

# Design Thinking: Using Mobilities and Geosemiotics Framework in Designing Road Signs System in Urban Spaces

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## Abstract

**Background** In everyday life, a person moves from one place to another according to his or her needs. As designers, the understanding of user needs is very significant as part of the design thinking process. The design thinking process enables the design practitioners to inspire, ideate, and implement their product. In common practices, designers have different approaches in conducting research by design. This paper explores the theories of mobilities and geosemiotics that can be utilised as a framework in research, through the design practices of road sign design system. Most designers conduct focus group, surveys, and interviews as part of the research and development. The mobilities and geosemiotics paradigm gathers empirical and theoretical evidences that examine the social and material phenomena. Through this paper, we also discuss the possibilities of using the empirical methods from both theories that are relevant to the visual communication design practices especially when designing road signs.

**Methods** This research employs a qualitative research method to investigate people's behaviour towards road signs. Through activity-oriented focus group, drawings, google maps, and discussion on photo manipulations and map drawing were gathered from the focus group.

**Result** The results show different interpretation of signs and symbols of road signs based on activity-oriented focus group interviews. Cultural differences also contributed to the different perceptions of the meanings from the findings either through visual data or verbal data.

**Conclusion** This paper takes into account the use of design thinking and theoretical aspects of mobilities and geosemiotics in investigating people's perceptions and behaviour towards the road traffic signs in their daily lives.

**Keywords** Mobilities, Geosemiotics, Road Signs Design, Design Thinking Process

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# 1. Introduction

In reading traffic signs, social interaction differs between public road signs and official road signs (Juhlin, 2010). The styles and materials of signs within a community vary. The roles of road signs systems are meant to be read not only by drivers, but also by other road users such as pedestrians, cyclists, and motorcyclists. Each of them has different daily experiences when searching for signs in the environment especially in complex urban spaces. The urban spaces, which contain complex information such as street names and road notices, create individual differences in human perceptions (Chun, 2003). A good understanding of a road sign, according to "Bazire and Tijus (2009), has to be in agreement with the mental representation of the situation that the driver builds." This implies the importance of visual understanding in specific urban space, but such interpretations vary according to the mobility practices of the road users. For instance, a driver needs faster understanding of road signs compared to a pedestrian.

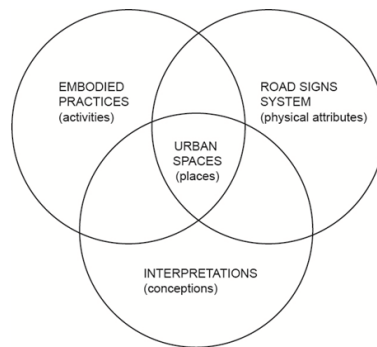


Figure 1 Visual metaphor for the nature of places (Adapted from Canter, 1977)

Figure 1 shows an adapted version of Canter's visual metaphor for the nature of places (in this case, I use urban spaces). The visual is composed of three main characteristics: a road signs system, embodied practices, and interpretation. In urban design planning, embodied practices are considered very significant in determining how the urban spaces can best serve community needs. This study posits three possible interlinking elements of places that correlate with Canter's (1977) nature of places model. This model can be used to frame people's perceptions or interpretations of signs when moving within the urban spaces. People, the way they use the urban spaces, and the elements that are physically located, are dimensions that can be associated with their experiences. Below is an adaptation from Visual metaphor for the nature of places model that are relevant to this research (Refer Table 1).

