

# MENTAL MAPPING

The Science of Orientation

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# MENTAL MAPPING

## The Science of Orientation

New Approaches to Location – Spatial Patterns  
of the Global Economy Conference

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## PREFACE

Although it may seem to look like a book at first sight (*prima facie*), the Reader is holding a business card in his/her hands: the visiting card of Hungarian and Central-Eastern European researchers dealing with mental mapping. The Reader may now ask back: 'researchers dealing with what?'

The notion is not new, yet it had never become widespread enough to make an explanation useless.

### ***Mental mapping is the science of orientation.***

Orientation is an important part of our lives, we use it in several fields, and mental mapping is accordingly an interdisciplinary area, primarily falling into the realms of interest of environmental psychology, cultural anthropology, geography and urbanism. Questions in these different areas are similar to one another: How do we get somewhere? How do we use space? What makes something in space visible for the audience? These questions are not irrelevant from a practical point of view either, in marketing, urban development, or the development of tourist destinations or systems of navigation. The digital support of orientation, the evolution of self-driving systems make the science of orientation face serious challenges.

The expression of "mental" or "cognitive map" is a notion used for different things in different disciplines. The number of misinterpretations is increased by the occurrence of many similar notions with a different meaning, like value map, concept map, semantic map etc. The definition used as the most frequent synonym is cognitive map. According to some opinions, cognitive or mental mapping means two different things in the word usage of psychology and social geography. It looks like as if the subject of research was inverted: geography collects knowledge about space, while cognitive map in the interpretation of psychology maps knowledge, i.e. it is engaged in creating a "map" of the meaning structures of consciousness. Other researchers on the other hand (e.g. Barbara Tversky, also appearing in our volume) consider that there is no difference between the two types of notion usage, as in both cases we are dealing with the discovery, the mapping of consciousness contents; and when consciousness is examined, it would be impossible to narrow down the inquiry to the things related to space, because cognitive processes can only be understood in their complexity.

## THE STRUCTURE OF THE VOLUME

The present volume is not a typical conference volume. Although it was compiled following a conference organised in 2019, our aim was not to present the newest writings or the currently undergoing research projects of the participants, but rather to summarise their most inspiring studies. The aim of the collection is to enhance dialogue in the quickly developing fields of orientation science, between the areas of application and the academic sphere. The conference volume brings out a few works that had had a significant influence of the definition of this field of science, alongside a few case studies that demonstrate well the areas of application of the field. The volume begins with three theoretical papers, signed by three renowned authors: Barbara Tversky, Zoltán Cséfalvay and Andrea Dúll.

The paper of American professor of cognitive psychology, Barbara Tversky focuses on the processes of spatial recognition. Her study about cognitive collages was a revelation for Central European specialists.

Economist and geographer Zoltán Cséfalvay laid the foundations connected to mental mapping in several areas of science in Hungary. The second generation of scholars is growing up on the foundations he had laid, and while he primarily starts from the angle of urban geography, his theoretical works constitute the basics of many contemporary researches.

The dynamically developing slant of environmental psychology is represented by the theoretical work of Andrea Dúll, also written in the early nineties.

The rest of the volume contains case studies. These case studies are independent of each other and do not directly reflect to one another. This is how the inquiries about dog walking, the connections between island and space experiences, the studies about housing estates in Cluj-Napoca and Miskolc, as well as the examining the theoretical and physical space delimitations of ethnically groupable communities can all find their places in one book.

Our authors came from several countries and bring news about several countries. They characteristically cross borders and ethnic boundaries. It seems like our authors were trying to dissolve the usual conceptions of cartography, and the legally existing social group frameworks. Several corners of Central Europe appear as examples, one could mention the Berlin research field of the Hungarian researcher, or the mental mapping examination of the Slovakian and Serbian border regions.

Like every volume, the present one is also missing notable authors. We accept that our volume is not complete. Many important authors should have been necessarily included. Yet, as in the case of the great majority of volumes, we also had to set quantitative and theoretical limits. In spite of these inevitable shortcomings, we consider the volume an acceptable publication, a worthy visiting card of the Central and Eastern European researchers of mental mapping, and of the international association of mental mappers (the International Mental Map Analysis Platform, iMMAP).

## CONFERENCE AND VOLUME

Since its establishment, the International Mental Map Association Platform has been striving to become a research workshop of international mental mapping in the Carpathian Basin, presenting and popularising the methodologies of mental mapping and its theoretical and practical applications. The conference fits into a long series: the professional events of the International Mental Map Association Platform have been organised in 2007 in Budapest, in 2011 in Timișoara and Szeged, in 2015, and from 2017 annually in Budapest. These events have a strong community building character: in the past years a strong community and network, a true professional workshop has formed not only of the specialists working in the Carpathian Basin, but also including researchers active on the international scene.

## DEDICATION

We dedicate the present volume first of all to the fellow-professionals working in the area of practical orientation. It is a teaser volume. I encourage the reader, no matter his/her everyday occupation, to mix in it a little bit of mental map approach, from now on. Stare in wonder on his/her everyday route, the places walked in at work, ask why a place is liked or not liked in his/her own flat or in a public space. Or as a driver, think over the route followed with the mind of a pedestrian, or that of a traveller of public transportation!

Traffic and transportation are going to face tremendous changes in the immediate future. Yet behind the glaring lights of new technologies, we always find human beings, and although technology can indeed widen the limits of perception, its theoretical frame will always remain human beings. That is why it is important to walk consciously in the spaces we are covering. Our volume wishes to provide a basis for just that.

Budapest/Passau, the 25th of September 2019

*László Letenyei and Judit Dobák*



Barbara **Tversky**

## COGNITIVE MAPS, COGNITIVE COLLAGES, AND SPATIAL MENTAL MODELS

### ABSTRACT<sup>1</sup>

Although cognitive map is a popular metaphor for people's mental representations of environments, as it is typically conceived, it is often too restrictive. Two other metaphors for mental representations are proposed and supported. Cognitive collages are consistent with research demonstrating systematic errors in memory and judgment of environmental knowledge. Yet, for some simple or well-known environments, people seem to have coherent representations of the coarse spatial relations among elements. These spatial mental models allow inference and perspective-taking but may not allow accurate metric judgments.<sup>2</sup>

## 1 INTRODUCTION

### 1.1 Cognitive Maps

There is a popular view that people's mental representations of environments are embodied in „cognitive maps.“ Like many useful concepts, the term cognitive map has many senses, leading to inevitable misunderstandings. One prevalent sense is that cognitive maps are maplike mental constructs that can be mentally inspected. They are presumed to be learned by gradually acquiring elements of the world, first landmarks, pointlike elements, then routes, linelike elements, and finally unifying the landmarks and routes with metric survey information. The appeal of this view is manifold. As cognitive, they are presumed to differ from „true“ maps of the environment. Social scientists from many disciplines would be quick to bring forth evidence for that. As maps, they are presumed to be coherent wholes that reflect spatial relations among elements. As mental constructs available to mental inspection, cognitive maps are presumed to be like real maps available to real inspection, as well as like images, which, according to the classical view of mental imagery, are like internalized perceptions.

### 1.2 Constructionist View

In this paper, I will present evidence not compatible with the view of mental representations of environments as cognitive maps. I will discuss two alternative constructionist

views of the mental representations underlying people's knowledge of environments. According to the constructionist view, people acquire disparate pieces of knowledge about environments, knowledge that they use when asked to remember an environment, describe a route, sketch a map, or make a judgment about location, direction, or distance. The separate pieces include recollections of journeys, memories of maps, recall of verbal (aural or written) directions and facts, and more. As for any human memory task, it is possible that not all the relevant stored information will be retrieved when needed.

### 1.3 Cognitive Collages

In many instances, especially for environments not known in detail, the information relevant to memory or judgment may be in different forms, some of them not maplike at all. Some of the information may be systematically distorted as well. It is unlikely that the pieces of information can or will be organized into a single, coherent maplike cognitive structure. In these cases, rather than resembling maps, people's internal representations seem to be more like collages. Collages are thematic overlays of multimedia from different points of view. They lack the coherence of maps, but do contain figures, partial information, and differing perspectives. In the second section, I will review some of the evidence for the notion that cognitive collage is often a more appropriate metaphor for environmental knowledge than cognitive map. That evidence shows that memory and judgment are systematically distorted and potentially contradictory, thus not easily reconcilable in a maplike structure.

### 1.4 Spatial Mental Models

In other situations, especially where environments are simple or well-learned, people seem to have quite accurate mental representations of spatial layouts. On close examination, these representations capture the categorical spatial relations among elements coherently, allowing perspective-taking, reorientation, and spatial inferences. In contrast to cognitive maps and cognitive collages, these have been termed spatial mental models. Unlike cognitive maps, they may not preserve metric information. Unlike cognitive collages, they do preserve coarse spatial relations coherently. These are relations that are easily comprehended from language as well as from direct experience. In the third section I will review some evidence for the success of language in inducing coherent mental representations of the categorical spatial relations in environments.

## 2 SYSTEMATIC ERRORS IN MEMORY FOR ENVIRONMENTS

### 2.1 Hierarchical Representations of Space

When students at U.C. San Diego were asked to draw the direction between San Diego and Reno, they incorrectly indicated that San Diego was west of Reno [36]. Indeed, it is surprising to learn that Reno is in fact west of San Diego. After all, California is on the western coast of the United States, and Reno is far inland, in Nevada. A glance at a map reveals that the coast of California, far from running north-south, in fact cuts eastward as it cuts southward. Stevens and Coupe attributed their findings to hierarchical representations of space. People do not remember the absolute locations of cities. Instead, they remember the states cities are part of, and the relative locations of the states. Then they infer the relative locations of cities from the locations of their superset states. Since this (shall I call it „landmark?“) study, other evidence for hierarchical representations of geographic knowledge has accumulated. Hierarchical organization has been found to distort distance judgments as well as direction judgments [11]. Hirtle and Jonides asked one group of students at the University of Michigan in Ann Arbor to form subjective groups of buildings in town. They grouped the buildings according to function, commercial or educational. Another group of students was asked to judge distances between pairs of buildings. Distances between functional groupings were overestimated relative to distances within functional groupings. Chase found that a detailed hierarchical organization distinguished experienced taxi drivers from novices [4]. Other studies have demonstrated that people impose a hierarchy on what is in reality a flat two-dimensional display, and that that affects judgment and memory for environments [for example, 12, 23, 24, 25, 44; for a brief review, see 42 and 43]. Of course there are no hierarchies in maps, so this widespread cognitive phenomenon already introduces a distorting factor difficult to reconcile with maps.

### 2.2 Cognitive Perspective

Experienced hikers know that distances between nearby landmarks appear relatively larger than distances between faraway landmarks, though it is difficult to make adequate compensation for that. A similar phenomenon occurs in making distance judgments from memory. Holyoak and Mah [14] asked one group of students to imagine themselves on the East Coast of the United States, and another group to imagine themselves on the West Coast of the United States. Both groups were then asked to estimate the distances between pairs of U.S. cities along an east-west axis, for example, San Francisco and Salt Lake City, New York City and Pittsburgh. The students given a West Coast perspective overestimated the distances between the westerly pairs relative to the easterly pairs, and the students given an East Coast perspective did the opposite. Thus, the vantage point assigned for making the judgments systematically distorted the judgments.

### 2.3 Cognitive Reference Points

When I am out of state and asked where I live, I usually answer, „Near San Francisco.” If I am closer to home, I will answer, „On Stanford campus,” or „Off Stanford Avenue,” or „Next door to the ----s.” In other words, rather than giving an exact location, I convey where I live relative to a reference point [see 8] that I believe my questioner will know. Not only do we describe less-known locations relative to better-known landmarks, we also seem to remember them that way. As is often the case in memory, we describe situations to ourselves just as we would describe them to others. Remembering less prominent locations relative to landmarks induces a distortion that is particularly intractable for metric maps, namely asymmetric distance. Sadalla, Burroughs, and Staplin [32] have found that people judge the distance from an ordinary building to a landmark to be smaller than the distance from a landmark to an ordinary building.

### 2.4 Alignment

Remembering one spatial location with respect to another leads to direction distortions as well. Two nearly-aligned locations tend to be grouped, in a Gestalt sense, in memory, and then remembered as more closely aligned than they actually were [41]. Students were given two maps of the Americas, one a correct map, and the other, a map in which South America was moved westward with respect to North America, so that the two Americas were more closely aligned. A significant majority of the students thought the altered map was the correct one. Another group of students selected a world map in which the Americas were moved northward relative to Europe and Africa in preference to a correct map of the world. In the preferred incorrect map, the United States was more closely aligned with Europe and South America with Africa. Alignment errors in memory were also obtained for judgments of directions between cities, for example, students incorrectly thought that Boston was west of Rio de Janeiro and that Rome was south of Philadelphia. Alignment was also observed in memory for local environments most likely learned from navigation rather than maps, in memory for artificial countries and cities, and in memory for blobs not interpreted as maps.

### 2.5 Rotation

Remembering a spatial location relative to a frame of reference can also lead to direction distortions [41]. Think of a situation where the orientation of a land mass is not quite the same as the orientation of its frame of reference. A good example is South America, which appears to be tilted in a north-south east-west frame. In fact, when students were given cutouts of South America and asked to place them

correctly with respect to the canonical directions, most students uprighed South America. Similar errors appeared for the San Francisco Bay Area, the environment immediately surrounding the students, and for artificial maps and blobs as well, in our work as well as that of others [4, 21, 22].

## 2.6 Other Systematic Errors

This is by no means a complete catalog of systematic errors in memory and judgment of environments. Irregular geographic features may be regularized. For example, Parisians straighten out the Seine [27], and Americans seem to straighten out the Canadian border [36 as interpreted by 43]. Turns and angles are regularized to right angles [3, 13, 29, 34]. Distance judgments are arguably more complex than direction judgments. They are rarely known directly, so they seem to entail use of a number of surrogates that may yield distortions. Distances have been judged longer when a route has barriers or detours [7, 18, 30], when a route has more turns or nodes [33, 35], and when a route has more clutter [40].

## 2.7 Cognitive Collages

Thus, a number of different factors, hierarchical representations, cognitive perspectives, cognitive reference points, alignment to other locations, rotation to a frame of reference, regularization of geographic features, and more, can systematically distort memory and judgment of environments. On the whole, each empirical study has isolated the effects of a single factor, but in real cases, many factors may be operative. There is no guarantee that the distorting factors are consistent; in fact, it seems easy to construct cases where one factor would distort in one direction and another factor in another direction. The distortions alone are incompatible with a metric mental map, and inconsistent distortions make mental maps an even less satisfactory explanation. Of course, not all our spatial knowledge is distorted. Some of it may be quite accurate. But even so, it is unlikely to be complete, so that problems arise when trying to put it all together, especially if some of the information is erroneous and if the information from different sources is not compatible. The inconsistencies, however, seem to provide a mechanism to reduce error. When subjects are asked for more information from an environment, it turns out that their judgments become more accurate [1, 2, 26]. This could happen because when confronted with their own inconsistencies, people retrieve additional information that allows them to reconcile the inconsistencies in the correct direction. It could also happen if there were a large number of unreliable judgments, with the majority going toward the correct. Figures can emerge from collages. In many real world situations, however, people are asked for partial information and may not use other information as a corrective.

## 2.8 Two Basic Relations

The situation is not always as chaotic as I've implied. Most of us manage to find our ways most of the time, either because an environment is familiar, or because we use maps or instructions or environmental cues or all of the above or more. For some well-learned environments, large-scale or small, people's knowledge can be well-organized and systematic. In those cases, the knowledge often has the form of locating elements relative to one another from a point of view or of locating an element relative to a higher order environmental feature or reference frame. Interestingly, the systematic errors described depend on these basic relations. The errors attributable to cognitive perspective, cognitive reference points, and alignment rest on representing landmarks relative to one another from a vantage point. The errors attributable to hierarchical organization and to rotation are based in representing a landmark relative to a higher order feature, a region or a frame of reference. Although much of human knowledge about space, including systematic errors, can be reduced to these two-relations, some cannot. These two simple relations can form a foundation for spatial knowledge from which memory and judgment are constructed. Although the relations can be quite coarse, they can also be refined by adding constraints imposed by other spatial relations. Significantly, these relations also form the basis for spatial language used in descriptions of environments. Because the spatial relations between elements or between an element and a reference frame can be expressed by the many disparate formats that convey environmental knowledge, the relations provide a means to integrate spatial information from different formats.

## 3 SPATIAL DESCRIPTIONS

One of the major functions of language is to convey experience vicariously. Anyone who has laughed out loud reading a novel or felt their heart beat rapidly reading a mystery knows that. Describing space effectively must have been an early use of language, in order to tell others where to find food and where to avoid danger. Although modern-day spatial language can convey locations of landmarks with great accuracy using formal systems designed for that purpose, everyday spatial language is not very precise. Typical spatial expressions like „next to,” „between,” „to the left of,” „in front of,” „east of,” and „on top of” describe spatial relations at coarse levels of precision, but their frequency in the language suggests that they are easily produced and readily understood. These expressions convey the relations between elements. Expressions like „within,” „contains,” „divides,” „borders,” and „curves” convey the relations between elements and reference frames. [For more discussion of spatial language, see for example, 6, 9, 15, 19, 28, 31.]

### 3.1 Comprehending Route and Survey Descriptions

Taylor and I have been interested in the nature of the spatial information that language alone can impart [37, 38]. Thus far, we have only investigated those spatial

expressions that seem to be readily produced and understood. Spatial descriptions normally assume a perspective, explicit or implicit. An informal survey of guidebooks indicated that descriptions of environments take one of two perspectives. A route perspective takes readers on a mental tour of the environment, describing landmarks with respect to the (mentally) changing position of the reader in terms of the reader's front, back, left, and right. A survey perspective gives readers a bird's eye view, and describes landmarks relative to one another in terms of north, south, east, and west. These two perspectives have parallels with two major means of learning about environments, the first through exploration, and the second through maps. They also have parallels to a distinction made in knowledge representation that is both popular and controversial, namely, procedural and declarative.

**Design.** In our first set of experiments [38], students studied either a route or a survey description of each of four environments. Two of the environments were large-scale, one county-sized and the other a small town, and two were smaller, a zoo and a convention center. The environments contained about a dozen landmarks. After studying the descriptions, students responded true or false to a series of statements: verbatim statements taken from both the perspective read and the other perspective and inference statements from both perspectives. The inference statements contained information that was not explicitly stated in either text, but could be inferred from information in either text. If perspective was encoded in the mental representations, then inference statements from the read perspective should be verified more quickly than inference statements from the other perspective. After responding to the statements, students drew maps of the environments.

**Results.** From only studying the descriptions, students were able to produce maps that were nearly error-free, indicating that language alone was sufficient to accurately convey coarse spatial relations. The speed and accuracy to answer the true/false questions suggested that readers formed at least two mental representations of the text, one of the language of the text, and another of the situation described by the text, that is the spatial relations among the landmarks. We termed the latter a spatial mental model [cf. 16] to distinguish it from an image. Responses to verbatim statements were faster and more accurate than responses to inference statements. Presumably, verbatim statements were verified against a representation of the language of the descriptions, but inference statements had to be verified against a representation of the situation, a spatial mental model. Even though responses were faster and more accurate to verbatim statements, the overall level of responding to inference statements was high. Subjects were able to verify spatial relations not specifically stated in the text, further support for the creation of spatial mental models. Responses to inference statements from the read perspective were neither faster nor more accurate than responses to inference statements from the other perspective, for both perspectives. This result was obtained in four separate experi-

ments, including one where the students read only a single description and did not know they would be asked to draw maps.

**Spatial Mental Models vs. Images.** In this situation, where subjects studied coherent spatial descriptions of relatively simple environments, perspective did not seem to be encoded in the spatial mental models. Rather, the spatial mental models constructed seemed to be more abstract than either perspective. These spatial mental models appeared to capture the spatial relations among landmarks in a perspective-free manner, allowing the taking of either perspective with equal ease. As such, these spatial mental models are akin to an architect's model or a structural description of an object. They have no prescribed perspective, but permit many perspectives to be taken on them. Thus, spatial mental models are more abstract than images, which are restricted to a specific point of view [see 10, 17].

### 3.2 Producing Spatial Descriptions

Descriptions composed of the simple spatial relations between landmarks and between landmarks and reference frames were successful in inducing coherent spatial mental representations. It is then natural to ask what is the nature of the spatial descriptions that ordinary people spontaneously produce. In two experiments, Taylor and I [39] gave students maps to study, and asked them to write descriptions of the environments from memory. A compass rose appeared in each of the maps, allowing orientation with respect to the canonical axes, north-south and east-west. In a third study, we asked subjects to write descriptions of familiar environments they had learned from experience.

**Survey, Route, and Mixed Descriptions.** The descriptions subjects produced indicated that subjects regarded the maps as environments, and not as marks on pieces of paper. Perspective was scored using the definitions of route and survey described previously. As our intuitions suggested, descriptions used either route or survey perspectives, or a combination of both. No other style of description emerged. In the mixed perspective descriptions, either one perspective was used for parts of an environment and the other perspective for other parts, or both perspectives were used simultaneously for at least part of the descriptions. Across a wide variety of environments, survey, route, and mixed descriptions were obtained, their relative frequency depending in part on features of the environments. This was despite widespread claims that most spatial descriptions take a consistent perspective, specifically, a route perspective [for review, see 20]. The descriptions that subjects wrote from memory were quite accurate. They allowed a naive group of subjects to place nearly all the landmarks correctly [37].

**Basic Relations and Coherence.** A detailed analysis of the words, phrases, and clauses used in the descriptions revealed that the essence of a route description was describing the locations of landmarks relative to a single referent with a known perspective, in this case, the moving position of the reader. The essence of a survey description was describing the location of a landmark relative to the location of another landmark from a fixed perspective. These parallel the two basic relations described earlier. The situation is slightly more complex, however. In route descriptions, although the referent was constant, the orientation and location of the referent kept changing. Readers had to keep track of that orientation and location relative to the canonical frame of reference. Both our own and our subjects' route descriptions oriented readers with respect to north-south east-west. In survey descriptions, the referent kept changing, but the orientation was constant. Route descriptions, then, establish coherence by relating all landmarks to a single referent. They are complicated by the task of keeping track of the orientation of the referent. Survey descriptions establish coherence by using a single orientation, but they are complicated by changing the referent element. When either type of information is consistent and complete, as it was in the descriptions we wrote and in many of the descriptions subjects wrote, the individual pieces of information can be integrated into a coherent representation of the spatial relations among the landmarks independent of any specific perspective.

### 3.3 Spatial Mental Models

The integration of the relative locations of landmarks independent of perspective or orientation that occurs when people read spatial descriptions also seems to occur as people navigate the world. It would be inefficient to remember successive snapshots of the world because they would not allow recognition or navigation from other points of view. It makes more sense to isolate landmarks, and to remember their locations relative to one another and relative to a frame of reference so that recognition and way-finding are successful from different starting points. For simple, familiar environments, whether learned from direct experience, or learned vicariously through language, people can form coherent mental representations of the spatial relations among landmarks.

## 4 CONCLUSIONS

Despite its considerable appeal, as traditionally used, the „cognitive map” metaphor does not reflect the complexity and richness of environmental knowledge. That knowledge comes in a variety of forms, memory snippets of maps we've seen, routes we've taken, areas we've heard or read about, facts about distances or directions. It can also include knowledge of time zones and flying or driving times and climate. Even knowledge of historical conquests and linguistic families can be used to make

inferences about spatial proximity. Some of that information may contain errors, systematic or random. When we need to remember or to make a judgment, we call on whatever information seems relevant. Because the snippets of information may be incomparable, we may have no way of integrating them. For those situations, cognitive collage is a more fitting metaphor for environmental knowledge. Yet, there are areas that we seem to know quite well, either because they are familiar or simple or both. Even in those cases, metric knowledge can be schematic or distorted. What our knowledge seems to consist of in those cases is the coarse spatial relations among landmarks, what we have termed spatial mental models. Although spatial mental models may not allow accurate metric judgments, they do allow spatial perspectivetaking and inferences about spatial locations. They are constructed from basic spatial relations, relations between elements with respect to a perspective or between an element and a frame of reference. Those situations that are simple and that we know well are also easy to describe. Languages abound in expressions for categorical spatial relations. These expressions are readily produced and easily understood. Although many languages have adopted technical systems to convey metric information about location, orientation, and distance, this terminology is not widely used in everyday speech. When it is used in everyday situations, it is often used schematically. Apparently, descriptions using, categorical spatial relations are sufficient for everyday uses. Viewed as mental models or cognitive collages, environmental knowledge is not very different from other forms of knowledge. Just as for environments, there are areas of other knowledge where our information is consistent and integrated, but there are also areas where, because of incompleteness or incomparability or error information cannot be consistent and integrated.

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## NOTES

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Zoltán **Cséfalvay**

## THE "LEGIBLE" CITY

"Just as this printed page, if it is legible, can be visually grasped as a related pattern of recognisable symbols, so a legible city would be one whose districts or landmarks or pathways are easily identifiable and are easily grouped into an overall pattern..."

(K. Lynch)

### ABSTRACT<sup>1</sup>

A city like this – where stepping on the Széchenyi Chain Bridge one immediately arrives at the abutment leading to New York City of the Brooklyn Bridge, and what is more, in evening floodlight – obviously does not exist in reality. Yet the message of the advertisement is easy to understand. Even without one word of a hint, a few emblematic buildings immediately take us to the large cities of the world. Seeing the advertisement – without even noticing it – our consciousness immediately "calls forth" the images in our minds about the countries, metropolises of the world, or in other words, our cognitive map.

### THE INSPECTION OF COGNITIVE MAPS

As everyday the practice of rebuilding spatial reality in our consciousness – or making cognitive maps, as we have called the process earlier – may be, the phenomenon is as problematic to analyse. The problem arises from the fact that while we use cognitive maps on an everyday basis, yet these can only be researched in an artificial, experimental setting. Thus, we continue to lack a commonly accepted method by which cognitive maps could be "elicited". This state of affairs obviously does not mean that there would not be resourceful and highly effective methods to investigate the issue.

