SCIRES it
SCIentific RESearch and Information Technology
Ricerca Scientifica e Tecnologie dell'Informazione
Vol 8, Issue 2 (2018), 77-84
e-ISSN 2239-4303, DOI 10.2423/i22394303v8n2p77

ARCHITECTURE AND MULTISENSORY. A PROJECT OF INCLUSION FOR THE SENSORY IMPAIRED AND A NEW APPROACH OF SYNAESTHETIC VISIT IN EXISTING ARCHITECTURAL SITES

*Giuliarosa Granata**

*Department of History, Drawing and Restoration of Architecture - Sapienza Rome University, Italy.

Abstract

From the conviction that space must be perceived by all the senses, an experimental degree thesis has been developed - at the end of the 5 years of study of Architecture at the Sapienza University in Rome - which analyzes and re-proposes the non-visual perception inherent in the human being but which, in today's society, is increasingly buried by the visual perception that instead grows in proportion to the spread of new technologies which aim to interact almost exclusively with the visual apparatus.

Keywords

Multisensory, Tactile perception, Sensory tools, Synesthesia, Sensory architecture, Architecture for all, Universal Design.

1. *The essential is invisible to the eyes*

"The essential is invisible to the eyes", a sweet truth that Antoine de Saint-Exupéry[1] tried to explain with a beautiful metaphor but without convincing anyone: today, all dominated by and at the same time creators of the society, we are estranged from reality putting to sleep the residual senses, we forget the strong and inherent relationship that unites them all and that would allow us to appropriate what we only see.

"The little prince", read at an early age, as one usually does, contains in it a precise moral:

The idea of not letting oneself be convinced only by the appearance, by the silhouette of an apparent hat, always stimulates us to look further, pushes us to find a snake that has swallowed an elephant everywhere, in all things (Fig.1).

In the Italian context, this sensorial opening has led to various experiments on the acessibility to the culture towards sensory impaired people. Still closely linked to figurative art alone, tactile representation is increasingly present in museums, for example, which reproduce paintings or sculptures in versions that can be touched. As for the representation of spaces or architectures, applications are still very few, although it will soon become mandatory for all public places to equip themselves with adequate instruments to make the visit and understanding of the building or monument accessible to all sensory impaired.

However, this is not a mere representation of the geometry of a place, which is nevertheless necessary to orient oneself: the goal is to go beyond the shape and also represent all the other components that we catch with the sight and that allow us to appreciate or less a space, like the depth, the breadth, the brightness, the coldness of the materials, the sounds of the echo. Through collaborations with the public and private administrations of the city of Turin, some associations have installed tools such as these in museums and churches, integrating them with existing guided tours or inserting them where no instrumentation was present.

This made all the blind and deaf people of the city happy and participated, and it also have re-evaluated monuments that were almost unknown to the inhabitants, bringing everyone closer to rediscover them. Apart from the reality of Turin, there is still little attention to the architectural

[1] The Little Prince, first published in April 1943, is a novella, the most famous work of French aristocrat, writer, poet, and pioneering aviator Antoine de Saint-Exupéry.

sphere that instead would bring innovations and new ways of thinking and appreciating it.

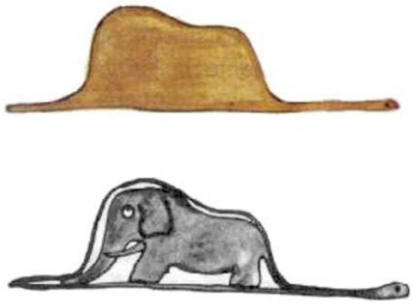

Fig. 1: A boa who ate an elephant. Image from "The little prince" of Antoine de Saint-Exupéry, 1943

2. *Architecture is multi sensorial*

Architecture, for example.

An art that involves the greatest number of senses, stimulates a total synesthesia but continues to be considered as a visual art.