Table 1 The Elements of Visual Metaphor for Urban Spaces

Urban Spaces	Embodied Practices	Embodied Practices	Road Signs System
Streets	<ul style="list-style-type: none"> <li>• Walking</li> <li>• Cycling</li> <li>• Driving</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge</li> <li>• Experience</li> </ul>	<ul style="list-style-type: none"> <li>• Official signs</li> <li>• Public signs/unofficial signs</li> </ul>

## 1. 1. Reading Signs in Urban Spaces

An act of reading, according to de Certeau (1984: p. 117), is "the space produced by the practice of a particular place: a written text, i.e., a place constituted by a system of signs." The basic principles of road signs are "uniform design, application, and location and that they convey uniform messages" (Lay, 2004, p.27). In Jensen's (2011) study on mobile semiotics, signs, and mobilities, he discusses the significance of materials and physical movements in space and the flows of goods and people. The author focuses on the mobilities and geosemiotics approaches in the area of aeromobilities, especially at airports. In this paper, the embodied practices which relate to traveling in urban spaces include walking, cycling or driving. People tend to ignore the common signs that they see and the building they pass by every day, unless there are new constructed buildings along their familiar routes.

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## 2. Methods

Numerous methods have been adopted to investigate human behaviour in urban spaces. In relation to design practices, qualitative methods have been employed to develop deep empathy for the target users. As stated in IDEO Human Centred Design Toolkit (2009:22), qualitative research is a "powerful for analyzing and mapping the relational dynamics between people, places, objects and institutions." In design practices, designing a product looks not only at the creativity of the designers, but also at the emphatic understandings of their audience. Figure 2 shows the emphatic horizon strategies of designers when designing their product. As mentioned by McDonagh (2013:3), "empathy enables designers to gain intimate insights and understanding into human experiences". The model shows that in designing products, designers should always consider experiences, demographic characteristics, cultural background, and the training received.

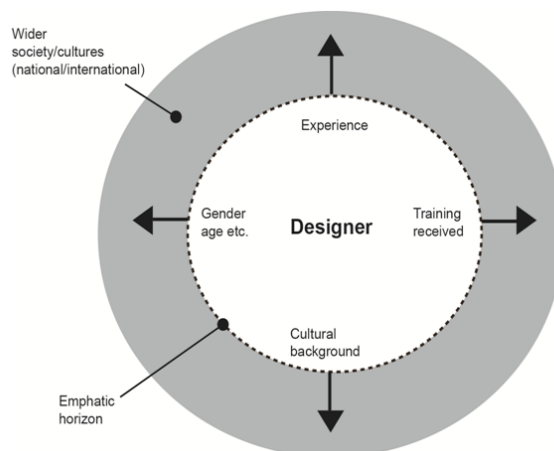


Figure 2 The emphatic horizon of designers (McDonagh-Philp and Denton, 1999)

This paper looks into the methods used in mobilities and geosemiotics studies that can be adapted into the research framework. Activity-oriented focus group discussion was selected for this study since it can provide designers with insights of users' needs, aspirations, and

emotional bonds with the products (Bruseberg & McDonagh, 2003). The discussion took place in Aalborg, Denmark, and the participants consisted of twenty individuals from different countries. The activity-oriented focus group interviews involved drawing, photo-manipulation, and discussion with all the participants in four room environments. This paper looks into the data obtained from the focus group research through knowledge and experiences when navigating the urban spaces.

## 2. 1. Methods in Mobilities

Mundane embodied practices in specific spaces, especially in urban spaces, are found not only in our movements between home and the workplace, but also in other activities. By and large, the mobility practice that facilitates movement of people in their everyday life throughout the world is driving a car. Cycling and walking, on the other hand, are the common mobility practices in Europe and some parts of Asia (see Canzler, Kaufmann, & Kesselring, 2008). Increasing mobility practices of people in the urban spaces pose a potential danger to road traffic if city planners do not take people's practices in Europe and some parts of Asia (see Canzler, Kaufmann, & Kesselring, 2008). In the process of being mobile, humans commonly engage in "social interactions of staging mobilities" (Jensen, 2013). The term mobility has been established in scholarly articles and publications for years, but the term geosemiotics is still new to some. Hence this paper intends to achieve better integration of the geosemiotics and mobilities paradigms in the field of road signs design. The notions of mobility practices and semiotic alertness are considered important in this research as they help to shape the different points of view and experiences of people searching for visual information in the urban spaces. In Jensen's (2009) study, he explored "mobile sense making" through a person's meaningful engagement and experience with the environment. The term mobilities turn/paradigm will be used as a foundation of the studies of materialities between space and time. According to Hein, Evans and Jones (2008), the development of mobile methods is supported through the increasing development of technologies and tools.

