



Beyond function: Street Furniture as a Catalyst for Interaction in Public Spaces of Cairo

Doha EISSA^{1, *}, Ammar ELSHAER¹

¹Department of Architecture, Faculty of Engineering, Cairo University, Cairo, Egypt

*Corresponding author E-mail: Doha, Eissa, dohamagdy@cu.edu.eg

Abstract. As open spaces decline in megacities, maximizing the quality of users' experience within the few remaining public amenities becomes crucial. This paper highlights how street furniture can be instrumental in improving the users' experience of open spaces by fostering interaction. While existing research mostly focuses on street furniture design standards, materials and functionality, its role as a social catalyst is often underestimated. This study aims to bridge this gap. The study identifies two modes of interaction promoted by street furniture in open spaces; those are content interaction and social interaction. Then, an analytical framework that dissects "interaction" and "street furniture" into their constituent attributes is constructed, enabling the subsequent identification of potential correlations between the two. Consequently, the framework is utilized to develop an online survey measuring users' preferences for different interactive street furniture features. The survey returned quantitative data that was statistically described in terms of mean and standard deviation, and percentages were used when appropriate. Qualitative on-site observations were conducted and integrated with quantitative data to establish guidelines for desired interactive experiences through street furniture. These guidelines advocate for designing holistic settings, account for differences in preferences based on gender and age, offering a spectrum of interaction levels, and legitimizing interactive experiences. By prioritizing users' needs, this research seeks to revitalize Cairo's public spaces, fostering a more vibrant and inclusive social experience.

Keywords: Street Furniture- Open Spaces- Users' Preferences- Responsive Urban Settings- Cairo- Interaction

1 Introduction

Public open spaces offer a platform where people may come together in face-to-face interactions. Such interactions may manifest in interplay, communication and cooperation. They bring about impacts on individuals wherever existent [1] as they foster one's social integrity and competence, and construct a common ethical code of conduct [2]–[4]; which in return fosters the public realm [5]

Although there is a consensus on virtues of interactions promoted by responsive environments [6], very few research come to terms with what is really meant by ‘interactions’ and how they can be achieved [7]. Moreover, despite the critical role of street furniture in shaping users’ experiences within public spaces as users get in direct contact with it [8], most research has concentrated on its physical attributes (typologies, design specifications, functionality) [9][10], overlooking its potential to influence social behavior.

To address this research gap, this study clarifies the concepts of "street furniture" and "interaction" by examining their constituent elements and attributes. Then, both notions are overlaid in an analytical framework that facilitates the identification of potential correlations between street furniture design attributes and the resulting interaction patterns. Empirically, the framework was used to structure an online survey answered by 174 Cairo residents and guide on-site observations for users interacting with ISF in Cairo. Both the survey and observations aim to depict users’ preferences of different ISF attributes.

Cairo was chosen as the focus of this research due to its status as a major metropolitan center in both Africa and the Middle East [11]. The city has been consistently losing significant quantities of its already limited green spaces in favor of other developmental projects [12], leaving contemporary Cairo to witness a great decline of open spaces. This highlights the importance of maintaining existing available open spaces and optimizing the users’ experience offered by the little left of those public amenities.

Research results identify guidelines for crafting impactful ISF informed by users’ preferences, which would ultimately improve open space performance and user’s experience in Cairo

2 Street Furniture: Definitions and Classifications

Street furniture, also known as “urban furniture”, “street facilities” or “small scale architecture” [13] is one of the main components of public spaces.

Street furniture benefits cities in two key ways. From a social perspective, it enhances users’ experiences and makes public spaces more attractive [14], whereas from an urban perspective, it contributes to a city's identity and image such as red phone boxes in London [15].

Several classifications for street furniture have been proposed either through its context/ surrounding environment or its function/ purpose [16], [17]. Classifications according to the later include :

- Decoration: planting, fountains, sculptures, etc.
- Information: city maps, clocks, poster plots, noticeboards, etc.
- Recreation and hygiene maintenance: benches, drinking fountains, trash containers, etc.

