanent or even seasonal rivers or creeks [...] Larger watercourses have running water in them only after major rainfall events [...] Permanent pools occur where [...] the water table [...] break[s] the surface of the ground [...] There are also some small permanent springs and soaks (where water can be obtained by digging)' (Turk et al., 2011, p. 27).

Landscape terms and place names relate to access to water. Unlike Western Pantar, all water is referred to with the Yindjibarndi superordinate term *bawa*. Within this, hydrological classification attends to the affordance of water in terms of its permanence or otherwise, and the flow of watercourses, when they occur, conceptually separating the flowing water itself from the fluvial channel in which it occurs. Terms for bodies of water recognize permanence and means of access, not scale or shape, as in (4). Terms for watercourses distinguish between the flowing water itself, and the fluvial channel in which it occurs. There are therefore no terms comparable to English *river* or *creek* referring to both a channel and the water in it. Terms for channels distinguish shape (5). Terms for flowing water distinguish strength of flow (6), regardless of whether or not the flow is located in an existing channel: a strong flow of water is *mankurdu* regardless of whether or not it is in a river bed, and a trickle of water, even just across rocks during a rare rainstorm, is *yijirdi*.

| | | | |
|---|---|---|---|
| (4) | a. | *yinda* | permanent body of water of any size (pool, billabong, lake) |
| | b. | *thurla* | small temporary body of water |
| | c. | *yurrama* | soak |
| | d. | *jinbi* | permanent spring |
| (5) | a. | *wundu* | wide low river bed or channel |
| | b. | *garga* | narrow deep channel (gully) |
| (6) | a. | *mankurdu* | strong deep flowing water |
| | b. | *yijirdi* | slow shallow flowing water, trickle |

Cultural practices in obtaining water, driven by the affordances of different water sources, shape the classification of landscape types. However, cultural beliefs in the form of water-focused cosmology are also inherent in the concepts expressed by hydrological terms. All *yinda* are crucial as reliable sources of water, and are highly culturally salient. All permanent bodies of water in Yindjibarndi country are *yinda*, and all *yinda* are places and have toponyms. All *yinda* also have cosmological status: all are occupied by and protected by the water spirit *warlu*. In addition to a functional relationship with *yinda* as a source of water, cultural practices relating to *yinda* involve respect behaviour towards the *warlu*. The term *yinda* includes both functional and cosmological components of meaning: it is a body of water that is permanent and occupied and protected by a *warlu* spirit.

In the sociotopographic model, terrain shapes Yindjibarndi cultural practices in accessing water through the affordances of permanent water sources, whether those sources take the form of a body of water or a spring, or requiring digging, itself requiring knowledge of the locations in the terrain in which to dig. These cultural practices shape conceptual representations of landscape through motivating landscape classification by water source permanence, and for non-permanent water, by still or degrees of flowing. The absence of even seasonal water flow in rivers and creeks motivates a conceptual distinction between a landform through which water flows (in exceptional circumstances), and the nature of the flowing water itself. The salience of permanent bodies of water in cultural practice plays a role in motivating the cosmological status of such bodies as incorporating the presence of a relevant spirit in the conceptual representation of landscape objects of this type. The landscape classification

**Figure 5: Atafu atoll and village with landscape/place terms mapped.**

itself shapes cultural practice by reinforcing knowledge of where to find such sources, where to dig for soaks, etc., and how to behave cosmologically when at bodies of water. Landscape classification and cultural practices and beliefs shape notions of place, through the conceptual representation of all water source locations as places and the assignment of toponyms.

### 6.1.2   Social Constructs Motivated by Topography

The cosmological dimension of Yindjibarndi hydrological terms involves topography motivating cultural beliefs as well as practices. Complex and comprehensive social structures and cultural belief systems can respond to topography in this way, shaping conceptual representations of landscape and place. Atoll-based languages provide an example. Atoll islands comprise an unusual location for habitation. Strips of land are strung around a large central lagoon. Islands are so narrow that both the central lagoon and the ocean outside the atoll are often visible from a single location. The lagoon side and ocean side of atoll islands differ in highly salient ways and provide distinct affordances (Hoëm, 1993; Lum, 2018, p. 30, 34, 40; Palmer, 2007). The lagoon is typically calm and shallow and the lagoon shore is furnished with sandy beaches, allowing the safe landing and anchoring of boats. The lagoon side of an island is protected from ocean waves and currents and typically sheltered from ocean winds. In contrast, the ocean side of an island is typically rocky and fringed with reef, and cannot be safely approached from the sea. It is exposed to the open ocean seas, currents, and winds. All attested atoll-based languages lexicalize the distinction between the lagoon side and ocean side of an island with distinct terms referring to each (Lum, 2018, p. 180; Palmer, 2007). These are assumed to represent distinct categories of landscape and place. In response to this terrain, cultural practices and beliefs and social structures in atoll-based communities typically incorporate this distinction. This includes maritime and agricultural practices, as well as settlement patterns, with villages and towns built along the lagoon shore, unless they become so large that they spread from the lagoon side across the width of the island. In this bidirectional relationship between the environmental and sociocultural modules of the sociotopographic model, terrain affordances shape cultural practice in the form of settlement patterns, which in turn shape topography through the built environment.