## 2. 2. Methods in Geosemiotics

From the perspective of semiotics, it is in human nature to interpret the meanings of signs that are familiar from appropriate sets of conventions (Chandler, 2002). Human behaviour is significant in the context of semiotics as a person's actions are related to how he sees and interprets, and how he reacts accordingly. The following three attributes are important in the study of geosemiotics: "interaction order", "visual semiotics" and "place semiotics." Interaction order relates to the social relationship between the actors and the spaces (e.g. sense of time, perceptual spaces, interpersonal distances). Visual semiotics, on the other hand, involves visual representations and meanings in space (e.g. represented participants, modality, composition and interactive participants). Place semiotics is the contributed meanings from semiotic systems that exist in the spaces (regulated or natural). In relation to the interpretation of meanings, Jensen (2013) points out another new understanding of social interactions through the perspective of geosemiotics, which can be used as another lens through which a new knowledge of design practices can be framed.

Several different approaches and analyses can be used to examine social behavior and discourses in place. One useful reference is *Discourses in Place: Language in the Material*

*World* (2003) by Scollon and Scollon. In Scollon and Scollon's methodological research, regulatory signs and code preferences are all part of place semiotics. The study of geosemiotics also involves the study of discourse analysis, as well as space for materials to be placed. People will always have different perceptions of the signs they see in their daily practice. This paper emphasises the relevance of Scollon and Scollon's theories on geosemiotics to the traveller's perspective. The drawings and manipulated-image activities were adapted from Scollon and Scollon's (2003) "place semiotics emplacement." The results and analysis of the data are used as a later discussion, which focuses on the theoretical and empirical gaps in the mobilities and geosemiotics practices in everyday life. Two geosemiotic activities were integrated into this research:

- Photo manipulation through the representation of real-world actions
- Drawings exercises

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### 3. Results

Numerous methods and strategies can be used for analysing focus group data. The data analysis in this study was inspired by the psychological approach of "an essentialist framework" (Wilkinson, 2003), which emphasises the participants' own ideas and the content of the discussion. The analysis is based on two different themes that look into two data collections such as map drawings and photo manipulation. The visual data collected were analysed according to the two themes: (i) Mapping mobility vs. Google mapping, and (ii) Manipulated vs. unmanipulated photos of signs in place. In addition, the data obtained from the verbal discussions were transcribed and will be further used to describe each theme.

#### 3. 1. Mapping Mobility vs. Google Mapping

Google Maps has been widely used by researchers as a point of reference for geographical locations and street-view searching. Numerous methodologies for mapping travel behaviour have been developed in the field of urban planning and cognitive behaviour. Kuipers (1983) argues that there are problems with sketch-map representation from a human's cognitive mapping. Therefore, in this study, the researcher adopted a common online mapping application that consists of "closest street views" of the present urban spaces in Aalborg, Denmark (Google Map Streetview) and compared it with the hand-drawn maps from the participants (Refer Figure 3(a) and 3(b)).



**Figure 3** (a) Google map of biking journey (b) Rotated view of sketch map

Based on his journey map from home to his workplace, one participant identified several significant traffic signs regulated specifically for pedestrians and some for motor vehicles. He cycles to work. Similar to another participant's map drawing, he uses simple lines, shapes, and symbols to indicate the route, and the landmarks along his journey from home and workplace. This participant recalled the signs most obvious to his eyes—the "quayside or riverbank" warning signs (Figure 4a). Another participant (Figure 4b) also indicated similar symbols for "a car and a riverbank" but with a different traffic sign shape. He indicated that the "quayside or riverbank" warning sign was a prohibitory sign instead of a warning sign by indicating the circle shape.