An American researcher, J.S. Adams for instance asked his experimental subjects to perform the laborious task of writing down as many street names from their neighbourhood as they could remember in a given amount of time. P. Gould on the other hand

started with the traditional survey question of "Where would you like to stay the most if you could choose freely?" K. Cox required the participants in his experiment to fulfil the not very entertaining task of ordering all the states of the United States of America according to a scoring system. D. Ley had them draw some kind of a criminological map of Philadelphia, on which participants were asked to mark the less safe, "ill reputed" locations of the city.

According to American architect K. Lynch – a student of the famous painter of Hungarian origin György Kepes – emblematic constructions that became the symbols of the towns where they are located play an important role in shaping our image of the towns, our cognitive maps. Lynch considers that five elements can be distinguished within the structure of cities, merely from the perspective of visibility. Looking at a city, the first thing that comes to our sight is the network of its paths. These paths, along which we move every day, bind the different spots of the city into an organic system. Thus, the visual structure of Budapest, for example, is significantly defined by its ring roads, the embankments alongside the Danube and the boulevards leading out of the city centre. The second important visual elements, the edges are also accompanied by paths. A characteristically outlined edge for instance in the case of Budapest is the line of the Danube or the border of the rising Castle hill. Striking nodes appear at the intersection of paths, like Moszkva tér (Moscow Square) or Móricz Zsigmond körtér (Zsigmond Móricz Circus) in Buda. Further important elements are the well circumscribable areas, the districts, like for example the Rózsadomb or the Gazdagrét district. Finally, the fifth visual element in the view of Lynch consists of the landmarks, the symbolic objects closely connected to the given city, which are immediately associated with the city in people's minds (e.g. Matthias Church or the Parliament). According to K. Lynch, we can thus construct the city on our cognitive maps using five visual elements: the paths, the edges, the nodes, the districts and the landmarks.

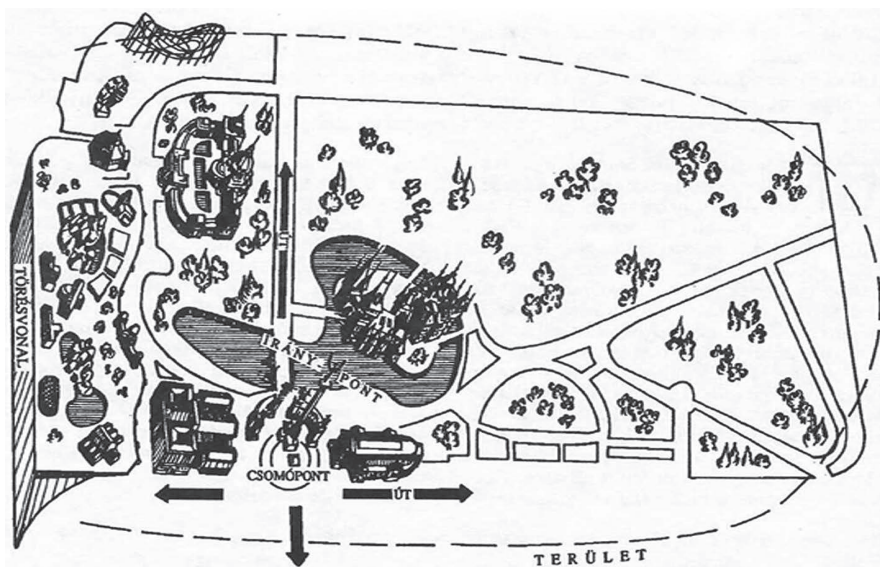


Figure 1: Visual elements in the Városliget (City Park of Budapest) (Cséfalvay Z., 1990)

Translation of the words on the image:

Törésvonal = Fault Line/Edge; Iránypont = Reference Point/Landmark; Út = Road/Path, Csomópont = Point of Junction/Node; Terület = Area/District]

## VISUAL ELEMENTS IN THE VÁROSLIGET (CITY PARK OF BUDAPEST)

Using the systematisation of Lynch in the Városliget (City Park), a well-known area of the Hungarian capital, well-defined visual elements can be distinguished. The City Park obviously means different things to everyone, therefore its visual elements are also perceived and appreciated differently by each and every individual. (See Figure 1.)

Based on his system of visual elements, Lynch asked the residents of three major cities – Boston, Los Angeles and New Jersey – to draw their respective cities from memory the way they see them. The drawing was supposed to show the degree to which the visual elements appeared on their cognitive maps. Yet he did not only base his research on these map drawings, called "mental maps" by P. Gould, but also completed it with interviews. Thus, eventually three possibilities for comparison were available for Lynch. Firstly, he could match the actual structures of the cities with the drawings, the "mental maps" created about these, secondly, he could compare the "mental maps" of the three cities to one another, and finally, he could explore the differences between the map drawings and oral communication.

Lynch's results are extremely instructive from the perspective of city architecture and planning. The "mental maps" almost regularly included the spatial elements that everyone, without exception, remembered, while the unknown parts of the city, its "white spots", were also the same for almost everybody. Thus, the different parts of the city were very dissimilar in how they could be visually grasped, or using Lynch's terminology, differed very much in their degree of "legibility".

## THE "MENTAL MAPS" OF BOSTON AND BUDAPEST

According to Lynch's research, the most clearly arranged, "legible" one of the three examined cities was Boston, which had followed the European traditions of city architecture. In spite of that, it was remarkable that even in the case of the in-depth interviews, which provided more grounded and in-depth information, there were quite a few "white spots", unknown areas – consistent with the drawings made from memory – even in this "legible" American city.

Yet Lynch was not only interested in the cognitive maps, but also in the methods leading to them, the process of cognitive mapping. Therefore he took the effort to observe how the participants in his experiment set about to draw the sketch maps, and what were the steps that led to their respective cognitive maps. The result of his investigation was a typology of five types, from which everyone can easily identify their own styles of cognitive mapping.

The most frequent style trend is the route method. The cognitive map of the city and the map drawing serving as a "mental map" is constructed in this case with the help of a known route – most frequently the route between home and workplace –

and its forks that are important for us. The other frequent procedure is the frame filling method, when a shape defined by a characteristic boundary is filled with the most important elements of the city. The third method is built on the road network, i.e. the objects of the built environment attached to the channels of communication of the city. The fourth strategy, the mosaic, or tile method is relatively rare. In this case only but a few details of the city are placed on the cognitive map, with an extremely accurate elaboration, but, at the same time, mostly with white spots stretching among the tiles. Finally, according to the fifth solution, the cognitive map is organised around a centre – usually the dwelling place or the downtown part of the city –, thus the rest of the objects of the city only make sense in this connection.

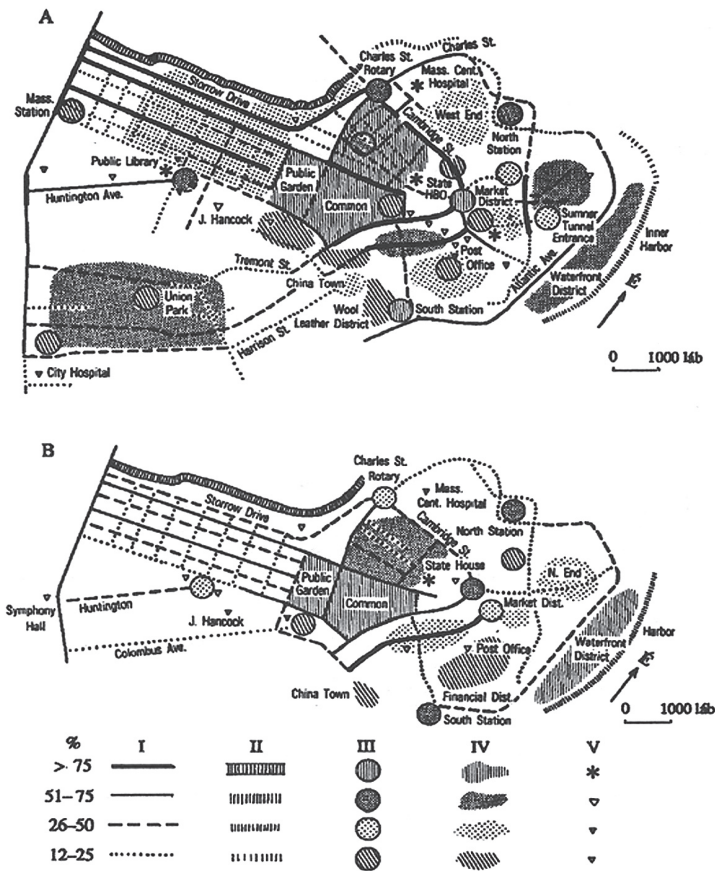


Figure 2: The “mental maps” of Boston, based on in-depth interviews (A) and drawn from memory (B) (Lynch, K., 1960)

The spatial objects (I = paths; II = edges; III = nodes; IV = districts; V = landmarks) are mentioned by the given % of the subjects

[Translation of the words on the image: 0 ... 1000 láb = 0 ... 1000 feet; É = N(orth)]

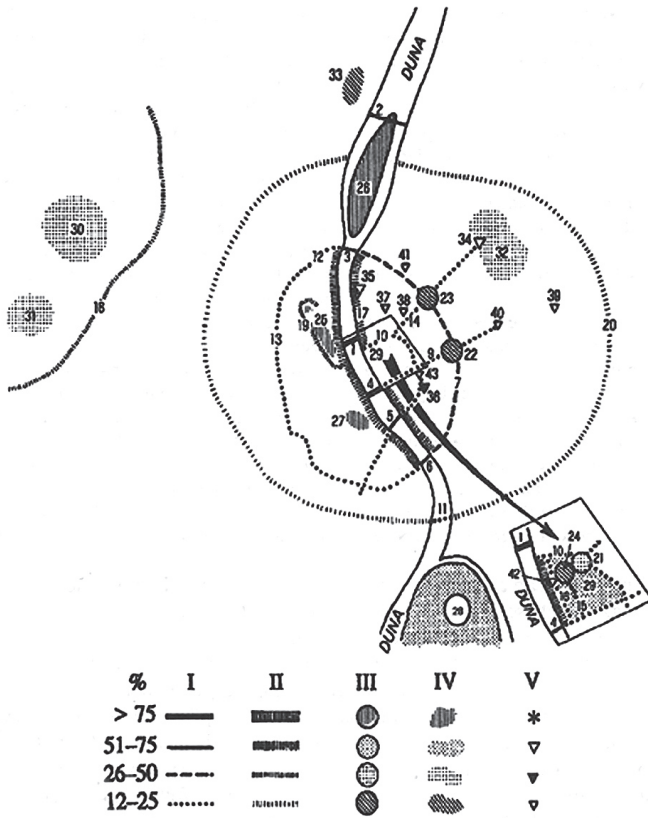


Figure 3: The "mental map" of Budapest, based on the sketch maps of the students (Cséfalvay Z. - Fischer, W, 1990)

The spatial objects (I-V) are mentioned by the given percentage of the respondents.

**I. Paths:** 1 = Széchenyi Chain Bridge; 2 = Árpád Bridge; 3 = Margaret Bridge; 4 = Elisabeth Bridge; 5 = Liberty Bridge; 6 = Petőfi Bridge; 7 = Grand Boulevard (Ring Road); 8 = Northern Rail Bridge; 9 = Rákóczi Street; 10 = Small Boulevard (Ring Road); 11 = Southern Rail Bridge; 12 = Margaret Ring Road; 13 = Alkotás-Bocskay-Irinyi Avenue; 14 = Andrássy Avenue; 15 = Váci Street; 16 = Danube Promenade.

**II. Edges:** 17 = Danube bank; 18 = the edge of the Buda hills; 19 = the edge of the Buda Castle hill; 20 = City confines.

**III. Nodes:** 21 = Deák Square; 22 = Blaha Lujza Square; 23 = Oktogon; 24 = Vörösmarty Square.

**IV. Districts:** 25 = Buda Castle; 26 = Margaret Island; 27 = Gellért Hill; 28 = Csepel Island; 29 = Downtown; 30 = János Hill; 31 = Svábhegy; 32 = Városliget (City Park); 33 = Óbuda centre.

**V. Landmarks:** 34 = Millennium Monument; 35 = Parliament; 36 = National Museum; 37 = St. Stephen's Basilica; 38 = Opera; 39 = People's Stadium; 40 = Keleti Railway Station; 41 = Nyugati Railway Station; 42 = Vigadó; 43 = The Building of the Faculty of Science of the Eötvös Loránd University

[Translation of the words on the image: **Duna** = Danube]

Based on the method of K. Lynch, a similar survey was conducted in the 1980s among the students of the Eötvös Loránd University of Budapest. According to the results of the survey, the “mental map” of the Hungarian Capital is characterised by downtown centricity. For the subjects of the experiment Budapest meant the area delimited by the Grand Boulevard of Pest, the Margaret Ring Road and the Alkotás Avenue in Buda. Anything falling outside this boundary “was not even the Capital”. It is also striking that most of the urban landscape elements on the “mental map” were somehow related to the channels of traffic communication. In the view of K. Lynch the city landscape can best be grasped with the help of well-delimited areas and zones. Yet it seems that this statement is mostly only true for the American cities, where the territorial segregation of the different social groups is extremely sharp, while in the case of European cities the roles of areas and zones is less important on cognitive maps. In Budapest, for instance, the defining elements of the “mental map” are the major channels of communication and the bridges across the Danube River. The so characteristic downtown centeredness of the Capital’s “mental map”, which hardly takes note of middle class building estates, the privileged green area of the Buda side, or the industrial districts of the outskirts, can be traced back to a variety of far-reaching reasons. Firstly, Downtown Pest, primarily built during the period after the Austro-Hungarian Compromise, is an extremely characteristic architectural ensemble, making it even today the most uniform and best arranged part of the city. Secondly, most of the functions that make the life of a capital city go round (different services, management etc.), are predominantly concentrated here. Thirdly, all the establishments that are important in the everyday lives of students are located in the Downtown area of Pest.

The other important conclusion arose from the comparison of the “mental maps” of the cities – particularly Boston and Los Angeles. The survey participants could generally draw very detailed, well-proportioned maps of more than 200 years old Boston, a city that partially followed European architectonic traditions. On the other hand, only very general, obscure “mental maps” were produced about Los Angeles, a rather monotonously built city that could be qualified with a little exaggeration as an agglomeration of about forty villages. The question arises therefore, of how urban designers could come up with clear-cut, “legible” cities. Where is the point when regular city structure changes over into monotony, and vice versa, when does irregular crowdedness become visually incomprehensible? What can civic design do in this respect at all? Although since Lynch’s research city designers have tried out countless experiments meant to turn large cities “legible” – e.g. by rediscovering old street furniture or by painting the blocks of flats in vivid colours instead of concrete grey or using pitched roofs instead of flat roofs –, but failed to come up with a true answer so far.

The purpose of the architect Lynch with these “mental maps” was to create a comprehensible, receptive, “legible” city. Yet, it lies within the nature of cognitive mapping that the same city – no matter whether it is easily comprehensible or not – is “read” differently by everyone. For that very reason, only a decade after

Lynch's survey, geographer P. Orleans asked people again to draw "mental maps" in Los Angeles. According to Lynch Los Angeles, primarily because of its peculiar city structure, was a hardly "legible" city, one difficult to read. However, P. Orleans made a twist in the optics: the nature of the "reading", i.e. of the "mental map" depended, he said, on the place from where the city of Los Angeles was observed, more precisely on the angle of the observing social group.

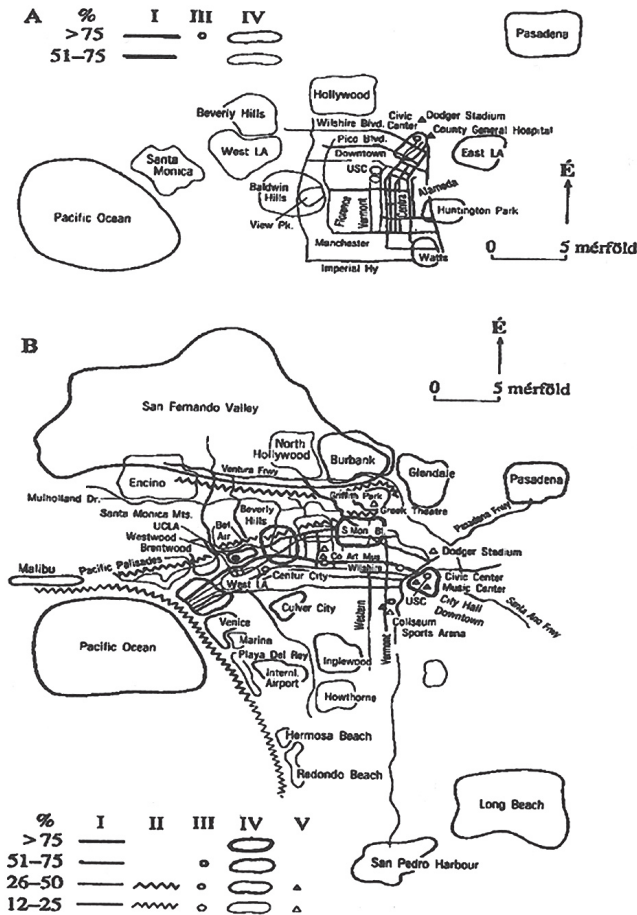


Figure 4: The "mental map" of Los Angeles seen from Avalon (A) and Westwood (B) (Orleans, P., 1973)

The spatial objects (I = path; II = edge; III = node; IV = district; V = landmark) are mentioned by the given percentage of the respondents.

[Translation of the words on the image: 0 ... 5 mérföld = 0 ... 5 miles; É = N(orth)]

## DIFFERENT PERSPECTIVES ON THE “MENTAL MAP”

P. Orleans had “mental maps” drawn on four areas of Los Angeles, differing sharply from one another in terms of social character. In Boyle Heights, the immigrant Mexicans living there hardly knew their town at all. Los Angeles is nothing but a tiny spot on “mental map” drawn by them, the metropolis from their perspective is not more than a few streets of the slum. Watching from the predominantly black inhabited district of Avalon, Los Angeles seems to be a much more complex city. Yet, apart from the elaborate downtown and their own dwelling location, the other parts of the city are unknown to them. The middle class inhabitants of Northridge drew a completely different map of Los Angeles, which also included the areas between their dwelling places and the downtown area. Finally, the most detailed, best structured image of the city was drawn by the participants in the experiment from Westwood, mostly belonging to the upper class. (See Figure 4)

The reasons of the differences between the “mental maps” this time are literally to be found in the differing viewpoints. The subjects participating in the experiment, belonging to different social groups, have in fact drawn the parts of Los Angeles that were indeed known to them. This knowledge naturally came from their direct, everyday experience. The immigrant Mexicans living in the poor district of Boyle Heights understandably did not draw the shoreline of the Pacific Ocean, because they did not go to surf there, and similarly omitted the downtown of the city, as they never reached there during their shopping routes, not even by accident. In other words: these segments lack the financial means and the social ability needed to enter the mentioned areas. It was exactly this social difference that the “mental map” reflected. Thus, everyone draws only the parts that truly belong to them on the “mental map”. People only mark the areas that they use in reality, those symbols of the town that they can indeed identify with. “Mental maps” visually grasp what of the city falls to the share of each individual. A city, in principle, obviously belongs to everyone, but the whole city – as it became clear from the assessment of P. Orleans – only belongs to a very few. When Lynch had such “mental maps” drawn, he in fact demanded the participants of his experiment an account of the entire city. However, the city is much more a mosaic of social worlds at a distance of a light-year from each other – as R. E. Park had already discovered as early as the 1920s –, rather than a kaleidoscope of visual elements. Similarly, “mental maps” only indirectly and clumsily relate to our relationship to the city. To what degree are we attached to our place of living, do we love our city or not, and if so, why? With the research of “mental maps”, by overemphasising the visual character of spatial environment, the most important feature of cognitive mapping, the subjective, evaluative relationship to space, remains in obscurity. This kind of relationship is hard to investigate by city drawings, sketches tossed from memory. Cognitive maps can not only exist as mere maps, but also in the form of opinions, misbeliefs and stereotypes.

## THE MAP OF ENGLAND STANDING ON ITS HEAD

The scientific investigation of the subjective relationship to spatial environment obviously began with the simplest possible solution. If we are curious to learn about how people value their environment, we have to ask them. Let's say, we should ask them the question "Where would you like to stay the most if you could choose freely?" And if we have enough time and enough helpful subjects ready to answer, then we can ask them to list all the possible places that can be taken into consideration, according to their value. P. Gould and R. White asked English university students to ponder from that perspective each administrative unit of Great Britain, and give them a value from 1 to 100. The result gave a subjective image of the insular kingdom, which was by all means differing from reality, therefore – in order to showcase that – the map summing up the results of the research was drawn upside down.



Figure 5: The "mental map" of England based on the preference assessment of the dwelling place (scores based on the percentage of the inquired subjects)  
(Gould, P. - White, R., 1968)

As it is shown by this strange map, such assessments – which had already been carried out since in almost every important country in the world – do not bring too many novelties on the level of direct results. On the upside down map of England, the regions with the highest score are along the Southern shores of the island, the traditional holiday areas with the most agreeable climate. Second on the list of preference is London, the pulsing metropolis. The third place is occupied by the lake region of Middle England, which by its beauty – as if the earlier mentioned typology of B. MacKaye was followed – create the successful harmony of rural life and life close to nature. Dwelling place preference lists resulting from the inquiries done in the United States also repeated the long known spatial value judgments: California is the realm of “high tech” and of eternal sunshine, Texas still represents the Wild West, New York continues to be the home of Wall Street and Manhattan. Positive value judgments were connected almost always to the current dwelling place and the areas with a traditionally high dwelling prestige in the given country. At the same time, the regions qualified as less attractive usually also corresponded to the areas publicly perceived as “Godforsaken places”.

In addition, between these well-known extremes – as a result of the nature of the scoring method – a wide, homogeneous zone was stretching, as it was simply impossible to create a well-differentiated ranking list of all the nearly one hundred administrative units in Great Britain based on the question “Where would you like to stay the most?”.

A fashionable tool of the research on the opinions, value judgments regarding our geographic environment, dwelling place or city is linked to the name of Ch. Osgood. His method is based on two thoughts. On the one hand, it is relying on the recognition that the surrounding world can be more or less well mapped with language, the world of words, by which we in fact reproduce the image of the outer world formed inside us. Another starting point is the empirical fact that written words are more than just their letters in a specific order, because they perpetually elicit new thoughts, associations, and emotions from the readers.

Osgood, accepting Goethe's wisdom – “Every word that we utter rouses its contrary” –, turned the previous thoughts into tests using the following method. Let us place in front of the participants in the experiment a list with opposite notions, qualifying the dwelling environment (e.g. cosy – bleak, clean – dirty, quiet – noisy), and ask them to choose which of the pair of opposing notions describes best, in their opinion, the given spatial environment. Let us also attach a scale to the list – for instance a seven degree scale –, because the world is not black or white, and our value judgments can have a great variety of shades, too. And when we have done this, the new measurement method, the so-called semantic differential scale – to use a term borrowed from linguistics – is ready to be used. (For truly accurate investigations the arbitrary selection of opposing pairs of notions is obviously not enough. Osgood himself worked with 130 pairs of notions in his first approach, a number that he narrowed down later to a standard list of 41 pairs of notions, based on his assessments.)

## BUDAPEST AND GYŐR ALONG THE SEMANTIC DIFFERENTIAL SCALE

In what the opinions of an inhabitant of a metropolis and that of a town in the countryside are different about their dwelling places? What is the difference between being a resident of the "Capital" or living in "the countryside", when we conduct a more in-depth examination of the meanings of these two notions? The question was attempted to be answered by two different researches – carried out on different occasions –, based on the tests of Osgood and others. In 1989 a young, mobile, future-oriented and relatively homogeneous group, the students of the Geography Department of the Eötvös Loránd University answered the questions about the atmosphere, social milieu, conditions of the environment of Budapest. Two years later, the citizens of Győr answered similar questions. (Although far-reaching conclusions cannot be drawn today from the results of the two assessments – especially because such surveys are a very young branch of domestic geography research, therefore the mentioned surveys were also built on relatively small, less representative samples – yet, in spite of that some of their findings were significant.) According to the semantic differential scale, the atmosphere, mood, the distinctive, pulsing world of the Capital was unambiguously seen as positive, and the rating is no accident, as the leisure time offer, the opportunities for entertainment and socialising in the capital city with millions of inhabitants is quite adequate for student lifestyle. However, the social milieu was almost unanimously qualified as inert. It may be true, that one cannot really expect more exciting opinions about a social medium that had seemed motionless for decades – like Hungary had been in the middle of the 1980s. The greatest part of the negative opinions, – not surprisingly at all – were connected to the environmental conditions.

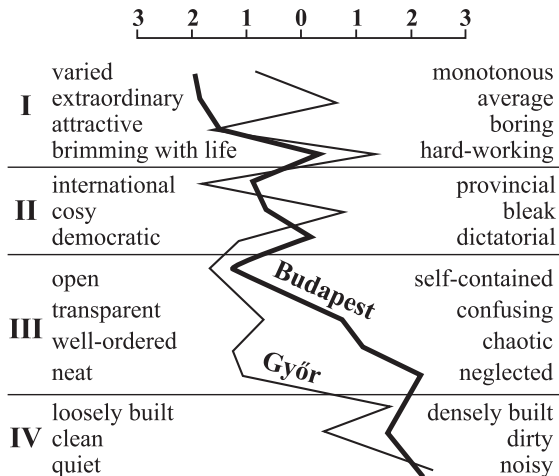


Figure 6: The images of Budapest and Győr along semantic profiles  
(Z. Cséfalvay, W. Fischer W, 1990 and Gy. Szakál, 1993)

I = atmosphere; II = social milieu; III = town structure; IV = environment

Interesting parallels and differences can be found when this image is compared to the view of the citizens of Győr about their own town. The inhabitants of the town in the countryside – naturally enough, one might say – consider their locality a little more average, monotonous than the students of Budapest, the two-million metropolis. It may also seem natural that Győr, with its less than 130 thousand inhabitants looks more organised and better maintained than the Capital. At the same time it is surprising that, because of the proximity of the Western border, the citizens of Győr see their town more international than the inhabitants of Budapest see their city visited by millions of tourists.