Polynesian Tokelau is typical: 'The orientation of interest and activity in the Tokelauan village is centripetal, toward the lagoon, rather than centrifugal, toward the ocean and the world beyond' (Hoëm, 1993, p. 141). The lagoon side of an island or village is regarded as its front, and the ocean side as its back (Hoëm, 1993, p. 141–143). On land, the lagoon side is referred to either as *namō* 'lagoonside' (from *namo* 'lagoon'; Hooper pers. com.) or *gātai* 'seaward', and the ocean side is referred to as *i tua* 'in the back' (Anon, 1986; Hoëm, 1993; see Figure 5).

Tokelauans tend to 'conceptualise social relationships in concrete spatial terms' (Hoëm, 1993, p. 138), and the front-back dichotomy is a key element of this. The front of an island is regarded as moral and under social control, while the back is uncontrolled, wild, and dangerous, where 'danger lurks' and one is vulnerable to attacks by spirits and ghosts (Hoëm, 1993, p. 141–143), correlating with the
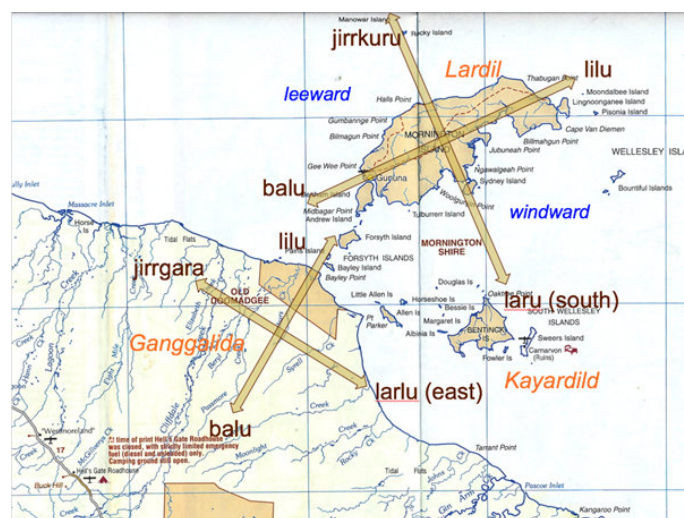
**Figure 6: Mornington Island showing windward and leeward sides,** with directional terms in Lardil and the Ganggalida language of the adjacent mainland also mapped showing skewing to wind direction.[3]Map and data courtesy of Cassy Nancarrow.

sheltered topography of the lagoon side and exposed topography of the ocean side. This correlates with a broader social alignment in Tokelauan society between the notion of front associated with appropriate personal behaviour and conformity to social expectations and the notion of back associated with the opposite. In the settled, inhabited front of an island, controlled, dignified, quiet behaviour is expected. At the back of an island such behaviour cannot be relied on.

In the sociotopographic model, the terrain affordances and settlement patterns in the built topography shape cultural practices, social structures, and societal values and mores. These sociocultural forms interact bidirectionally with conceptual representations of landscape and place, shaping landscape categories and notions of place associated with the lagoon and ocean sides, with distinct notions of each side as landscape categories and as places reinforcing cultural practices and social behaviour and expectations.

## 6.2 Sociocultural Correlates of Topography with No Obvious Environmental Motivation

In Section 6.1, cultural practices and beliefs and social systems that underpin aspects of landscape classification and place are motivated by the nature of the topography and its affordances. Sociocultural forms may also be assigned to aspects of topography without any apparent motivating factor. In other words, sociocultural forms may be arbitrarily mapped onto topographic distinctions. Aspects of the social structure of the Lardil community of Mornington Island, in Australia's Gulf of Carpentaria, provide an example. The highest level Lardil social structural division reflects a topographic opposition – the leeward and windward sides of Mornington Island, with no evident environmental motivation other than simply the existence of that topographic distinction.