- Parking: parking lots and charging facilities.
- Technique: lightings, signs, electrical facilities, communications, postal and fire services
- Play structures for children: swings, slides, etc.
- Public transportation furniture: public transportations stations and facilities
- Public communications furniture: mailboxes and public telephone booths

The aforementioned functions could be grouped under two main umbrellas/ categories. Those are: street furniture of practical use, or that of an aesthetic / decorative use. In our study we suggest four main sub-categories for classifying street furniture, which will be used to construct our framework for ISF. Those are:

- Utilitarian street furniture: supports successful functioning of the space program such as shading devices, seats and playground equipment.
- Informative street furniture: provides users with necessary pieces of information such as clocks, billboards and signages.
- Operative street furniture: such as lighting and guard rails.
- Decorative street furniture: enhances aesthetics, such as plants, water features and art objects.

3 Interaction in Open Spaces through Street Furniture

Interaction in public spaces is the process when one or more persons engage either with an installation (content interaction) or with one another (social interaction), resulting in intellectual, emotional or learning experiences. Street furniture could promote social or content interaction, based on the role it plays. In content interaction, users directly interact with street furniture itself, regardless of having other users involved. In this case, street furniture is an “agent” of interaction and lies at the core of the process. In social interaction, on the contrary, users’ engagement with one another lies at the core of the process. Although social interaction does not necessarily require users coming in direct contact with street furniture, however, it could be facilitated by supportive street furniture. [18].

The following part unpacks various attributes of both types of interactions.

3.1 Content Interaction with ISF

Content interaction takes place when a single or a group of users engage firsthand with street furniture. In this case, street furniture lies at the core of the interaction process and is independent on the presence of other users. This engagement ranges from passive to active, and could be described by the following criteria:

The Number of Interacting Agents: This criterion describes the number of users who could engage with street furniture at a given time. In scenarios of passive content interaction, unlimited users can engage simultaneously through observing or photographing the street furniture. However, with active content interaction, scenarios vary from:

“*Watch and take over*”: For ISF designed to accommodate a single user at a time (e.g. Figs 7 & 9 in table 2).

“*Watch and join*”: For ISF designed to accommodate multiple users simultaneously (e.g., Figs. 2, 3, 4, 8 & 12 in table 2). Accordingly, street furniture that targets promoting social interaction may be designed with an operative scenario that brings simultaneous users together or requires collective collaboration [19]. This scenario may be mandatory or optional.

The level of Content Interaction: Content interaction can be:

Passive: Referring to distant, non-tangible engagement with street furniture such as “watching” or “photographing” street furniture or landmarks that become spots for taking commemorative photos of a place.

Active : Referring to a hands on experience with street furniture, where users "walk up and use" the street furniture physically [19]. This may manifest in moving street furniture, modifying its arrangement or climbing it up (Figs. 3,5,8 &12 in table 2).

Duration of Interaction: Interaction duration varies; however, a main criterion is whether it is a pre-defined interval of time or is left up to the users’ preferences. As much as the latter gives freedom of choice to users, unlimited waiting time may be irritating in scenarios of “watch and take over”.

Features Driving Interaction: The following features were deduced from literature as well as reviewing multiple examples of interactive furniture. They include, but are not limited to:

ISF Encouraging Physical Activity: such as furniture manipulating movement, climbing or incorporating tactile engagement [20].

ISF that can be Acted Upon: Such as flexible, movable or adaptable street furniture.

ISF Stimulating User Emotionally or Intellectually: Such as furniture providing the user with sensual experience or mental challenges [20]

ISF for Communication and/ or Information: Such as phone boxes, digital maps and other operative furniture that often contains computer software [21].

To conclude, content interaction explains scenarios where people engage primarily with ISF. Nevertheless, in some cases, social interaction may come as a byproduct.

3.2 Social Interaction through ISF:

ISF may play the role of a catalyst which facilitates people’s social interaction through conversations, playing and communicating together [22], [23]. The study identifies four main criteria to describe social interaction. Those are:

The Number of Interacting Agents: Social interaction sparks by as few as two people and can expand to include groups of users.