In spite of the diversity of research solutions, the world of cognitive maps and the value judgments connected to our dwelling places are still a relatively unknown area. Yet there is no shortage of methods full of imagination, or which are tiresome for the participants in the experiments. Just like the statement that “everyone constructs their cognitive maps using their own, specific, unique procedures” holds true, it is similarly true for the assessment of cognitive maps, that everyone investigates them in their own way.

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## NOTES

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Andrea Dúll

## THINGS AND PLACES: THE MEANING OF THE PHYSICAL ENVIRONMENT FROM AN ENVIRONMENTAL PSYCHOLOGY AND ENVIRONMENTAL COMMUNICATION PERSPECTIVE

### ABSTRACT<sup>1</sup>

According to environmental psychology, in the process of behaviour physical environment is man's companion, equal partner, which, together with the internal psychological processes and in interaction (transaction) with these, partakes in the behavioural process. This standpoint makes it possible to raise quite a few questions, psychological in nature, about humans acting in a built/physical and natural environment, starting from this psychologically unusual set-off. These questions can (or for the most part can) be answered with psychological tools – “only” the man-environment transaction must be taken seriously, both from theoretical and practical perspective.

### ENVIRONMENTAL PERCEPTION AND REPRESENTATION

According to ecological psychological research results, the successful behaviour (or more widely: the survival) of individuals largely depends of the degree to which the organism is able to accurately perceive the surrounding environment. Practically, the processes of sensation and perception are the only direct connection of living organisms – humans among them – with the outside world (see e.g. Sekuler-Blake 1994/2000). The perception of the environment is the basis of all environmental behaviour: in order to comprehend, alter and efficiently utilise the physical environment, first of all a clear and accurate environmental perception is needed. One of the most important psychological roles of human environmental perception is, that in an active interconnection, transaction with the environment (see Dúll 2002c), it oversees, organises most of the human activities constituting everyday life. Transaction means that environmental perception is the basis of knowledge about the world – mental representation –, the existence and operation of which is a basic condition of efficient functioning in the world. Based on the perception of the world around us, representations mapping the world in our heads and words expressing them are developed, which have direct reference to the actual, physical/material world. Let us quote the thought experiment of Putnam about the mental representations of the physical world, of the people of the imaginary “Twin Earth”:

“We imagine that the year is 1750 (both on Earth and on Twin Earth) and Daltonian chemistry has not yet been invented. We also imagine that the people on Twin

Earth have brains identical with ours, a society virtually identical with ours, and so on. [...] The only relevant difference between Earth and Twin Earth is that the liquid that plays the role of water on Twin Earth is not H<sub>2</sub>O, but a different compound, call it XYZ. On Twin Earth it does not rain H<sub>2</sub>O but it rains XYZ, people drink XYZ, the lakes and rivers are full of XYZ, and so on. [...] Imagining this case to be actual, we should say that the term »water« does not have the same reference (even in 1750) in Earth English and Twin Earth English. [...] The reference of the word »water« on Earth is the stuff we call water, the stuff we have discovered to be H<sub>2</sub>O. [...] What they call »water« on Twin Earth, [or the stuff it is referred to as »water«] is the stuff that the people of Twin Earth discovered to be XYZ. [...] The »mental representations« of the speakers on Earth and on Twin Earth do not differ in anything, [...] the references are different because the compounds are different” (Putnam 1988/2000: 66–69.).

Following the above train of thought, it becomes quite clear that the material-physical world, even in such a broad sense, has got a direct role in shaping mental representations and the psychological meaning of the world.

## THEORIES OF PERCEPTION: A SHORT OVERVIEW

Processes of perception are tried to be explained by two groups of theories<sup>2</sup> in an animated debate with each other: the theory of constructive perception (e.g. Neisser 1967) and the theory of direct perception (e.g. Gibson 1979). As we will see below, the contradictions between the constructive and the direct views of perception seem to be radical. Their discussion and the attempts to solve them (e.g. Neisser 1976/1984) are not the subject of this chapter – on the issue see for instance Fodor–Pylyshyn (1981), Gibson (1991a) and Eysenck–Keane (1990/1997).

## THE THEORY OF CONSTRUCTIVE (INTELLIGENT OR CREATIVE) PERCEPTION

According to the theory of constructive perception the first step of perception is when the organs of sense receive the stimuli of the surrounding world. Sensation is the activity of physical systems (neural receptors) as a consequence of the physical and chemical stimuli arriving from the outside world, respectively from inside the body. The sensation of the stimuli, or in other words, the sensory processes are followed by perception, in fact active, interpretative perception<sup>3</sup>, during which “environmental information turns into experiences of objects, events, sounds, flavours and others, with the help of the organs of sense” (Roth 1986: 81.). Perception is considered to have a constructive nature in modern psychology, which means that the actual perception of the world surrounding the observer is very complex, and in fact “objective” only from a psychological perspective: the process of perception does not “map” or “reflect” the world at all in the direct sense of the word; the result of perception rather contains the information and its relations very efficiently – in the form of the mentioned representations. It is due to this that we can walk along the

stairs without actually “having them” in our minds, as our conscious perception is not effectively analysing the changes of the surface, but we are following with attention the face of our interlocutor, for instance. The mental representation of the world is not given to us from the day of our birth, but it is rather shaped and enriched by experience. Walking on the stairs with alternating feet for instance is learned for a long time with great attention in childhood. The personal and collective experiences of the perceiver, similarly his/her emotional conditions, personality etc. are all organic part of active and constructive perception processes. Thus, perception is not objective in the sense that the perceiver often does not perceive at all what is there or “really” going on in the outside world, but rather “constructs” his/her own perception (i.e. what he/she is seeing, hearing, touching, tasting) based on physical stimuli, by means of his/her own psychological processes. When someone returns to his/her important childhood environment or faces an earlier experience, disappointment is not rare: a huge “mountain” seen earlier, perhaps as a small child, and represented as such in memories, can in fact be just a small hill for the adult...

Above a shop I saw a sign  
 saying “GIANT” and “Jeweller”,  
 in golden letters... I watched again:  
 G-I-A-N-T?... Yes, indeed!... Good Lord!... I got excited,  
 This means that a Giant is living there,  
 announcing his trade!  
 [...] For five days I waited; for five full days.  
 [...] And on the sixth day there I was again  
 on Main Street. Lifted and let fly  
 by all the fairy tales. A wing-opening bliss  
 was to observe the golden sign  
 shining from afar!... And then I got there... And  
 got shocked: “WATCHMAKER<sup>2</sup> and Jeweller”:  
 that was what the wondrous sign said.  
 Who stole my Giant? --  
 I cried almost loudly and my heart ached...  
 Then I just stood there and felt ashamed.  
 (SZABÓ, Lőrinc: “Cricket music”, excerpts from the poem)

The essence of perception, as we have seen, is the interpretation of the raw materials of higher level perception functioning, i.e. of sensory information, in other words a perceptual meaning transmission. The meaning of the stimuli are hence not “given”, but rather defined by cognition. Still, perception is also interestingly accurate from a psychological perspective, exactly as a result of its consequence character: we know about the vehicle coming in our direction from the end of the street, that it is approaching, and not growing in size (although its growing image on the retina “objectively” informs us about growth). In everyday life artists, building, garden or object designers deliberately build on these constructive, psychological, creative processes: this is how it can be achieved for instance that a building or a garden seem to be greater from an adequate perspective.

The nature of perception also depends on cultural experiences (about this see e.g. Segall et al. 1966/1970; Altman–Chemers 1980; Serpell 1976/1981; Berry et al. 1995). In a classical inquiry (Allport–Pettigrew 1957, quoted by Holahan 1982c/1998) for example, a swivelling, trapeziform window was placed in a room so that the observers could not see it as a trapeziform rotating window, but a rectangular (i.e. traditional) one, that could dangle back and forth. In Western culture people are used to rectangular windows (the meaning of a typical “window” most of the time also implies that it is rectangular), therefore it confirmed the experiences of their perceptions – knowledge, mental representation –: if they observed a moving type of window-like thing, they could more easily perceive it rectangular, even if by that assumption the perception of its movement became inaccurate. This also shows the active nature of perception: movement – unlike the window – is irrelevant in the case of a window as an element of the environment. For that matter, in some cultural comparative surveys, the “window perception performance” of European and African town children, used to rectangular windows, was compared to that of rural African, Zulu children, who had not been familiar with rectangular windows, as the doors on the huts of Zulu settlements are circular. The characteristics of the representation is shown by the fact the Zulu do have a word for the circle, but not for square or rectangular. As it had been expected, the results showed that Zulu children were less likely to be “deceived” by the window illusion than their African or European urban counterparts.

## THE IDEA OF “DIRECT PERCEPTION”, OR THE THEORY OF ECOLOGICAL PERCEPTION

According to the ecological perception model<sup>5</sup> (Gibson 1979) there is no need for superior, interpretative cognitive processes on the side of the perceiver for the act of perception: on the one hand the actual world includes all the information needed for perception and active behaviour in the environment, and on the other hand, there is often not enough time for complicated cognitive evaluation processes when important decisions must be quickly made (e.g. “attack or run away”). Meaning – present in the environment – is directly perceived from the environment. In animal organisms (including humans) so-called effective perceptual systems developed during evolution, more precisely, during natural selection. Therefore, organisms are biologically “wired” to be able to pull out “readily available” information in the best possible way from the evolutionarily relevant three-dimensional world. This theory also provides a good explanation for the previous “vehicle approaching” example: the background (buildings, pavement surface etc.) and the moving target object itself (changing texture, velocity etc.) provide enough residing information to teach the perceiver that the approaching vehicle is not growing, but coming closer. The representatives of the ecological theory also find the role of learning important in environmental perception (Gibson–Gibson 1955/1975), yet, in contrast to the constructivist approach, they consider that it is not the knowledge about the environment

in the head of the perceiver that is growing to become richer and more accurate, but perceptual systems become increasingly capable to separate relevant and irrelevant environmental stimuli. As I have already mentioned it earlier, it is not that important what the head contains (i.e. representation), but more “what the head is contained in” (Mace 1977).

Ecological psychologists underline the importance of the active movement of the individual in environmental perception. During active movement, we perceive the permanent physical characteristics of the objects in the environment, the so-called constant, invariable functional characteristics, based on which the perceiver is able to judge the usefulness of the objects in the environment: e.g. one can sit, walk, lie down, etc. on a uniformly horizontal surface that is adequately large for the human body: the surface is “fit for sitting, walking, lying”. These affordances of the objects inform the perceiver about their useful functions. Holahan’s (1982c/1998) affordance example: a non-fenestrated object with a solid surface and with an inner space that is larger than a human body can serve well against wind, snow or rain.

## THE PROCESS OF ENVIRONMENTAL PERCEPTION

The perception of the environment and of the physical objects is therefore fundamentally important in everyday life. Perhaps that is why we are so inclined to see this extremely complicated process as self-evident. The processes of environmental perception are often unconscious, and this tendency gets stronger the better we know, or are used to the environment or the object. Thus, one of the important empirical methods of the examination of environmental perception is when researchers observe and describe the behaviour of the people, their primary perception processes and the resulting meanings of new objects or the physical environment unknown to them. Let us take an example: the lady of the house receives a new kitchen appliance with many functions as a Christmas present from her mother-in-law. At first she only observes it, touches it, trying to acquire information about the machine in as many perception modalities, as possible, and as a consequence she may find it “hard to assemble” or “difficult to clean up”, in other words “useless”. The result of the perception for her in this case is a very complex meaning, that the gadget is “too complicated”, or “what I gain by the machine quickly cutting vegetable into pieces, I lose with the disassembling of its parts, their cleanup, picking out jammed pieces etc. I should better stick to the knife. By the way, it is typical for my mother-in-law to come up with a useless object.” Let us suppose that she tells the story to her tech-minded husband, who examines the machine thoroughly: “After all you got it from Mom, so it should be good for something”. During his perception, the husband might also reach to the conclusion (meaning) that the assembling and disassembling of the machine is a way too complicated technical task. Then the harmless parts of the gadget could end up in the sandpit of the child, for whom they could bear the meaning of “I got a nice little toy from Grandma again”. The example shows that the objects and their meanings resulting from the perception

of their physical environment are not always identical, they can depend on the situation, the perceiver (his/her competence, expectations, age etc.), on where the object came from etc. Therefore, when explaining the meaning of objects and the physical environment, in the following parts of the present chapter we will rely on the approach of the “constructive perception” theory.

The general psychological examinations of perception – just like the above example – are primarily connected to the perception of objects. There has been less research – although that is what environment psychologists would be particularly interested in –, on how people perceive complex environments that are composed of many objects (Holahan 1982c/1998), like a room, for example, or a building, an entire city, or a natural landscape. However, studies about object perception, especially the ones that point out the dependence of object perception from the context, are a very useful starting point, or even an appropriate framework to understand complex, molar environment perception. In an interesting, general psychological experiment Biederman (1972/1989) proved for instance, that the perception of objects is extremely influenced by the whole environmental context. The participants were asked to take a quick glance at slides presenting different environments (e.g. street, kitchen). Every picture was projected in two versions: once in a naturally coherent, clear, meaningful format, then cut into pieces, and mixed. The pictures presented to the participants – both the meaningful and the mixed versions – contained the same target objects to be observed, always left in their original positions (e.g. a fire plug on the street photo, or a pot on the kitchen photo). Participants were asked to identify the target objects on the photographs. According to the results of the survey, the participants could recognise the objects much more accurately on the meaningful pictures than on the mixed ones. Thus, a meaningful context helps in the perceptual identification of things. As in the real world objects are almost all the time perceived in a meaningful environment context – this result can be especially important when trying to understand the perception of objects in a real environment (Holahan 1982c/1998).

What is more, according to the approach of environmental psychology, objects cannot even be adequately perceived from just one perspective. In the case of the environment this must be even more underlined: in order to relatively fully perceive a room or a street, it must be observed from several viewpoints and many modalities – in other words, noises, smells, movement experiences can also be important. Environmental psychology-oriented perception theories also emphasise, that the perception of the physical environment and its objects infer target orientedness, as the complexity of the objects/environments, or their size for that matter, make it impossible for the perceiver to perceive them passively (Holahan 1982c/1998; Benedikt-Burnham 1985). In the environmental psychology specialist literature an art exhibition of the New York Jewish Museum is frequently evoked: the artist created an extremely “unusual” environment using eight large mirrors. A stroboscope lamp and a loudspeaker were attached to each mirror, thus creating a multitude of complex and unusual series of light and sound effects. This exhibition inspired

several psychological inquiries (see Holahan 1982c/1998), in which the behaviour of people was observed under lab control, in unusual, more or less complex, artificial environments, very similar to the above one. In our interpretation, the process was examined during which the psychological meaning of a strange space was defined. In one of these inquiries for instance, participants stayed alone in the unusual environment for six minutes. They could have left the space before the time passed, yet the majority remained there for the entire six minutes. According to the observations, people mapped the new environment following two, radically different strategies: those belonging to the structural type handled space independently of themselves, e.g. by setting up hypotheses about how the environment worked, and formulated them, measured the length of sound effects and the time passing between them, tried to find connections between the sounds and the flashes of light etc. Participants belonging to the other experience type obtained information about the space regarding themselves, their own bodies, movements as part of the environment, like e.g. they lied down on the floor, stood on one leg, closed their eyes in order to perceive the environment in different ways. We may assume that the two different ways of cognizance resulted in two types of mental representation, but the role of both physical environmental meanings was to assist the perceiving person in his/her orientation in a world gradually becoming more and more meaningful.

### **THE MEANINGS OF THE PHYSICAL ENVIRONMENT: SPACE/PLACE AND OBJECT/THING**

The highly significant, meaning defining dimensions of the physical environment are real spatial directions and their psychological mappings. During the course of evolution the environment and the bilaterally symmetrical human body are psychologically divided according to the important spatial directions – up and down, ahead and behind, right and left side. However, these directions do not only help in actual orientation; they have also got a more abstract psychological-symbolic meaning for orientation in a meaningful world: they create and express actual and psychological relations: for example the words right/left also express value judgments in many languages (making one side the “right” one as opposed to the other), rules of conduct specify for women to walk on a particular side of men etc. Similar symbolic meanings are attached to the directions up and down (cf. “superior” – “lower level”) and ahead-behind (forward, backward) and their linguistic representations. Taking the psychological characteristics of the distinguished spatial directions into account we can differentiate objective, ego and immanent spaces (Beck 1967/1970). Objective space is the actual space that can be physically-mathematically described, having characteristics like distance, shape, volume. As its name shows, the ego space is defined by the self, when it separates objective space with psychological operations; it is a psychological-physical world that serves as the actual scene of the accommodation behaviour of the individual; in fact the research of objective/

environmental perception reveals this space. The immanent space is the internal, subjective space, the unconscious world of representations (which, however can be made conscious), meaning personal spatial orientation, mapping dimensions, but can also appear in dreams or as imaginary object and space manifestations. Manifesting behaviour in the above sense means a complex accommodation to a complicated world that is mapped along both physical and psychological characteristics.

It follows from the above that one of the most important, general objectives of environmental psychology is to describe behaviour in a way that is specific for the place where it occurs (Russell–Ward 1982; Genereux et al. 1983). This means that “people always situate their actions in a specifiable place and the nature of the place, so specified, is an important ingredient in the understanding of human actions and experience” (Canter 1977: 8.). The notion of “place” had already been used in a specific way<sup>6</sup> before the development of environmental psychology [by architects and geographers, insofar as they had realised and used in their work the principle that generally speaking there are no environments, only “homes”, “hospitals”, “towns” etc. – in other word, people map the “world”, i.e. space in countless personal experiences, which also carry physical features: these are the places.

“Place refers not only to geographical location but also to the essential character of the site which makes it different from other locations. Place, in this sense, is the way in which dimensions of landscape come together in location to produce a distinct environment and particular sense of locality.” (Seamon 1979: 130.).

Thus the meaning of place also includes its physical features and the emotions, experiences connected to them, i.e. the affective component (cf. Russell–Pratt 1980). Environmental psychological place theory (Canter 1977) adds to this the psychological process of interpretation, the cognitive meaning component, the essence of which is exactly the meaning attribution to the place. Similarly to the space/place distinction the object/thing distinction can also be introduced: in this sense objects are physical reality, while things are psychologically defined, meaningful entities (Dúll 2003).

The meanings of environment and objects can be examined from several viewpoints (Dúll–Urbán 1997): we can speak about the (1) denotative-cognitive, (2) connotative, (3) symbolic-aesthetic and (4) behavioural meanings of places. The essence of places and objects are exactly that – as it has been mentioned above – these dimensions are strongly connected, due to the complexity of the environment/object. The different environmental psychological meaning levels have been discussed earlier (Dúll–Urbán 1997), in this chapter we rather underline their interconnectedness, their patterns.

The denotative-cognitive meaning of the place/object<sup>7</sup> denotes in fact what the environment/object is according to its lexical meaning (a chair or a living room) and to what degree it can be recognized, how one can find one’s bearings in/on it, how legible it is. Lang (1987; 1992) elaborated a detailed “environmental semiology” based on the well-known linguistic system of Charles Morris. According to that, the

evolution of environmental symbols (places and things, according to our present interpretation) is the result of cognitive processes, such as comprehension, categorisation,

linguistic formulation. During these acts of interpretation an environment/object gains additional meaning beyond its proper use, which has got three levels: (1) syntactic, which means the contextual relationships of the environmental elements: for instance in homes that belong to the Western cultures, living rooms, as public spaces are located in the front, while bedrooms in the back of the house (cf. Dúll 1995; Money 2007). (2) The semantic meaning refers to the rules and norms related to the environmental elements: what kind of objects we place in our living rooms, how these are organised, and it also defines the rules guests must follow on these premises. For instance, if chairs are placed facing each other, then this sociopetal arrangement favouring social interaction will most likely encourage conversation, while if all chairs face the television, than people will very likely watch the screen, rather than talk to each other. (3) The pragmatic meaning links the environment/object to the user: in our example the arrangement of the furniture in the living room as a tool meant to create an impression will tell the visitor a lot about the owner of the flat. The essence of the connotative meaning is that feelings, personal, individual associations (see e.g. Crozier 1994/2001) could be connected to all meanings discussed so far – we judge along emotional dimensions all the spaces/objects that we encounter: beautiful–ugly, dangerous–safe etc. This obviously can also help us in direct survival, and the affective evaluation can be carried out even without the comprehension of the cognitive content: we do not have to know about a narrow, dark, foul place what it exactly is – the adaptive manifestation will urge us to avoid it, because “it may be dangerous”. The situation is further complicated by the fact that – exactly functionally entwined with psychological interpretation processes, in a transactional relationship with them (see Dúll 2002c) – almost all the elements and characteristics of the built environment carries/may carry some meaning (Lang 1987): the shape, structure, size, material, colour, smell, style, designation of the place/thing – and we could go on. It can be seen therefore that (a) these meaning forms, in an organic connection, give the meaning of the place (e.g. a living room) or of the thing together, and (b) thus meanings consciously end/or unconsciously may influence the knowledge and the feelings of the people about places and things, just as their behaviour in connection with them.

We must not forget however, that environmental stimulation itself also plays an important role in environmental meaning, exactly due to its transactional nature.

According to Berlyne (1960; 1971/1997) environmental stimulation can be described by so-called collative variables, such as the novelty, complexity, unexpectedness and incongruity of the stimulation. Meaning thus is emerging when the perceiver compares the given, current stimulus with other stimuli, alongside these variables, and according to general experience he/she perceives the environmental stimuli as pleasant, acceptable, meaningful mostly in the mid-range area. Using the example of a town: the visitor will judge the given place as cognizable (cognitive component) and thus beautiful, lovable (emotional component), he or she will be more likely to

visit it frequently (behavioural factor), if the town offers him/her interesting personal experiences, because it is original, complex, surprising, containing unexpected scenes when one turns around the corner, for instance, but the experience for the visitor is neither too little (to make him/her bored), nor too much (to make him/her overwhelmed with stimuli, become tired or even aggressive), but exactly enough, i.e. optimal. It is worthwhile to remember the “object” aspects, as well, like in the earlier example with the lady of the house and the kitchen gadget: if the meaning of an object is “exaggerated” or “too limited” in any respect, that can produce the limited or even the total lack of use of that unenjoyed thing (perhaps even its waste and destruction). In such processes the psychological characteristics of the person partaking in the object/environment-person interaction (his/her temperament, current emotional state, experiences etc.) are certainly also important – however, the detailed discussion of these go beyond the scope of this chapter (for more on that see Little 1987; Dúll-Urbán 1997). In the present outline we emphasise that the development of the meaning of the physical environment, environment evaluation are interactive in nature: in it the person with his/her own psychological traits and the object/space with its characteristics play a simultaneous and equal role. Thus, what environmental psychology researches consistently prove, becomes possible: the psychological meanings of places/things create a much greater effect than their objective characteristics, and this effect can even be a very long-term one, in fact it can still hold true even if the given environment or its objective elements physically change to a significant degree, or even disappear from our lives.

A female acquaintance kept a small, empty medicine ampoule with an almost completely faded label on her book-shelf for years, at a visible place. When I asked her why she kept that small object at such a visible place, she told me, that about three decades before she had fallen madly in love with a boy, who had barely noticed her. Once, in the school-yard, the boy accidentally hit her with a snow-ball. She happily collected the snow from her coat and put that in a small medicine ampoule that she happened to have in her pocket. The small bottle from then on served magical purposes: she often kept it in the palm of her hand, trying to influence the boy by suggestion to observe her. But the “object-magic” was unsuccessful. Snow-broth has long disappeared from the little bottle – yet the bottle reminds her of many things: when an idea or an undertaking seems hopeless, by quickly casting a glance on the bottle, it is easier to give up the attempts.

The emotional conditions of the person in the example, her experiences, and the characteristics, affordances of the object have been and still are simultaneously producing a changing psychological meaning: an object originally created for a certain use can gain many symbolic meanings during the object-person transaction. In a similar way it is possible that a suitably designed object/environment becomes non-functional in time – almost all the towns have parks or public spaces that are no longer functioning because people do not use them, or conversely, and the list could be continued (cf. Dúll 2003).

## OBJECTS AS ENVIRONMENTAL TRACES

We have already seen above how important contexts were in shaping the meanings of things/places. Yet the process of conferring meanings does not only help present and future orientation in the world, but also functions “backwards”, namely that from environmental stages – exactly based on our objective/environmental representations, knowledge of meanings – we are able to infer conclusions about what had happened in the past at the given place with the given things (and persons, of course). Environmental/objective traces (Zeisel 1993) are “expressive”, they provide us with sharp environmental communication<sup>8</sup> (Ruesch–Kees 1964/1970) about the events: with their help we can draw conclusions about the facts/ways of using places/things or even the lack or unusual ways of their use etc., which of course, further enrich their mental meaning. Such physical traces are e.g. the things “left behind” – garbage is especially interesting among these<sup>9</sup>: exciting analyses of environmental psychology were made about what sort of environments are more likely to produce garbage (Meeker 1997). But a kitchen is also worth to be examined from the perspective of what is left there, where exactly (and for how long!) after a feast... The opposite of things left behind is their lack of use, something that had already been mentioned in connection with deserted resting places in towns, or uselessly complicated household appliances. Further environmental traces are bridges-connections, where spatial/physical elements are vertically or horizontally united by users; and their opposite, isolation-separation, where a unified space is divided onto several parts. A good example for the former could be a plank leant to a container to permit a loaded wheel-barrow to be pushed up to the opening of the container, or the continuous deterioration at the same spot of sports ground fences in order to make a direct “entrance”. Otherwise, if deterioration is always done at the same spot, that could also be expressive from an environmental psychology perspective: it could mean that the original entrance had been badly placed from the perspective of the practical common sense of human behaviour (e.g. a long way has to be made from every direction to enter), but also that the dilapidators consider the place their own territory, do not tolerate repair, i.e. intervention etc. This example is a further evidence for the fact that without context analysis the meaning of environmental/objective traces can never be entirely comprehended, their meaning is not absolute, there is no dictionary-like list of solutions to solve them. Common-place examples of isolation-separation are fences and other elements of boundary, but the same function can be fulfilled by a “No trespassing” or a “Private property” sign, the differences in level of the surfaces, or a plant on the two sides of a desk. A next environmental trace is wear and tear - erosion, which provides good information about intense or even proper use: in a museum, for example, “the best” possible arrangement of the exhibited objects was examined with environmental psychology trace analysis (Thomson 1986): from the wear and tear of the carpets it could be established which were the most visited objects in the museum. Environmental trace analysis also revealed the phenomenon called “keep right” or “exit gradient” (Melton 1933, quoted by Thomson 1986), which is worth to be taken into account when designing exhibitions: people are more inclined to walk to the right, open doors

on the right more frequently etc. Identification as environmental/objective trace leaving means that the user makes the object/space meaningful for him/herself and the others by connecting it psychologically to him/herself: puts his/her name on it, paints it a certain colour etc. An example for that is graffiti, quite controversial also from an environmental psychology perspective; yet for competent experts the style, colours of a work of art or a building tell a lot, too, and based on them sometimes even the creator can be identified.