Mornington is an island about 65 kilometres in length, oriented roughly southwest to northeast in cardinal terms. For most of the year the prevailing winds are from the southeast to the northwest, roughly corresponding to the line of coast in the southern Gulf of Carpentaria, with winds from the northwest prevalent during the wet season from January to March (Rosendahl, 2012, p. 60; see Figure 6). For most of the year, the long southeastern side is windward, and the northwestern side is the lee side. This distinction between the southeastern windward and northwestern leeward sides is represented conceptually in landscape and in place, and corresponds to key Lardil social structure and cosmology.

Lardil society is organized on the basis of a complex exhaustive kinship system, and on the basis of clans associated with 31 clan estates (*Country*) around the island (McKnight, 1999, p. 81–107). These estates are distributed across four cardinal regions: the northeastern and southwestern ends of the

island and their adjacent smaller islands, the southeastern windward side, and the northwestern leeward side (McKnight, 1999, p. 111–113). Individuals belong to their clan estate, and their cardinal region. However, the strongest social group identity is based on two moieties: the Windward Moiety and the Leeward Moiety, associated with the southeastern and northwestern sides of the island respectively (McKnight, 1999, p. 113; Memmott, 1979, p. 79–84; Rosendahl, 2012, p. 54). All clan estates are associated with the Windward and Leeward regions, and all Lardil individuals belong to one of the two associated moieties. This socio-geographic bifurcation corresponds largely but not entirely to cardinal regions. The southeastern and northwestern regions belong to the Windward and Leeward Moieties respectively. However, the northeastern and southwestern regions are distributed across the two moieties, with most northeastern people belonging to the Leeward Moiety and most southwestern people belonging to the Windward Moiety (McKnight, 1999, p. 113).

The social distinction between Windward and Leeward people is highly prominent in traditional Lardil cultural practice and cosmology. The division of Lardil society into these two moieties was manifest in inter-group conflict, and in the competitive dancing displays that are a key feature of traditional Lardil culture (McKnight, 1999, p. 8, 113). Fighting between groups of opposing moiety members remained common at least until recently, and children played and fought along moiety lines (McKnight, 1999, p. 113). Groups from each moiety competed in displays of dancing, and each moiety maintained its own dancing ground, even in the main settlement on the island that resulted from colonization.

The distinction is manifest in Lardil cosmology. Of the three Lardil creation ancestors, one travelled along the leeward side, while the other two travelled along the windward side, naming the places on their respective sides as they went (McKnight, 1999, p. 53f; Memmott et al., 2006, p. 38). The windward ancestors built fish traps as they went, while the leeward ancestor speared fish from sandbars, corresponding to cultural practice, with fish traps much more prevalent in the archaeological record on the windward side than the leeward side (McKnight, 1999, p. 79; Rosendahl, 2012, p. 58). A dispute arose between one of the windward ancestor beings and the leeward ancestor being, resulting in the windward ancestor killing the leeward ancestor, explaining the origin of death (McKnight, 1999, p. 78f), corresponding to the traditional competition and open conflict between the moieties.

The most salient topographic distinction on Mornington Island is between the windward and leeward sides. The principal sociocultural distinction is mapped onto this topographic distinction. However, there is no evident motivation in any topographic difference between the two sides that corresponds to any sociocultural features of the two moieties. It appears that the topographic difference between the windward and leeward sides of Mornington simply provides a useful environmental distinction onto which to map the principle distinction in sociocultural practice and beliefs, underpinning the conceptual categorization of landscape into leeward and windward categories, and those regions and associated *countries* into windward and leeward places.

## 6.3 Landscape Categorization with No Obvious Interactional or Sociocultural Motivation

Among the Lardil, certain cultural practices and social structure along with landscape categories and notions of place map onto a topographic dichotomy, but the motivation comes from within sociocultural structures, not the topography itself. The corollary to this lies in topography motivating landscape categorization directly, without the mediation of sociocultural factors. The role of shape in categorizing landscape among Manyjilyjarra speakers appears to exemplify this (Hill, 2022; Hill and Turk, 2016; Turk, 2020, p. 309–354; Walsh, 2008). In the Indigenous Manyjilyjarra language, spoken in Western Australia's Pilbara region, scale plays no role in landscape categorization. Instead, two factors play a role in the classification of landscape features: material composition, and shape.

Of these, material composition has an interactional dimension in affordances and interaction with different ground types. Manyjilyjarra speakers make a pervasive contrast between ground that is *runyu* 'soft' and that which is *nantirr* 'hard', and classify landscape types and places as regions of hard or soft ground (Hill, 2022), a distinction common in hunter-gatherer societies (see, e.g., ‡Akhoe Hai∥om, Namibia; Widlok, 1997, p. 320f, 327; Widlok, 2008, p. 366f). Hard and soft ground have crucial differences in their affordances. They are the locus of different biosphere (e.g., useful plants and animals). They have different potential for water containment (hard ground types retain water after

rain, soft ground types do not); and in ease of tracking and hunting (it is easier to track game across soft ground types, and more difficult across hard ground; Hill, 2022; Walsh, 2008, p. 254). However, the role of shape as a categorizing basis for landscape has no apparent analogue in affordances or other interactional factors. It appears to reflect attention to shape rather than scale in landscape categorization, with no specific correspondence in cultural practice.