Yet, true architecture is for everyone, right? Even those who do not see live in an apartment, in a villa, visit museums or historical monuments, profess their religion in a place of worship, cross bridges or go shopping in malls, and somehow use that architecture, perceive it, are aware of it, but do not see.

The objective of this research was born from this: to stimulate a synesthetic approach, similar to the one that blind people automatically develop, to the society of the image through architecture.

This multisensorialism is necessary to experience the world of reality, and this is not the case. In fact, what would be the point of verbally describing a painting to a sighted person but preventing him from seeing it?

This should be applied to all the arts, obviously following the singular characteristics there would be senses with a greater importance than others in forming an experience.

The synesthesia of the senses becomes essential in our society, which is now based on the absolute denominator of sight. The sensory contact of a work of art, like anything else, is indispensable for anyone who wants to have an authentic experience.

3. *Research goals*

The objective of this research was born from this: to stimulate a synesthetic approach, similar to the one that blind people automatically develop, to the society of the image through architecture.

The objectives become twofold: to broaden the perceptual possibilities of all individuals with disabilities who tend to numb their senses and at the same time to simplify the sensory perception of architectural reality for the blind people.

Professor Levi[2] writes about architecture: "A beautiful building is never made just to be looked at, a building must still have a meaning, it must serve something.

Even when architecture reaches the highest peaks of aesthetic evaluation, it always expresses itself, with a strong sociological characterization, in political, economic and social terms. It's true: it's possible to be enchanted by looking from afar at an architectural work that enriches the landscape. We are struck by that visual image, but it is as if we were admiring the content of a postcard: something far away, something abstract. If we get closer and put our feet inside that space, we see something else. Let's approach that space and share it with that construction: we are one with it. The perception we have of it is a set of sensations that add and intertwine with the vision, even the noise of our steps acquires a characteristic sound due to the effect of resonance or echo, if we approach a pillar and if we enter the vastness of a nave. And let us not forget that the touch does not lie only on the tips of the fingers, but on the whole body. On the feet that trample on the marble of the slabs or the soft thickness of a carpet."

Of course, a blind man also needs a reproduction that allows him to "see" the facade, the bell tower, the dome and the ornaments. But even the sighted person seeks, often without even realizing it, that total relationship with the place that remains in his memory not as a "vision" but as a true experience.

[2] Fabio Levi, full professor at the Torino University. Scientific disciplinary sector of contemporary history.

Maurice Merleau-Ponty[3], in her "The eye and the spirit" writes on this theme: "On the other hand, it is true that the vision is suspended from the movements, we only see what we look at.

What would vision be without the movement of the eyes? But it is also true that immersed in the visible through his body, the sighted does not appropriate what he sees: he approaches it only with his gaze, he opens up to the world. Movement, on the other hand, is the natural continuation and maturation of a vision. So whoever sees and moves, keeps things in a circle around himself, things are an annex or an extension of it, they are encrusted in his flesh, they are part of his full definition, and the world is made of the same fabric as the body."

Ponty writes: "The vision is not the metamorphosis of things themselves into their vision, it is not the double belonging of things to the great world and to a small private world. Our organs are not instruments at all, but rather our instruments are added organs. Space is no longer what Dioptrique talks about, a network of relationships between objects, as a witness to my vision would see it, but it is the space considered from me as a point or degree zero of spatiality. And I don't see it according to its outer shell, I experience it from the inside, I am incorporated into it. After all, the world is around me, not in front of me. So this little word "to see" is not a certain mode of thought, or presence in itself: it is the means given to me to be absent from myself, to assist from within to the fission of being, at the end of which I only close myself in on myself".

4. Research findings

This intense study of the world of sensory perception has resulted in the design of some mediation tools that could expand the perceptual capabilities of all.

"Roma non basta una vis(i)ta"[4] (A visit is not enough for Rome) was born, a system of guided tours aimed at any type of public -with a view to Universal Design- that aims precisely to propose an authentic visiting experience involving all the senses through specific and designed tools.