By all the discussed transformations the psychological meaning of the places/things are also altered in most of the cases, which – as we have mentioned before – influence their use even on the long run, and naturally, further change their meaning, and so on.

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## NOTES

1. Excerpt from the book of Düll, Andrea: *Helyek, tárgyak, behaviour*. L'Harmattan, 2009

2. See also Düll (2001b)

3. The notions of sensation and perception were distinguished for the first time by the Scottish philosopher Thomas Reid (1710–1796), and this separation is also at the basis of modern conceptions. For a more detailed description of the physiological and general psychological processes of sensation and perception, see e.g. Sekuler–Blake (1994/2000).

4. Word-wit: ÓRÁS = “watchmaker” and ÓRIÁS = “giant” in Hungarian.

5. See also: Szokolszky–Kádár (1999); Szokolszky–Düll (2006).

6. We do not deal here with the phenomenological antecedents of the notions of place and thing, e.g. the works of Husserl, Heidegger and others – see e.g. Bacsó (2003).

7. The issue of cognitive meaning is generally the classical area of analysis of general psychology and environmental psychology; therefore it has got extensive literature. The subject is treated from a general psychological point of view by Baddeley (1997/2001), Eysenck–Keane (1990/1997), for instance, from the perspective of ecological psychology by Szokolszky (1998), and from the perspective of environmental psychology by e.g. Downs–Stea (1973).

8. Due to reasons of extent, the present chapter does not deal with the issues of non-verbal communication, related to objects. From an explicitly architectural or environmental psychological point of view the issue is treated by e.g. Ankerl (1991), Csíkszentmihályi–Rochberg-Halton (1981).

9. An interesting study was published on the subject by Losonczy (2003).

# CROSS-BORDER AND TRANSNATIONAL STUDIES

Péter **Bajmócy** - Dániel **Balizs**:

## RAJKA – RAPID CHANGES OF SOCIAL, ARCHITECTURAL AND ETHNIC CHARACTER OF A CROSS-BORDER SUBURBAN VILLAGE OF BRATISLAVA IN HUNGARY

### ABSTRACT

The Northwest Hungarian village, Rajka has special geographical location: it is only fifteen kilometres from Bratislava, the capital city of Slovakia. This settlement is an excellent example of the phenomenon of cross-border suburbanization which means the migration of the urban population from the city to the not too distant rural area even if it is in another country. This process is transforming the original character of Rajka. There are huge differences between the lifestyles of the indigenous and the immigrant community. The autochthonous inhabitants are worried about Rajka's fast alteration, there are considerable problems between Hungarians and Slovaks due to language differences and a lot of tensions because of the village's changing atmosphere, congested local traffic and the new challenges in Rajka's educational institution. Besides the presentation of social changes, this paper is focusing on the ethnic and residential ancestry of the immigrants to show new linguistic and social patterns in Rajka. On the other hand, examining the specifics of the dramatic transformation of the architectural character of this settlement is also an important element of the study.

### INTRODUCTION

Suburbanization is one of the main factors, which changed dramatically the urban structure of the cities and nearby settlements in Eastern-Europe during the last three decades (Bajmócy 2007, Berg et al. 182, Dövényi et al. 1999, Timár 1999). After the years of mass-urbanization the processes changed totally, new housing estates emerged around the large cities of the regions. It was the strongest around the capital cities and if the large cities are close to international borders, cross-border suburbanization could start. Because of the large differences of land prices, ethnicity and social systems this kind of suburbanization can be very fast, but it can cause different types of conflicts as well. This is the situation in Rajka, the fastest growing "Hungarian suburb" of the Slovakian capital city of Bratislava.

Rajka, that can be found in the north westerly periphery of both Hungary and the county of Győr-Moson-Sopron, have until recently functioned as a border crossing to Slovakia, from the Paris Peace (1947) that had ended World War II, and the community remained part of Hungary against the wills of the Czechoslovakians. The mass deportation of the German-speaking residents and their replacement with mostly ethnic Hungarians from Czechoslovakia caused big trauma in the history of the village, which was originally mainly inhabited by Germans. The village that was regarded as peripheral in terms of its spatial-connections, and due to its position was hardly developed during the socialist era. For this reason, its typical social process was migration, mainly towards Mosonmagyaróvár and Győr.

A new situation occurred when Hungary and Slovakia joined the European Union (2004), then border control was ceased (2007). Rajka lies only 15 kilometres away from the Slovakian capital of Bratislava, therefore with the abolishment of the border alterations from the early 20th century the regional relations were revitalised – just like in the case of several other border towns (Oradea, Arad and even Szombathely) – bringing with them the possibility of reorganization within the urban agglomeration. Rajka was “promoted” to be Bratislava’s potential suburbia and gained instant advantage over the already saturated suburban villages: property prices were much lower than those of its Slovakian “fellows”, and it was also much less saturated.

The influx of immigrants from Bratislava to Rajka received strong publicity in the Hungarian national press, too. The changes in the community, social transformation, coexistence within the community together with the possible consequences all appear as relevant questions, which can also become relevant in other Hungarian villages (mainly in the Romanian border regions mentioned earlier) in the near future. The articles published can only be interpreted as snapshots, providing information about the current situation, based mainly on the locals’ reports, and require new field-days due to the fast-changing nature of social statuses. Only a few words have been said so far about the process regarding spatial formation, furthermore the changing language and social relationships presented street by street or perhaps by households were completely left out, or putting changes into the context of time and space. Based on what has been said so far, the aim of this study is the following:

- Our first goal was to define the processing of domestic and foreign (Slovakian) reports from the written media, the changes in the situation in Rajka, completed with information from the few scientific publications existing and our own information sources.
- Regarding Rajka’s ethno-linguistic pattern our preconception was that the changes in the ethnic characteristics – although they do not create any conflicts in everyday life – has a perceptible effect not only on the local community, but on Rajka’s visually measurable parts (e.g. public places). Our second goal was therefore to survey the local ethnic language circumstances, to characterize the current situation, and to analyse the temporal changes of the relative proportion of indigenous and immigrant populations.

- We also aimed to present the physical impact of the suburbanization process on the appearance of the village, and to compare the current and previous state of the settlement. We assume that the transformation of the built environment on this local scale is very significant and reveals a lot about the direction and speed of this process.

Rajka, in its own complex case offers a rather diverse academic subject, in fact there are hardly any past or present social changes in the village which would not offer significant professional results when assessed. Furthermore – like it often happens on a local scale – information arising while carrying out the research or extra information experienced during field trips can lead to several further questions (i.e. migration within Rajka or the condensation of the built-in areas in the settlement). These questions – since they are in line with our two main objectives – were also included within the topics we wanted to analyse.

## METHODS

In order to present the current situation of Rajka, reports from previous domestic publications provided a sufficient background; we regard these articles and field trips as academic literature, which complement the actual information provided to us by local sources. Thanks to their local knowledge, we could not only discover parts of the village that is relevant to our topic, but from their opinions and personal anecdotes (the state of the local property market, the characteristics of the migration or local conflicts) we could discover their point of view regarding the landslide-like changes that happened over the past decade. It was important to us that both the native and the immigrant side was represented, so we worked with two informants. We present the reasons for the social changes in the settlement by looking at material already published together with the opinion of the locals; we also show which are the factors that still have an effect, and what new effects lined up with them since. By shedding some light on to the questions not yet examined we establish the foundation to our research.

The previous researches – despite being well-founded – need updating due to the dynamic changes that occur in the area. The academic literature relevant to our subject requires further expansion, which is the aim of this article, together with assessment of the changing pattern of the inner language- origin and the changing appearance of the settlement. Despite the fact that the number of professional publications is fairly low, the Hungarian and Slovakian media quickly snapped up the subject. Besides the regional publication called *Kisalföld*, journalists from other countrywide press releases (*Magyar Nemzet*, *Heti Világgazdaság*) and from Slovakian newspapers and periodicals became “regulars” in Rajka, presenting from time-to-time the unique development in the community and other actual changes. Apart from the academic publications, we analysed 20 articles out of the ones that were published in these journals, both in the printed and online versions.

When examining the appearance of the settlement we concentrated on the changes, which in the case of Rajka can be well detected even within a few years. 250 photographs were taken during the field-day (April 2017). Due to the lack of previous field-research we compared the photos taken by us to those from the database of Google Street View from December 2011, identifying the locations on the pictures and then comparing the two stages. Besides the fact that we are talking about a mere six-year period, we are convinced that the substantial transformation proves

In Rajka's case we have to be careful when using the terms native and indigenous, since a large percentage of Hungarian nationals living in Rajka today can only trace back their family members coming from Rajka to the end of World War II. The village was mainly inhabited by Germans residing in Hungary, who were only replaced with Hungarians following their deportation in 1945. Regardless, we can call the Hungarians and the few Germans who stayed behind natives, in order to clearly distinguish them from those who moved here from Bratislava after the year 2000.

Besides the facts above, any kind of visual information can play a part, which in any way contributes to understanding the general linguistic aspect, or to establish the original background of the population. This is how registration numbers of vehicles on and off the road or the occurrence of cars with different number plates (Hungarian or Slovakian) could qualify as usable data. The monitoring of the cars' number plates as a research tool mainly appears when detecting the cars or when conducting criminal investigations. Many case studies draw attention to the wealth of information when it comes to number plates (Du et al. 2012, Prates et al. 2014), which aims to partially identify the owner. It is also mentioned by László et al. (2011) in a similar context, but with a different topic. He focuses on identifying the origin country of visitors in tourism related research. Both approaches can be useful to us. However, it is important to stress that since the method is based on simple observations, it can only be used with necessary caution or together with other methods.

Based on previous information it became clear that during the investigation we cannot ignore Rajka's unique inner structure, fragmented build. Consequently, we differentiated between the "old" part of the village that can be traced back to many centuries, but in terms of its buildings was predominantly established between 1960 and 1980, and the "new" part which was built after 2007 and almost entirely inhabited by people originating from Bratislava. The two parts show significant differences, comparing them further enriches our research.

As we mentioned in the introduction, previous publications dealing with Rajka were missing the presentation of the changes in the spatial structure, therefore visualisation with the help of a map became an important method, giving an insight into the social-immigrational process and the current linguistic structure.

## SUBURBANIZATION IN CROSS-BORDER ZONES

The enlivening of the cross-border migration with aims to settle down in Western-Europe can be linked to past few decades' integration process, but in the same time the development of the transportation infrastructure plays an important role, too. The increase of cross-border residential mobility is in coherence with some level of decrease of the state's power, and with EU guidelines urging free movement and ensuring the right to stay (Jagodic 2010). To the west from us, this could be felt straight after signing the Schengen Treaty in 1985, especially in the German-Dutch (Strüver 2005), Belgian-Dutch (Van Houtum and Gielis 2006), and the French-German (Terlouw 2008) border zones, but it appeared relatively quickly in the Central-European countries that joined after the turn of the millennium, first of all at the Slovenian-Italian border (Jagodic 2011).

After the process had become widespread in Western-Europe, it could also be experienced in Central-Europe in an increasing number. The increasing level of mobility mentioned earlier falls into this category, at part of the Italian-Slovenian border, but we can detect several similar cases in the Pannonian Basin, too. The abolition of passport checks in 2007 (within the Schengen region towards Austria, Slovenia and Slovakia) and checks being simplified (towards Romania and Croatia) in many cases leads to unionisation of the agglomerations of towns (e.g. Oradea / Lovas Kiss 2011/ and Košice [13][14]).

In Slovakia a suburban process can be detected near several urban centres, out of which two are very significant on a national level (Bratislava and Košice), apart from these, movement to suburban areas can be noticed in Banská Bystrica, Prešov, Trnava, Nitra, etc. (Sveda 2014). Authors who are engaged in this subject stress that the process is very significant on a Slovakian scale, however rather low-key when compared to Western-Europe (Sveda, Krizan 2011). The only exception is Bratislava, where the level of the population affected by suburbanization and the speed of the process proves to be especially remarkable. The core of the city of Bratislava had significantly started to lose its population at the mid-1990s, the surrounding settlements could register a considerable level of immigration from around the turn of the millennium (Slavik et al. 2011). Although the most intensive period of immigration falls between 2003 and 2008 (Sveda 2011; Sveda, Suska 2014), its intensity is still notable today; the constantly appearing new property development plans and investments show that demand for newly built property in the Bratislava area will remain significant in the next decade (Sveda, Suska 2014).

On the Austrian and Hungarian side settlements that lie the nearest to Bratislava and can easily be reached on the motorway (Berg, Hainburg, Kittsee, etc. and Rajka, Bezenye, Mosonmagyaróvár, etc.) became the targets of the newcomers (Ira et al. 2011). In the first few years Rajka was mainly chosen by high earners who were highly qualified and at the beginning bought already existing properties, which they then renovated. Even then a still existing practice was detectable (this worries many of the local residents), which involves local residents of Rajka selling their

houses or flats to buyers from Bratislava at a price that is much higher than their realistic value, then leaving the village. This resulted in a population decrease in Rajka before 2009, however this was also the result of the fact that a large proportion of the newcomers did not formally register in the village (Slavik et al. 2011). This, as the number of the non-registered residents keeps increasing, is proving to be a growing problem for the local authorities, while it is taking its toll on services and infrastructure of the village, since they were designed for a settlement with a lot smaller population. Ira, V. and their colleagues (2011) write about the problems of Rajka in great detail, which in fact appeared when the first wave of newcomers had arrived. Our study can be interpreted as an answer to the topics and questions raised by them (the unique nature of suburbanisation in Rajka, language barriers, the social status of those moving out, the position of the community etc.) for further analysis.

The development of a suburban zone in the Bratislava area and its spreading across the Slovakian-Hungarian border is a well-known process for social scientists thanks to the works of Hardi, T. and Lampl, Zs. in particular. The negative effects of the political transformation were reasonably small on the Slovakian capital; Slovakia's independence gave the country an even stronger growth economically and in its regional organisational powers, after 1993. Its population grew fast in the second half of the 20th century: from 193 thousand to 442 thousand within four decades. Large percentage of the growth was made up of the influx of workforce ensuring the operation of new industrial sites. The immigrational background – with generational time lag – is shown in the flexible approach toward moving on, and in Bratislava's case this forms an important base for the suburban process (Lampl 2010). The intense and mutual relationship of the western part of the Slovakian-Hungarian border was already developed during the socialist era, mainly in the form of work exchange (Hardi 2011). Also, a telling data, that 50% of Slovaks living in the Slovakian-Hungarian border region of the Bratislava area regarded being near the neighbouring country as an advantage, while out of those living on the Hungarian side only one tenth said the same (Hardi and Lampl 2008). Hardi, T. paid special attention to linguistic attitudes during his 2009 research, and he established that 80% of the immigrants had Slovakian nationality, but every other person spoke or understood Hungarian to some level. According to the author's new research only 29% of those living on the Slovakian side of the Bratislava agglomeration said that they could manage without speaking Slovakian, while on the Hungarian side 76% of the immigrants said that they could get by without speaking Hungarian. This is of course strongly related to the fact that part of those who move to Hungary have no intention of adjusting to their new environment, they have no need to do so; the fact that they feel at home in Rajka does not mean a change in identity (Hardi 2011). Four fifth of them agreed that they had a helpful and friendly welcome by the locals, regardless whether they had Slovakian or Hungarian nationality. Their positive experience however has little impact on their mobility for work, 82% of them worked in Bratislava, and only one tenth in their current place of residence (Lampl 2010).

If we do not just focus on the relationship between Bratislava and Rajka, but we examine one of its main unique features, the language issue on a European scale, we can find many examples where migration from central towns to suburban zones had a significant effect on the linguistic-ethnic pattern of these zones. Crossing the border is not the only way for this process to happen, like in the Italian, German and Dutch examples we have mentioned earlier. It can also originate from the central town being more ethnically diverse than its surroundings, and because of this the linguistically and ethnically heterogenic migrating population will turn the population of the neighbouring settlement heterogenic, too. The case of Lugano in Switzerland is an excellent European example for this process, where 40% of the city's population is not from Swiss origin, but immigrants who had arrived from nearly a hundred different countries. Diversity in residential preferences can be shown in how certain ethnic groups place themselves within a city, for example the level of segregation, and it also shows great diversity when it comes to moving into suburban areas (Ibraimovic, Masiero 2014). One thing is sure, that due to this process the neighbouring rural settlements become linguistically much more mixed. The diverse city – homogenic countryside dichotomy is not only a unique feature of the suburbanisation in Western-Europe, we can also experience this in Eastern-Central Europe. The clearest examples can be discovered at the Baltic region, where in the Soviet era the industrialization was in connection with the influx of Slavic (mainly Russian) speaking nations, altering the nationality ratios of scarcely populated areas. More than a third of the population of Tallinn and Riga is still Russian, but the Slavic population also makes up a significant proportion in other cities (amongst others in Tartu in Estonia). Since the latter had arrived within organised frames, all in all they were met by ready housing estates (providing relatively modern living facilities), while the Estonian and Latvian population lived in the more scarcely populated outskirts of towns in detached houses. Segregation deriving from this and segmentation experienced in the standard of living had fallen since 1991, however it is still an important characteristic of cities in the Baltic region (Kontuly, Tammaru 2006; Hess et al. 2012; Krisjane, Bezins 2012; Leetmaa et al. 2015).

## CAUSE OF THE CHANGES: BRATISLAVA

Between 2004 and 2008, 130-140 properties came under Slovakian (Bratislava) ownership, the number of those who moved across reached 400. After the first impressions it became obvious that:

- the new arrivals have a much higher income than the residents of Rajka, which soon led to a rise in otherwise attractively low property prices on this side of the border;
- the rise in property and land prices led to the departure of the residents of Rajka, because those who are about to start a family are unable to pay such high prices, and property owners are better off selling and moving away;

- the new arrivals' social (community life, education, health and social services, local interaction, self-organisations) and economic (using local shops and services, adding to the income of the settlement) integration into the local community is minimal, although there has been a slight improvement in the past few years.

The phenomenon of rising property prices has been a common scheme in both the closer and wider areas outside Bratislava; but in Rajka's case – due to the previously relatively low prices and the fast-accelerating demand – this rise is a lot more dynamic than that experienced on the Slovakian side. Based on data collected from Hungarian property sites and on Slovakian statistics, in 2008 house-, flat- and land prices in Bratislava were three to five times as high as those in Rajka. Only nine years later the difference is only one and a half to twice. In the meantime, property prices in Rajka are getting closer to those in villages in the Bratislava area, which are much more affected by suburbanization, whereas the difference there, too used to be significant (Table 1). Meanwhile the price of a house or a flat in Rajka is twice as much as it was in 2008; in terms of land prices the rise was somewhat slower.

	2008			2017		
	house	flat	building plot	house	flat	building plot
Bratislava	320	470	450	147	222	228
Bratislava region	220	0	375	123	156	158
Rajka	100	100	100	100	100	100

Table 1. Property prices in Bratislava, Bratislava region and Rajka between 2008 and 2017

(Rajka=100; source: [1][3][5] [21] [22] [23])

The never-before experienced, dynamic transformation in the local area means new challenges to the community, both native and immigrant:

- the number, income, qualification etc. of those moving in is attractive, which according to the native residents contributes to – through the rise of the population and proportion of young people, and also through changes in the physical surroundings – the invigoration of community life;
- both the leaders and the residents of the community resent the fact that even though the immigrants are using the infrastructure of the settlement the majority of them still works and pays taxes in Bratislava, or many of them live in Rajka without being registered there, which leads to a controversial position in the – normative and task based – Hungarian social support system [3];
- the native residents of Rajka are not in favour of the fast-changing appearance of the village, the spreading of the urban lifestyle, the increasing traffic, nor the poor knowledge of the Hungarian language within the Slovakian residents;

- there are frequent complaints that the fast-rising property prices put great pressure on the native families, who in many cases bought their houses with a mortgage, this way the immigrants, by offering more than the market price, effectively force the locals to sell up and leave the village.

10% of Rajka's population was changed until 2008, one fifth of the population was "Slovakian" in 2009. Until then 13 children were taken out of the kindergarten, because of moving [2], however after 2009 the institution became more and more popular amongst the immigrants, which made it necessary to employ a Slovakian nursery teacher [5]. In 2015 one third of the 69 children enrolled came from Bratislava [18], in 2017 this proportion rose to 35-40%. Uniquely, the local school does not follow the same trend, almost everyone chose schools in Bratislava: in 2015 out of the 149 pupils only one has Slovakian nationality [16]. The effect of moving away can also be felt here, the number of pupils decreased by 13% between 2006 and 2009. The German ethnic heritage can be detected at primary school, in the institute that teaches the ethnic language, German is taught in a high number of lessons since year one, the Local Government of German Ethnicity contributes to the running of the school. The bilingual German minority with dual identity is active in maintaining traditions, and according to the informers adopts well to the new situation (other minority groups also turned up in the village). The immigrants however cannot form a Slovakian Local Government until they take up Hungarian nationality. This however cannot be expected due to Slovakian law that makes having dual nationality impossible.

As Lampl (2010) summed it up residents of Rajka who originally came from Bratislava have had a high level of satisfaction rate right from the start.

***"This is my home, but I am also a guest here. We have to bear this in mind and behave accordingly. We are European citizens with common interests. It is important to avoid negative stereotyping, and not to consider only our own interests" [15]***

The quotation above is from a man who moved from Bratislava, his wife is an ethnic Hungarian from Slovakia, his children are bilingual. They arrived in Rajka at the start of the "moving out fever", their jobs and other connections ties them mainly to Bratislava, but at the same time they have a good relationship with the locals, and unlike other immigrants they enrolled their children at the school in Rajka. The few sentences above describe the new residents' cautious attitude well, they show the willingness to integrate, but also that the right approach from the natives is necessary in order to achieve this. However, not everyone wishes for integration in the community: it can happen, that the new residents are happy, because "there is a close Slovakian community" [17] in the new residential area in the outskirts of Rajka. This view can suggest a different meaning when phrased differently:

***"For us it is good that they are coming here, because the village is developing nicely. Sometimes people are cursing each other, but this happens in other villages, too. In the so-called Slovakian quarter people are closer than the natives of Rajka." [18]***

Conflicts and more significant protests only happened in the first few years, in forms of signs in public places, graffities (*“Slovaks, the Hungarian land is not for sale!”*) [1], vandalization of vehicles with a Slovakian number plate, protests organized by the border (in which, according to the locals no one from Rajka participated). Provocation also happened on the Slovakian side, coming from an estate agent who painted a depressing picture of the immigrants` situation, he stated that *“70% of the Slovaks wants to pack up because of the incidents, the rest is contemplating weather to stay or not.”* This statement was received with an uproar from the Slovaks in Rajka, stressing their peaceful coexistence with the locals [4]. According to similar experiences of the informants and local reports the difference between the new and the old residents lost its ethnic dimension at an early stage, today it is fed -with low intensity- by differences in points of view and lifestyle (city vs country life, locals vs immigrants) [6]. One of our informants who is a native Hungarian but lives in a mixed marriage mentioned the following statement that refers to those who come from a different environment (other settlement, other country): *“It happened that my children were mocked as Slovaks at school”*. Nowadays there are only very few frictions, there is an opportunity for the two communities to get closer to one another through programmes that are open to everyone, clubs, special occasions (mother and baby club, sport club etc.). According to our informant, unfortunately the new residents very rarely visit local community events in Rajka, which shows that their local identity is still in an immature state. Restaurants and pubs are proving to be more suitable to spend time together, one in particular, a “Slovakian Pub” which opened a few years ago in the south part of the village and run by a native Hungarian businessman who moved here from Slovakia. This pub is visited by both Hungarians and Slovaks [15].

As we mentioned earlier, Rajka is not the only target destination of the immigration. In 2011 Rajka had the highest number (535 people, 19% of the residents). At the same time significant Slovakian community can be found in Mosonmagyaróvár (284 people, 0.9%), Bezenye (131 people 9% [1][7]) and Dunakiliti (126 people, 6%), which means that in 2011 only 40% of Slovaks of this area lived in Rajka [24]. In 2017, the second largest Slovakian community after Rajka could be found in Mosonmagyaróvár (500-600 people) [9].

Year	Number of proper-ties	Population		%			Proportion of the registered newcomers (%)
		Cenzus	Estima-tion	Indigenous	Newcomers		
					Slovak	Hungarian	
2007	930	2 504	2 500	100	0		100
2009	949	2 385	2 800	80	16	4	85
2012	1 161	2 561	3 600	61	29	10	71
2015	1 339	2 607	4 500	49	36	15	58
2017	1 556	2 843	5 300	43	38	19	54

Table 2. Examination of the number of properties and inhabitants by timeline in Rajka (source: [1][5][8][18][19][20][25])

In 2009 the number of immigrants was 500, in 2010 it was 900, and in 2012 it was up to 1400, which shows that the recession during this period did not affect the growing number of immigrants from Bratislava. Thanks to the continuous demand – unlike in other parts of the country – property prices did not drop here, on the contrary, they continued to rise. Due to increasing demand not only detached houses were built or purchased, in 2012 four blocks of flats with 29 flats in each were under construction, which in the meantime were all completed [8]. In 2013 the Local Government allocated 131 new building plots [14]. We only have indirect information about the origin of the immigrants, at the beginning they probably arrived from the nearest part of Bratislava, called Petržalka, which is the home of 106.000 people and consist almost entirely of high rise blocks of flats [14].

In 2015 the population of Rajka exceeded 4500, 50% of which are originally from Bratislava [18]. In the freshly allocated new living quarters, which was saturated within a couple of years practically everyone is from Bratislava, but their number rapidly increased in the old, central part of the village, too. According to our informant they were also in majority here by the year 2017.