Some Manyjilyjarra landscape categories reflect material, others reflect shape, others correspond to both. For no category is scale a factor in the distinctions that are encoded. The Manyjilyjarra landscape dictionary contains around 120 terms (Hill and Turk, 2016). Some key terms are shown in (7)–(10). Broadly, a key distinction is encoded between convex and concave topographic structures. The terms in (7) encode only shape, distinguishing raised or convex forms from concave forms, natural or artificial, of any size (Figure 7). Other landscape terms encode only material. For example, *yapu* (8) encodes any object of any scale made of rock, from rocky mountains to small stones on a path (Figure 8). Others encode both shape and material (9), encoding landscape forms of any size of the requisite soft material and round or elongated shape (Figure 9). The same neutral encoding with relation to scale applies water features, with terms encoding shape, material, water-holding potential, and water flow (10).

| | | | |
|---|---|---|---|
| (7) | a. | *warrarta* | raised area of any size, natural or artificial (hill, plateau, crest in road, bank of river, roof of building, top of table) |
| | b. | *takurru* | any concave form, natural or artificial (valley, gully, dip, divot or hollow in landscape, pipe, satellite dish, bowl; Figure 7) |
| (8) | | *yapu* | rock (mountain, rock hill, outcrop, rock, pebble, coin; Figure 8) |
| (9) | a. | *tumun* | rounded elevated shape comprised largely of sand or earth of any size, convex rounded form of sand or earth (large hill, ants nest, etc.; Figure 9) |
| | b. | *yintiri* | elongated convex form of sand (sandridge kilometres long, small sand-bank that can be stepped over) |
| (10) | a. | *wirrkuja* | concave form in rock capable of holding still water (large permanent rockhole suitable for swimming, small crevice in rock capable of briefly holding water after rain, etc.) |
| | b. | *karru* | watercourse, channel, depression of any size where water can flow |

Numerous other terms encode shape without consideration of scale. *Jiwarlykarra*, e.g., encodes shape and material: a rock face, vertical or horizontal, of any size from a towering cliff to the surface of a stone embedded in the ground. *Larrku* encodes just shape: a slope of any size or degree of steepness, from the side of a sandridge to a rocky hillside or edge of a lake to the embankment at the side of a road to a roofline. The lack of encoding of scale is pervasive throughout Manyjilyjarra landscape terminology.

The importance of shape without any reference to scale in Manyjilyjarra appears to be an instance of landscape categorization responding to topography without the mediation of sociocultural practices or structures. While the material compositional differences between a hill that is *yapu* and one that is *tumun* provide different affordances, the shape of a *yapu* or *tumun* do not: it is not apparent what affordances could be shared by a rocky mountain and a stone on a path, or by an earth hill and an ant mound. No Manyjilyjarra cultural practices appear to treat all instances of *tumun* alike, for example. The shape element of this landscape concept appears to be motivated by topographic form alone, accessed directly via perceptual modalities. For terms such as *warrarta* and *takurru*, the sole topographic motivation appears to be direct. In the sociotopographic model, this involves a unidirectional interaction between topography and the conceptual representation of landscape. How perception as the means of this interaction fits into the model remains to be considered.

It is noteworthy, however, that although shape and material are the bases for landscape categorization in Manyjilyjarra, they play no role in notions of place encoded in toponyms. These are assigned solely on basis of affordance and cosmology. The crucial affordance factor relates to reliable access to water. A *yinta* is a permanent source of water of any type, including soaks, springs, rockpools, and lakes. Every *yinta* is a place for Manyjilyjarra speakers, and almost all have a toponym (Hill pers. com.; Turk, 2020, p. 325f). However, as in Yindjibarndi (Section 6.1.1), all *yinta* have also cosmological status: all include a range of spiritual associations (*jukurrpa*), including the presence of a creation being, and the term and places identified as instances of *yinta* include both the utilitarian and spiritual

**Figure 7: Examples of takurru:** valley (left); corrugation in road (right). Photos courtesy of Clair Hill.



**Figure 8: Examples of yapu:** rocky mountain visible for kilometres (left); stone on dirt track (right). Photos courtesy of Clair Hill.



