TAMED CITY
THE PERCEPTION OF URBAN SPACE BY VISUALLY IMPAIRED PEOPLE

Paulina Tota
M.Sc. Arch., PhD candidate
Institute of Urban Design, Faculty of Architecture, Cracow University of Technology
ul. Podchorążych 1, 30-084 Cracow, Poland
+48 12 628 24 33
+48 12 628 20 22
+48 50 637 96 88
paulina.tota@gmail.com

Key words: perception, orientation, public spaces, accessibility of the city

Abstract

Relations between man and his surroundings can always be referred to the general question of one’s being in the world. Therefore, the spatiotemporal reality creates a framework for any human activity. Space orientation is the basis for determining the place of a human being - not only in the physical environment, but also in the whole spectrum that is carried by its meaning. The city has become a primary habitat for man and his nearest space – hence it seems to be essential to take into consideration the issue of urban spaces; perception.

Thanks to cognitive processes, a human being has the ability to create in his mind a subjective representation of the physical world outside of him. The physical world can be perceived by constructing our internal mental image based on the information received through our five senses. It is estimated that up to 90% of the external stimuli are received by man via eyesight. The other four senses provide us only with 10% of all sensations.

Visually impaired persons are so often presented as those users of space who do not understand it entirely. Usually we do not realise that blind people are the ones who are the most attentive audience to the city space: they pay attention to those of its elements that are almost imperceptible for people without disabilities.

The article discusses the issue of urban composition as one of the determinants of orientation in the urban space. The author aims to analyse the issues of perception and environmental cognition together with the question of cognitive maps created by blind space users.

Preface

Due to the fact that man is a social creature by nature, his willingness to gather and create groups comes as no surprise, and since cities constitute the most natural area for the activities of the type, it is likewise not surprising that their populations grow unstoppably. Over centuries the city has undoubtedly become the basic environment for human life, an anthropogenic space filled with the traces of man’s activity, the place of the development of society and culture,
accompanied by the economic progress. What is equally important, it also constitutes a reflection of the basic values and relations in the societies that form them, being their first icon and record of their past, as well as of their future pursuits. The urbanisation processes of the last fifty years have brought about a situation where already over a half of people of the world live in cities. It is estimated that by 2050 this number will have exceed 75%, whereas this will be the share of the number estimated for that year, which is to reach 9.5 billion.

Currently, the city has also become a subject of research carried out in numerous fields of study, as well as the area of interest of a large group of individuals, engaged in all sorts of topics. One of such issues, not a new one, but one that is being rediscovered, is the concept of the accessibility of the city – its perception and orientation within it. It is a problem tackled most of all due to the constantly growing number of people with disabilities in urban communities, which entails a belief that contemporary cities should become areas that are fully adjusted to their needs.

Social life calls for legible and well composed spatial frames; hence an element that is extremely important for the development of the city is the urban order, that is an *interrelation occurring between patterns of the urban life and the logic of the urban form*. It is quite obvious that the form of the city keeps changing, reflecting this way transformations of societies and civilisations. And yet, at the same time we can always find the same characteristic elements of the original structure in them: residential development, public utility buildings, or public spaces.

Recently, the quality that has become the fundamental category of the evaluation of the city is its quality. As it is commonly known, the quality of the physical surroundings of man has a direct effect on the dimension and nature of his activity outside his home – these relations have been very precisely described by Jan Gehl: according to the research conducted by him, if the activities of the kind occur a lot and with a considerable frequency, we can talk about a well-designed space. What is extremely important, the main measure of the quality of urban space could undoubtedly be the easiness of getting around in it, based on the general logic of the structure of the space, its components, characteristic spots, or areas that lead the user.