The Level of Social Interaction: ISF can catalyze different levels of social interaction:

Co-presence with Distributed Attention: People are passively near each other, with separate focuses ; eg. proximate seating areas. [24] , [25].

Co-attention / Shared Attention: Passive interaction where everyone focuses on a central point . This requires furniture such as screens, seatings and shades. (Ibid)

Co-exchange” and Co-action : Active interaction with direct social engagement in a “collective action”. Such actions may be rivalry such as a football match or cooperation in a collective game [24], [26]. At this level, direct contact with other users is achieved [6] and street furniture becomes a “stimulus for active social interaction”.

The Age Group of Interacting Users: As age groups of users vary, some street furniture is designed in favor of a certain age group, such as children playing with a seesaw, while others may engage mixed age groups.

The relationship between users: This indicates whether interaction is likely to happen between users who are acquaintances or strangers [22]. In some cases, active social interaction might last long enough to bring up strangers at some point, such as children activities pulling the parents together [24].

Table 1 summarizes categories of street furniture as well as attributes of content and social interactions.

Table 1 . Categories of street furniture and the attributes of various interaction scenarios.

Category of street furniture	Type of interaction			
	Content interaction		Social interaction	
1- Utilitarian: those which contribute to a successful functioning of the space program , such as:	1-Level of interaction		1-Level of interaction	
	Level	Examples	Level	Examples
1-1- Shading device	1-1-Passive interaction	1-1-1-Watching 1-1-2-Taking photographs	1-1-Passive interaction	1-1-1-Co-presence 1-1-2-Co-attention
1-2- Seats	1-2- Active interaction	1-2-1-Watch and take over 1-2-2-Watch and join	1-2-Active interaction	Co-action through: 1-2-1-Cooperation 1-2-2-Competition 1-2-3-Entertainment
1-3- Bike stands				
1-4- Playground equipment				

<p>2- Decorative: This is furniture that adds to the aesthetic of the place, such as:</p>	<p>2-Number of engaged people</p>		<p>2-Number of engaged people</p>	
	<p>2-1- # of users</p>	<p>2-2-Mode</p>	<p>2-1- # of users</p>	<p>2-2-Mode</p>
<p>2-1- Plants</p>	<p>2-1-1- Single person</p>	<p>2-2-1- Optional scenario</p>	<p>2-a- Couple</p>	<p>2-2-1- Optional scenario</p>
<p>2-2- Water features</p>	<p>2-1-2- Couple</p>			
<p>2-3- Art objects</p>	<p>2-1-3- A group</p>	<p>2-2-2- Mandatory scenario</p>	<p>2-b- A group of three or more ppl</p>	<p>2-2-2- Mandatory scenario</p>
<p>2-4- Landmarks and statues</p>				
<p>3- Informative: This is furniture that supplies user with necessary pieces of information such as</p>	<p>3-Feature driving interaction</p>		<p>3-Prior relationship</p>	
<p>3-1- Clocks</p>	<p>3-1- Street furniture that encourages physical activity</p>		<p>3-1-Acquaintances</p>	
<p>3-2-Billboards</p>	<p>3-2- Street furniture that can be acted upon</p>		<p>3-2-Strangers</p>	
<p>3-3- Maps</p>	<p>3-3- Street furniture that triggers emotional or intellectual stimulation</p>		<p>3-3-Both</p>	
<p>3-4 -Info centers</p>	<p>3-4- Street furniture that provides people with information or help them communicate together</p>			
<p>4- Operative:</p>	<p>4-Age group</p>		<p>4-Age group</p>	
	<p>4-1-Age range</p>	<p>4-2- Operation mode</p>	<p>4-1-Age range</p>	<p>4-2- Operation mode</p>