**Figure 9: Examples of tumun:** rounded earth hill (left); small mound of ants' nest (right). Photos from Hill and Turk (2016) with permission.

elements. The few named places that are not *yinta* appear to all refer to locations of *jukurrpa* sites where ancestral beings transformed or were transformed by landscape. Although shape is central to conceptual representations of landscape, it is not an component of place in Manyjilyjarra, either in toponyms or the individuated landscape entities they refer to. This raises the intriguing general possibility that although concepts of landscape may respond to perceptually accessed topography without corresponding sociocultural practices and structures, the same is not true of concepts of place, which, as individuated conceptual entities with which humans interact, are always associated with sociocultural practices and structures. This is a hypothesis that warrants further empirical investigation.

## 7 Conclusion

Sociotopography recognizes that humans' physical environment includes terrain (raw landforms, natural vegetation, climate, wind, etc.), and the effects on terrain of human activity (built environment, settlement patterns, modification of the terrain, etc.). Terrain and human impact on it together comprise topography. Humans construct conceptual representations of the environment in the form of landscape categories, places, and geocentric directions. These conceptual representations are encoded in linguistic terms and structures, and are in turn shaped and reinforced by language. They interact with sociocultural practices, structures and beliefs, being motivated by, and in turn shaping and reinforcing those sociocultural forms. And they interact with terrain and topography itself, via sociocultural forms that respond to the affordances and other interactional aspects of the environment, and directly via perceptual modalities.

### Notes

1. Turk also notes that 'topography' can refer to the study and/or mapping of land (Turk, 2016, p. 374). The term does not have this sense in sociotopography.
2. Landscape is therefore understood as a representation of topography, i.e., including the impact of human activity, and not merely of the unimpacted world of terrain, a relationship neatly captured in the European Landscape Convention definition of landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human forces' (Council of Europe, 2000).
3. The salience of prevailing winds is also manifest in Lardil directional terms, shown in Figure 6. The wind and coast-based nature of the terms is evident in the skewing with cognate terms in Ganggalida on the adjacent mainland coast. *Laru/larlu* and *jirrkuru/jirrgara* encode windward and leeward directions respectively, although they are typically translated as south and north for Lardil and east and west for Ganggalida, with corresponding translational shift for *balu* and *lilu* (Nancarrow, 2014, pers. com.; Ngakulmungan Kangka Leman (Language Projects Steering Committee), 1996; Tindale, 1974, p. 45). *Laru/larlu* encodes direction towards the prevailing wind southeast from the windward side of Mornington or southeast along the coast in Ganggilida, with *jirrkuru/jirrgara* encoding the direction leeward from the leeside of Mornington or along the mainland coast leeward. The skewing tied to winds means, e.g., that *larlu* is translated as east for Ganggilida, but south for Lardil, and while the sun is described as rising *lilu* and setting *balu* in Lardil, it rises *larlu* and sets *jirrgara* in Ganggilida. The consistent geocentric correlate to the terms is wind direction.

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# Report from the First Workshop on
# Cyber Ethics in Platial Research

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## 1  Motivation and Overview

The examination of morality has a long-standing history in philosophy, but recent events, including the dramatic rise of computational technologies has expanded the field into a multidisciplinary study of ethics. With the global connectivity provided by the Internet, *cyber* ethics is unique due to rapid changes in technology and ever-changing ethical considerations pertaining to everything from human subjects to artificial intelligence (AI). Among the deluge of data generated by machines and humans, place-based information is special due to its vague boundaries, subjectivity, and heterogeneity of descriptive data. Compared to spatial data, *platial* information is a much broader concept as it is more than simply geographic coordinates and often involves human attachments. While we fully support the recent renewed interest in the field of *geoethics* (Goodchild, 2022), we also feel it is important to discuss ethic beyond the surface of the earth. Here, we propose to extend this discussion to include cyberspace and bring together the concepts of cyber and geo-ethical studies under the umbrella of place-based cyber ethics. We encourage the readers of this workshop report to reflect on these questions and the importance of place-based cyber ethics in their own work.

On December 15th, 2021, the *First Workshop on Cyber Ethics in Platial Research* was held in Enschede, the Netherlands (virtually), in conjunction with the *Third International Symposium on Platial Information Science (PLATIAL'21)*. The objective of this workshop was to explore the unique aspects of ethics related to place. During the workshop, invited speakers first provided a summary of their related work followed by organizers and attendees discussing the topic more broadly. With the goal of spurring an active discussion, the organizers prompted discussion through proposing the following three questions to the speakers and workshop attendees.

**Q1** What ethical concerns are unique to platial research, but not to geospatial research more broadly?

**Q2** What is volunteered platial information, and what influence does it have on contributors/users?

**Q3** How should we better incorporate cyber ethics in platial research?

In the following sections, we paraphrase the perspectives on the topic as presented by speakers and attendees. A wide variety of opinions were provided on the various aspects of place-based cyber ethics. We aimed to organize these by key themes, often reflected by individual speakers.