Figure 4a  
Drawing of riverbank warning sign

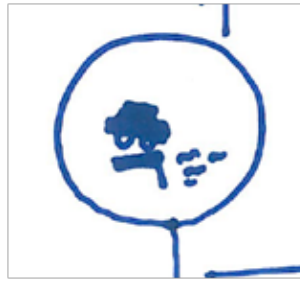


Figure 4b  
Drawing of riverbank warning sign



Figure 4c  
Actual traffic sign

### 3. 2. Manipulated vs. Unmanipulated Photos of Signs in Place

Using another mobile method (Büscher, Urry, & Witchger, 2011), integrated with Scollon and Scollon's (2003) activity, the manipulated vs. unmanipulated photos of signs in place theme investigates manipulated sign images using computer visual aids. These "photo-interviews" (Schwartz, 1989) were used to promote dynamic interaction between the participants in discussing specific images. Mannay (2010) used visual methods of data production to make "the familiar strange". The rationale of this theme is to emphasise participants' awareness of their environment, especially in terms of their familiarity with the traffic signs in their daily lives. Photos of traffic signs were shown to the participants and were discussed during the sessions. The photos of real traffic signs were manipulated in terms of the symbols, shapes and colours. Table 2 shows the categories used in the manipulation of images as part of the activity.

Table 2 Categories and Manipulations of Images

Categories	Manipulations
Symbols/pictograms	The universal symbols of road signs were manipulated by exchanging the original signs with others.
Shapes	The shapes of signs were manipulated by exchanging the triangular warning signs for circular prohibitory signs.
Shapes	The colours were manipulated by exchanging the warning/prohibitory sign (red) for an informational sign (blue).



**Figure 5a** Real warning sign of riverbank



**Figure 5b** Manipulated warning sign of riverbank into prohibitory sign

Participants were asked whether or not the traffic signs shown in Figure 5a and Figure 5b looked familiar from their everyday travel experiences. In the manipulated image of the sign (Figure 5b), the circle and the diagonal line were used instead of the warning "triangle" shape of the sign. Below are some excerpts from the focus group interactions where the real vs. manipulated traffic signs were shown. During discussions of the manipulated signs, participants had different interpretations and perceptions of the signs shown. In this scenario, they only noticed the picture of the car falling into the river, paying no attention to whether the sign was a warning or a prohibitory sign.

**Table 3** Excerpt from the Focus Group Discussions

**Participants Interpretations Based on Gender, Cultural Background and Formal Traffic Knowledge/Experience**

"I don't read the triangle. I read the picture."  
(Participant#1, Male, Chinese, No driving licence)

"I tend to have a big red line across it then. Maybe it's a bit more warning".  
(Participant# 2, Male, Danish, With driving licence)

"But this I think is a warning sign. If it is forbidden, I don't know if it doesn't have to be round and then with a thing and red. Yeah. It is like that."  
(Participant#3, Female, Portuguese, No driving licence)

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## 4. Conclusion

With motivation from Jensen's staging mobility's framework, geosemiotics and mobility approaches were used as two lenses in the body of knowledge to support the design thinking process. Tim Brown, a pioneer of design thinking process from IDEO, has outlined a guideline for designers, thinkers, planners, business people and so forth. Thus, it is very significant for designers to not only design the aesthetical value of their products, but integrate the knowledge and experiences of their target audiences in order to provide more meaningful and functional products. This study has found that most people remember signs that are pertinent to their mobility practices. The findings of this study suggest that some



traffic signs are recognisable or unrecognisable depending on the placement of signs. Having taken a formal traffic course is significant in understanding the meanings of signs. This is an example of "learning to see", whereby learning involves "modifications of the sensory representation in the brain" (Sagi and Tanne, 1994: 195). The empirical findings of this study provide a new understanding between the mobilities paradigm and geosemiotics in relation to visual communication of traffic signs in the urban spaces.