***“For the first sight visitors would think that they are in a settlement of Csallóköz, there is perfect reception from the Slovakian mobile network provider. In some shop windows Slovakian, as well as Hungarian signs can be read. The street signs are in Hungarian, there are Hungarian and German signs on the walls of official buildings. The ratio of Hungarian and Slovakian cars is about fifty-fifty.”*** [18]

In 2017 the number of residents reached 5300, out of which 3300 had a registered address (Table 2). The remaining 2000 residents are without exception from a Slovakian origin, but out of those who have registered still at least a 1000 belong to this group. Their number all together gives almost 60% of the residents of the village. Out of them at least a 1000 people have Hungarian as their mother tongue, which means that so far, the Hungarians are still the majority in Rajka. Over the past few years the number of the ethnic Hungarians from Slovakia rose continuously, while 10 years ago, out of those originally from Bratislava 18% regard themselves as Hungarian, this number today is 33% (Lampl 2010). The departure of Rajka's native residents is continuous, but has somewhat decreased since 2012, today purchasing property that became vacant (its owner diseased) from the inheritor is more significant. Besides building new properties, buying new flats or refurbishing old properties are all part of the process: so far approximately 500 properties were bought by Slovaks [7]. According to current planning the population of the village can rise up to about 7000, any higher number will require the assignment of new areas that can be built on. The population of Rajka is expected to reach the above number within five to six years [6].

Analysing the relationship between the two communities instead of peaceful co-existence – despite the many examples of mutual contacts and relatively conflict-free environment – we are more likely to talk about living next to one another. It is an unnerving thought that the spatial (separate living quarters where still more

than half of the immigrants live) and mental seclusion and the low level of interest in each other forms a gap between the new and the native residents, while the immigration continuous, with the lack of conscious integration and willingness to fit in this will stay the same or will keep re-occurring. As Lampl, Zs. said, spatial proximity has an effect on building a community (...), but whether they live segregated or together (...) they have different values, lifestyles, habits, and most probably financial situations (...). Perhaps this why they do not want or cannot participate in community life (Lampl 2010, pp. 102-103). Rajka's residents who came from Bratislava so far kept a distance from important matters regarding the village and from the local elections, however in a few years' times they might want to express their wills in a much more determined manner [19]. It matters whether there will be two separate groups in Rajka, who hardly acknowledge one another or a much more united community.

## HETEROGENIC VILLAGE CENTRE, HOMOGENIC NEW AREAS

The monitoring of the ethnic spatial-pattern is the categorisation of public places with unique local relations, based on the linguistic-origin, illustrated in individual households. It was also monitored by surveying the registration numbers of local vehicles (as a unique add-on to the linguistic landscape). Based on the facts above we only examined one street (Móricz Zsigmond Str.), for the following two reasons: our informant could provide detailed information about this public space, plus conducting a similar survey in the "Slovakian quarter" was regarded unnecessary, due to their origin being identical. In the case of the registration numbers – since here the objects examined represent a much more dynamic category - we examined three different parts of the village.

Before presenting the results, it is important to stress that the area-pattern is first determined by the origin based on a person's (former) address, this is followed by differentiation based on linguistic origin. On the one hand this came about when the informant clarified the situation, saying that the differences between Rajka's social sections can be traced back to their lifestyle, and the main cornerstone of that is the place of origin. On the other hand, the informants could in every case determine the immigrant background or the lack of it (are there immigrants living there or not) of a community within households, or in public places, but determining their mother tongue proved a lot more difficult. Therefore, the aim was not to draw up Rajka's ethnic map, but to present the diversity of a typical part of the village, based on origin.

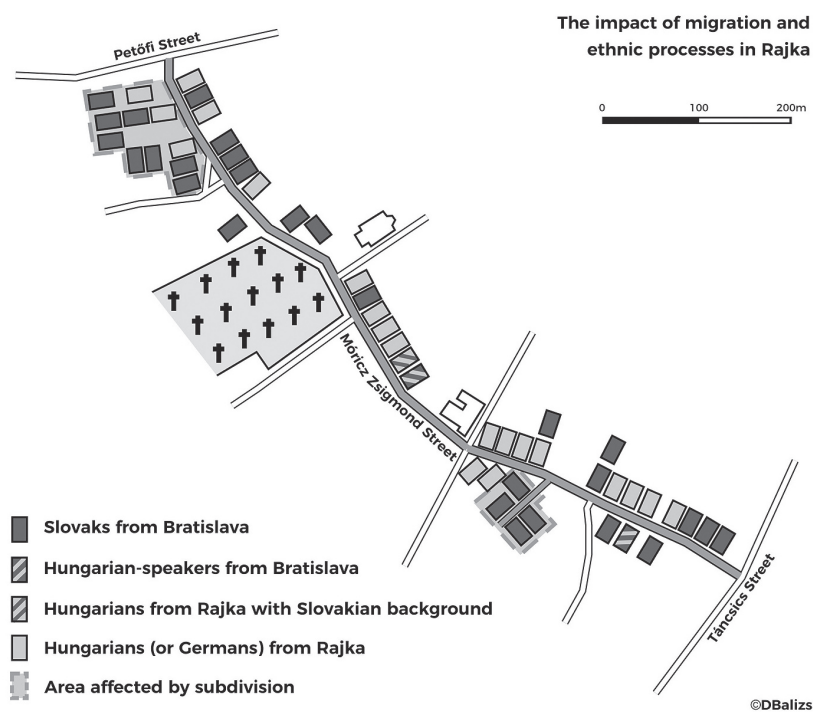


Figure 1. The impact of migration and ethnic processes in Rajka (Mórca Zsigmond Street, source: own illustration)

Out of the 51 households identified 30 (59%) have a background from Bratislava. Our informant indicated that only in two of those households did the residents spoke Hungarian. This low figure can be explained with the fact that the informant could not identify the linguistic relationships within the households; in the same time, he stressed that the number of Hungarian speakers must be much higher than what he identified. The other 21 properties are inhabited by native Rajka residents; it should be noted here, that amongst them there are people who fled to Hungary, and there to the nearest village, Rajka, from the “Bratislava bridge-head” area, which was given to Czechoslovakia after World War II.

***“An old man standing in front of me in the queue talked with rage about the number of Slovaks coming to Rajka. It did not even occur to him that after the war he arrived from Čunovo, and the two things are not really that different.”*** (Informant, Rajka)

The over-all view of the Mórca Zsigmond Street is remarkable in the sense that despite the fact that it can be found in the centre (old) part of Rajka, the majority of the households have background from Bratislava (Figure 1). Based on the above, a so far hardly documented transition can be detected, which shows an influx of the new residents to the older parts of Rajka, too.

Surveying the number plates confirms the continuous influx of people from Bratislava into the old part of Rajka. In order to present the real-life situation, we conducted the survey on three different roots:

- in the new, easterly part of the village;
- in the centre of the village;
- in the west, which is a mixed zone regarding the age and characteristics of the buildings (older and new detached houses, old blocks of flats next to new housing estates).
- At the beginning of the survey we expected cars with Slovakian number plates to have clear majority in the new parts, while in the centre and other older parts of Rajka, besides a significant number of cars with Slovakian number plates we expected Hungarian ones to be dominant. During our field-trip we tried to only get each vehicle once into survey.
- In the newly-built area 95% of the vehicles out of the 196 we surveyed had Slovakian number plate.
- In the village centre we noted the SK mark on 51% out of the 147 vehicles surveyed. The primary school located here has hardly any Slovakian pupils, so all the cars parked outside had a Hungarian number plate.
- On the route leading to the west part of Rajka we counted 124 vehicles, out of which almost half (48%) had been registered in Slovakia (Figure 2).



Figure 2. Migration and ethnic processes in Rajka  
(source: own illustration)

## CHANGING APPEARANCE

The changes in Rajka's settlement structure and buildings are happening in various ways, but the intensity and simultaneity of the changes are undoubtable. The number of flats (1430 in 2006) grew by 70% between 1990 and 2016, almost nine tenth of which happened after 2007. The growth speed in the past three years – despite the fact that the areas that currently have a building permit are becoming saturated, or perhaps for this very reason – has accelerated further (80-90 new flats per year).



*Figure 3. Fakopáncs Street and Pisztráng Street /in December 2011 and April 2017/ (source: Google Street View [10] and own photos)*

The five and a half years that passed between downloading the pictures from Google Street View and our field-trip proved sufficient to notice significant changes in some parts of Rajka, in many cases the volume of these changes made it difficult to identify certain locations. Out of the newly built areas, north of the road leading to Dunakiliti, the building of the infrastructure had only just finished (or was still in progress) at the end of 2011, the freshly allocated pieces of land were either empty, or had half-built buildings on them. This area is now completely built-up, or shows further saturation (by dividing lands). South of the Rajka-Dunakiliti road we could find land untouched by developers (fields) even a few years ago. By now this is also a fully developed area, and living space per person – thanks to building rows of houses – is smaller than areas north of the main road (Figure 3).

Still we cannot talk about a complete change in appearance, the new arrivals are also obliged to keep to building regulations (which for example does not allow the building of flat roofs). The area fitted with public utilities was only included in the

village a few years ago, is now almost 100% saturated with only two or three streets that can still be built on. Further land suitable for building can be found north of the village, however allocating it is hindered by two factors:

- providing public utilities and building an access road would mean a one and a half to two billion Forint investment;
- both the leaders and the residents of the village disagree with further developments being carried out in Rajka, which in the long run, according to some people would lead to losing the feel of the countryside and the deterioration of living standard in the village; by which it would lose the attraction that defines its development at the moment.

The lack of space does not mean a decline in demand; this is why the local government is again forced to allocate new building sites, like in the 2007 period, despite “protests” against further developments. Even though property prices are stagnating at the moment, after a continuous rise in the previous years, a rise can be expected again when the available lands are all sold out. This does not slow down immigration but continues to force native residents to sell their property, and then move away. In addition, in 2008 the local government developed 50 building plots, especially for families in Rajka, and offered them significantly under the market price (3-4000 HUF per square metre), which attracted only 4 Hungarian, but 304 Slovakian bids [2].

People from Bratislava can find different solutions for the already existing problem of the shortage of land that can be built on or for restricting immigration, since so far there is no sign of decreasing demand for local property. One of the possible solutions is choosing another settlement; of course - as we have mentioned before - for many Rajka is not the number one target destination. The other solution is moving into the old part of the village by buying and renovating existing properties. This was already noted during field research - both by a survey carried out in Móricz Zsigmond Street and by looking at the number plates of cars here; photographic evidence taken here only confirms this statement. At the same time, local handling of the lack of space in the new streets does not only make the old part of the village more popular but leads to sub-dividing plots of communal land.

***“The process in which all the existing plots are being built on has really accelerated in the past few years. And the plots are fast running out. Because lots of the people, especially Hungarians arriving from Slovakia say, that they want to buy land in the old Rajka, not in the outskirts. Because this has more atmosphere.”*** (Informant, Rajka)

Dividing the building plots is becoming more and more common in Rajka, because there is plenty of room for one more building (detached house) at the back of the fairly big plots. To some extent this can be traced back through generations: it was a tradition in Rajka, that there was more than one house on each plot, separate one for the old and for the young.

The diverse nature of immigration is shown by the fact that the immigrants simultaneously move into the old and the new parts of the settlement, but the move can also happen at different stages. This means that the new resident first moves into one of the new housing estates (or old blocks of flats), then after a short while moves on to the old, usually central part of the village.

## CONCLUSIONS

The process happening in Rajka is in many ways; similar to others experienced in Hungarian or other European settlements (Strüver 2005; Van Houtum and Gielis 2006; Terlouw 2008; Jagodic 2010, 2011; Lovas Kiss 2011); amongst these can be mentioned the cross-border aspect of suburbanisation (as the foundation of changes), the conflicts of interest between the immigrants and local residents, the changes of appearance, and the somewhat contradicting transformation of the language issues. By this we mean the appearance of many Hungarian-speaking residents, who only change certain elements of the language pattern of the effected are, since taking part in the community's life, and the usage of local institutions and services (so far) only partially happened (Hardi and Lampl 2008; Hardi 2011). For example, in Rajka's case the local kindergartens have a large number of immigrants while their number is insignificant in local primary schools. Clearly this issue is not only very important in terms of ethnic pattern, but also in relation to local economic and social relations, and the every-day operations of the village. A certain percentage of the newcomers are native Hungarians, which can be traced back to the regional positioning of Hungarian people within the Pannonian Basin.

The unique nature of Rajka comes from the outstandingly high intensity of this process, which without a doubt can be traced back to the demographic and economic "strength" of Bratislava as a capital city. The fact that Rajka's language pattern is going through significant changes for the second time within a barely 70-year period can also be regarded as unique. Furthermore, the rate in which the originally local residents leave the village is particularly high, which is probably in connection with the facts stated in the previous sentence, and can lead to further acceleration of the process happening in the community.

Rajka's population and appearance has significantly changed in the last decade, the village is very attractive due to its geographical location, being near to the border and to the Slovakian capital city. Its population more than doubled, 60% of which are Slovakian nationals, still since part of them are ethnic Hungarians from Slovakia the leading language of the village remains Hungarian. The new residents occupy 500 properties all together, two-third of them found homes in the newly-built east side of the village, but many moved to the older streets, where there is a mosaic-like pattern in terms of co-habitancy. With the lack of new building plots, the new residents are increasingly targeting the old parts of the village, where in contrast, the native residents tend to move away from. Part of the reason for this is the

change in Rajka, the disappearing rural milieu, but the better financial background of the new residents also plays an important part: in several cases the immigrants buy the natives out of their properties, often by offering a much larger amount of money than the market price. Thank to this the property prices in Rajka started to rise fast, they in fact doubled within a few years.

There is a constant rise and change in the population, and although the relationship between the two groups is not effected by ethnic-linguistic conflicts, there are difficulties in integration, and the almost complete lack of purposeful integration keeps the interaction between the old and the new residents to a minimum. Residents form a Slovakian background are still tied to Bratislava through their work, social life and education, they hardly use services offered by Rajka, most of them live here unregistered. This means that the number of people using Rajka's infrastructure is a lot higher than those who contribute to its maintenance. Rising population and heavier traffic, difference between urban and country life lead to tension between the native residents and the immigrants. However, there are no conflicts when it comes to every-day communication, the future aim is to bring the two communities closer and help them to understand each other.

The appearance of the village has changed, the population's linguistic-origin diversity has significantly increased. Today many new resident, renovated or newly-built houses, Slovakian signs can be found even in the older parts of the village. The old part also became more attractive to the immigrants, as opposed to new residential quarters or flats in newly-built housing estates. The state of the buildings often makes the origin of the owner obvious even to the outside viewer. The demand for property remains high, which not only results in changes of the residents, but in more densely built-up areas (land division). Residents (old or new) who would like to preserve the rural feel of Rajka face a difficult decision: without extending the building areas the locals will move away and be replaced by those from Bratislava, on the other hand by assigning new building plots the population is expected to rise sharply. In either scenario the transformation of Rajka will continue.

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## NOTES

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## WHO REAPS THE BENEFITS OF PERMEABLE BORDERS?

### MENTAL MAPS, NETWORKS AND LANGUAGE SKILLS IN THE HUNGARIAN-SLOVAKIAN BORDER-REGION

#### ABSTRACT

Every year the European Union spends millions of euros to promote cross-border cooperation among its member states. The efficiency of these expenditures is measured with indicators, such as

- the number of enterprises in the region increases
- the number of jobs along the border increases
- there is a given number of women among the project management staff

All in all, we argue, that the indicators demanded by the EU are not suitable to measure how efficiently have the funds assigned to Cross-border Cooperation been spent.

The present paper aims to present a direct measurement of the efficiency of Cross-border cooperation programmes, based on

- mental mapping (how do people see the other side of the borders, the towns and villages, services and opportunities)
- language skills (how much do people speak the language of the neighbouring country, how functional are these language skills)
- and position generator (how much does their social network reach across the state border)

This proposed research tool is suitable for both a cross-sectional analysis of a given geographical region (e.g. the two regions of Hungary and Slovakia that were examined in the pilot study), as well as a longitudinal analysis and measurement of the impact of Cross-border Cooperation programmes.

#### INTRODUCTION

From one programming period to the next, the amount of funding allocated for cross-border cooperation (CBC) programmes in the framework of the Community Initiative Interreg is increasing,<sup>1</sup> however, little attention is given to the social effect of

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1 In the 2007-2013 programming period 8.7 billion Euros were allocated. In the following fifth programming period of 2014-2020, which is still in progress, the amount of funding was raised to 10.1 billion Euros out of which 6.6 billion Euros were allocated for 60 cross-border programmes along 38 internal borders. [https://ec.europa.eu/regional\\_policy/hu/policy/cooperation/european-territorial/](https://ec.europa.eu/regional_policy/hu/policy/cooperation/european-territorial/) (Retrieved: 11.07.2019)

these projects. The purpose of the eMMAP project was to provide a set of indicators, which measure these often neglected direct social effects of cross-border cooperation programmes on the basis of mental mapping, an estimation of social capital, and language skills. But more generally, this instrument is designed to be flexible enough to measure the relationship of people living alongside any border in the world.

In the construction of the measurement tool – i.e. the questionnaire –, it was important for it to be suitable for various modes of data collection. As part of the pilot study we tested the questionnaire in face-to-face interviews, online self-completed and CATI surveys as well. For the purpose of the various modes of questioning, multiple versions of the modular questionnaire were produced. Although the design of the pilot study was cross-sectional, the methodology is suitable for longitudinal research as well.

Research with the paper-based questionnaire was conducted on four sites close to the border between Hungary and Slovakia. The pilot study's other part was conducted online with the help of a newly developed 'Online Mental Map Editor' software, on a sample of Hungarian and Slovakian enterprises. First the questionnaires were sent by email to a list of addresses, and then a series of phone interviews was made to reach the target number of respondents in both countries.<sup>2</sup> In this case we cannot speak of a representative sample, our goal was to prove the software's applicability.

The paper is based on the first component, the personal interview survey. This pilot study showed that easy access has a profound effect not only on the frequency but also the nature of the visits to the neighbouring country. The results have also shown the linking role of language minorities, but also the effect of income and education level on the relationship with the neighbouring country. First we present the methods we used to explore the respondents' relationship with the neighbouring country and its inhabitants, then the locations of data collection and finally we move on the results of the pilot study that we present in three sections according to the three main methodological components of the research.

## Methodology

Mental or „*cognitive mapping is a construct that encompasses those processes that enable people to acquire, code, store, recall, and manipulate information about the nature of their spatial environment*” (Down and Stea 1973, quoted in Letenyi 2006: 149). The main idea behind mental mapping is that the use of space redraws the actual image of our surroundings in our minds. It affects how we perceive this particular space, what we consider close or distant, our own, friendly or alien and strange. The

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<sup>2</sup> The online sample consisted of 500 people (250 Hungarians and 250 Slovakian entrepreneurs from the border-region).

result is a mental representation of our surroundings consisting of mental spaces, boundaries and orientation points. The method of mental mapping is used to collect and interpret these cognitive maps of the respondents. Collection of data can take many forms ranging from purely quantitative data collection to purely qualitative and may be accompanied with map drawing, either based on free recall, or guided to ensure some level of standardisation, or also existing maps or images may be used. Regardless of the method, data on the area and data on the respondents' attitudes and opinions are gathered. The data regarding the area (Lynch 1960) consist of

- a) the names and extent of mental spaces
- b) borders and boundaries
- c) orientation points and landmarks
- d) routes
- e) junctions

In the pilot study we explored the frequency of the respondents' visits to the neighbouring country, the names of the visited settlements (*mental spaces*), a *route* the respondents have used more often in the neighbouring country, *junctions* and *reference points* along this route, and *reference points* and places of interest in the town or settlement they knew the best. We also explored the respondents' attitudes towards the neighbouring country and its inhabitants. The survey was complemented by the drawing of a map of the neighbouring country by the respondents (preferably) containing the places mentioned by the respondent.<sup>3</sup>

Another social impact of the projects supporting cross-border cooperation may be the emergence of cross-border interpersonal relationships. To measure this aspect, we chose the so-called position generator method (Lin-Dumin 1986; Lin, Fu and Hsung 2001) over other methods such as the name generator or the resource generator. The former of these two would have been more suitable to explore a restricted number of variously operationalized (see Wellman 1979, Marsden 1987, Fisher 1982) strong ties (Granovetter 1973, Lin-Erickson 2008), and less suitable to examine the diversity of personal networks, furthermore it is relatively time consuming. In the case of the resource generator (Snijders 1999, Van der Gaag & Snijders 2005) the number of relevant resources is big, and may vary depending on life-situations, cultures, and geographical area. Van der Gaag, Snijders and Flap (2008) have found a strong correlation between the results of the resource generator and the position generator, therefore, we decided to use the more easily applicable position generator. Further advantages of the position generator are that the position generator has been used successfully in a culturally diverse set of countries (Lin-Erickson 2008) and that the answering takes up relatively little time, and thus participants are more willing to answer.

<sup>3</sup> For online self-completion surveys, an 'Online Mapping System' has been designed, to fully utilize the potential of the mental mapping methodology. Respondents had to pinpoint the settlements on an outline map.

Essentially, the respondent had to indicate whether he knows people of the listed occupations. The list included occupations that were relevant from the viewpoint of people living in borderregions and were fit to inspect both the vertical and horizontal reach of the respondents' social networks (Lin-Erickson 2008), and all millieus identified by Angelusz and Tardos (2008) were represented by at least one position. In a similar way we explored the relationship with relevant services: the respondents were asked to indicate whether they had any favourites, in both countries, out of the listed service-types and locations (town, village).

The third component assesses the respondents' language skills, the extent to which the respondents are familiar with the language of the neighbouring country. On the one hand, we asked what languages the respondent spoke and at what level, similarly to the Europass CV to identify and control for people who are more proficient in the language of the neighbouring country. On the other hand, we developed a method, which explored the basic vocabulary needed to get around (e.g. to use a map or ask for directions), to get information during short period stays. The 25-item list included expressions that the respondents may come across in public, e.g. at a train station, in the main square, etc. One can learn these expressions during visits to the neighbouring country by natural language acquisition (Murányi 2015). Incidentally, a respondent with such limited language capacity and unfamiliar with the grammar and vocabulary of the other language in general could declare that he didn't speak the neighbouring country's language at all in the Europass CV section.

The knowledge of the selected expressions was tested in three ways: as part of the active vocabulary, as part of the passive vocabulary, and finally we measured visual recognition. The concept of active and passive vocabulary is rather well known. The testing of visual recognition (using photos) allows us to know the extent to which respondents can recognise the target country's reference points even if they are not familiar with their linguistic code, e.g. does a Hungarian visitor recognise a main square, a pharmacy, a bus stop in Slovakia, even if he does not speak Slovakian, so he does not understand the labels. The results of this method held no obvious surprise: Slovakia and Hungary are visually similar, and their reference points were recognised by the countries' respondents even if they did not speak each other's language at all (they were not familiar, even on a passive level, with the basic vocabulary of getting around). This may seem an obvious result to everyone familiar with the two countries, but we must point out that this indicator was conceived to measure the cognitive distance between any two countries.

### **Data collection locations and sample composition**

The pilot research forming the basis of the paper was conducted in 2015 simultaneously in four locations along the Slovak-Hungarian border. We chose two locations in both countries: in Hungary, Esztergom and Mosonmagyaróvár; in Slovakia,

Štúrovo and Šamorín. In each location 125 respondents filled out the questionnaire. The research was primarily designed to focus on comparison, and this goal was fulfilled from several aspects by the chosen settlements.

At the time of the 2011 census, Esztergom had 28,926 inhabitants and Mosonmagyaróvár had 32,004; in both cases the vast majority declared Hungarian nationality, neither have significant minority ethnic groups. Štúrovo and Šamorín are somewhat smaller than their Hungarian counterparts: in the 2011 census, Štúrovo had 10,919 inhabitants and Šamorín had 12,726. Both towns have significant ethnic Hungarian minorities: in the last census in Štúrovo 6,624 (60.7%), while in Šamorín 7,309 (57.4%) people declared themselves ethnic Hungarians.

Esztergom and Štúrovo are members of the Ister-Granum EGTC, Mosonmagyaróvár and Šamorín are members of the Arrabona EGTC. Moreover, Štúrovo and Esztergom are twin towns, and so are Šamorín and Mosonmagyaróvár. Cooperation between Štúrovo and Esztergom has a long history: the two municipalities became official twin towns in 1991. Later on, the respective mayors first agreed on a regional cooperation in 1999, which was further fuelled by the simultaneous accession of both countries to the European Union.<sup>4</sup> Arrabona EGTC was established in 2010.<sup>5</sup>

Esztergom and Štúrovo are border crossing points, they have been connected by the Mária Valéria Bridge since 2001, and previously the Danube could be crossed by ferry. However, there is no direct connection between Šamorín and Mosonmagyaróvár. The closest border crossing point on road is 18 kilometres from Mosonmagyaróvár (Rajka-Rusovce), and approximately 27 kilometres from Šamorín (Gabčíkovo-Lipót).

Thus, a two-dimensional comparison could be made: on one level, the samples of the two Hungarian and two Slovak settlements could be compared, by which we could examine the effect of the direct connection and the longer cooperation; on a second level, the two Slovak samples could be compared with the two Hungarian ones, which showed the role played by minority groups living in neighbouring countries.

Figures 1 and 2 show the composition of the samples by two control variables: level of education and subjective income. The Slovak samples had more respondents with secondary school certificate, but the two Slovak samples did not show significant differences. The subjective income composition of the two Hungarian samples did differ, however: the replies given by the Mosonmagyaróvár respondents indicated a somewhat better income situation. The Slovak samples did not differ greatly from each other, nor from that of Mosonmagyaróvár.