**Space perception by visually impaired people**

Perception, or the way in which man sees the world around him, is possible thanks to the reception of a number of external stimuli (sensations) via individual senses. Thanks to cognitive processes, man has a chance to create an image of the surrounding area, whereas he analyses the external environment actively, creating his own notion about it. Therefore, the perception of the outside world is based on the information received by the senses. They in turn, synthesising the data, analyse individual impressions, providing man with an image of the surrounding area. What is important, the very ability to perceive depends not only on the physiological condition of a person (the ability of their senses to operate properly), but also on the degree of mastering

---

1. Cf.: J. Gyurkovich: *W poszukiwaniu miejskości…*, p. 131
4. Cf.: J. Gehl: *Życie między budynkami…*, pp. 31 – 37
5. Cf.: P. Tota *Miaost oswojone…*, p. 181
individual analysers on specific stimuli\textsuperscript{6}. Therefore, perception is the most elementary process of getting to know the surrounding world for man, and thanks to cognitive processes man has an opportunity to create in his mind a subjective image of the reality that objectively exists outside of him.

\textbf{Role of eyesight and perception in perceiving the surrounding world}

It is believed (as M. Podgórski claims, after W.J.T. Mitchell\textsuperscript{7}) that the domination of eyesight in our culture and the way we perceive the world began in the moment when God looked at His work and saw it was good\textsuperscript{8}. It is impossible not to notice that evolution has moulded humanity so as to make a culture based on the prevalence of visual impressions be the most natural to us – up to 90 per cent of all our experiences come from stimuli received by eyesight\textsuperscript{9}, it is also eyesight that is responsible for the need of orientation to the highest extent - both in time and space. Eyesight provides the most obvious and the richest perceptive information, and seeing things is extremely important for understating all spatial relations in the surrounding area.

Over the centuries of the culture of the western world, eyesight has been traditionally recognised as the most important of all senses. Plato recognised it as a cause of the greatest benefit for humanity, and Aristotle as the noblest of all senses, which is \textit{the closest to intellect}\textsuperscript{10}. Since the times of ancient Greeks the philosophy of subsequent epochs has been overgrowing with visual metaphors, eventually identifying knowledge with seeing, and the truth with light. The renaissance invention of perspective representation made the eye the focal point of the perceived world, and the very perspective grid became not only a tool to describe the world, but rather a factor conditioning its perception. In our culture, looking and seeing has grown to the rank of not so much a cognitive experience as an existential one: it establishes relations between the observer and the observed. Eyesight itself, on the other hand, in the human understanding is equal to a godly property, the tool of control, and thus of possessing wisdom and knowledge, which are so characteristic for the Eye of Providence. Moreover, over the past years visuality has definitely dominated the word – the written or the spoken one – which currently has become an addition to it and not information in its own right. We recognise the primacy of image over other information carriers, believing that it conveys clear and objective messages; whereas the visual information received may be absolutely independent from the intentions of the creator: as Professor Ernst Gombrich demonstrated, even \textit{A holiday photograph of a group of people on the beach, thoroughly analysed, can be useful for an intelligence officer to prepare a landing operation}\textsuperscript{11}.

The primacy of visuality in our culture seems to be unquestionable. We are surrounded by images, and most of all images mould our perception of the world, and the discussion over the

\begin{flushright}
\textsuperscript{6} Cf.: M. Wysocki \textit{Projektowanie otoczenia...}, pp. 39-41
\textsuperscript{7} W. J. T. Mitchell \textit{Pokazując widzenie. Krytyka kultury wizualnej [in:] Artium Quaestiones (XIII), Scientific Publishing House of the Adam Mickiewicz University, Poznań 2006, p. 280; cf.: M. Podgórski \textit{Ucieczka od wizualności i jej...}, pp. 5-6
\textsuperscript{8} Chpt 1.12, \textit{Pismo Święte Starego i Nowego Testamentu. Biblia Tysiąclecia.}
\textsuperscript{9} Cf.: T. Majewski, after: M. Wysocki \textit{Projektowanie otoczenia...}, pp. 39-41
\textsuperscript{10} Cf.: J. Pallasmaa \textit{Oczy skóry}, pp. 21-22
\textsuperscript{11} Cf.: E. H. Gombrich: \textit{Pisma...}, p. 47
\end{flushright}
perception of the urban space is usually based predominantly on the visual stimuli provided to recipients. Nevertheless, there is no doubt that the reception of the reality by a person is cased not only on what is visible, but it is of a more multisensory character, thanks to which it is possible to function efficiently even in a situation of a complete loss of one of the senses.