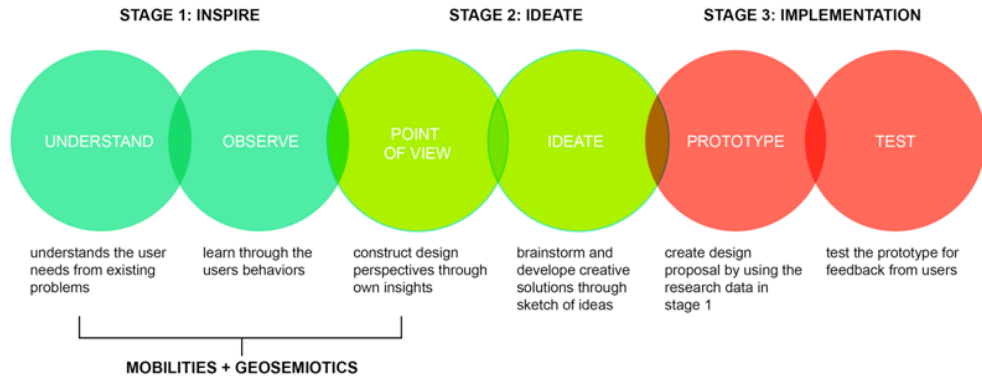


Figure 6 Design thinking process (Adapted from Brown, 2008)

Figure 6 shows the adapted design thinking process with integration of mobilities and geosemiotic approaches as part of the process in designing the new road sign design system. In the mobilities paradigm, most studies emphasise the spatial environment and the objects within. Geosemiotics explores the discourse of signs in place in the material world. The researcher believe that the empirical data gained from this investigation through stories and visual-based activities strengthen the previous stage of data collection from observations of people’s movement. This is also part of the emphathy design strategies suggested by McDonagh (2013) for designers to consider when designing human-centred design. From the findings of the researcher's previous study, people not only look for signs when they are driving but also when they are walking. For pedestrians, street names, traffic signs, and traffic lights are the most noticeable signs and are used as guides. For a traveller in an unfamiliar place, it is a common practice to search for signs to whichh he or she can refer according to his intended action. The experiences of a traveller are distinct from those of an every day person going about their normal activities, although both may employ similar modes of mobility such as walking, cycling, or using the subway. But like the unfamiliar traveller, routine travellers engage in a variety of mobility practices with which they become comfortable. For instance, travellers employ different modes of transportation along one trip. For example, they may walk to the bus stop or underground station and then walk again to the work place. Additionally, while waiting for the bus, travellers may notice a new advertisement on the side of the bus stop. If the bus is delayed, a traveller will search for the bus schedule posted near the bus stop. If it seems that the bus schedule has been changed, a traveller may consult their mobile device to search for an online bus schedule. These are some common scenarios of traveling from home to a work place, or any other place with which we have some familiarity.



The mobilities notion not only involves movement from home to the work place, but also the activities between the spaces and time. Thus, in the future, more mobile methods and geosemiotics approaches can be employed to investigate people's behaviour within spatial environment, especially within the urban environment. Such approaches can be integrated into the design thinking process in seeking for problems in current product designs. The designers should create ideas that can better serve the consumers' needs and desires rather than develop attractive designs. In the case of road signs system, even though there are standard regulations of design and placement, the designers need to work with the urban authorities in terms of the needs for the signs to be placed accordingly. The designers' role is to implement their creative ideas into the context, in this case the urban spaces. They need to put themselves in the context in order to understand the meanings of the signs placed in the urban spaces. For instance, authorities and designers have to work on placing better street name sign design on specific street corners or on the structure of buildings to ease the road users when searching for the signs. Based on the findings, it is learnt that road users understand more on the meanings of signs when placed appropriately, with appropriate signs and symbols that are visually understood. Visual elements such as the symbols, shapes, and colors are the important aspects of designing road signs system whereby road users absorb information from visual elements compared to texts. The present research emphasises everyday life experiences of road users which can be related to the emphatic strategies model by McDonagh-Philp and Denton (1999) that considers "experience", "demographic characteristics", "cultural background" and also the training received to be considered by designers when designing new road signs in urban spaces.

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