Everything stimulates synesthesia, starting from the advertising of the visits themselves: information postcards (Fig.2) describe with simple relief drawings (a plan, a prospectus and a section) the monument subject of the visit accompanied by the name and time of the site in black and braille. Below there are also two QrCodes that refer to the website of the monument, to book the visit, and to a vocal description of the postcard itself to facilitate tactile reading of the drawings to those who do not see.

It is a very open, expandable system, which on the occasion can become "a visit is not enough for Milan" or "a visit is not enough for London", choosing sites more or less known, it does not matter, but with a strong sensory potential to be found and rediscovered.

The visit of the architectural building can make interact with each other all or some sense at a time but certainly can not miss a tactile stimulus, according to the most used sense after the sight, that's why I have the functionality of the tools that is focused on this sense.

[3] Maurice Merleau-Ponty, (14 March 1908 – 3 May 1961) was a French phenomenological philosopher, strongly influenced by Edmund Husserl and Martin Heidegger. The constitution of meaning in human experience was his main interest and he wrote on perception, art, and politics. He was on the editorial board of Les Temps modernes, the leftist magazine established by Jean-Paul Sartre in 1945.

[4] RomaNonBastaUnaVis(i)ta, brand of guided tours born in 2017 from an idea of G. Granata in order to propose an innovative approach to guided tours in the architectural sites of Rome
https://www.facebook.com/Romanonbastaunavista-526862551013905/?ref=bookmarks

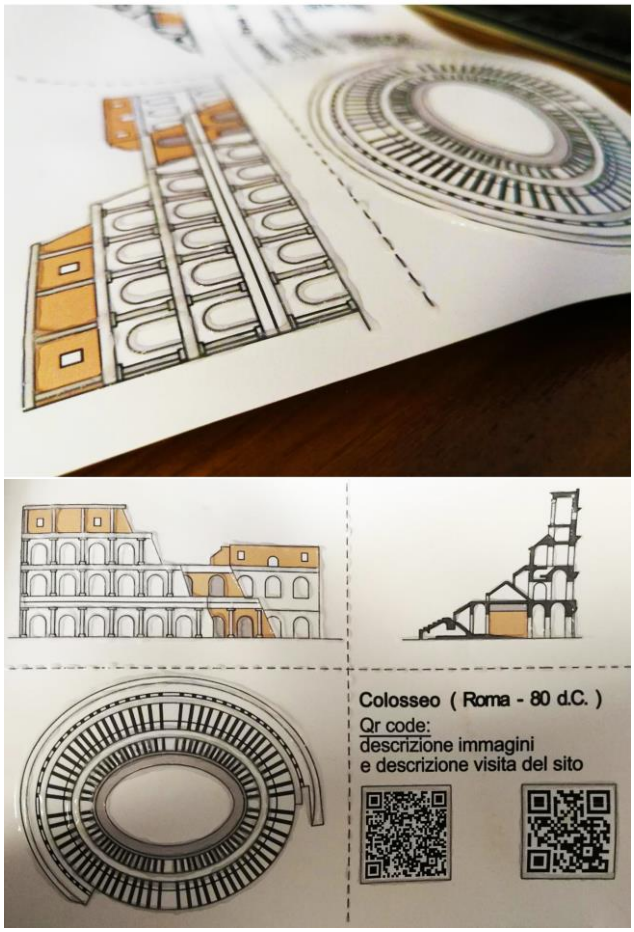

Fig. 2: Information tactile postcard of Colosseum in Rome

5. Production and first application of the prototype

Thanks to the curiosity and willingness of the curator of Villa Farnesina at Lungara[5] in Rome (Fig.3), this system has been applied to the current path of visiting the site:

Three panels have been produced, on a project of 10, with graphic information in relief. Overall planimetric drawings, which narrate the morphological changes of the cartography of the time compared to today; plans of the actual state, which describe the shape, thicknesses and dimensions of the building; facades' elevations, which refer to proportions but also decorations and styles and sections of the building and its exteriors to emphasize the continuity between the two thanks to the openings of the entrance porch.