**Perception of the surroundings by the blind and the visually impaired**

The fundamental senses responsible for human perception are: eyesight, the sense of balance, and the sense of touch, whereas the former, as it has been already mentioned, provides as many as 90% of all sensations. Eyesight is a sense which was the last to develop on the path of the evolution of species, thanks to which it is the most complex. Perception possible by means of eyesight enables to understand the surrounding world as fully as possible, as all senses of a human being occur in time and space, and it is eyesight that is our main spatiotemporal sense. What we see is not just arrangements of shapes and colours, but also movements and changes.

Interestingly enough, though, eyesight never provides us with a full mapping of the reality as we are never able to see everything. When watching the surrounding area, some surfaces will be always blocked by others, and even on a plane that is not blocked by any elements, our eye-field is limited by the horizon. Therefore, full perception of the surrounding area is possible thanks to the movement of the observer. This movement not only enables to explore the space, but it also puts it in order: by the rhythm of our steps we create our own order, and by the rhythm of our steps we also measure the reality that surrounds us. It is even very probable that the first rhythmic architectural layouts did not derive from the mathematical proportions ‘pleasing to the eye’, but from a module measured by the steps of a walking person.

Research aiming at the comparison of the decision-making processes when getting around in the space, conducted in a group of persons blind since birth and in a group of visually impaired persons demonstrated that they are very similar, the difference being that the blind subjects prepared their route much more carefully than the other group, and when making specific decisions they based on different information. Obviously, complete blindness renders it impossible to create a mental image of the entire surrounding area in the same way it is constructed on the basis of seeing; nevertheless, even people blind from birth are able to repeat a route they have once walked, and even to combine the routes they have learned before into an entire spatial system, as well as to learn a similar system from a model or a tactile map, and find it later in the natural scale of the actual spaces.

Contrary to a popular opinion, people with the eyesight dysfunction (i.e. the blind or the visually impaired) do not have specially developed senses that would compensate for the lack of the visual experiences. In their perception of the reality they base most of all on mastering of the abilities they have to the fullest. In order to be able to reach full independence in getting around, and generally speaking in being in the space, **being-in-the-world**, a blind or visually impaired person should most of all master the skill of orientation and safe movement in the surrounding spaces.

---

12 Cf.: T. Majewski, after: M. Wysocki *Projektowanie otoczenia...*, pp. 39-41
13 Cf.: E. Kuryłowicz: *Projektowanie Universalne...*, pp. 42-45
space; and to be able to move without anybody’s assistance such a person must be able to find themselves and to analyse characteristic landmarks on their route and to locate them on the vision map created by them. Learning to get around in space in people with the eyesight dysfunction begins with getting to know of the nearest surroundings (within the range of arms or the cane), subsequently moving on to exploring a larger and larger space. The research carried out in a group of the blind and the visually impaired\textsuperscript{14}, focusing on the understanding of beauty in the context of the city, has provided an interesting image of the reception of the urban environment by people with the eyesight dysfunction. What blind persons recognised as exceptionally interesting were streets and roads - the ones that are safe for them, that is where orientation is not hampered, and there are no obstacles on the pavement (such as waste bins, benches, bicycles, etc.) or which are arranged rhythmically, at regular intervals. An answer that was particularly frequent was that they believe that walking along streets of different cities is very interesting. Answers to the question concerning elements important for the aesthetics of the city and the ones which have their effect on moving around safely and on the orientation in the city proved to be very interesting. For most respondents, \textit{order, rhythm, harmony, and arranged items} were the elements of beauty in the space. At the same time, the same qualities, according to the respondents, should be exhibited by a space in which it is easy and safe to get around without anybody’s assistance. Despite this fact, when asked whether space it is easier to move around in a nice (meaning \textit{harmonious, orderly, rhythmic}), all the respondents answered that it doesn’t matter\textsuperscript{15}. A conclusion that seems to be interesting is that although in terms of the reception of the reality that surrounds us the role of subjective impressions, associations, recollections, or practiced cultural codes is nearly unlimited, despite differences in perceiving the world by different recipients, as well as irrespective of the discretionary character of the sense of beauty, some of its attributes, such as order and harmony of proportions, seem to be common for all people. Therefore, it is possible that the search of order or rhythm, as informative components necessary to understand the space, as well as elements of aesthetic systems, is simply inherent in the human nature, irrespective of the senses we use to explore the reality.

