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# Exploring interaction patterns of public seating as a triangulation element encouraging social interaction

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**Abstract.** Design and programming of triangulation elements are formative actors in crafting the dynamics of interpersonal interactions in public settings. With the proliferation of technology, new placemaking strategies, along with an approach of the city as a playground illustrate an expansion in the variety of interaction dynamics in public spaces (Hespanhol & Dalsgaard, 2015). This Ph.D. research questions the role of design as an interaction initiator between citizens in public settings through seating elements. The objective is to explore the interaction design space of '21st cc triangulation elements' and emergent social interaction patterns through the lens of embodiment. A corpus is developed and analysed using methods adopted from grounded theory. Analysed data provided further information to generate design concepts for prototyping and testing interactive seating elements.

## Interactions in Public Spaces

Public spaces can be a form of a stage, whether acting is done consciously or not—all occupants play a part in generating a performance (Waal, 2014). These become areas of recognizing the other, defining and differentiating self, where audience and performers meet, demonstrating a continuous relation of ‘to see and be seen’. The initial starting point of this study stems from investigating how the interaction between strangers in public spaces forms and the role of mediator furniture forming that interaction. Looking at the user’s perception and behavioral habits of interacting with strangers through tertiary elements within public spaces required exploration of concepts from the fields of interaction design, urban design, and media architecture.

This study positions the work of one of the prominent urban design researchers, William Whyte, to its foundation and builds upon the approach of embodied interaction design. Whyte (1988) developed his work around the actual use of plazas evaluating the street elements within, such as chairs, ledges, and benches. He approached studying interaction in public spaces by focusing on street elements and furniture as well as their environmental positioning. His studies about the street elements in urban settings led him to develop the term ‘triangulation’ (Whyte, 1980). He defined triangulation elements as unexpected things that externally stimulate strangers to interact by offering common ground to initiate contact.

The design and programming of triangulation elements within public spaces can alter and shape the interaction dynamics in place (Waal, 2014). This can either ease or hinder the emergence of social interaction with strangers. Exploring various ways of developing social interaction within public spaces through street furniture as triangulation elements is the focus of this study, especially regarding the range of embodied responses and (un)predictability of the system.

## Street Elements and Triangulation

The meaning of ‘triangulation element’ within the context of this study can be defined as a connection point in the form of street furniture that possibly triggers synchronous interaction between co-located people. The etymology of the word derives from triangulare. As can be inferred, at least three components are required, one of which acts as a mediator of interaction initiator between people.

People notice each other in public spaces; sometimes the act of seeing and watching others might even evolve into developing mutual trust in time. It is also possible to build “Public Familiarity” through consistent encounters with strangers until the place or other becomes recognizable and meaningful (Blokland, 2006). Sites of triangulation create nodes within the space, where citizens realize the

other's presence by sometimes solely 'looking' at each other and sometimes conversing.

Although the persistent occurrence of spontaneous interactions within public spaces plays a fundamental role in creating neighborhood development, some studies show that citizens clearly avoid interaction with strangers (Wekker, 2017). Observing citizen engagement in modern and post-modern public spaces, sociologist Zygmunt Bauman points out the lack of voluntary interactions in urban settings. He introduces the concept of "Mis-meetings - a management of meetings with strangers so that no actual meeting takes place, in place of a meeting" which is a descriptive quality of modern and post-modern urban spaces (Bauman, 2000). Individuals make their lack of interest clear to the 'strangers' through certain indicators and body signals.

Within this context, William Whyte's triangulation elements destabilize the notion of mismetings. There is a vast array of 'triangulation elements' within public spaces created by various actors; citizens, artists, designers, marketing teams, and government agencies. Revisiting the term in the context of 21st-century public spaces brings about some fundamental differences. Field studies of Whyte (1980) outlined key triangulation elements like sculptures, entertainers, street musicians, and art installations in the plazas of New York around the 1960s, as demonstrated in Figure 1. They acted as a surprise element amongst the mundane everyday life, leading to the gathering of strangers around a common attention point.