4-1- Lighting fixtures	4-1-1- Childhood stages (6-18)	4-2-1-Allows mixed age groups to interact at a time	4-1-1- Childhood stages (6-18)	4-2-1-Allows mixed age groups to interact at a time
4-2- Guard rails.	4-1-2- Early adulthood (20–39)		4-1-2- Early adulthood (20–39)	
	4-1-3- Middle adulthood (40–59)	4-2-2- Designed for one age group at a time	4-1-3- Middle adulthood (40–59)	4-2-2- Designed for one age group at a time
	4-1-4- Old age (60+)		4-1-4- Old age (60+)	
	5-Duration of interaction		5-Duration of interaction	
	5-1- fixed / predefined time span		5-1- fixed/ predefined time span	
	5-2- open time span		5-2- open time span	
	6- Can it lead to social interaction?			
	No	Yes , to be described in next column		

4 Methodology:

After concluding the above analytical framework, a field study investigated the acceptance and preferences of different genres of ISF among Cairene residents. For that purpose, the field study was conducted on two phases using a mixed-method approach [27], [28]. At first, an online questionnaire involving 174 respondents from Cairo yielded quantitative indicators of preferred scenarios of interaction with street furniture. Then, for triangulation, on-site observations of users’ interaction with street furniture in two distinct settings were made. Both online and on-site surveys aim to obtain complementary data [29]to portray preferred attributes of ISF from the users’ perspective.



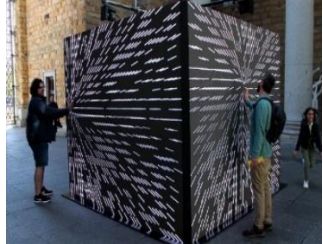
4.1. Online questionnaire:







The first phase of the empirical study is a “cross-sectional survey” [30]; conducted through google forms and disseminated among people who are currently living in Cairo. It was available online for two weeks until filled by 174 responses. Respondents were reached by snowballing [31], [32] and primary referrals were reached by convenience [30]




The questionnaire was composed of three parts (appendix 1). The first part reviewed the users’ profiles including their gender, age and education level. The second part of the survey consisted of eight yes/no and multiple-choice questions testing users’ preferences for concepts related to “interaction in open


spaces” such as the type and level of interaction. Relevant illustrating pictures were attached to the questions for a better visual communication of the questioned schemes. In the third section of the questionnaire, respondents were shown pictures of street furniture offering various interactive scenarios (table 2). Likert scale from 1 to 5 was used to rate how likely respondents would interact with this furniture if existed in open spaces of Cairo. Data of the latter part was statistically described in terms of mean and standard deviation. Percentages were used when appropriate.

Table 2. Pictures of interactive furniture as included in the questionnaire.

	Installation name and pic	Description	Type of interaction
ISF	 <p>Fig. 1- Informative map: An informative interactive map through a touch screen.</p> <p>Source: https://heykd.com/mechanics-of-mall-kiosks/ Accessed 20-2-2024</p>	 <p>Fig. 2- Bottle bench: Public seating that encourages social interaction through its configuration.</p> <p>Source:https://www.designboom.com/design/bottle-bench-social-garden-furniture-by-maarten-pauwelyn/. Accessed : 22-2-2024</p>	 <p>Fig. 3- Control no control cube: A sensory cube that emits sounds and lights according to the way it is touched to stimulate thought and emotion.</p> <p>Source: https://www.lavozdeasturias.es/noticia/cultura/2017/04/27/peregrinaje-digital/00031493322835023174189.htm. Accessed 2-2-2024</p>
Induced Interaction	Content interaction- ISF that provides people with information	Social interaction: co-presence / cooperate	Content interaction : intellectual simulation , promotes creativity Social interaction: passive (watching) and active (cooperation)