Fig. 3: Photo of the south facade of Villa Farnesina in Rome. Taken from the internet site of the Villa Farnesina

Thanks to the very kind willingness of the Arch Fenici and technicians, who work in the Laboratory of the National Federation of Pro-blind in Rome[6] , this material was produced in relief with the technique of thermoforming. Starting from a positive matrix of the design to be realized (Fig.6), obtained with a normal milling machine, we moved on to the thermoforming of the transparent plastic material which, with the vacuum suction, took the shape of the matrix and became the "tactile" part of the panel (Fig.4 e Fig.7).

[5] The Villa Farnesina (or Villa della Farnesina) is a historic building in Rome, now home to the Accademia Nazionale dei Lincei.
It is located on Via della Lungara, in the Trastevere district, in the Town Hall I and is one of the representative buildings of the Renaissance architecture of the early sixteenth century. Designed by Baldassarre Peruzzi, it was the prototype of the Roman suburban villa and its construction had considerable resonance, also because starting from 1511, completed the walls, the residence was frescoed according to an iconographic program of extraordinary breadth entrusted to the greatest artists of the period. himself Peruzzi, Sebastiano del Piombo, Raffaello Sanzio and his school (including Giulio Romano) and Il Sodoma

[6] The national federation of pro-blind institutions was founded in Florence on February 24, 1921, associates Italian institutions and institutes that work for people with visual disabilities. It carries out activities of coordination of all the federated institutions, but also its own activities in order to promote the integration of people with visual disabilities, especially in the school sector. To this end, the Federation offers free tiflodidattica consultancy, organizes training courses for parents and teachers, establishes meeting places and exchanges between families and school operators and distributes tyloididactic material.

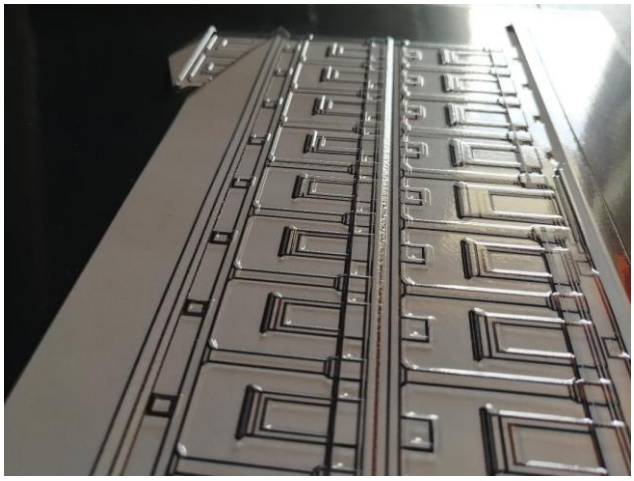

Fig. 4: Tactile panel produced with the technique of thermoforming. It represent the façade of Villa Farnesina

This sixteenth-century villa, however, has a peculiarity inside, which makes it famous in the Roman environment, a feature of enormous aesthetic and cultural value that has prompted me to face an extreme sensory challenge.

It is a series of frescoes that cover the entire room, called the "Room of Perspectives", which is located on the first floor of the building. All the surfaces are decorated with perspective frescoes, such as "trompe-l'oeil", which reproduce glimpses of a Rome of the past (or perhaps invented) alternating with real Roman glimpses that can be glimpsed from the existing windows. An ecstasy for the eyes, a real scenography with depth, shadows and nuances that in reality have no matter and do not touch.

How can one explain that to a blind person? How can such works arrive at synaesthetic perception without sight?

You can't! The easiest and most obvious answer.

