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Tactile Architectural Models as Universal ‘Urban Furniture’

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Abstract

Tactile architectural models and maquettes have been built in the external public spaces of Polish cities since the latter half of the 00s of the 21st century. These objects are designed for the blind, but also other people - tourists, children, and those who arrive in wheelchairs. This collection has got currently more than 70 implements, which places Poland in the group of European leaders. Unfortunately, this "furniture", is not always "convenient" and safe for all recipients. Studies, which have been conducted together with Maciej Kłopotowski since 2016 across the country, show a number of serious design and executive mistakes or examples of misuse. The purpose of this article is drawing attention to these issues and pointing out ways how they can be avoided. These objects may become completely valuable, universal tool for learning and a great way of studying architecture in an alternative way.

1. Introduction

Models and maquettes of interesting buildings and architectural spaces have appeared on the streets and squares of Polish cities since the latter half of the 00s of the 21st century. These projections, made available for the touch view, are primarily dedicated to the blind, for whom they can become an excellent tool to compensate cognitive deficits in the area of architectural space. In practice, however, the recipients of this type of miniature are much more likely people who can see, and who are interested in an interesting form of presentation architectural art.

The set of tactile representations of the architectural space currently counts more than 70 objects in Poland, located in 30 cities. Such a large (and still growing) number of executions places Poland among the European leaders. It also leads to substantive documentation and scientific analysis of the new phenomenon. Such research has been conducted by a team of two architects from the Białystok University of Technology since 2016, including: the author of this article and M. Kłopotowski. This study is the first such attempt to cover comprehensively the issue of architectural models located in Polish public spaces. It should be noted that this subject is still outside the main stream of architecture. Selected aspects of designing models for blind people have been studied by Polish architects: H. Grabowska - Pałęcka [1], A. Kłopotowska [2], J. Pietrzykowska [3], M. Wysocki [4]. The tyflogological literature of the subject, analyzing the role of models mainly as aid to spatial orientation [5], but only sporadically as a way of experiencing architecture [6] is very poor and insufficiently updated. The bibliography gap and the belief in the high social relevance of the aforementioned issues led the research team to take up the subject.



2. Area, goal, conduct of the study and methods used

The area of research covered touch architectural maquettes and models, presented in external public spaces in Poland. Such delimitation criteria were determined to exclude objects that did not meet the boundary conditions, including: non- architectural models, in-house models, non-tactile objects, forms not made available to the public.

According to the purpose of the researched groups, this collection was decided to examine from the point of view of the model usefulness for the blind, but also in terms of their value to other audiences. As the main goal of the conducted research, the coverage of precise design and implementation guidelines and technological and operational guidelines related to the studied modeling forms and improving the quality of such publications as universal "urban furniture" were determined. The intention of the authors, acting with a warm approval from the environment of blind people, is also the implementation of the aforementioned principles as commonly used Polish standards.

In pursuit of the goal, the authors have performed a number of multi-stage practical and theoretical studies, such as:

- Preliminary analyzes - including: building a localization database, and gathering general information on specific examples
- Field studies - including: inventory and detailed photographic documentation of the entire collection, obtaining contact details for the entities responsible for selected projects
- Authors consultations - including authorial interviews with originators, authors, and users of models,
- Multiple - choice critical analysis of accumulated research material - including analyses based on team experience and knowledge, additional specialist consultations, consultations with blind and visually impaired people.

3. Research results and further research perspectives

3.1. Reasons for the intensive development of models and maquettes in Poland

The basic role of the studied models and haptic maquettes is to bring the architecture closer to the visually impaired people, particularly vulnerable to exclusion from this important discipline of science and art. The tyflogical potential of an alternative method may be manifested primarily in the formation of valuable, three-dimensional images and imagery of selected architectural works, and to some extent also provide support for distorted spatial orientation.

The innovative form of architecture presentation has also quickly gained recognition among other audiences. This fact, according to the authors, results from the multi-faceted attractiveness of models for different users. For sightseeing tourists, they are an educational element and an opportunity to see the city from a new, unfamiliar perspective - presenting roofs and inaccessible parts of buildings, teaching interesting compositional systems and spatial relationships. From the perspective of city dwellers, they are attractive spatial elements - elegant "gadgets", organizing urban space and improving the quality of public spaces and squares. These forms, which draw widespread attention, are used among others in promotions of cities. On the other hand, children perceive models as an interesting spatial toy, encouraging to reach, circle around, climb. The "magnetism" of the subconscious touch inspires them to look, explore architecture, compare the representation with its actual prototype. Scaled-down images may also be appreciated by disabled mobility-impaired recipients who are given the chance to explore a specific area without the need for physical communication, sometimes generating significant difficulties. Due to their numerous values and important social message these objects have become an element of the identity of Polish cities and an acceptable public good.

Unfortunately, in Poland this phenomenon has also other definitely less positive face. According to the author's research, in some cases the only prerequisite for the implementation of models are purely economic incentives arising from the willingness to obtain grants for the adaptation of facilities to the needs of people with disabilities.