<p>ISF</p>	 <p>Fig. 4- Urban movement: An urban furniture that choreographs exercise.</p> <p>Source: https://www.archdaily.com/258787/urban-movement-design-debuts-unireunite-at-maxxi/img_1453. Accessed 15-1-2024</p>	 <p>Fig- 5- The pop-up: Furniture that is pumped out from the ground, flexible for use in multiple functions.</p> <p>Source: https://carmelabogman.nl/portfolio_page/pop-up/?lang=en. Accessed 6-2-2024</p>	 <p>Fig. 6 - Sensacell Luminous Footprints : Pressure-activated light-up flooring.</p> <p>Source : https://broccolicity.wordpress.com/2008/08/16/sensacell-luminous-footprints/</p>
<p>Induced Interaction</p>	<p>Content interaction : physical activity</p>	<p>Content interaction: ISF that can be acted upon</p>	<p>Content interaction: physical activity (regular)</p>
<p>ISF</p>	 <p>Fig. 7 - Spun chair: Pointed-bottom chair for 360-degree swivel. Source: author</p>	 <p>Fig. 8- Parkour park: A parkour park for physical exercise. Source: authors</p>	 <p>Fig. 9- UNICEF treadmill billboard: A billboard with a treadmill promotes for exercise. Source: https://imwiththebrand.wordpress.com/2010/01/25/nikes-unicef-interactive-billboard-makes-each-kilometer-go-farther/ . Accessed 22-4-2023</p>

<p>induced Interaction</p>	<p>Content interaction: physical activity (intense) social interaction: passive- watching</p>	<p>Content interaction: physical activity; Social interaction: passive (watching) and active (rivalry)</p>	<p>Content interaction: physical activity social interaction: passive (watching)</p>
<p>ISF</p>	 <p>Fig. 10 - Dubai canvas: 2D planes that show as a 3D scene from a certain point. Source: author</p>	 <p>Fig. 11: Europe! It's just next door: Doors that show live events in other cities via a door-sized screen with cameras mounted above them. Source: https://simonanovakovablog.wordpress.com/2014/11/23/europe-its-just-next-door/. Accessed (6-2-2024)</p>	 <p>Fig. 12: Water light graffiti: LED graffiti screen that lights up when touched by water. Source: https://www.waterlightgraffiti.com/about-wlg/. Accessed 2-6-2024</p>
<p>Induced interaction</p>	<p>Content interaction: passive (photography) Social interaction: passive (watching)</p>	<p>Content interaction: intellectual simulation. Active social interaction.</p>	<p>Content interaction : intellectual simulation , promotes creativity Social interaction: passive (watching) and active (cooperation)</p>

ISF	 <p>Fig. 13 : Pixel Wall. An interactive wall made of wooden blocks threaded onto steel rods.</p> <p>Content interaction: active, ISF that could be acted upon.</p> <p>Source:https://tomato.co.uk/journal/pixel-wall</p> <p>Social interaction: optional, cooperation.</p>		
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4.2: Field survey:

In the second phase of the empirical study, two case studies for users interacting with street furniture in open spaces of Cairo were analyzed based on queries in the deduced framework. Data was gathered using field observations and photographic documentation for users' behavior within the surrounding venues influencing them, both of which are tools suitable for phenomena based on experiential and non-numerical values [33]

The first case study is a water feature in Al-Azhar Park. Built in 2005 on a garbage dump, the park is the only green lung for the surrounding 200,000 residents of "Aldarb al Ahmar" neighborhood [34]. The feature under study is a decorative fountain of multiple nozzles placed on the floor of the main entrance plaza of the park. It is installed for aesthetic purposes[35] and was not originally meant to be an interactive feature. The fountain is unfenced to give room for performances and events when nozzles are switched off [36]. The second case study is in Family Park, which is built on the expansion of Cairo over 70-acres. The park design is intended to educate, entertain, and stimulate the curiosity of both children and adults through the different interactive exhibits and programs[37]. It includes miniature versions of many known places in Egypt, as well as a military museum with outdoor showroom, which is the focus of our study. The military museum displays multiple warfare antiques that are left un-fenced, to encourage people to explore and interact with them.

5 Results:

174 respondents participated in the questionnaire, 133 females and 41 males. The age of respondents ranged from 11 to 60, with the majority (77%) between 20-40 years old.