## 2   Key Themes

### 2.1  Who Can Talk about place?

When one talks about place, and the ethics surrounding place, it is important to understand the locale, the attachment to and belonging with the locale, as well as the social and cultural norms governing this attachment. This was the key theme of the presentation by Martin Tomko.

Dr. Tomko invited us to consider the following situation, familiar to many: Over the course of our lives, we move, and encounter many locales to which we form an attachment. For instance, most of us have a place that they currently call *home*. To many, this is not the same place where they grew up, again, another place we refer to as *home*. Perhaps our parents have moved from our childhood homes to a location we ourselves have never lived. Why is it then, that we feel an attachment to this place? Why is a place labelled as *home* if there is no continuous attachment over an extended period of time? There is an inherent entitlement to the concept of *home* which is clearly framed within the context of place.

Our speaker then invited us to consider the specific example of Melbourne, Australia. Melbourne has been, for millennia, the home of the Wurrunjeri people of the Kulin nation. These are the Indigenous, Traditional Owners of the lands where the city called Melbourne is now found. Can one truly feel at home in this place where its rightful owners have been dispossessed? This begs the broader question, what are the social and cultural norms attached to the places surrounding us, and are we respectful of them in our day-to-day lives? For instance, when hiking, could we be trespassing through a place that, unbeknownst to us, is a place traditionally reserved for Wurrunjeri women? Is it possible to feel comfortable and at home in a place to the same extent as people of the First Nations? Moreover, can we as visitors, researchers, or current inhabitants of a place publish and articulate opinions about this place? The answer is not trivial, as can be attested by numerous researchers (McClure and Corlett, 2021; McConnell et al., 2021).

According to Purves et al. (2019), 'The identity of a place must be shared.'[1] The questions then are: With whom is it shared? And which identities are shareable? Dr. Tomko argued that the identities of a place may not be shareable with everyone without distinctions, due to the fact that one's current location may afford different activities, emotions, religious significance, etc. to different people (e.g., a place to hike or rock climb, a place of cultural significance). These various aspects of a place are not easily shared or quantified. As data scientists, we might choose to mine large datasets with the goal of identifying patterns and relationships between places. The difficulty here is that any analyses of these data are most often devoid of context. One could reasonably argue that it removes what is fundamental to *platial* information – the nuances, context, and subjectivity – that make a locale a place. Our speaker argued that big data are only able to provide broad, aggregate, socially salient reflections on these locales, but often fail to reveal nuances.

During his presentation, Dr. Tomko posited that everyone may talk about any 'location', but not everyone has the right to talk about any 'place'. Places are thus not only conceptualized based on lived experiences, experiences may also be handed down, inherited, even to people that have never visited a traditional motherland. While tourists may observe and experience the positive aspects of a place, others may experience negative or complex emotions based on memories or historical experiences. We must be careful when reflecting on places that are significant to others. One suggestion is to let the original caretakers of a place guide the discussion in order to avoid perpetuating colonial concepts related to the place, including through volunteered geographic information and data contributions of uncertain provenance.

Finally, it was proposed that in the future, our research must consider the ethical use of platial information through at least the following lenses: (a) What ethical and moral rights do we have in collecting information about a place? Can the collected information about a place be shared, and with whom? (b) Biases in the data cannot be ignored: How was the data collected? Does the data capture representative voices (e.g., interviews with local residents) or only tourist perspectives (e.g., social media posts)? (c) Is the data actually volunteered? The question has already been discussed in the literature of volunteered geographic information and user-generated content (McKenzie and Janowicz, 2014), but it is even more important when it comes to platial information. Finally, (d) we must consider *how* we share platial information and visualizations, and ensure that we are doing so appropriately. A co-design with traditional caretakers is, for instance, a good approach to cartographic representations of places[2]. The framework of the AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research[3] may be a good framework to investigate with respect to platial research.