<sup>4</sup> Ister-Granum EGTC (<http://www.istergranum.hu/tortenet.html>, 12<sup>th</sup> May, 2015)

<sup>5</sup> Arrabona EGTC ([http://www.arrabona.eu/egtc\\_bemutatas.html](http://www.arrabona.eu/egtc_bemutatas.html), 12<sup>th</sup> May, 2015)

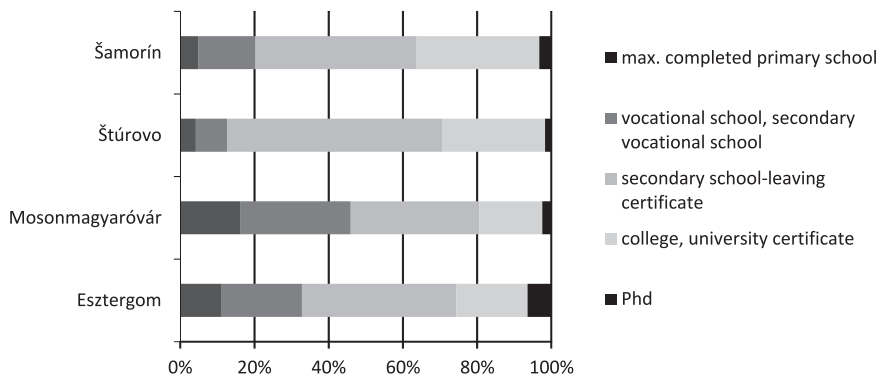


Figure 1: Respondents by levels of education

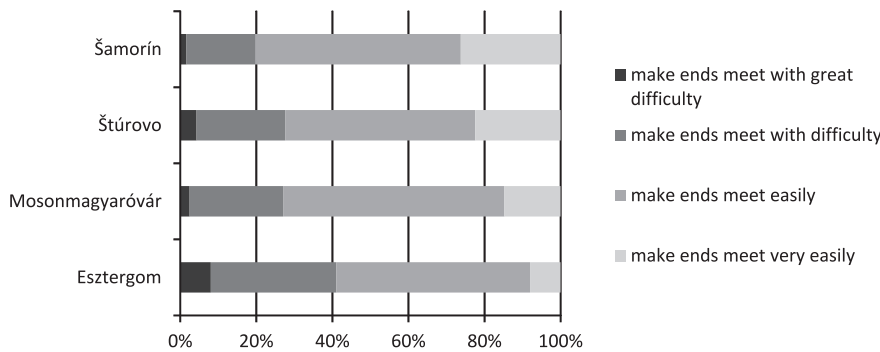


Figure 2: Respondents by their subjective income

There were many respondents with Hungarian mother tongue in the Slovak samples: we found 99 Hungarian speakers in Štúrovo, 116 in Šamorín, while there were 20 Slovak speakers in the former and 6 in the latter sample; however, out of them 18 and 4, respectively, spoke Hungarian as a foreign language. There were none with Slovak mother tongue in the Hungarian samples; except for a small number of the respondents, all declared Hungarian mother tongue. Language skills are discussed in more detail in the next section.

MAIN FINDINGS

1. RESPONDENTS' MENTAL MAPS

As Figure 3 shows, the presence of ethnic Hungarian respondents and respondents with at least basic Hungarian language skills in the Slovakian samples resulted in a higher proportion of those respondents that have visited Hungary at least once.<sup>6</sup>

This is true for almost everyone in these two samples. However, contrary to our expectations, this proportion does not differ significantly in the two Hungarian samples. The proximity of the border apparently did not play a deciding role in this aspect. While Mosonmagyaróvár and Šamorín are located several kilometres from the nearest border crossing point, thus it takes a rather considerable detour to get to Slovakia or Hungary, the same percent of respondents have visited the neighbouring country as in the other two cases. The expected difference, however, can be found in the frequency of the visits.

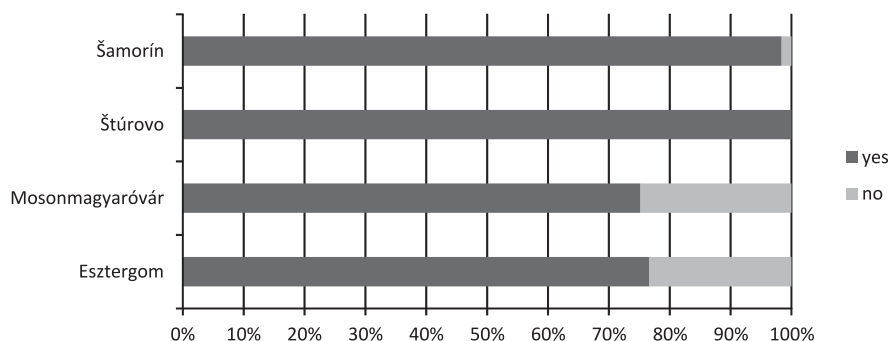


Figure 3: Respondents on whether they have ever been to the neighbouring country

There were only 4 people in Štúrovo and 12 in Esztergom who indicated that they have *not* been to the neighbouring country in the last 12 months. This number was 39 in Mosonmagyaróvár and 10 in Šamorín. The respondents of Esztergom visited the neighbouring country on average 34.7 times in the last 12 months, of Štúrovo 30.12 times, of Šamorín 8.47 times, and of Mosonmagyaróvár only 1.94 times. Based on the median values, the first two samples switch places: the median is highest in Štúrovo with 20 visits, in Esztergom it is 13.5, in Šamorín 4, and in Mosonmagyaróvár 1, which means half of the respondents have been to the neighbouring country maximum this many times, and the other half minimum this many times. Both estimates showed a rather close connection of the Štúrovo and Esztergom residents to the neighbouring country. Further, they showed that the values were higher in Šamorín than in Mosonmagyaróvár, which we attribute mainly to the presence of the ethnic Hungarian minority. These results supports the assumption usually present in academic literature about the mediator and bridge function of linguistic minorities.

Those respondents that had already been to the neighbouring country were asked further questions: they were asked to name a settlement, which they visited most often, and could list a maximum of 5 other settlements they had been to. According to the answers, in all samples it was the closest town they visited most often. The

6 As the section on language skills will show, there were only few people who spoke any Slavic language in the Hungarian samples.

data clearly demonstrates the existing strong ties between Esztergom and Štúrovo. In Šamorín, the primary destination was Győr, the second in line was Budapest; in Mosonmagyaróvár, most people listed Bratislava as first, while Šamorín was tied in second place with Dunajská Streda with only 7.5% of the responses. If we added to this the rest of the settlements the respondents had visited, we got more settlement names that were situated far from where the survey was carried out: typical tourist and holiday resorts had a relatively high number of mentions, such as the settlements of the High Tatras and Piešťany in Slovakia, and Lake Balaton in Hungary. Respondents in Slovakia also mentioned several large Hungarian towns, primarily county capitals (e.g. Eger, Debrecen, Szeged, Pécs).

Nevertheless, the strong relationship between Esztergom and Štúrovo was still obvious in the comprehensive list: Esztergom was named by 121 out of 125 respondents in Štúrovo, and Esztergom respondents put Štúrovo far above the rest of the list with 85 mentions, while the second was Bratislava with 13, and the third was Komárno with 12. The comprehensive list showed that Mosonmagyaróvár respondents listed Bratislava first (72), Šamorín second (21), and Dunaszerdahely third (17). Most of the Šamorín respondents visited Győr most often (115), Budapest was in second place (102), and Mosonmagyaróvár was only the third (33) on the list. It is thus clear that for those living in Mosonmagyaróvár and in Šamorín are primarily affected by the pulling effect of the nearby big towns (Bratislava, Győr, Budapest) and rarely visit the twin town, while respondents living in Esztergom and Štúrovo, connected by a bridge since 2001 tend to concentrate their visits on each other's town.

The strong relationship of these two towns was evident from the routes that the respondents described as well: Štúrovo and Esztergom functioned not only as destinations but in case of longer routes as transit and orientation points. In the case of even farther destinations, Budapest was the most frequently mentioned settlement in between. In the other two samples, the twin town had no dominant role, the already mentioned pulling effect of the respective capitals could be perceived. The twin town was cited by 5 people in Mosonmagyaróvár, and only by one in Šamorín. The respondents of Mosonmagyaróvár named Bratislava as the town "in between" on the way to farther destinations, and Rajka in the case of visits to the Slovak capital; Šamorín respondents most often travelled through Budapest or Győr.<sup>7</sup>

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<sup>7</sup> The graphs of typical routes can be found in the Appendix.



Figure 4: What respondents from Esztergom and Mosonmagyaróvár perceive of Slovakia (Esztergom – light, Mosonmagyaróvár – dark)



Figure 5: What respondents from Stúrovo and Šamorín perceive of Hungary (Stúrovo – light, Šamorín – dark)

The respondents from Esztergom indicated 1.42 visited settlements on average (out of a maximum of 1+5), those of Mosonmagyaróvár 1.85, of Šamorín 4.85, and of Štúrovo 4.91. On the one hand, it is apparent that respondents in Slovakia, primarily ethnic Hungarians, know Hungary better than the Hungarian respondents know Slovakia. On the other hand, the higher average in Mosonmagyaróvár than Esztergom shows a different kind of relationship with the neighbouring country: one that results in a relatively more diverse set of destinations.

The reasons and motivations of the visits answers were examined in two forms: on the one hand, respondents could formulate them in their own words, and on the other, they had to state whether they had taken part in the listed activities in the neighbouring country. The answers given to the two types of questions were in harmony. In Šamorín and Mosonmagyaróvár, recreation (excursions, holidays, tourism) ranked higher than in Esztergom and Štúrovo, but, perhaps linked to the above mentioned, many took part in small or large-scale shopping, had lunch in a restaurant, chose some form of entertainment, and a relatively high percentage visited family or friends. In Esztergom and Štúrovo however, the needs of daily life, e.g. shopping proved to be more important than in the other two cases. The respondents in Esztergom highlighted the cost of petrol in Slovakia, which for a long time was more favourable to the Hungarian petrol cost, the fair of Štúrovo, and they also mentioned that the proximity of Štúrovo and the ease of its access appeared as further motivations. Employment, education, and doctor's visits were listed among the less common activities, however, these ranked higher in Štúrovo and Esztergom than in the other two settlements.

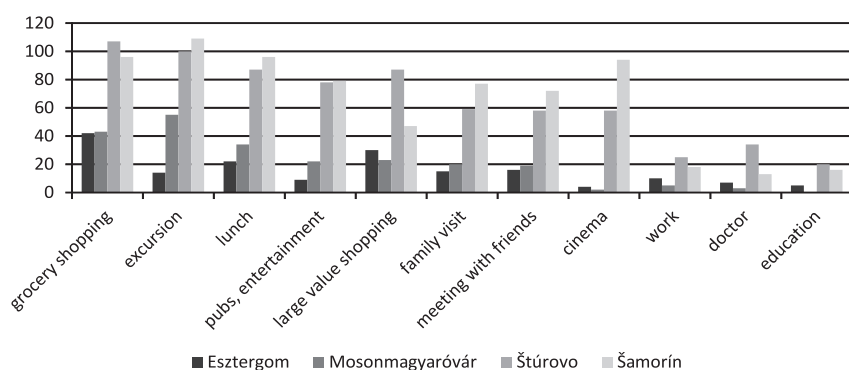


Figure 6: How many of the respondents took part in the following activities in the neighbouring country?

The average number of activities was 1.81 in Mosonmagyaróvár and 1.39 in Esztergom. The Slovak samples presented higher values: respondents reported 5.7 activities in Štúrovo and 5.66 in Šamorín. The differences between settlement pairs were not significant, and the somewhat higher values in Mosonmagyaróvár may have been caused by the wide spectrum of activities they took part in during

holidays and excursions (lunch, entertainment), which again shows the different nature of the visits.

Respondents were also asked to imagine a visit to the settlement they visited more often with the interviewer, and name the places they would undoubtedly have him visit. The responses underpin our claims referred to above: for Štúrovo and Esztergom residents, visits to the neighbouring country are different from those of Šamorín and Mosonmagyaróvár. The respondents of the first two samples would take the interviewer shopping (to malls, stores, markets), while the residents of the latter two preferred recreational activities (sights, baths, theatre, cinema, etc.).

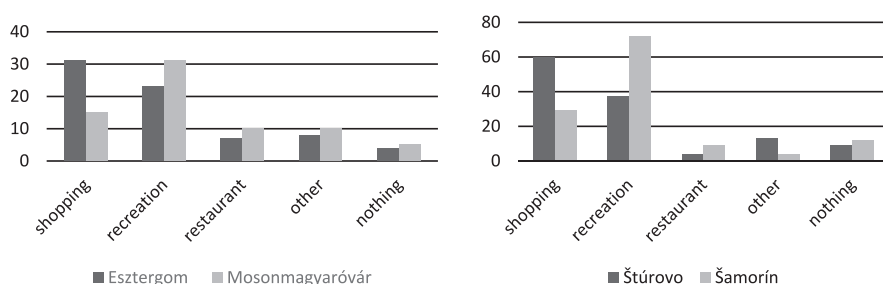
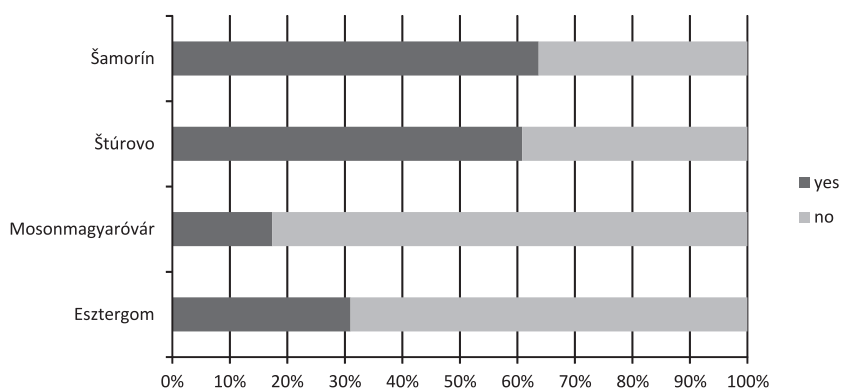


Figure 7: What would the respondents have the interviewer undoubtedly see in their most visited settlement?

Another significant difference between samples was the willingness to live for a specific time in the neighbouring country, which, of course, was very much influenced by the respondents' language skills. The question was two-fold: first, they had to state whether they would live in their most visited settlement, and after that they could freely choose a settlement they would be willing to live in. **Figure 8** shows a comprehensive picture about the percentage of respondents willing to live in the neighbouring country for a couple of years. It was apparent that the percentage of those who were willing was higher in the Slovak settlements, given the presence of Slovakian Hungarians, but at the same time, it was obvious that their proportion was higher in Esztergom than in Mosonmagyaróvár. A possible interpretation of these results is that Esztergom respondents accept the neighbouring country more easily, because they visit it more often, and they have more experience of the daily life there.



*Figure 8: Respondents' replies on whether they would be willing to spend a couple of years living in the neighbouring country for work purposes*

Deeper familiarity with the neighbouring country showed strong positive correlation with education levels and subjective income, the reverse of which meant that people with lower education level and/or poorer people could benefit less from the advantages presented by the proximity of the border.

The frequency of visits to Slovakia was clearly influenced by the level of education: in the last year, respondents from Štúrovo with college or university degree have been to Hungary 49 times, with secondary school-leaving certificate or lower 25 times, and with vocational certificate only 19 times. In Šamorín, the difference presented itself between the respondents with and without secondary school-leaving certificate: respondents with higher education level visited Hungary 10-11 times on average, those with lower education level only 3 times. Subjective income only had a manifest effect in Šamorín. This also suggests that in Šamorín, a visit to Hungary was also a question of available financial resources, as opposed to Štúrovo, where, as it was the already mentioned, proximity and easy access eliminated the role of financial resources.

In the Hungarian samples, neither education levels, nor income had palpable effects on the frequency of neighbour visits, but age did: younger residents crossed the border over to Slovakia more often.

The number of towns the respondents had visited and named (the scope of the mental map) was related to levels of education in Esztergom and Štúrovo, and to subjective income in Mosonmagyaróvár and Šamorín. In Esztergom, college or university graduates named 2 settlements on average, people with secondary school-leaving certificate 1.5, and those with vocational certificate or lower only 0.9. In Štúrovo, those with lower than completed secondary education listed 4.4 settlements on average, while those with higher level of education approximately 5.1-5.2 settlements. In Mosonmagyaróvár, those who found it hard or very hard to

make ends meet named 1.33 visited settlements, while 2.1 were named by those living in better financial situation. In Šamorín, these values were 3.8 and 5 respectively.

## 2. INTERPERSONAL NETWORKS

Interpersonal network of the respondents were explore using the position generator method. All in all, we can state that the social network of the respondents did not reach far over the border. Slovakian respondents, most of all ethnic Hungarians, had more personal relationships in Hungary than vice versa, and the absolute number of relationships was positively influenced by education and income levels.

Out of the 22 listed occupations, on the average 1.35 was mentioned in Esztergom, 0.67 in Mosonmagyaróvár, 2.8 on Šamorín, and even in Štúrovo the number of mentions was only 3. The difference in sample averages is due to a higher percentage of respondents in Štúrovo and Esztergom who could access a relatively high number of contacts. The limits of the top deciles were 6 in Esztergom, only 2 in Mosonmagyaróvár, while 9 in Štúrovo and 7 in Šamorín: the most well-connected 10% of the respondents in each settlement, knew people of at least that many occupations in the neighbouring country.

There were of course noticeable differences between the occupations. Some were relatively well known, like teachers, small entrepreneurs, doctors, and nurses, while occupations like maids, unskilled workers, tractor drivers, and policemen were barely mentioned.

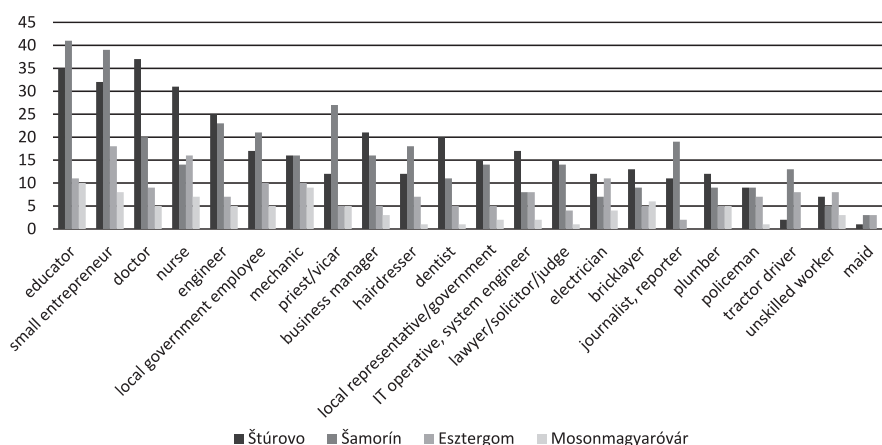


Figure 9: The number of respondents that knew people of the listed occupations

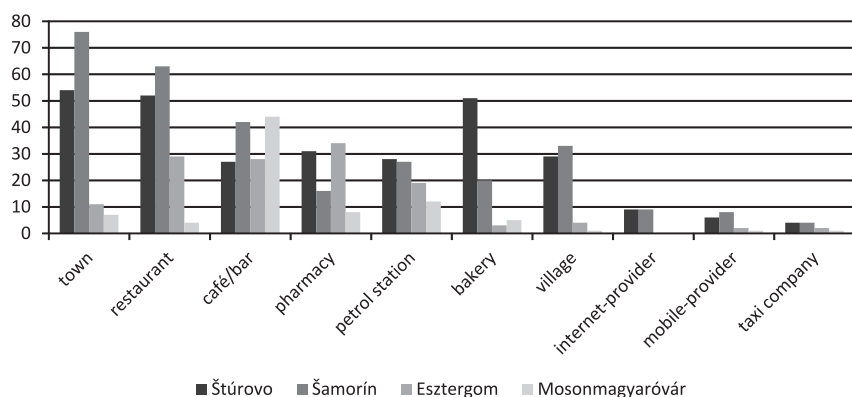


Figure 10: The number of respondents with favourite services or locations in the neighbouring country

In a similar way we asked whether respondents had any favourite services and settlements in the neighbouring country. On the average, there were 1.1 favourite places in the Esztergom sample, 1.7 in the Mosonmagyaróvár one, 2.1 in the Štúrovo one, and 2.3 in the Šamorín one. The results again showed higher values in the Slovakian samples and are consistent with the different nature of the visits: e.g. respondents from Šamorín and Mosonmagyaróvár were more likely to have a favourite bar, but less likely to have a favourite pharmacy.

### 3. LANGUAGE SKILLS

Figure 11 and 12 show the foreign languages spoken by the respondents. Most respondents in the Hungarian samples did not list any, but most of those who did, listed German or English. There were 10 people in Esztergom who spoke some degree of Slovak, and there were 5 who spoke some other Slavic languages (Russian, Croatian, and Czech). Nobody spoke Slovak in Mosonmagyaróvár, but 10 spoke Russian. In Šamorín and Štúrovo, the most common “foreign” language was the official language of the country, as most of the respondents were of Hungarian mother tongue. The other most spoken languages were English and German, too. Most of Slovak mother tongue respondents also spoke a certain degree of Hungarian.

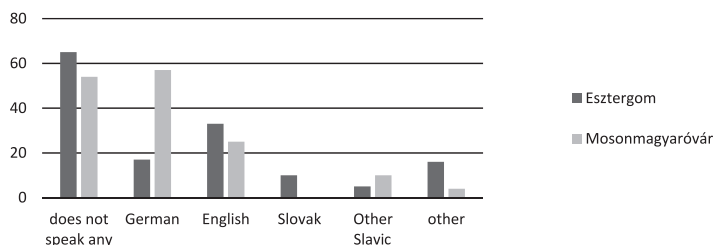


Figure 11: Knowledge of foreign languages in Esztergom and Mosonmagyaróvár

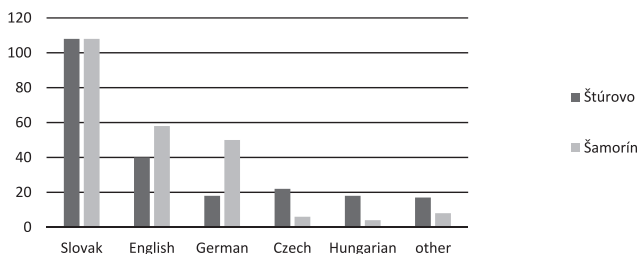


Figure 12: Knowledge of foreign languages in Štúrovo and Šamorín

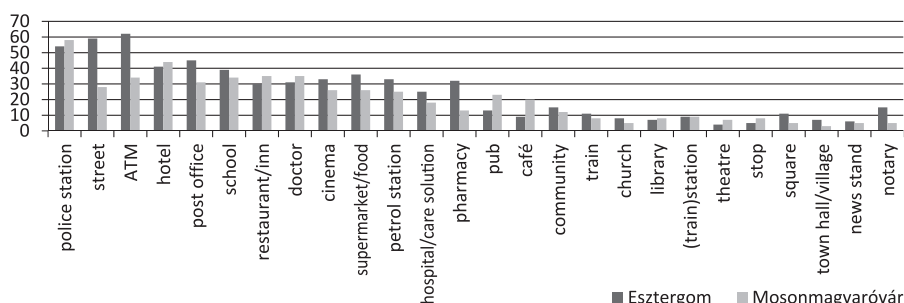


Figure 13: The following expressions were present in the active vocabulary of the respondents

Due to the high proportion of ethnic Hungarians and Slovaks speaking Hungarian as a foreign language in Štúrovo and Šamorín, 24.6 and 24.4 expressions, respectively, were present in the active vocabulary on average. Of the listed expressions, 5.1 were present in the residents' active vocabulary in Esztergom, and 4.2 in Mosonmagyaróvár. The median, which is less sensitive to outlier values, was 4 in Esztergom and only 1 in Mosonmagyaróvár, so the difference in between cannot be explained by the presence of Slovak speakers in the Esztergom sample.

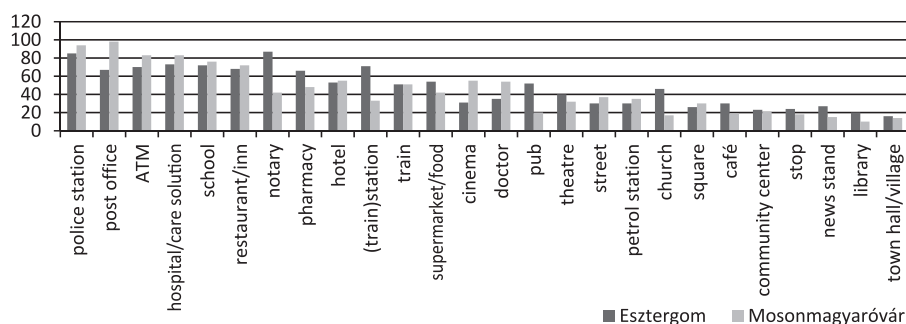


Figure 14: The following expressions were present in the active or passive vocabulary of the respondents

However, the difference in between the two samples disappeared when we also took into account the *recognition* of foreign language expressions. Mosonmagyaróvár respondents were more successful in this respect. In Esztergom, 10 words were recognized actively or passively on average, while in Mosonmagyaróvár 9.2 on average, the median was 9 in both cases.

There were well-known and not-so-well-known words listed. All in all, many respondents recognised words that had similar Slovak and Hungarian forms, or which they recognized as the forms used by major European languages, e.g. *polícia* - police station, *pošta* - post office, *hotel* - hotel, *bankomat* - ATM. When the two forms of the word differed greatly in the two languages and also from major European language form (e.g. *újságárus* – *novinový stánek* - newsstand, *színház* – *divadlo* - theatre, *városháza* – *městský úrad* - town hall, *könyvtár* – *knižnica* - library) they were recognized by less people. In some of these cases, and especially in the case of the active vocabulary, there were significant differences between Esztergom and Mosonmagyaróvár, which shows the positive effect of the frequent visits on natural language acquisition.

#### 4. CORRELATIONS BETWEEN INDICATORS

The study yielded a number of indicators that measure the intensity (e.g. frequency of visits), diversity (e.g. visited settlements, activities) and effects (e.g. language skills, interpersonal networks) of the visits in the neighbouring country, which indicators are, of course, interrelated. Beside the magnitude of the individual indicators, the patterns of their correlation provides additional insight into the residents' relationship with the neighbour country.<sup>8</sup>

In Esztergom for example, there was a strong correlation between the two indicators measuring the frequency of the visits (last year and total visits to primary destination), which, however, was not present in Mosonmagyaróvár. This is consistent with

<sup>8</sup> The correlation matrices can be found in the Appendix

our reasoning that the visits of Esztergom respondents were chiefly concentrated at one particular settlement: for most of them, it was Štúrovo. However, for Mosonmagyaróvár residents, there was no settlement of this degree of popularity; their latest visits did not target the same, already well-known destination. This is suggested by the fact that there is a medium strong correlation between the number of visits to the settlement at the top of the list and the number of settlements listed in Mosonmagyaróvár: the more visits to the primary destination, the more visits to other places, frequency and diversity go (more or less) hand in hand.