Study finds interaction is appealing to 75% of respondents, with content interaction (57%) preferred over social interaction (43%) across all demographics. This aligns with real-world observations of people interacting with the fountain and the military missiles more than those who got socially engaged with their peers. Interestingly, half of those preferring content interaction still enjoy having others around using the same ISF.

As for ISF incorporating social interaction, 60% of respondents prefer interacting with acquaintances over interacting with strangers. This may be justified by cultural norms and acceptable habits in the Cairene society. Fieldwork suggests age plays a role in defining the pattern of interaction: children and youth socialize more readily than adults, observed through splashing water onto each other in Al-Azhar Park (fig. 1 -a) and role-playing warriors in a battlefield in Family Park (fig.1- b). ISF incorporating entertainment tops users' preferences (42%) across all demographics; cooperation follows (37%) then rivalry (21%). However, a gender gap emerges in the last two: females favor cooperation over males (41% : 24%) while males lean towards rivalry than females (30% : 18%). This suggests prioritizing interaction based on entertainment for inclusivity, while catering to preferred activities with gender-specific spaces (cooperation for females, rivalry for males).



Fig. 1: Active social interaction as a result of ISF .(a) at Al-Azhar Park, (b): at Family Park. (Source: Authors)

Respondents to the questionnaire were asked to rate pictures in table 2 from 5 being their highest preference to 1 being their least. Preferences are represented in (fig.2)

ISF	Dubai canvas	Parkour	Nike trade mill	Europe is next door	Sensa-cell	Spun chair	Water Light graffiti	Bottle bench	Pixel wall	Info. map	Control no control	Urban movement	Pop-up furniture
Mean	3.44	3.22	3.56	4.16	4.20	3.35	4.07	3.48	4.08	4.16	4.05	3.64	4.41
Std. Deviation	1.34	1.418	1.269	1.209	1.168	1.38	1.136	1.324	1.067	1.061	1.053	1.226	0.937

Fig. 2: Users’ preferences for different ISF illustrated via the mean value & SD; where max. = 5, min. = 1. (source: author)

It is noted that ISF incorporating emotional or intellectual simulation and creativity such as “control or no control cube” and “Europe is next door” are favored over those incorporating high physical activity such as the” parkour park “or “spun chair”. Figure 3 breaks down users’ preferences by age group. Notably, users between 20-40 show consistent preferences, whereas preferences of users between 11-20 year old and those over 40 differ significantly.