But it is precisely this answer that pushes us to look for the famous snake that swallows an elephant, going beyond the gaze and imagining that we are touching the perspective.

The result was a trio of three-dimensional models (Fig.5), composed of cardboard and various types of paper, which reproduce in three dimensions the various planes of depth that make up the perspective.

Each floor is represented by one or more silhouettes of the buildings represented, very stylized. Very simple forms that directly refer to the height, the geometries and the relationships of the facade.

Each one is lined with paper that is more or less rough to the touch, so as to reproduce a sensory vibration that can be traced back to the warm colour of the brown plaster, rather than a cold shade of marble.

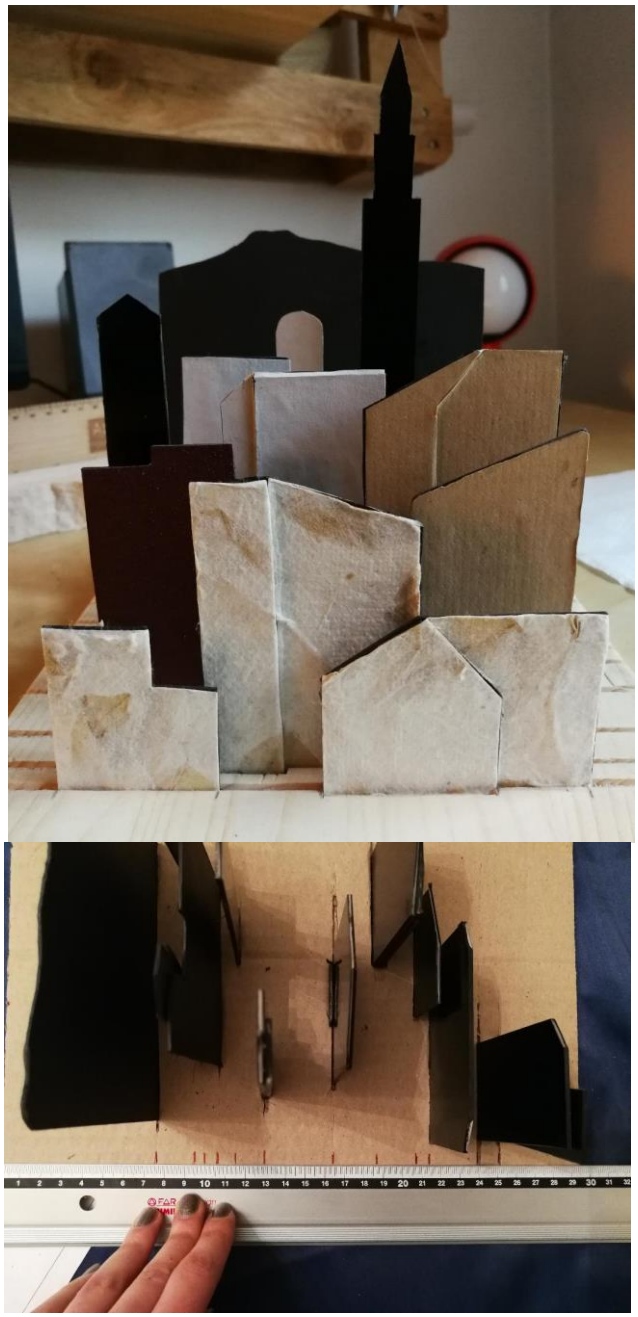

Fig. 5: One of the three three-dimensional models, composed of cardboard and various types of paper, which reproduce in three dimensions one of the frescoes in the Villa.