\textbf{Orientation in space of the blind and the visually impaired}

E. Kuryłowicz defines orientation in space as the \textit{ability to determine one’s location towards elements that form the space}\textsuperscript{16}, combining it with the \textit{process of creating of a mental image - a map of the surrounding area}\textsuperscript{17}. A. A. Kantarek, on the other hand, determines it as the fundamental ability which \textit{makes life and operations in space-time possible}, the scope [of which] begins with the determination of a \textit{physical relation of a human body to the space [...]}, which pertains to relations with people [...] as well as relations to individual elements in the space.

\textsuperscript{14} Research conducted by the Author, described in the publication \textit{Niewidzialne piękno}, cf.: \textit{Rzut}, No. 7 (2) / 2015, pp. 17-21

\textsuperscript{15} This can mean that although these elements are important for safe orientation and positive aesthetic sensations, the categories of form (beauty) and function (usability) are so distant from each other that it is impossible to find a common plane for them.

\textsuperscript{16} Quoted after: E. Kuryłowicz: \textit{Projektowanie uniwersalne...}, p. 77

\textsuperscript{17} Ibid.
and developing the thought of K. Lynch\textsuperscript{19}, she defines orientation in space as the \textit{ability to get to know, to determine the location, and to assess the situation}\textsuperscript{20}. What is important, orientation is based on two components: the recognition of information coming from the surroundings and reaching us by means of our senses, and on processing of this information on the basis of the already held experience, knowledge, and preconceived notions. The recognition of the information coming from the surrounding area, in combination with the creative processing thereof on the basis of one’s experience, knowledge, and preconceived notions, constitutes the foundation for orientation in space of a human being. The very observations are of a selective character – we do not respond equally to all of the appearing stimuli, but we concentrate on few of them which we recognise as the most valuable.

Orientation in the urban space is directly linked with the notion of imageability, which assumes that in every environment, the natural one as well as the one created by man, there are elements which thanks to their specific properties (shape, colour, size), or thanks to the symbols embedded in them (places of special historical importance, or crucial from a religious or social / cultural perspective) stand out from amongst the rest. So as to get around efficiently in the area and to understand it, each person conjures in his mind their own mental maps of the space, enabling them to make decisions in it. Obviously, blind and visually impaired persons have a smaller range of perception, which is why their cognitive areas are smaller. For this reason they need a more precise and logically arranged system of points of reference in the structure of the space.

In order to reach full independence in getting around, and in being in space in general, a person with the eyesight dysfunction should, therefore, master the skill of safe navigation in the surrounding area; so as to be able to get around without anybody’s assistance, such a person needs to learn to find and analyse characteristic landmarks on their route and to locate them on the vision map conjured by them.

\textbf{Accessible and comprehensible space (for users with impaired vision)}

Since public space is regarded as a natural place for the fulfilment of one of the fundamental needs of a human being – that of a social contact – it comes as no surprise that there is a close relation between the urban social life and the urban public space; for the same reason deficits in the adjustments of space may result in hampering or even stopping of the appropriate development of social contacts.