Figure 1. Entertainers (left) & Dubuffet's stainless steel "Rag Lady"(right). Original Images from Whyte, 1980

With the proliferation of new technologies and responsive installations, public spaces are being developed and metamorphosed into something different from what was before and is now. As innovative means of communication within the cities are emerging, with a glance around in urban spaces now, we can observe tools facilitating this interaction incorporating more dynamic and digital elements demonstrated in Figure2.



Figure 2. Piano Staircase (left) & Chatterbox (right)

## Methodology

This research aims to explore and understand the potential role of design in creating tangible social interaction within public spaces. It is important to define which aspect of design the study will evaluate its findings. To do this, it is required to unpack the keyword ‘tangible social interaction’. Hornecker and Buur define tangible interaction as “encompass[ing] a broad range of systems and interfaces relying on embodied interaction, tangible manipulation and physical representation (of data), embeddedness in real space and digitally augmenting physical spaces” (2006, p.1). Building on their focus on the embedded nature of the interaction, this study expands it towards its social nature and positioning of it. ‘Tangible social interaction’ should be formed from at least two actors and a triangulation element, developing a triadic relation as demonstrated in Figure 3. Each user would need to interact with an external stimulus (a triangulation element) and with each other through it is the focus of attention.

For the start of the study, a corpus collection of triangulation elements was acquired to define and clarify the term. The examples were collected from various resources, academic research papers, social media accounts, blogs, and online research. This collection was gathered to depict what triangulation elements are according to its original definition. The corpus consisted of around 100 examples that are then analysed and categorised to re-evaluate the original definition and how it has evolved.

Adopting methods used in grounded theory methodology to observe and analyse triangulation elements, the development of the corpus played a vital role. The initial analysis started with affinity diagramming, which went through iterative changes as new examples were added to the corpus. All examples fall within the scope of synchronous face-to-face interactions; those that did not meet this criterion were removed from the corpus, which is then grouped in Table I.

Table I. Initial grouping

Type of features	Realization stage	Scale of the concept
Group1. Physical Elements	Group3. Conceptual Work	Group5. Small scale
Group2. Digital Elements	Group4. Realized Project	Group6. Large scale

Memos were written for each example to generate a code list for analysis, also feeding in from the literature review. After an initial examination, examples that fall within groups 3 and 6 (Conceptual Work and Large Scale) were removed from the collection. Analysis and re-evaluation of the codes (Table II) lead to filtering the corpus by the principal object used in the intervention. This provided a more straightforward path for comparison and, thus, the formation of concepts and subcategorization shown in Table III.

Table II. Initial Code List

public participation	smell	digital display	hands
collective	touch	sound & audio	Competition
input	sight	proximity	Cooperation
output	taste	motor	Dialogic
artefact	hear	DIY	interactive
product	single user	light	predictive (feedback)
device	co-use	pressure	unpredictive response
installation	multi-user	location	sudden
Ad	Public space	biomorph	gradual (phase by phase)
Social Awareness	Parks	IOT	Independent
Fun	playground	vibration	Co-dependent
Artists	museum / galleries	body	Interdependent
Designers	trigger	mechanical	Dependent
PR / Ad agencies	feedback	computing	tangible
Individual interventions	flexible	vibration	intangible
Grassroots	rigid	positioning	smart city
Government	single object	GPS	social city
Anonymous	group of objects	bluetooth	hybrid city
		beacon	redescription

It is still an ongoing process as it depends on gathering of data and giving rise to theories by digging and reconstructing that collected data by alternating between macro and micro level analysis (Corbin & Strauss, 2008). Constant comparisons of

similarities and differences, even within codes reveal different dimensions and properties which leads to a more grounded analysis.

Table III. Subcategorization

<b>Category</b>	<b>Subcategory</b>
Intervention Creators	Reflection of various ideologies
	Various public participation level (openness for participation)
Interaction Participants	Change in the number of people interacting lead to the change in the feedback
	Change in the number of people interacting lead to the change in use scenarios
	Various manipulation mediums are applicable in one
	Individual unit vs. group placement of the object
Communication & Exchange Type	Indirect / direct communication between participants
	User-triangulation element interaction
Feedback & Response Type	Time plays a role in changing feedback
	Feedback is same and static
	Flexibility in the use and acquired response
	Communication with the surroundings and the environment

It is crucial to note that the unit of analysis is not solely the interaction between the main user and the triangulation object, but also the interaction of all users within themselves and the mediator. The findings of the analysis will provide input to development of prototypes to be evaluated in field studies. These in situ prototype tests will provide a space to observe and evaluate the dependent, interdependent and independent relations derived from ongoing analysis.