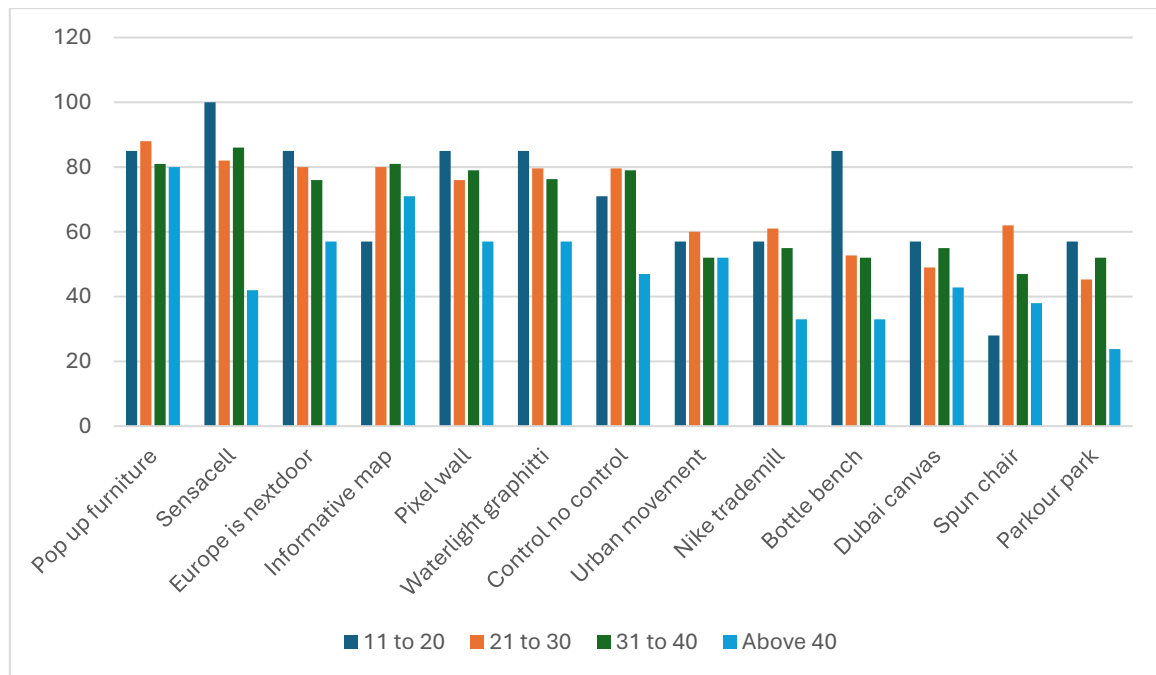


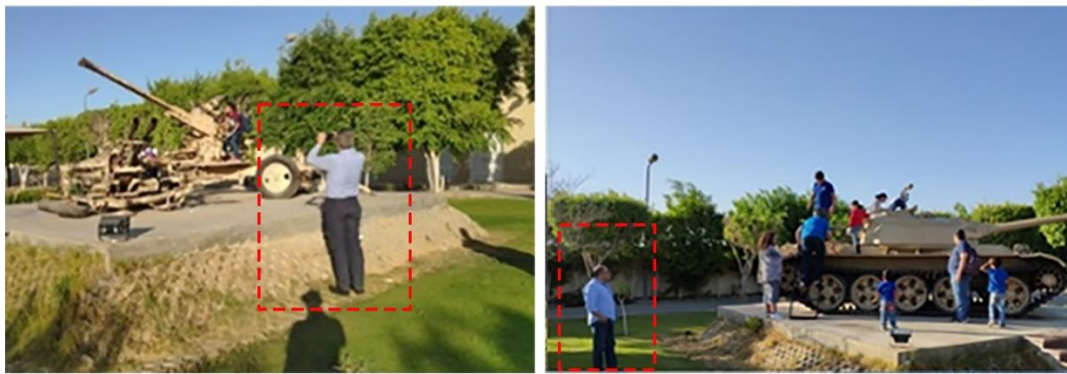
Fig. 3: Preferences (%) of interaction scenarios across varying age groups. (source: author)

This exemplifies in field observations where the response to interactive furniture differed with different age groups. In Al-Azhar park, children engaged in active social and content interactions through water fights. Similarly, in Family Park, children got engaged in physical activities such as climbing and steering the missiles, and in social activities with their peers through battle-like games. In both cases, adults were

mostly engaged in passive interactions, such as watching children playing and distantly taking pictures with the fountain (fig. 4).



(a)



(b)

Fig. 4: (a) passive content interaction ; (b) passive social interaction. (Source : authors)

6 Discussion:

The above case studies of ISF show how it could be designed to target preferences of different age groups and intrigue different levels of social and content interactions. Overlaying results of the online survey and on-site observations, the study concludes the following design considerations to achieve successful interactive experiences in open spaces of Cairo.

6.1. Considering the Target Age Group in the Design of ISF:

While respondents' preferences and responses to scenarios of interaction vary, some patterns of preference were consistent across certain age groups. This suggests tailoring the interactive experience with a target age group in mind to enhance the overall effectiveness of ISF.

For instance, passive content interaction like watching or taking pictures of street furniture suits almost all age groups. However, active content interaction that engages users emotionally or intellectually was more accepted among adults over furniture involving physical activity, whereas the latter was mostly preferred by children. For a more inclusive intervention, it is suggested to incorporate ISF with features that are agreeable across most age groups such as : ISF that promotes content interaction, allows for

multiple simultaneous users and incorporates emotional/ intellectual entertainment activity rather than physical activity.