It is also interesting to note that the number of occupations, favourite services, and enjoyed activities are all primarily correlated with the number of listed settlements, and there is only a much weaker correlation with the frequency of the visits if there is any correlation at all: thus, for respondents to have many relations and favourites in the neighbouring country visiting a higher number of different settlements yields more than frequent visits to the same settlement.

Except for the Šamorín sample, and primarily in the Mosonmagyaróvár one, there is a relatively strong correlation between the number of listed settlements and the number of enjoyed activities, that is, the indicators measuring the diversity and variety of the relationship with the neighbouring country. The proportion of lower correlation coefficients in the matrix of Šamorín is relatively high, which appears to show that the different indicators measuring the relationship with Hungary are more independent from each other. Significant correlation was only present between the indicators of the visit frequency and the number of activities, the latter of which is rather strongly connected to the number of occupations known.

In contrast, in Štúrovo, relatively high correlation coefficients are much more frequent. Out of all the indicators, only that of the number of visits to the firstly listed settlement shows a relatively weak correlation with the others.

## SUMMARY

Our study presented the main results of the pilot research carried out at the Slovak-Hungarian border. The pilot study tested the suitability of a questionnaire that measures the direct social effects of CBC projects, and the relationship of residents on both sides of any border with the neighbouring country, their knowledge thereof and attitudes towards it and its inhabitants, and finally the consequences of their cross-border visits on their social networks and language skills.

The results demonstrated that the presence of ethnic kin in the border region exerts considerable influence on the development of cross-border relationships. This was shown by the percentage of those who have ever been to the neighbouring country (Hungary), their knowledge about this country (e.g. the number of settlements they had visited), and also by their number of weak ties to people on the other side of the border.

Furthermore, other differences have also been revealed. The respondents in Esztergom had the stronger relationship with the neighbouring country than respondents in Mosonmagyaróvár, while of the Slovak samples the same was true for the residents of Štúrovo. Compared to the respondents of Mosonmagyaróvár, those of Esztergom visited Slovakia more often in the last year, they were also more willing to live a couple of years in the country, they had more cross-border relationships, and their active vocabulary was also relatively more extensive than that of Mosonmagyaróvár respondents. Accordingly, the relationship of Štúrovo respondents with Hungary was more intense: the number of their visits to the neighbouring country in the last 12 months was especially high, and they also had more, although only slightly more, relationships across the border.

However, some indicators subverted our expectations, and indicated a relationship motivated by different factors in Mosonmagyaróvár and Šamorín on the one hand, and Esztergom and Štúrovo on the other. Recreational visits more typical in the former pair of samples led to a higher number of listed destinations and favourite services, while the visits motivated by everyday activities (e.g. grocery shopping) more typical of the latter pair, tended to be concentrated on one particular destination. Additionally, although all in all these activities were not typical at either location, the number of those who studied, worked, or went to the doctor in the neighbouring country was higher in Štúrovo and Esztergom; these were the activities that indicated a tighter, regular connection.

It is important to point out the strong relationship between Štúrovo and Esztergom: in both settlements, the most well-known settlement was the twin town, and the most frequently visited. The same cannot be claimed about the relationship between Mosonmagyaróvár and Šamorín: for Šamorín respondents, the most well-known settlements were Győr and then Budapest, and for those in Mosonmagyaróvár, the primary destination was Bratislava, with Šamorín trailing far behind. The direct connection offered by the Mária Valéria Bridge offers ample opportunities for the residents of Štúrovo and Esztergom to visit the neighbouring country, they can do so easily, even on foot. Therefore, it is not a privilege of those in a consolidated financial situation, but everyone, regardless of wealth can profit from the permeability of the border.

The situation of Šamorín and Mosonmagyaróvár is different. Although they are only 17 kilometres away as the crow flies, they are still relatively far from border crossing points, thus a visit to Hungary and Slovakia is more typical for those in higher income positions. The construction of a new, closer border crossing point could, even significantly, transform the relation of Šamorín and Mosonmagyaróvár residents with their neighbouring country.

As a result, out of all the potential covariates which could explain the strength of the connection, education level was the strongest influencing factor in the case of Esztergom and Štúrovo, but subjective income proved to be more influential in Šamorín and Mosonmagyaróvár. This is again consistent with the different type of the visits: shopping in one case and recreation, holiday in the other.

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APPENDIX

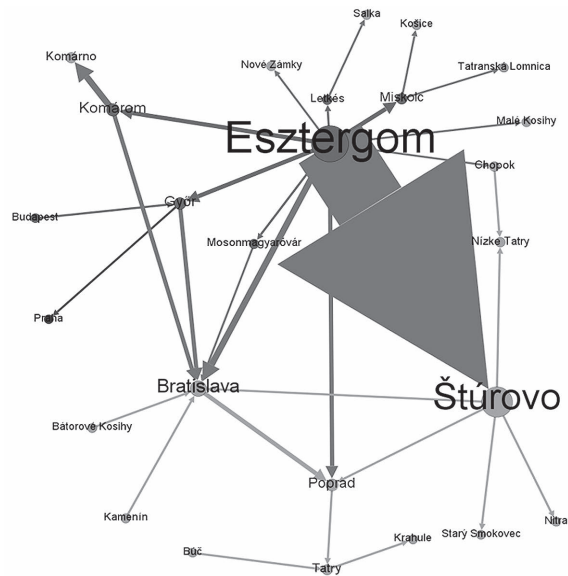


Figure 15: Routes taken by Esztergom respondents<sup>9</sup>

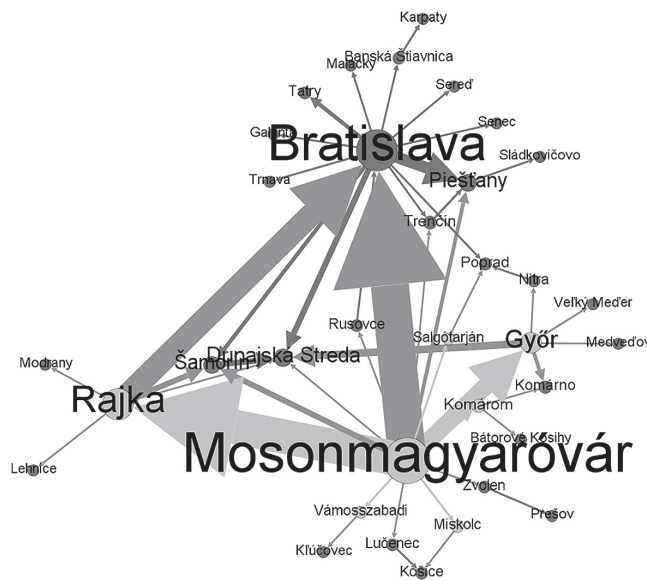


Figure 16: Routes taken by Mosonmagyaróvár respondents

<sup>9</sup> The position of the settlements on Figures 15 through 18 does not reflect their geographical location.

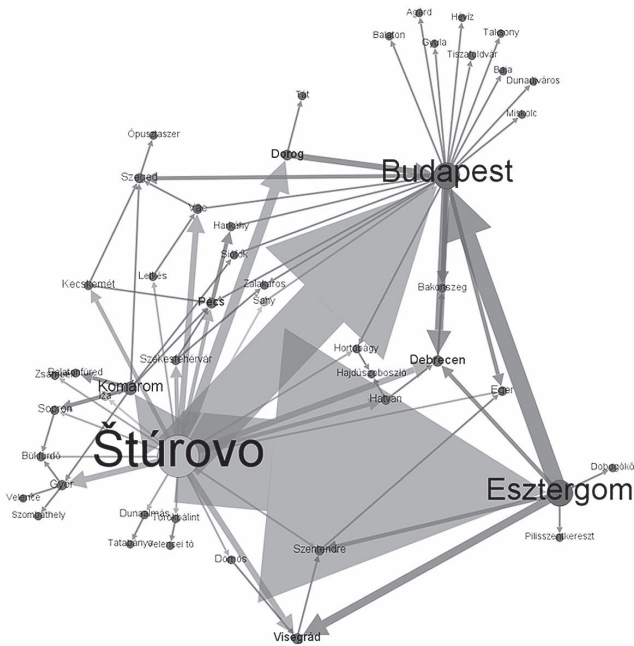


Figure 17: Routes taken by Štúrovo respondents

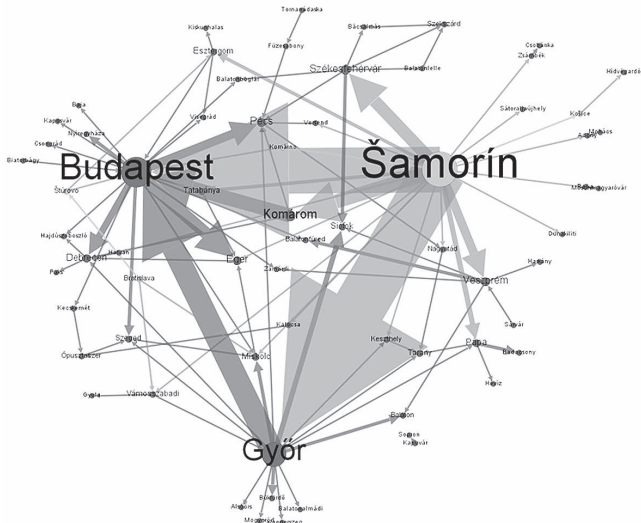


Figure 18: Routes taken by Šamorín respondents



Sorin Adam **Matei** (Purdue University, USA) Lorenza **Parisi** (Link Campus University, Italy), Francesca **Comunello** (Lumsa University, Italy), Kelly **Vibber** (University of Dayton, USA)

## ALTERPODES: COMMUNICATION BIASES IN PLAUSIBLE REASONING ABOUT GEOGRAPHIC PERCEPTION OF PLACE AND SPACE

### ABSTRACT<sup>1</sup>

This study builds on existing work on cartographic thinking in everyday life to better understand how digital and/or traditional media influence our perceptions of continental scale geography. Using a mixed, US-Italian sample of college students living in cities on similar latitudes, we found that there is a bias in placing U.S. cities further north and European cities further south than where they should be. Such biases reflect a process of 'plausible reasoning,' which assumes that places are located cartographically in a biased way due to cultural-cognitive processes facilitated by media. The specific media found to be related with such biases in this study and directions for future research are discussed.

This study examines how "plausible reasoning" facilitated by media connections contributes to geographic misperceptions. We explore the possibility that people infer geographic alignment of global cities especially on latitude from perception of cultural similarities between the people who inhabit them. A core question it investigates, building on existing literature on cartographic reasoning and knowledge (Friedman and Brown, 2000a, 200b), is that cultural and social heuristics may be shaped by social learning and interaction channels, such as those mediated by social media and by knowledge/media resources more broadly. It is our contention that in addition to basic categorical judgment mistakes, induced by basic mapping information errors, we can also detect some errors and corrections induced by social and mediated experiences. From a broader perspective, our study aims to address the question if easier access to media, especially more sophisticated channels and source of digital information (social media, maps, social networking) alleviates or not geographic misperceptions. In a word, does access to social media make us sense of geography better and how does such access interact with our cultural biases?

### LITERATURE REVIEW

The starting point of our investigation is a more fundamental question: what factors shape the way in which we store and retrieve geographic information, especially at the global level? Cartographers who study the way in which people perceive and

store information about physical space have determined that global/continental space is perceived and stored not as a continuum entity, but as a conglomeration of discrete regions or places, which are organized hierarchically, according to a model of 'plausible reasoning.' Friedman and Brown note, 'although people may generally have inexact item-level knowledge (e.g. they do not know the specific latitudes of most cities), they have a wealth of other specific and general beliefs—correct or incorrect—about the cities and the geographic regions and continents to which the cities belong' (2009: 94). Such beliefs typically pair places on the basis of climate or political/cultural affiliation by a process of plausible reasoning (Collins and Michaelski, 1989; Friedman and Brown, 2000a, 2000b). Such processes typically infer item (city-level) places from regional (country or continent-level) affiliation (Friedman and Brown, 2000a, 2000b). For example, southern cities in the United States are seen as being at the same level as Southern (Mediterranean) European cities, based on a similarity of climate (broadly defined), although US locations are typically farther south than most European ones. For example, the latitude of Jackson, Mississippi is much further south than that of a supposed European correspondent, such as Italy or Spain. Jackson is as far south as Benghazi, Libya, which is six hundred miles south of Rome and 200 off the southernmost Italian location in Sicily. Further south, Miami, whose Latino heritage might induce some superficial inclination to align it with Spain, is in the middle of the Sahara desert. The biased logic of locating cities across regions and continents goes beyond mere operational cartographic logic. Maps, especially cognitive ones, are complex constructs. 'Implicitly and explicitly, they contain spatial relational data along with environmental attributes and individualized and socioculturally conditioned beliefs, values, and attitudes' (Golledge and Stimson, 1997: 236). Geography, as understood by ordinary people, is, in effect, experiential. It is, 'a complex domain that is learned about over the life span from a variety of eclectic sources and experiences, so reasoning about geographic entities can potentially be affected by perceptual (Huttenlocher et al., 1991), cognitive (Friedman and Brown, 2000b), and affective (Carbon and Leder, 2005; Kerkman et al., 2004) factors' (Friedman, 2009, p. 95). Proximity and location then are allocated according to a 'plausible reasoning logic' of designating spatial characteristics on the basis of non-spatial attributes, which often leads to cartographic judgments and biases.

As Golledge and Stimson emphasize (1997), the maps people carry in their minds are not precise mathematical models, complete with a precise coordinate system and exact location parameters, but cognitive models of socioculturally conditioned beliefs. These refer not to an abstract notion of space, but to specific places of which we have some cultural (in an anthropological sense) beliefs. In this we follow one of the tenets of humanistic and cultural geography, which defines space and place as two different concepts (Tuan, 1977; Curry, 2002; Cresswell, 2004). Space refers to an abstract concept, which contains specific places. Place could be defined as a 'site of specific meaning or intention' and it is 'the result of an ordering and categorization of our spatial experience' (Willis, 2007: 155) on the basis of a cultural system of beliefs. In this study we investigate how places are mentally mapped

in cognitive spatial models that follow systems of beliefs derived from plausible reasoning that follows a procedural logic (Carbon et al., 2005). In this we follow Golledge and Stimson (1997: 163), who propose that cognitive spatial models include 'three components: declarative, which includes knowledge of objects and/or places with attached meanings and significances; relational or configurational, which includes ideas like proximity, sequence, and hierarchy; and procedural knowledge ('If... then...'). As such, mental maps of places combine factual information about where a place is in terms of relative location from key landmarks (oceans or land mass contours) or cardinal points (e.g., North or South), with cultural attributes, such as 'who are the people who live there' and 'what regions they hail from' on the basis of a belief-based cultural methodology for connecting the two. Beliefs are based on pre-empiric assumptions that rest on claims of cultural similarities between people on the basis of the most apparent facet of their similarity: that of ethnic origin. As such, cognitive models that represent places display significant distortions and biases. Cultural biases are compounded by so called "categorical biases," which are caused by the attempt to align spatial realities with a given preconceived idea of spatial distribution in discrete categories (places) that are organized in the knower's mind hierarchically. Stevens and Coupe (1978) explored these processes in a direct way. They used classic geographical questions to reveal the hierarchical organization of spatial knowledge. For instance, they asked whether Reno or San Diego was further east; when most respondents answered Reno, it was because they judged that Nevada was east of California and thus made their decision on the basis of the states in which the cities were located (Stevens and Coupe, 1978: 248).

Categorical biases, by which places are attributed locations on the basis of their affiliation to a region, are just one type of spatial misattribution error. Locations can be inferred for cities or places on the basis of the inferences we make about the people who live there or about the socio-cultural characteristics of those areas, often culled from false memories assimilated through movies and media (Tversky, 1981). In other words, locations can be inferred not only from climate or regional categorization, but also by the logic of plausible reasoning, by similarities in cultural and social conditions that are supposed to be prevailing in a specific area. When imagining some places in terms of cultural similarities, they are being thought of as what we might call 'alterpodes.' Unlike antipodes, which are the exact geographic opposite of a location, an alterpode is a place that is thought as being both different and similar. An alterpode is perceived as a mirror image in another continental dimension. Alterpodes are dyadic realities. An alterpode corresponds to a matching place by virtue of ethno-cultural similarities. Alterpodes in the language of mental mapping correlate places invested with characteristics, including spatial ones (latitude, climate, distance) derived from judgments about the people who live there.

For example, if you believe that New York City is mainly populated by people of European Ancestry (Anglo, Irish, Jewish, Northern or East European), you might also situate it geographically at a similar latitude as other known European cities (London, Amsterdam, Berlin, etc.), which are or were the homes of the Western

European, English, or German-Jewish populations. However, London, Berlin, or Paris are in fact much further north on the latitude scale, than New York City, which at 42 degrees N is almost on the same latitude as Naples, Italy.

Cultural critics, communication researchers, and scholars are increasingly interested in the connection between place perception and the mediated images that shape them (Kern, 2003). By extension, scholars have become interested in the potential mechanisms by which categorical or cultural biases distort cognitive representations of places. Such cognitive misrepresentations can be and often are induced by mass communication. Previous research has revealed several significant trends. Curry (1997) highlights the propensity of maps, cognitive or not, to assign various attributes to all individuals living in an area. The ecological fallacy of this assignment is particularly troubling when mapped because, as Curry argues, 'people tend to see maps as direct representations of reality in ways that tables and charts are not' (1997: 691).

Furthermore, in an increasingly connected world social interactions lose their exclusive connection with physical proximity (Giddens, 1990; Meyrowitz, 1983; Wellman, 2001) and through broadcasting media individuals can take part in public events diffused worldwide in real time (Dyan and Katz, 1992). Yet, this does not mean that people have a more accurate perception or understanding of the places that intersect their immediate or mediated experiences. In fact, as space has been 'domesticated', the boundaries between familiar and exotic, far and close, have been blurred (Kern, 2003). We often translate far away locations in our own terms, making them look more like our own world (Thompson, 1995). In a world dominated by media, the notion of place ceases to be coherent and fixed and it becomes open and dynamic (Castells, 1996). Constant access to media, traditional or digital, the adoption of wireless devices and social media and the production of user generated content deeply influence how individuals experience place. Mediated experiences transform our sense of presence and the perception of proximity and distance. A sense of mediated intimacy emerges (Thompson, 2008). Access to a continuous flow of information from institutional (media sites) and personal connections (friends, acquaintances, and social media connections) create an ambient awareness of faraway places.

More specifically, research in cognitive mapping, going back to Castells (1996), Golledge (1997), Kerkman et al. (2004) and more recently Kweon, Hwang, and Jo (2011) justifies the claim that place and space are culturally constructed. Kerkman et al. (2004) are particularly convincing in making the claim that cultural construction of space implies association of cultural stereotypes with spatial locations. Their groundbreaking study on misperception of North-South locations at a continental scale due to cultural stereotypes is particularly germane in this context. Following in their footsteps, we propose that perceptions of place and the mental maps we use to organize them are shaped by cultural perceptions modeled by core learning channels: personal experiences, social media interactions, knowledge gleaned from

books and movies, experiences from fleeting interactions with mere acquaintances or lasting friendships with people who live abroad (globally, regardless of continent). The claim that cultural perceptions are shaped by mediated and personal learning is not new (Meyrowitz, 1983; Thompson, 1995). Carey, in his classic *Communication as Culture* (1988) in fact equates the two, seeing culture and cultural bias consubstantial with communication. Meyrowitz's medium theory (1983) makes a similar and even stronger claim, when it proposes that the contours of the world, social or otherwise, are symbiotically influenced by media content. According to it, specific types of content shape cultural perception of the world in specific ways. Orality supports certain mnemonic devices that favor linear thinking by which space and time are unidimensional and circular. Print media favors a Cartesian vision on space and time, in a two-dimensional, hierarchical, intrinsically ordered and open-ended, progressive universe. Electronic media explodes space and time, compressing the distance between space and time, as emphasized by Giddens (1990), and inviting a multi-perspective, relativistic image of the space, time, and the universe, physical and social, as a whole (Kern, 2003). With new media we have the possibility of new forms of perception and expression that need to be further explored.

In this study we push ahead the exploration of these issues seeing a variety of media (traditional and digital) intersecting with other forms of immediate communication to create new learning experiences with new cultural and spatial perceptive dimensions (Thompson, 1995). Building on Carey (1988), Giddens (1990), Kern (2003), Meyrowitz (1983), and Thompson (1995), we propose that if media effects shape our cultural biases generally, they would also affect cultural biases related to space. Spatial perception should be seen as the product of multiple sources of information. For operational clarity and consistency with traditional media effects literature interested in basic media experiences (Ball-Rokeach, 1985), and newer literature, which discusses perception of space (Carbon et al., 2005), we distinguish between immediate and mediated sources. Immediate sources include individual experiences such as travel and personal contact. Mediated experiences can be divided into: a) traditional sources (movies, books, etc.), b) on-demand, customizable, dynamic media (online maps, review or reference websites) and c) social interactive experiences offered by social media – social interactions with individuals we know through and interact with online.

Knowledge acquisition can also be divided into formal and informal experiences, the former referring mostly to educational experiences, while the latter to individualized exposure to a variety of resources, from books, to movies, to social media contacts.

Intersecting these three dimensions (immediate-mediated, formal-informal, traditional-digital media) can generate a comprehensive but rather cumbersome typology. Since our primary goal is to explore the role of mediated experience in shaping perception of place, our study cannot explore all quarters of this communication typology. We will focus mostly on traditional and digital media. In the latter case we

distinguish between indirect exposure to faraway lands through the interactions with individuals we know through social media and more purposive searches for information about distant places using digital information sources, such as maps, reference sites, etc. The distinction between the two types of exposure is that while social media interactions shape our geographic knowledge indirectly and contextually, the latter type of digital media exposure is more direct and purposive. The distinction thus emphasizes modalities of influence.

In summary, our study focuses broadly on three separate domains of communicative processes: traditional media resources, digital communication knowledge resources, and social media engagement. This tripartite categorization responds to questions previously posited in the geo-spatial literature about our changing sense of place due to media effects on perception of space, as discussed above. For the purpose of this preliminary/pilot study these resources are operationalized as described below.

**Traditional Media resources.** These refer to the main mass mediated sources for learning about the world and about geography, such as books, movies, magazines, etc. These are typically consumed as stand-alone experiences. Both Friedman (2009) and Tversky (1981) suggest that information gleaned from the media can shape cartographic knowledge.

**Digital Communication Knowledge Resources.** In a networked world users on the move browse the web, search for information, and carry out personalized web searches according to their peculiar needs and locations (Gordon and De Souza e Silva 2011). Through a process of 'social annotation' citizens produce a large amount of information referring to different place experiences that can be shared with other users. Since our study is specifically focused on the changes brought about by the advent of digital and online communication media on geographic orientation and knowledge, particular attention needs to be paid to how much online maps, user generated content sites (TripAdvisor, YouTube etc.) or online news channels shape geographic knowledge. Digital online resources are in this context a focused concept, including online sources that are geographic in nature and highly interactive.

**Social media engagement.** Information gleaned from online sources is not limited to purposive, direct searching of information through online resources. A good deal of information about the world is transacted through social media (Facebook, Twitter, etc.). In this case, however, informing and learning is indirect and contextual. We learn about other places through inference, using as departing points messages or signals from our social media contact. Informing is a byproduct of sociability. We learn osmotically from the networks of interaction that we create based on choice and affinity (Castells et al., 2007). Following the 'networked individualism' perspective (Rainie and Wellman, 2012) each individual is conceived as a node within a network (ego-centered network), enabling/disabling social interactions according to personal experiences and current needs. In such a context, internet communication and, more specifically, social media platforms, enable not only the maintenance of long-distance

ties but also create channels of indirect communication and learning about the places long distance ties originate from (Rainie and Wellman, 2012). Taking into account the number, the geographic distribution and the depth of social ties across these media is of paramount importance for understanding how geographic knowledge takes shape.

While we believe that these categories map conceptually onto the basic source of information that may affect spatial perception, we are aware that, in the contemporary media environment, digital and traditional media often overlap, while the boundaries between different media are blurring. We are also aware that the same media platform can enable different reception strategies among its audiences. Nevertheless, an analytic tradition in media research, informed especially by the media dependency system perspective, distinguishes between content genre effects (Ball-Rokeach, 1985). Consistent with literature discussing traditional media effects on space perception (Carbon et al., 2005; Golledge, 1997; Kern, 2003; Meyrowitz, 1983), we decided to use these discrete categories for analytical purposes. More important, although movies can be consumed online, we make a clear distinction between social media, as a specific genre, that communicates through posts and brief messages, and movies, as a type of long form artistic endeavor.

## **HYPOTHESES AND RESEARCH QUESTIONS**

Our main proposition in this study is that when imagining the world outside our countries or continents, we rarely call on an objective cartographic method. Frequently, we use a categorical, social-cultural method of plausible reasoning, in which proximity is inflected by a *sui-generis* process of spatial reasoning, which is shaped by a number of communication and knowledge resources. Such resources can be mediated or unmediated. Of the mediated ones, we need to make a distinction between the more traditional channels (books, magazines, newspapers or movies consumed in a static/non-computer based environment) and the newer, online tools such as interactive maps, social media sites, including those dedicated to travel, media sharing sites, etc. For the purpose of this study, geo-spatial bias and the knowledge heuristics that may lead to these biases are explored via a mapping exercise. Respondents are asked to locate European cities in the US geographic space, and vice versa, keeping latitude and distance from most extreme continental points in the US and Europe constant. The basic assumption, as discussed above, is that mental maps at scale tend to be aligned according to a logic of cultural and ethnic similarity. To explore this assumption we posit that samples of European or American residents will generally make the same biased errors, in that they will try to geographically align US and European cities that seem to share assumed ethnic or cultural similarities. The exploration starts with questions about correct placing of United States or European Union cities on their correct latitude. This checks for accuracy and baseline geographic knowledge.