## Findings and Future Work

The initial insights revealed intriguing questions about the relationship between emerged interaction patterns and the use of the participant's body and movement. Figure 4 below shows examples falling under the category of interaction participants. Starting with the individual use in the center moving outwards, examples begin to incorporate unexpected feedbacks involving full body active movements. Individual use does not provide such a range of response to the actions of the user as co-use and multi-use scenarios does.

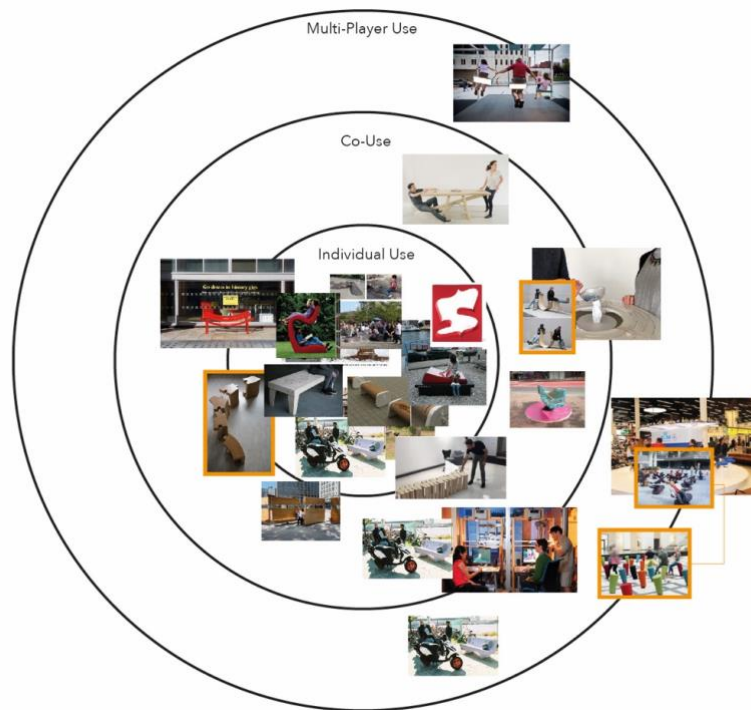


Figure 4. Interaction Participants

After an initial analysis and evaluation of codes, the corpus was filtered by the main objects used- table, bench, swing. The objects were selected to be mundane everyday object that is a part of everyone’s daily life. The original static state of these objects should be easily accessible and can be found in almost any public space, reflecting a body response that is familiar.

The selection criteria of these objects were derived especially from embodied design, as a search for examples that reflect a range of object-body relationships. This stems from a place of similar interest in exploring normative vs. unexpected body actions demonstrated in “Embodied Technology: Unraveling Bodily Action with Normative Types” (Boer et al., 2021). Demonstrating a similar selection criterion with the work mentioned, the key issue is to reflect on the different body responses in various usage scenarios. The collected triangulation examples are to display an everyday action in an unfamiliar way; either enhanced or displaced with other partial or full-body movements.

The examples and literature review yields to an understanding that ambiguity and surprise factor provided by different bodily responses would require less dependency on personal motivation to initiate social interaction with another. A question emerged as inferred from the examples, how using various body responses as an input for a triangulation element to function as a social ice breaker leads to a range of interaction patterns with the other and the triangulation element itself.

In order to evaluate and map out the terrain of interaction patterns, a selection of prototypes will be developed demonstrating a range of bodily feedback. Special attention will be given how different parts of body are involved in feedback generation and the relational emerged interaction patterns.

Future work will involve the development of various prototypes building on the conceptual findings. Design outputs will provide opportunities to observe and evaluate emergent interaction dynamics. The inquiry will be based around the developed interaction patterns; exploring the relationship between the involvement of active/passive body movements and their various use as input and/or output.

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