According to M. Dymnicka, the public character of a space is not dictated by its accessibility not limited with anything, but the type of its limitation, and the evolution of the conditions for such accessibility, on the example of a Greek agora or a bourgeois public space, has always been one of the factors determining historical and political transformations of the public space of the city. Nevertheless, those limitations – as K. Pluta proves, referring to the research of Alexander

\textsuperscript{18} Quoted after: A. A. Kantarek: \textit{Orientacja w przestrzeni miasta}, p. 29
\textsuperscript{19} K. Lynch defines the orientation in space as \textit{[...] the feeling of a clear relation between the observer and the city and its parts, and the wider world around him} (K. Lynch \textit{Notes on City Satisfactions}, quoted after: A. A. Kantarek \textit{O orientacji…}, p. 97)
\textsuperscript{20} Cf.: Kantarek A.A.: \textit{O orientacji…}, p. 118
Willis, are only of a formal and legal nature, resulting from the way they are managed, like e.g. certain specific time a day one can use municipal parks or marketplaces\textsuperscript{21}. It should be emphasised that accessibility limitations resulting from the failure to adjust urban spaces to the needs of specific groups of their users – people with disabilities, senior citizens, or people with limited mobility or perception – constitutes a sign of discrimination in the urban space.

**Design taking into account the needs of persons with the eyesight dysfunction**

Normal visual perception is based on the cooperation of three elements of the human body (the eye – nerves – brain system), which receive, analyse, and process visual stimuli, that is information from the outside world. Disorders in the operation of each of the parts of this system have different results, hence the great diversity of the level and manner of losing the ability to see in people referred to simply as the blind or the visually impaired. The most common deficiency is, obviously, the reduction of the visual acuity; there may, however, occur other types of diseases and reductions of the eye-field: recurring scotoma, or the so-called tunnel vision.

The adjustment of public spaces to the needs of people with the eyesight dysfunction is based on emphasising the role of multisensory sensations and composing them so as to make the space safe, comprehensible and attractive also for a user with a reduced ability to see, or the one who is completely deprived of this ability. Only by basing on the knowledge on diversified possibilities of perception occurring in the group of the blind and the visually impaired is it possible to design a space friendly to them, in a conscious way. What is particularly important in terms of universal design and the question of adjusting public spaces to the needs of persons with the eyesight dysfunction is the understanding of the complexity of the problem of not seeing, and at the same time the awareness of the fact that most visually impaired people still have some remains of eyesight, which should be used as much as possible. What is important, in any case the adjustment of urban public spaces to the needs of people with eyesight dysfunction is a two-fold activity: on one hand it comprises the implementation of extra-visual solutions basing on experiences and stimuli received by means of the senses; on the other, however, the visually perceived solutions which are to be helpful or essential from the perspective of visually impaired people should be designed in a particularly attentive way.

The main problem of visually impaired people with the vision acuity disorders concern the perception of details, and consequently reading and understanding of graphical symbols. Their sensitivity to light can also differ from the average one, hence photophobia and susceptibility to glare, so common among them\textsuperscript{22}. Reductions of the eye-field, on the other hand (scotoma or tunnel vision) can cause considerable problems with orientation in space and getting around without any assistance. In terms of designing urban spaces, this stands for the need to avoid sudden changes of the intensity of illumination, and composing essential landmark so as to make them easily recognisable even by persons with reduced vision acuity. It is also important

\textsuperscript{21} Cf.: K. Pluta: *Przestrzenie publiczne miast europejskich*…, pp. 44-45

\textsuperscript{22} Glare, that is a sensation caused by an inappropriate distribution or range of illumination or due to its too big contrasts; it causes the feeling of distress and discomfort of vision and reduction of the ability to recognise objects.
to replace the missing visual information with extra-visual data, which also constitutes the most important task of designing for people who are completely blind.

The most important issue in designing urban spaces accessible to people with the eyesight dysfunction comprises three commonly applied adaptation measures: tactile paving (the so-called leading strips and attention fields), tactile mock-ups, spatial models, and convex maps, executed by means of the typhographic technology\(^\text{23}\) and designations in the Braille writing system. When using the latter, it should be borne in mind that information addressed to people with the eyesight dysfunction cannot be prepared exclusively by means of this method, because quite a number of people, even completely blind (especially senior citizens and people who lost their vision later on in their life) do not know this writing system, or know it, but rather poorly. Therefore, all designations should be accompanied with a voice message.