After this preliminary exercise, the core questions are asked. Subjects are instructed to place a European or American city across the ocean in US or European space. The aim is to detect possible attempts to match geographic places with cultural locations. As suggested above, although about 80% of continental US is south of Rome, for cultural reasons, a general misconception might be that in fact most US locations are much further north than they are. Similarly, European locations will be perceived to be much further south than they should be, thereby aligning the two continents on latitude.

Since our theoretical model of plausible reasoning predicts that places will be aligned with cultural knowledge, we hypothesize that respondents will try to align US and European locations according to this logic. Southern or Northern US locations will be seen as being aligned with Southern or Northern European locations. Since the US is located farther south than most European countries, there will be a southerly bias for European cities and a northerly one for US cities. We thus hypothesize that:

H1: European locations will be misplaced in the US space in a southerly direction

H2: United States locations will be misplaced in the European space in a northerly direction

The literature did not explore in sufficient detail the possibility of differences between ethnic groups. Thus, our study will examine such differences as well:

RQ1: Are there any significant differences between European and US respondents in placing United States cities in Europe?

RQ2: Are there any significant differences between European and US respondents in placing European cities in the United States?

Finally, the sources of bias are explored taking into account the various knowledge resources that can influence place perception. Two final questions examine the impact of various resources and especially those that reside online.

RQ3: Do knowledge resources shape the biases, and if so, which ones?

RQ4: Of the online communication resources, which are more likely to shape the biases?

## METHODS

A pilot survey of geographic locations was conducted among students attending either a leading, large size Italian or US Midwestern State University. Both universities were located in cities situated at similar geographic latitude (40 degrees North). A total of 301 college age respondents, 229 studying at a state university in the United States and 72 at an Italian University, were recruited in exchange for extra class credit (typically 1% of the semester grade) to fill out a 30 minute online survey. The students were selected as target group due to their relative educational, demographic, and technological use homogeneity. The samples are thus not

representative of US or Italian populations. As pilot testing groups they are however indicative of certain comparable young learner, digitally adept populations. Surveys were administered in a computer lab under the supervision of the research coordinators. Students had no access to any outside materials and completed the survey without any interruption of the task. Although the students, especially those in the United States, included a variety of citizenships, for the purposes of this study we analyze and report the results only of the students that had United States or Italian citizenship ( $n = 212$ ). Out of 212 valid responses, 158 respondents (74.5%) are United States citizens, 54 (25.5%) are Italian citizens.

The study was conducted using the online survey platform Qualtrics. Most of the questions were in multiple choice format. The core geographic questions were presented as requests to place city locations on continental size image maps of Europe or the US. Both the US and European maps included areas not in Europe or US due to the fact that correct translation of locations demands some European cities to be placed in Canada and some US cities to be placed in Asia or North Africa. Maps depicted only terrain features and were devoid of any labels or city markers. As indicated below, some instructions were provided regarding west-east orientation. Both groups were asked to place cities in Europe and in US, equally, as detailed below.

## DEPENDENT VARIABLES

The key dependent variable is error in placement of 14 cities (7 European, 7 US) in a different continental space. This error is interpreted as bias, in that we expect that errors go in specific directions, colored by cultural inferences based on plausible reasoning, as predicted by Hypotheses 1 and 2. Errors for US cities placed in Europe should go in a northerly direction, while those for European cities should go in a southerly one.

To capture such biases, participants were asked to place US cities in Europe and vice-versa. The participants were instructed to think about the location of Rome in its own original location. Then, they were asked to

*'imagine that we moved Rome to a location on the map below {depicting the US in the middle of North America}. This place would be just as far south from the North Pole as it was in Europe. It should also be just as far west from the Atlantic coast, as it was east in Europe. In other words, if you think Rome is near the Atlantic coast, the selected location on the map below should also be near to the US Atlantic coast; if you think Rome is far from the Atlantic coast, the selected location on the map below should be as far from the US Atlantic coast. Click the map where ROME would be.'*

The respondents were given a red line and a direction of reference for making east-west inferences. Each city (place) was placed on the map individually, on a separate map. The exercise did not aim to determine how the cities are related to each other. Rather, the goal was to measure average bias in placing individual cities (places) and then to use bias measurement to obtain an approximate US / European bias measurement.

Cities were chosen at a variety of distances and in a variety of locations relative to the respondent places of domicile to minimize bias due to proximity to one's own present location.

Operationally, each city location marked by the respondent on the map was recorded in the dataset as a pair of coordinates. For each respondent a North-South Error average error was calculated for each continent and for each mapping exercise, subtracting the average value for real locations from the average value of the locations indicated by the respondents. West-East biases were not used in this study. For city locations we used points (centroids) obtained from the National Geographic Atlas. In effect, for each respondent we obtained two average values: one for N-S error/bias for placing all 7 US cities in Europe, and one for all 7 European cities in the US.

The average biases for placing cities are presented in Figures 1-2. On each map the origin marker represents the location of the city if latitude and distance from the coast are kept constant. The lighter (pink) arrow points to the average location of the city for all the Italian participants. The arrow, thus, represents the mean Italian bias (error). The darker arrow (blue) does the same for U.S. participants. As expected, a strong and consistent northern bias can be seen in the placement of U.S. cities in Europe (Figure 2) and a southern bias in the placement of European cities in the U.S. (Figure 1). Biases are quite similar, with some differences, which will be tested for significance below.

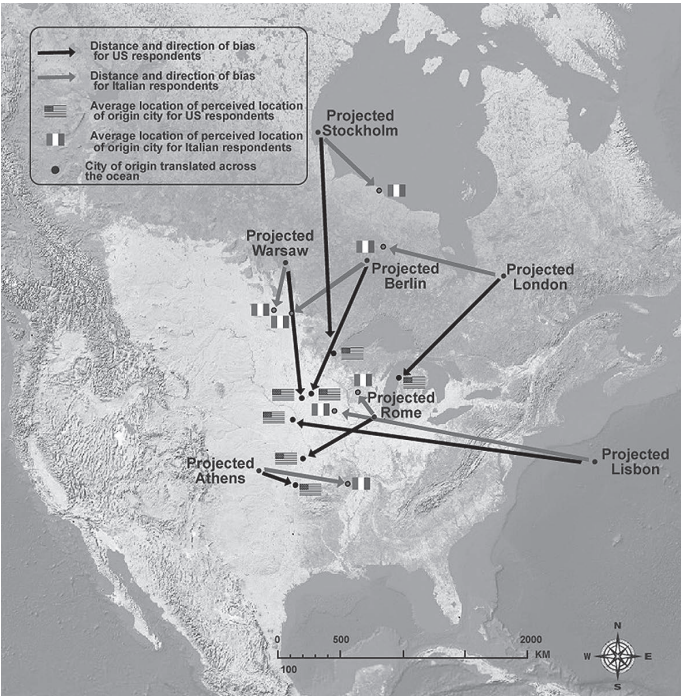


Figure 1. Error in projected placement of European cities in the U.S. Both US and Italian respondents place locations further south than they should be. Lisbon, which is less recognized even in Europe, presents a Westerly bias.

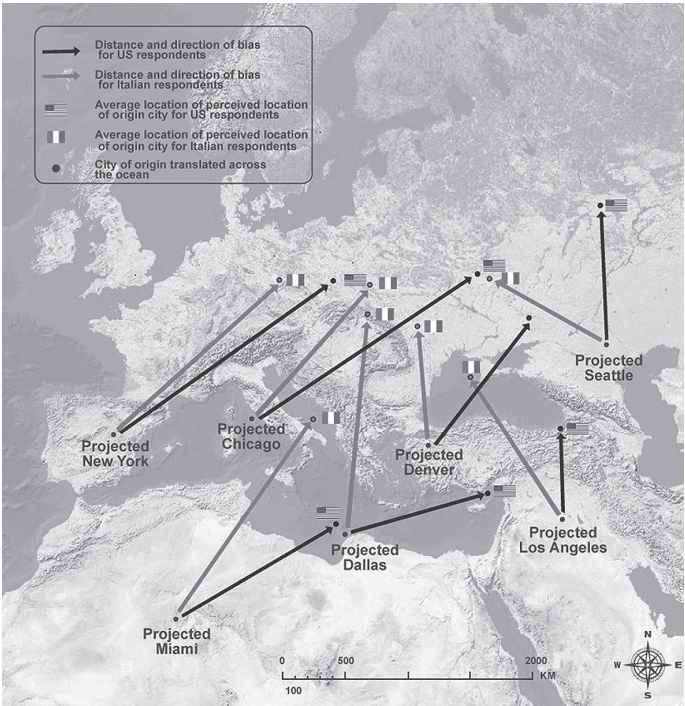


Figure 2. Error in projected placement of U.S. cities in Europe. Both Italian and US students place most US locations much farther north than where they should be. New York is in Germany, Chicago in Poland, and Miami in Italy/Greece.

INDEPENDENT VARIABLES

Placement biases can be the product of a number of factors. Some, as discussed above, might originate in the media, some in contextual and indirect learning about locations from interactions with social media contacts, while others arise from individual educational or perceptual experiences. At the same time, in detecting the sources of bias one needs to control for the different levels of actual geographic knowledge, from the simplest (meaning of north and south or east and west) to the more complex, including actual knowledge of where various cities are in their own continental spaces.

To control for actual geographic knowledge, participants were asked to place the cities in their expected geographic space: United States cities mapped onto a topographical representation of the U.S. situated in the middle of North America, European cities onto a topographical representation of Europe. This captures accuracy of geographic knowledge relevant for this exercise. Deviations from placement in the expected places were used as controls in the multiple regressions reported. Figures 3 and 4 depict the raw data. Average errors in terms of actual placement of the cities in their correct locations are represented as before, as arrows.

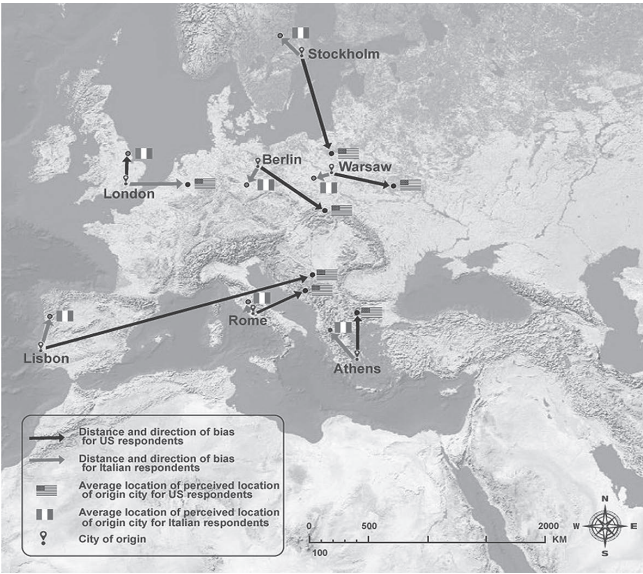


Figure 3. Accuracy of geographic knowledge when locating European cities in Europe. Light lines - Italian respondents. Dark lines - US respondents.

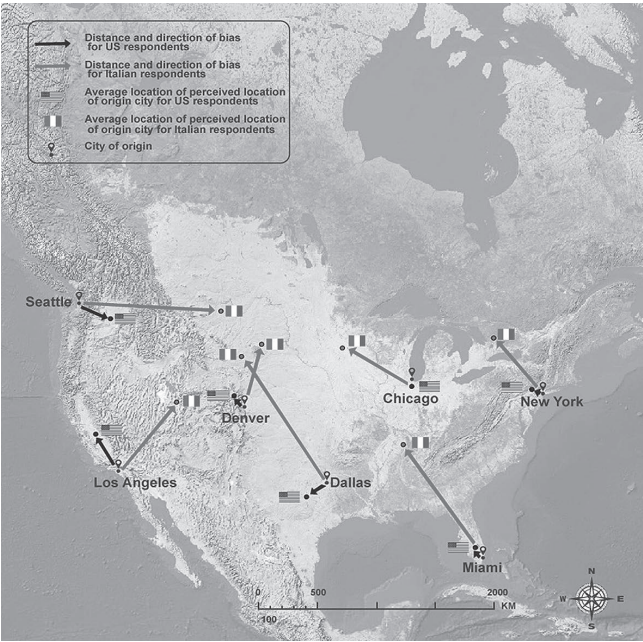


Figure 4. Accuracy of geographic knowledge when locating US cities in US. Light lines - Italian respondents. Dark lines - US respondents..

Overall, errors of location for cities in one's own continental space are lower. However, there is a clear bias in placing locations in continental spaces that are not one's own. Italians placed most US cities further up north than where they should be, and US students placed them further west. U.S. participants also tended to push southern European cities further north and northern European cities further south than where they should be.

The second set of independent variables in this study refers to the sources that might shape geographic knowledge. As already justified in the literature review and detailed in the appendix (<http://alterpode.com/>), which provide the wording and the summary statistics for the items, we looked at three groups of factors as potential explanatory or control variables.

### **1. Traditional media**

For each city the questionnaire assessed to what degree mental images of city locations were influenced by a number of traditional communication (books, movies, magazines, education etc.). Questions were asked in the format 'How much of these sources contributed to your image?' and the metric was 'a lot, some, little, not at all.'

### **2. Broad Internet communication and knowledge resources**

A distinct category of variables explored the degree to which respondents rely on digital/online/social media to learn about geography. Questions referred to online maps, travel sites, reference sites, etc. The questions were asked in the format: 'How frequently have you used {source: online maps, reference sites, etc.} to {locate places, learn about locations, or contributed/used content to travel reference sites} about {locations not in your own country}' (see <http://alterpode.com/>).

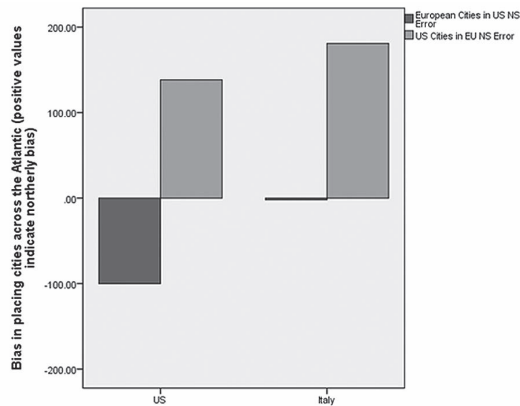
### **3. Amount of social media engagement:**

Another set of questions explored interaction via social media with people living in countries where the cities included in the study are located. Questions addressed frequency of communication with close friends via social media, as well as magnitude of constant contact with individuals who live in Europe or US. These questions are different from the ones mentioned above, referring to social contact, not to specific information queries. The goal is to measure amount of social contact and to use this as a proxy for contextual learning about various places in the world. For details see appendix at <http://alterpode.com/>.

## **RESULTS**

Single sample t-tests for significance of departure from 0 (no error) were used to detect biases in misplacing European and U.S. cities when projecting them across the Atlantic. Appropriate procedures for accounting for equality of variance were used. The tests provide answers to the first two hypotheses: H1: European locations will be misplaced in the US space in a southerly direction; H2: United States locations will be misplaced in the European space in a northerly direction.

The average error of latitude location for all European cities placed in the United States and for all U.S. cities placed in the European Union space were used as the test variables. The results indicate that in both cases the null hypothesis should be rejected. The average bias for United States cities placed in Europe was positive, showing a northerly bias, ( $M=149.18$ ) and the t-value for difference from zero (no bias) is highly significant ( $t(211)=19.35$ ,  $p<.01$ ). The Cohen effect size is very high  $d=1.31$  and the actual power is .96. As expected, the average bias for European cities placed in the United States was negative, indicating a southerly bias ( $M=-75.17$ ) and the t-value for difference from zero (no bias) is also highly significant ( $t(211)=-9.85$ ,  $p<.01$ ). The Cohen effect size value is moderate-high  $d=.7$  the actual power .95.



*Figure 5. Bias in mapping cities from one continent to another by Italian and US students (x axis represents citizenship of respondents). Both Italian and US students show a strong bias when placing US cities in Europe. US students also place European farther south than they should be, while the Italian bias is minuscule.*

With respect to RQ1 and RQ2, which ask if there are significant differences between European (Italian) and United States respondents in placing United States cities in Europe or European cities in the United States, t-tests for independent samples indicate that there are indeed significant differences between the two populations in their placements of cities from one continent into another. Specifically, although both samples tended to place U.S. cities in Europe further north than where they should be, the Italians did so to a greater extent than the U.S. participants. The t-test indicates ( $t(210)=-2.40$ ,  $p<.05$ ) that the Italian sample mean difference from average real location ( $M=180.80$ ,  $SD=118.34$ ) is significantly different from the United States sample ( $M=138.75$ ,  $SD=110.14$ ). The Cohen effect size value is moderate-low,  $d=.4$  and the observed power is .95. The t-test for placing European cities in the United States, indicates ( $t(210)=-4.91$ ,  $p<.01$ ) that Italians ( $M=-1.93$ ,  $SD=137.55$ ) placed locations quite accurately, compared to the United States respondents, who had a clear southerly bias ( $M=-100.20$ ,  $SD=87.93$ ). The Cohen effect size is very high  $d=.85$  and the observed power is .95. A representation of the data on bias by group can be seen in Figure 5.

Finally, to determine the impact of knowledge resources and social media connections on location bias (RQ3 and RQ4) we regressed positive (northerly) error for United States cities placed in an European context and negative (southerly error) of European cities placed in a United States context on the knowledge resource (see Appendix, III, Table 1 at <http://alterpode.com/>) and control variables. The procedure truncates the dependent variables to include only values that drift north for United States cities placed in Europe and only those that drift south for European cities placed in Europe. Truncation was justified by the directionality of the bias detected upon testing Hypotheses 1 and 2. At the same time, truncation would provide true estimates for bias. When the regression coefficients are positive and significant, they indicate that the independent variables contribute to bias. If they are negative and significant they reduce the bias. If the dependent variables were not truncated, negative values for regression coefficients would indicate that they contribute to a outhery bias, not to a more accurate representation of geography.

The SPSS regression model selection procedure with forward elimination was used. The procedure included trimming outlier cases and replacing missing values with series means. In addition, when a categorical variable was found non-significant, each level was tested separately via a dummy variable procedure to detect discrete effects at the category level. Two final models were obtained, one for predicting bias in placing European cities in the United States and one for placing United States cities in Europe.

The results for analyzing the positive (northerly) bias associated with placing U. S. cities in the European space indicate that knowing about U.S. cities from movies ( $B=33.12$ ,  $p<.05$ ) contributes to this bias. Using or not using online maps also had an effect on bias. Although, overall, the map use variable did not provide either a positive or a negative bias, follow up tests of each level of the variable indicated that those who do not use online maps to explore places outside their home country placed US cities in Europe with more accuracy ( $B=-172.201$ ,  $p<.01$ ). However, this should be interpreted with caution, since as mentioned those who do use maps were no more or less likely to make errors. In other words, while map usage is not detrimental to geographic knowledge, those that do not use online resources make on average better geographic guesses. Finally, those who have never contacted people who live abroad via online tools to learn about foreign countries were more likely to make northerly errors ( $B=-32.82$ ,  $p<.05$ ). In this context, social disconnection is associated with bias. The model  $R^2=.15$ . These effects are net of the effect actual geographic knowledge has on misplacing cities, since misplacing of U.S. cities to the north when originally mapping them onto the United States was controlled for and was found to be significant ( $B=0.53$ ,  $p<.01$ ).

When placing European cities in the US, all respondents, regardless of ethnicity, made greater errors, again, when they had originally misplaced cities in their own continents, mostly in a southerly direction ( $B=.19$ ,  $p<.05$ ). At the same time, those that relied more on internet communication to ask for geographic information about foreign countries were less likely to display a southerly bias when positioning

European Cities in the United States ( $B=-123.56$ ,  $p<.05$ ). Similarly, but only marginally significant, those that commented on current affairs through blogs and user generated content sites were also less likely to make misattribution errors ( $B=-28.76$ ,  $p=.07$ ). The model  $R^2=.08$ .

## DISCUSSION

The present study aimed to determine to what degree geographic biases are present in European (Italian) and US college age students' representation of space at a continental scale, the direction of these biases, and to what degree such biases reflect biases due to various knowledge experiences and channels. The results indicate that biases are indeed present and in the expected direction. When asked to place U.S. cities in a location at the same latitude in Europe, both Italian and U.S. students tended to place the cities much further to the North than where they should be, suggesting an assumption of cultural similarity, as suggested by the previous literature (Friedman, 2009). In other words, respondents made the 'plausible reasoning' argument that since United States and European cities are populated by people of largely the same heritage, they should share the same latitudinal location, pushing the U.S. cities up north, toward an assumed space of 'origins.' Thus, our findings seem consistent with previous literature (Friedman, 2009), which suggests that judgments about cultural similarity are transferred to geographic reasoning. Similarly, when placing European cities in the United States, the U.S. students, tended to place the European cities much further south than they should be. This reflects an attempt to 'normalize' the European cities to a 'standard' Euro-Atlantic space. Interestingly enough, the Italian students were relatively more accurate in their perceptions, their biases manifesting more intensely when translating U.S. cities in a European space. The reason for this error asymmetry remains to be investigated. A possible answer could be the greater emphasis on specific, factual knowledge in historical and geographical education in Italy.

The more interesting findings of our study relate, however, to the potential sources for such biases. An obvious one is, of course, basic knowledge of geography. Biases in placing both sets of cities across the Atlantic were related to ability to correctly position United States or European cities in their own geographic frames of reference. However, knowledge sources are also responsible for biased views of geography and their effects are independent of geographic knowledge.

Regarding misplacing U.S. cities in the European space, movies are an important source of such bias, a finding that suggests that the fictional world of cinema, which tends to equate American and European spaces liberally, might have a real life effect. Stereotypical images of U.S. colleges as replicas of English medieval university towns, or of Los Angeles as an Ibero-Mediterranean city can be an impetus for thinking that U.S. cities are located about the same place where some of their imaginary 'peers' would be.

More interestingly, online map use does not seem to help alleviate biases in placing U.S. cities in Europe. However, connections to people living abroad were correlated with lower biases, providing some support for the impact of osmotic learning (Castells et al., 2007) on cognitive mapping. Why map use does not reduce bias is to be further investigated, especially in view of the fact that we detected a bias reduction for the small subsample of those that do not use online maps. A hypothesis could be that online maps (e.g. GPS devices and mobile maps apps) propose an extremely personalized, automated and often narrow cartographic spatial representation that does not support a comparative and contextual spatial knowledge.

For placing European cities in the United States, we again found that in addition to basic knowledge of geography, biases are mitigated by interacting with other people online to learn about foreign countries or by being actively engaged with social media, by commenting or contributing to user generated sites (blogs, media sharing, news sites, etc.). This means that biased perception of latitudinal location of major United States and European cities seems to be mitigated by asking online peers abroad for help in figuring out where places are in foreign lands. The portable 'experts' selected from one's online 'bubble of sociability' seems to be quite useful in correcting images about latitudinal location of cities. On the other hand, images of cities, especially those in the United States, portrayed by movies tend to bias location of United States cities on latitude. Overall, the findings for Internet connectedness in both settings suggest a positive role for using the Internet, specifically in an interactive manner, in order to reduce biases in mapping.

## CONCLUSIONS AND FURTHER RESEARCH DIRECTIONS

Given the explosion of location aware media, Internet resources related to travel and geography, social media, online maps, and the rapid diffusion of mobile devices, more attention should be paid to how these media impact cartographic knowledge and our perceptions of space and place. The present study expands a research line on the impact of traditional media on cartographic knowledge (Friedman, 2009; Kerkman et al., 2004; Tversky, 1981) that emphasizes the role of cultural biases on spatial perception. In this respect, we build on Kerkman et al. (2004), who highlighted the role of cultural and social attitudes on spatial perception. As media affect cultural attitudes, we expand the discussion about cultural effect by introducing the role of mediated experiences, traditional and digital, on spatial perception. Our study also continues and expands previous work exploring the impact of digital media and social networks sites on spatial knowledge (Castells et al., 2007; Gordon and De Souza e Silvia, 2011; Kweon, Hwang and Jo, 2011). The data presented here make tangible the insights expressed by Carey (1988), Meyrowitz (1983), or Kern (2003) that media content shapes cultural patterns of perception and spatial organization. Media consumption is proposed in our study as a heuristic process of world "discovery" in which the contour of what is known is not dictated only by physical but also by the cultural geography of the mind. Some of the results produced by our

work make even more visible what Carey as early as 1988 suggested, namely that communication processes are in fact cultural processes and that in communication we build cultural patterns that may affect even fundamental categories of human understanding, such as space. Cultural patterns related to space are seen to emerge in a process of plausible reasoning, captured here through our mapping exercises followed by exploration of spatial perceptions.

Our study provides only preliminary findings, which should be continued with additional research to further examine media practices and the social-psychological mechanisms that encode spatial knowledge. Understanding what communication channels are most effective in reducing bias as well as cultivating accurate knowledge and understanding of other places could be advantageous as the world moves toward a more globalized and interdependent society. While, contact with other people seems to be important in shaping knowledge of geography, a more complex index needs to be developed and validated that could measure synthetically the impact of social media connections on cartographic knowledge. Such research could enrich our understanding of how a global, connected world reshapes the way in which people perceive each other through the lens of geography.

This study is limited by the focused nature of the samples. The samples are not representative and our conclusions are naturally limited to those of a pilot study. Drawing samples from various European and US cities, which is also part of our research program, could help better understand and validate the biases detected in this study. Moreover, in the context of a growingly globalized society, broader understanding of such dynamics could also benefit from investigating the geographic perception of non Euro-Atlantic population. We intend to deploy a multicultural/transcontinental study using a widely available, open source, creative commons toolkit, which could expand the scope of our study tremendously and make it truly representative. A web platform has been prepared at <http://anonymizedforeview>. The site allows real time data collection of information and interaction with participants from China, Europe, US, and Africa.

We hope that this line of research will further contribute to a deeper understanding of the role of cultural and communicative factors in shaping our understanding of global geography.

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## NOTES

1. A previous version of this paper was presented under the title "Alterpode: Where we think things are and what influences those beliefs" at the November 20-24, 2013 National Convention of the National Communication Association in Washington, DC