3.2. Variety of researched collection.

The examined collection is characterized by tremendous diversity. Among the realized forms there are presentations showing: landscapes, cities or their parts, urban groups (squares and markets, castles, palaces), individual buildings, as well as architectural details. Among them, you can extract maquettes related to the space currently in existence, and models that map historical systems. Most of the shows are single objects, while few are included in the series.

Authors' studies have shown huge heterogeneity in design and manufacturing solutions. Miniatures are made in different scales (architectural, modeling and completely freeform) and presented in various conventions (realistic, geometrical, and plastically transformed). Three-dimensional architectural images are placed on various pedestals (including: homogeneous pedestals, special tops supported by feet or legs, other supports). Exposure planes have different sizes and are placed at different heights. Their geometric shapes also differ. Among them are rectangular elements (squares or rectangles), regular and irregular polygons, circles, etc. The definitive differences also appear in ways of describing models and maquettes, both in content and form of communication (information in Latin alphabet, Braille texts, audio information).

3.3. Identified problems

Field studies conducted and interviews with users and specialists indicate, unfortunately, that there are a number of significant shortcomings in design and construction as well as technical and operational deficiencies. These defects reduce architectural quality of this type of "urban furniture" and depreciate their role as a tool for compensating architectural space cognition. Critical analysis of existing practices in terms of their convenience, safety, and perceptual effectiveness for different audiences (including visually impaired people) has identified a number of problem categories such as:

- Localization problems involving incorrect placement of objects in the space and faulty organization of the nearest surroundings. They manifest themselves by: accidental, changing, or difficult to find locations, lack of elements to guide the blind, location in an isolated, under-controlled place, which can generate threats. It is also not uncommon that in the immediate vicinity of models there are dangerous elements such as streets, obstacles and construction. Another drawback is the inaccurate orientation of some studies with respect to the original, impeding the orientation in the area (figure 1).



Figure 1. Localization problems a) Poland, Sierakowice, improperly designed surrounding of the model, b) Poland, Kościerzyna, model located in the vicinity of the street, photo: M. Kłopotowski

- Problems related to improper construction of the pedestal. First of all, it is necessary to point out such facts as: excessive dimensions of the pedestals, too high or too low positioning of the plinths supporting models, which severely disturb ergonomics of perception. Much of the tops or plinths have shapes that can result in additional loss of orientation for blind people (e.g. circle, polygon). In many embodiments, there is no adequate undercut to allow the wheelchair to move freely under the exposure plane. Part of spatial forms is characterized by aesthetic

inconsistency of the pedestal and maquettes (lack of elegance of pedestals or their excessively moldy forms) (figure 2).



Figure 2. Problems related to construction of the pedestal, a) Poland, Kraków, too high plinth of the model, b) Poland, Chełmża, too low plinth of the model

- Problems with the contents of the model, related both to the content of the mapping and to the form of the message. Such anomalies result in among others from the incomplete and faulty structure of the messages (lack of comprehensive presentation from the general to the detail) and sometimes also the incorrect borders of the elaboration forming the false mental image. Frequent problems are also: abnormal, unapplied to the haptic reception of the degree of generalization (simplification) of the tactile image, inappropriate scale (too high or too small), use of unrealistic convention of transmission (e.g. modeling in a "plasticized" convention which distorts mental image). Common misconceptions include invalid or misleading symbols, badly-made key, any other use of textures, markers of the North direction, and markers of the observer's position. These markings often completely ignore the developed standards for the production of tyfographics (including tyfochartography) (figure 3).

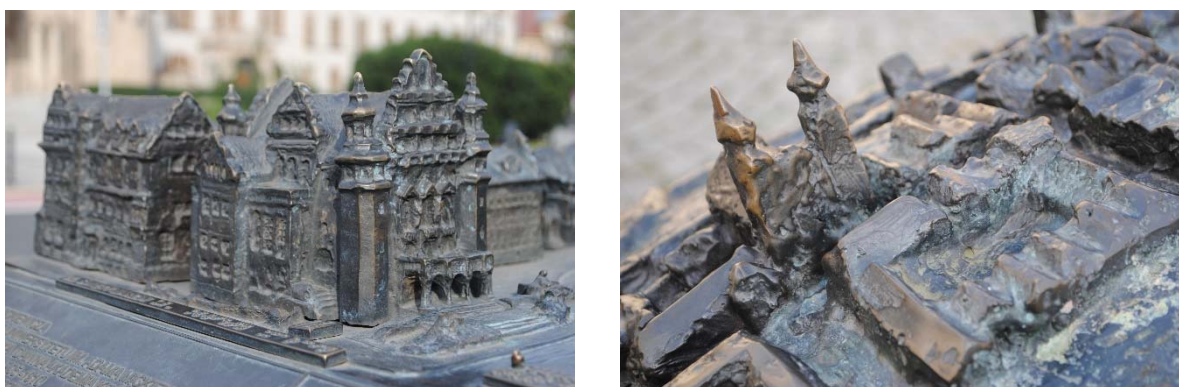


Figure 3. Problems with the contents of the model a) Poland, Poznań, deformation of the shape of buildings on the model, b) Poland, Legnica, deformation of the shape of buildings on the model, photo: M. Kłopotowski

- Problems related to information. Objections are raised both in substance of communication (including a general lack of titles, lack of comprehensive description, unreasonable omissions or accentuation of some data, defective text structure), and the wrong way of communication. There are only models described in Braille (sometimes only in English!) or only in Polish and / or English. Many times different versions have inconsistencies (lack of equivalence between sighted information and messages designed for touch reception). On some models, the

information overlaps the content of the model, making it difficult to understand it clearly. Excessive disclosure is made of funders or contractors. Only a few Polish models and maquettes have additional acoustic information, including solutions that send audio messages (via Bluetooth or GPS) to the recipient's personal devices.