## 2.2 Is Ethical Mapping Possible in Platial Research?

Our second speaker, Junghwan Kim made the argument that many maps may violate platial data ethics by disclosing people's private locations via spatial reverse engineering (e.g., see Curtis et al., 2006). Dr. Kim and his colleagues conducted an online survey that investigated individual levels of comfort with 30 maps that presented potential ethical concerns (Kim et al., 2021). The results of the survey identified a few areas for further discussion on the topic of platial ethics. First, a map that displays a large amount of information on one's private locations is considered to have serious ethical concerns. 74% of survey respondents expressed concerns regarding a map that only displayed home locations, while that percentage increased to 87% when the map depicted individual GPS trajectories. Further work was done to examine why people are uncomfortable with the disclosure of their home location. Reasons include the risk of identification an individual and the potential for negative consequences related to this identification process (e.g., criminal activity or hacking). Second, the results of the survey analysis indicated that proper geomasking or obfuscation techniques may resolve platial data ethic concerns to some extent. Provided advanced geomasking techniques, the percentage of concerned respondents decreased from 87% (unmasked GPS trajectories) to 39% when directional distorted private location data (obfuscated) were introduced. When it comes to different types of geomasking, aggregation-based methods may be more appropriate than relocation-based techniques as relocation simply moves a point elsewhere in the same vicinity and may inaccurately, and unjustly, identify innocent people. Third, stronger protection methods should be utilized when mapping socially vulnerable populations. Elementary school students topped the list of vulnerable groups ranked by survey respondents, and the list continued with substance abuse treatment patients, HIV patients, and many more 'at-risk' groups. Respondents worried about hate crimes, discrimination, and stigmatization that may come along with disclosure of private locations of vulnerable populations. Here, Dr. Kim emphasized the importance of recognizing that ethics in platial research is diverse and covers more than the topic of his presentation. The results of this survey was meant to highlight privacy issues in geovisualization and spur further discussion on the topic.

# 3   Discussion

After the two presentations of relevant works from Dr. Tomko and Dr. Kim, the panellists discussed the topic of platial ethics by addressing the three key questions stated in the first section.

Panelist Ekaterina Egorova highlighted two of her most prominent concerns regarding *Q1*. The first one relates to the growing digital divide and to the way in which digitality reproduces power, as demonstrated by feminist digital geography research (e.g., Elwood and Leszczynski, 2018). Multiple places and communities find themselves in *digital shadows*, which results in biases and inequalities that are further reinforced through artificial intelligence. Dr. Egorova's second concern relates to the lack of autonomy – not only do places have little control of their digital traces and digital representations, but their communities are often excluded from the process of defining research agendas that use those digital traces as data.

To define volunteered platial information, Dr. Egorova proposed to refer to the prototype theory by Rosch and Lloyd (1978). According to this theory, concepts are organized based on characteristic (rather than defining) features, and concept members range from prototypes to boundary cases. Applying this theory, the most prototypical case of volunteered geographic information is OpenStreetMap, which is mostly concerned with *geometry*, and corresponds to location and locale of place (Agnew, 2011). The most prototypical case of volunteered platial information is multimodal information about places found on the Web, such as textual descriptions, short reviews, and images. Global platforms such as *TripAdvisor*, or local platforms such as *Rankers* in New Zealand are rich in *semantics*, also known as soft information (Liu et al., 2020), which relates to the sense of place (Agnew, 2011). However, to gain a better understanding of the concept of volunteered platial information, we should also reflect upon boundary cases. For instance, does place-based environmental monitoring conducted by citizens qualify as volunteered platial information? Or, do local environmental challenges identified by citizens within community-based projects qualify as volunteered platial information? Dr. Egorova's response is 'yes', and in her view, it is a useful exercise for our research community to spend time disentangling the conceptual landscape of volunteered geographic and platial information. This landscape is in constant

flux, and new prototypes and category norms might be emerging, reflecting new realities in geographic knowledge production.

The influence of volunteered platial information on contributors and users, in the view of Dr. Egorova, depends on the type of volunteered information we consider. If we stay with the example of platforms mentioned above (Tripadvisor or Rankers), their contributors benefit from self-expression and memory-making, while users shape mental models and expectations of places and experiences (Egorova, 2021). If we look at place-based environmental citizen science projects, contributors may experience inspirational, educational, and social benefits, while the whole community benefits from the solutions made possible with the help of collected volunteered platial information. Importantly, this question invites us to explore this topic further, and reflect upon the influence that certain types of volunteered platial information have on placemaking, on communities, and on ecosystems.

So how can we better incorporate cyber ethics in platial research (*Q3*)? One way, according to Dr. Egorova, is to empower and educate communities on related aspects through *citizen science*. For example, engaging communities in the co-creation of research agendas will make research more transparent while allowing communities to preserve more autonomy. To give another example, involving citizens in projects around artificial intelligence will educate communities about 'what's in the black box', allowing them to join related societal discussions on geospatial and platial AI and ethics. Furthermore, our research community could draw ideas developed within the open science movement – for instance, facilitating open data policies, or adopting study pre-registration practices to inform communities about planned research. There is no single solution, but there are many advanced initiatives that are highly relevant and could serve as inspiration.