Apart from the application of the three measures improving the accessibility of urban spaces referred to above, we should also remember about other equally important ones, which have their effect on safe mobility of all users. These are – without limitations – legible designations of pedestrian crossings and public transport stops, entrances of public utility buildings, as well as all dangerous places (street kerbs, stairs, sudden changes in the level of the paving); using anti-skid and anti-glare materials when designing surfaces, and securing areas with limited height or a passage in a kind of opening, elements of fittings and street furniture, so that they do not constitute any hazard for space users moving close to them.

Reach – enter – use – perceive

The functioning of people with the eyesight dysfunction in the urban environment most of all requires that they are provided with complete safety and maximum freedom. Moulding of a space comprehensible and easy in terms of orientation for all its users is based on four main criteria, which are, in order: recognisability, attainability, accessibility, and usability.

Recognisability refers predominantly to logical and comprehensive designation of spaces, zones, and devices installed in them, adjusted to different groups of users, including the blind and the visually impaired, but also persons with visual, perceptive, and mental limitations, as well those who do not speak the language of a specific country. Attainability, on the other hand, is the limit of the distance that does not cause tiredness, that is the distance of ca. 1000 metres – this is the distance in which car parks, public transport stops and other private and public transport nodes should be designed so as to facilitate access to them to people with disabilities, as well.

Another criterion used for the evaluation of space is its accessibility, which stands for an ability to reach a specific intended destination, on foot or using a means of transport. It refers most of all to the system of transport routes, which would allow for a free passage of a wheelchair or a pram, as well as which could be used by a blind person walking. Accessibility is connected with the fourth element – usability, which is the ability of the space to be utilised by the user.

\(^{23}\) Typhlographics is ‘a graphical reflection and presentation of the reality using the scale and proportions in a tactilely accessible manner. Typhlographics enables a blind person to get to know, understand, and recreate the reality’, cf.: M. Jakubowski: Tylografika...
Usability results directly from functionality, and it stands for e.g. securing an appropriate width of passages, installation of devices at appropriate heights, or adjustment of specific structures.

Conclusions

A friendly public space is a space which is both safe and attractive, and where users are willing to stay and do it often. Since urban spaces concentrate the life of local communities, at the same time creating the image of the city, it is extremely important to adjust them to the needs of all groups of users, without creating individual ‘zones’ for each of them. Also, in the seemingly narrow scope of design, the most important element is the understanding of the diversity of users, and consequently designing of spatial solutions so as to make them address the needs of completely blind people, as well as those who still have some remains of eyesight and use them on a daily basis, and if possible, constituting at the same time as source of convenience and attractive aesthetic sensations for people who can see.

It is worth pointing out that the question of orientation in the urban space should be regarded as a property of the urban tissue itself, independent from the attitude of an individual. This means that irrespective of the perceptive abilities of a person, the space should be designed and marked so as to inform each user at any time where he is and how he can reach any place he chooses. Orientation grasped in this manner constitutes an important component of spatial order of the environment of the city, and at the same time a significant element of its general accessibility and adjustment to the needs of all its users.

References


Kantarek, Anna Agata, O orientacji w przestrzeni miasta. Cracow, Publishing House of the Cracow University of Technology, 2013


Podgórski, Michał: Ucieczka od wizualności i jej społeczne konsekwencje. Fenomen estetyki haptycznej, Ph.D. thesis written at the Institute of Sociology in the Department of Daily Sociology, under the supervision of Prof. Rafał Drozdowski, Ph.D., Poznań: Adam Mickiewicz University, Poznań, 2011


Tota, Paulina: Tamed city. The importance of urban composition for the orientation in the city space [in:] Housing Environment 14/2015, pp. 180-189

Tota, Paulina: Niewidzialne piękno [in:] Rzut nr 7(2)/2015, pp. 17-21