- Technical and operational problems. This group includes anomalies related to the material or used technology, creating difficulties and even threats related to tactile perception (including: unpleasant textures, sharp edges, spikes - which can result in clothing clutter and even skin burns or cuts). In severe climate, the problem is also the improper preparation of models for the prevailing weather conditions (materials overheating in the summer or excessively chilling in winter, lack of proper drainage of the model plate, causing rainwater to stay). There is also a faulty care for existing facilities (including lack of proper control around the models, lack of systematic cleaning of dirt, lack of proper maintenance and repair of damaged components, lack of proper lighting) (figure 4).



Figure 4. Technical and operational problems, a) Poland, Radom, rain water in the trencher of the model, b) Poland, Wrocław, a mess in the inside of the model, M. Kłopotowski

3.4. Generators of defective solutions

By examining the causes of such a situation, the authors stated that the source of the widespread occurrence of such serious shortcomings lies in the lack of sufficient knowledge of the designers and people responsible for implementation and public facilitating of the models. One possible justification for the first realization may be the status of novelty and the lack of relevant experience, which led to the development of this form of modeling by authoritative experiments. "It is worth recalling that the erection of (first models and tactile maquettes) was accompanied by enormous enthusiasm and zest. Unfortunately, the lack of well-established experience in the area of this newly developed creative "discipline" on the border of art and modeling, excessive haste and insufficient number of specialist consultations caused that during implementation of some projects some problems and shortcomings (as in other European countries) have not been avoided. It is fatal, however, that the further popularization of models not only results in positive conclusions, but in many cases even leads to duplication of predecessor errors and fixing negative patterns. Even worse "advisor" is "economical" approach to model design, resulting in apparent activities and resulting in poor quality development, created by random ("cheaper") contractors.

In the context of the enormous potential of this kind of work, further justification for ignorance, lack of knowledge, and even conscious abandonment would be damaging. According to the authors, there is a need for immediate remedial actions, which support the proper practice of this form of modeling, according to its intended purpose. The development and consistent application of relevant standards, analogous to regulations existing in other areas of space design, should be elaborated and consequently respected [7], [8].

3.5. Further research prospects

The final (currently implemented) stage of research will be the formulation of specific design and implementation indications that can serve such standardization. The author's strategy, designed to model best practices (tailored to the content of the project), will be based on a few basic paradigms such as:

- Make models and maquettes as accessible as possible. According to the spirit of universal design, no group can be discriminated or privileged.
- The tendency to meet safety requirements, ergonomics and comfort for the most vulnerable psychophysical user group, while assuming no harm to the rest of the target audience.
- Equal access to all cognitive content for the visually impaired people. In line with the spirit of the Convention on the Rights of People with Disabilities [9], these people should have full access to the same information that people who can see obtain in visual form.
- Maximum compliance of copyright rules with applicable standards for the production and adaptation of typographic (including tyfography), which facilitates learning to use models in a blindfolded environment.
- Systematize the modeling process by applying a fixed placement of specific elements to facilitate the orientation of the blind in the model space.

In search of optimal patterns, the authors of the research will be based on national examples (sometimes with excellent solutions) and ideas promoted abroad (including street models from Austria, Croatia, Czech Republic, France, Spain, Germany, Hungary, Great Britain and Italy). Architects also acknowledge the experience of European institutions exploring the possibilities of using models and maquettes as a substitute form of architectural presentation for people with visual impairments such as the Ancona State Touch Museum (the world's center for research on the art of making art accessible to people with visual impairment); The Museum of the Tyfology in Madrid (with a large collection of tactiles, presented in the interior of its own premises).

4. Summary

Despite the shortcomings, the cognitive value and the social usefulness of the tactile maquettes and models should be emphasized. A new kind of art from the border of architecture and modeling not only opens the way to a better and more effective experience of architecture, but also focuses the social attention for the needs of the visually impaired, teaching respect for this kind of difference. In Poland, a European country still catching up with the world, public space models are becoming a symbol of positive reappraisal in the universal perception of disability and the emerging social responsibility for all recipients.

According to the authors this particular form of urban furniture must be undoubtedly promoted. Decades of attempts and experiments, leaving persistent, visible and universally available spatial effects, empower to a careful analysis of existing resources, but also obliges them to systematical improvement and development of this form of modeling, in line with the spirit of universal design. This text, addressed to those who undertake the creation and implementation of such representations, but also to all those interested in the discussed subject, is an opportunity to draw attention to the current problems and to try to find ways of effective solution.

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