Panelist Grant McKenzie, approached *Q1* by first defining place from a multi-dimensional, data-centric perspective. While geographic space[4] is one (or arguably three) dimension(s), time of the day, e.g., is another dimension that signifies place as a concept of change. Applied examples of defining place involve exploring social media content (e.g., texts and images) outside of the Cartesian space that can potentially identify where people are located. In this context, geospatial information is often a secondary feature that individuals elect to share on the Internet (e.g., geotagged tweets). Dr. McKenzie highlighted his work in developing a set of criteria and scale to weigh whether a piece of geographic information is volunteered or coerced (McKenzie and Janowicz, 2014). He suggested that future research in this area must acknowledge that geographic space is only one dimension of the multidimensional concept 'place', and that we as ethical researchers must examine not only the ways in which geographic data are collected, but also content related to the other dimensions. In response to *Q3*, Dr. McKenzie highlighted the need for a better framework for *research ethics board* requirements. Place-based research related to user-generated content is a rapidly growing domain, and research ethics boards need to well versed in the complexities related to data collection in this area. Finally, it must be acknowledged that masking/obfuscating/anonymizing geospatial location does not necessarily mask platial information, and further research is required to understand how platial information can be identified without access to explicit geospatial information.

Panelist Hongyu Zhang argued that a location usually represents a single point while a place often incorporates multiple locations. Given this, one ethical concern unique to platial research is group privacy (Mittelstadt, 2017). Mr. Zhang reminded us that privacy concerns are not always individualistic. For example, insurance profiling may be inaccurate and unfair as a specified subset of the population (e.g., a 25 to 35-year-old dog owner who lives in Brampton, Ontario) may have a constantly changing membership. COVID-19 contact tracing may also lead to unintended consequences (e.g., discrimination and stigmatization) even though personal information remains confidential (e.g., releases of building locations). In response to *Q2*, and as discussed in earlier sections, volunteered platial information describes a much broader domain of data than traditional VGI. In light of this fact, the notice-and-choice paradigm (e.g., a website banner asking users to accept its privacy policy), as seen in the European Union General Data Protection Regulation, may not be the best solution for online privacy protection (Rothchild, 2018) as it does not include regulations on a wide range of contextual data.

Platial information, often heterogeneous and vaguely defined, extends the risk of unwanted spatio-temporal information disclosure as users are too often not aware of what data is being collected and how it can be combined with other data to identify the platial locations of an individual. To better incorporate cyber ethics in platial research (*Q3*), Mr. Zhang argued for the need to develop a set of place-based cyber ethics principles as ethics themselves are not a universal doctrine. Taking personal

geoprivacy concerns as an example, recent studies (e.g. Kim and Kwan, 2021) have demonstrated the influence of culture on one's privacy and ethical perceptions. In addition, the amount of location data one is willing to share also varies by culture. All of this points to a need for further discussion on the variety and heterogeneity of data in place-based cyber ethics research.

During the workshop, a participant[5] highlighted the fact that the broader discussion was geared towards the collection of platial information, whereas another important issue specific to ethics of platial information could be its application, or the way it is processed and used, not only in research but also in urban planning or management. The participant argued that platial information in many ways reflects 'local knowledge', i.e., subjective, or inter-subjective data, memories, personal histories, etc. For instance, these types of data tend to be neglected in the field of applied urban management. Therefore, one of the facets of platial information ethics could be how we treat *local* data as opposed to preferring universal knowledge or *objective* data.

## 4   Conclusions

The ubiquity of mobile technology, the Internet of Things, and artificial intelligence is rapidly transforming our society. Ethical discussions and research related to geospatial computation and online services, often referred to as cyber ethics, has been slow to respond (Maner, 1999). We have recently witnessed a resurgence of interest in *geoethics* that parallels the increasing interest in computational models of *place* within geographic information science. To the best of our knowledge, no previous events have been organized to combine these two topics and, in general, very few public discussions have involved the ethical concerns of place-based search. The purpose of this workshop was therefore to provide a platform through which parties interested in such a topic could engage. The discussion clearly demonstrated that this topic has multiple facets and that there are many different avenues and lenses through which to approach platial research. By many accounts the workshop was a success and we look forward to continuing to discuss the future of cyber ethics in platial research, outside of this event.

### Notes

1. We recognize that views on place identities can be different among communities.
2. https://www.imwaustralia.com/resources
3. https://aiatsis.gov.au/sites/default/files/2020-10/aiatsis-code-ethics.pdf
4. Here, geographic space refers to the mathematical representation of the physical space.
5. We did not receive authorization to publish the workshop participant's name.

### Author Contributions

H Zhang wrote the report based on the presentations from the co-authors. G McKenzie reviewed and revised the overall report. M Tomko, E Egorova, and J Kim reviewed and revised their corresponding sections.

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