6.2. Offering a Spectrum of Interaction Levels:

As explained earlier in the framework, content and social interactions range from passive to active and from individual to collective. It is advisable in any setting to provide a spectrum of interaction levels to cater for diverse users' preferences. As much as furniture that caters for simultaneous users at the same time may induce social interaction, it is important to consider that it can also be overwhelming or culturally inappropriate for some users. On the other hand, interactive furniture designed for single users may be more encouraging as a start, but it needs to be complimented with furniture based on group activities should a higher level of engagement is targeted.

6.3. Designing for Holistic Settings rather than Individual Pieces of Furniture:

The interactive experience is influenced by the layout design of the surrounding setting. As observed in the field study, the immediacy and accessibility of the unfenced missiles and the ground-level fountain catalyzed content interaction, although the latter was not designed for that intent. Other examples include interactive pieces of furniture in a playground, which would require a safe and visible context to function. Moreover, should the wider setting be complemented with seating, services and shades, higher levels of social interaction may evolve between caregivers.

6.4. Bridging the Gap Between Interactive Experiences and Official Recognition:

Empirical evidence from the online questionnaire and on-site observations show that users accept and desire interactive experiences in parks. Current policies, however, do not cater for and often restrict such interactions. As evident in Al-Azhar park fountain, when guards consistently try to hold users back from interacting with the fountain because this came in opposition to the park's policy (fig. 5). This disconnect highlights the need for designers and policymakers to embrace interaction and design parks with features that encourage it.



Fig. 5: Guards banning users from interacting with the fountain in Al-Azhar Park. Source: authors

6.5. Planning for Future Interventions:

The study suggests targeting users between 20-40 years of age, as this showed to be the most homogenous sample with highest acceptance to interaction. A two-phase plan to inform future interventions is proposed. First, quantitative surveys among target users could be recruited as an exploratory step to yield preliminary indicators of the preferred interactive scenarios. Accordingly, based on numerical indicators, mock-up / temporary installations may be installed for real-time experience trials. On-site observations and users' feedback on such experiences are crucial to corroborate the numerical results. The more real-time trials are undertaken, the more users will be aware of their own preferences and quantitative surveys may become a more credible tool [38]

7 Conclusion

This paper studies the potential of street furniture, as one of the main components of public spaces, to enrich users' experiences in public spaces through interaction.

Street furniture may serve utilitarian, decorative, operative or informative purposes. It plays a crucial role in shaping users' experiences in space, since it lies at the front line of users/space interface. The study highlights how the design of street furniture can deliberately encourage interaction, either between users and furniture (content); or between users together (social). Both forms of interactions can occur simultaneously and may influence one another. Street furniture designed to accommodate multiple users simultaneously could eventually provoke social interaction between those users. Similarly, activities that initially target social interaction are often facilitated with the presence of supportive street furniture. In both cases, interaction in open spaces creates an intrinsic relationship between urban spaces and the people they host, which makes the city a more enjoyable place for everyone.

The study concludes in a framework that dissects both "interaction" and "street furniture" into their constituent genres and attributes. This facilitates the identification of potential correlations between the two; and provides a structured approach to understand how people prefer to interact with street furniture.

The empirical part of the research, constituted of an online survey and field observations, indicates an overall acceptance for ISF in Cairo. Various preferences, however, were reported across different demographics.

Finally, the study suggests a range of essential considerations for maximizing the impact of ISF in open spaces. These are: considering the target age group when making design decisions, offering a spectrum of interaction levels, bridging the gap between interactive experiences and official recognition, and designing for holistic settings, not just individual pieces of furniture. To perform future interventions informed by users' preferences, the study recommends an intervention plan that starts with quantitative surveys to gauge initial preferences, then mock-up installations to provide early real-time feedback, which ensures user-centric solutions. Future research may extend to include a bigger sample size and analyze how interaction preferences may vary across Cairo's diverse neighborhoods, considering demographics, accessibility needs, and cultural factors. The framework could also be further adapted with more context-based interactive scenarios.

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