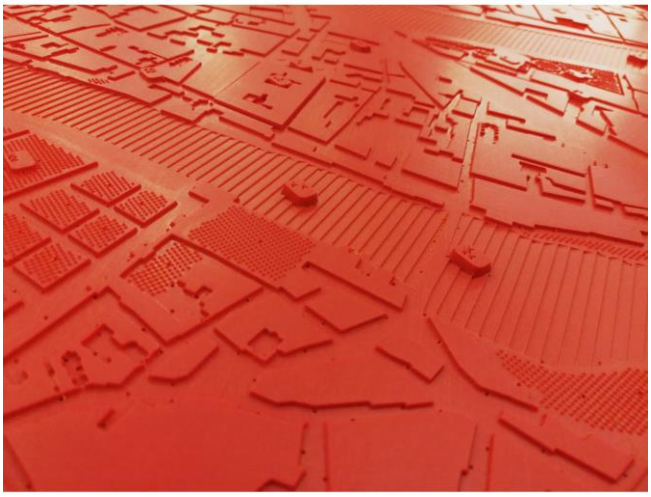

Fig. 6: One of the matrix in acrylic molded with a mechanical arm numerical milling machine.

6. *Future developments of the prototype*

The potential of this material has been approved by a substantial number of blind witnesses, and it has been decided to carry out a real prototype of sensory tools to be proposed to the competent bodies with the aim of making the project usable in public spaces in the city.

All could be made thanks to the use of advanced technologies for the research of this sector through CAD drawings, digital drawing, 3D modeling tools, and with technologies for physical prototyping, then according to processes that work starting from the model , passing through a physical matrix of the instruments and then to the machines for the thermoforming of the tactile surfaces. Also thanks to the help of Minolta[7] technology printer machines that use heat to transform ink into embossed thicknesses, to create faster versions to test them instantly.

The complete project, advertised as "RomaNonBastaUnaVis(i)ta", includes a system of mediation tools for the complete visit of an architectural building in Rome but conceived with clear and defined characteristics, repeatable and expandable, so as to be replicated or reinterpreted for any other existing architecture.

At the same time a Crowd Founding is starting on an online platform to finance the initial production of the prototype that will require the use of specific machinery, such as the thermoforming machine, and the use of technical materials for the best use of the tools themselves.

At the end of the production a dissemination of the result will be activated both in the form of practical tools to be applied to architectural or artistic sites that need technical support, and in the form of a new experiential approach.

Through the collaboration of other professional figures, such as psychologists, teachers, communication experts, designers and sound technicians and with the support of the various associations and bodies that manage the sites in question, a calendar of city events will be launched aimed at the direct involvement of users in order to raise awareness of the new way of actively perceiving reality.

The application in the art world will be implemented through demonstration conferences, temporary exhibitions, temporary applications to exhibitions or permanent collections in museums and art galleries with the function of cognitive testing.

For the architectural sites, other application tests can be installed in the same places: initially as an attraction to visit, proposing a "different visit" and then, installing them permanently, will be integrated into the architectural complex and transform a "visit experience" of a place previously little known, in an architectural experience increasingly integrated with the visiting habits of the future human being.

[7] Microcapsule paper and oven (Minolta)
The procedure is based on the use of a special "microcapsule" paper. The latter are heat-sensitive cells deposited on the sheet of paper and which swell and "explode" with heat.
Just photocopy the design you want to reproduce (a design suitable for tactile exploration, in black and white or in color) on the sheet of special paper (available in A4 and A3 format). It is important at this stage not to use laser printers or photocopiers that produce excessive heat, to avoid a first and indiscriminate expansion of the cells. Then just slide the printed sheet inside a special infrared oven. The heat produced by the oven causes the swelling of the microcapsules. Only the cells on which the black ink is deposited are expanding while the white or colored parts remain smooth.
The technique is also commonly called the "Minolta" technique, as this company was the first to market the special paper and the infrared oven. Minolta currently no longer produces the kilns, which have been produced by Zychem for some years now

With the diffusion of this prototype, the visitor or the curious of 2030, will have more mastery of his five senses and will know how to appropriate the space that surrounds him through their natural interpenetration and the conscious selection of the different forms of sensory information that our body can receive and make its own.

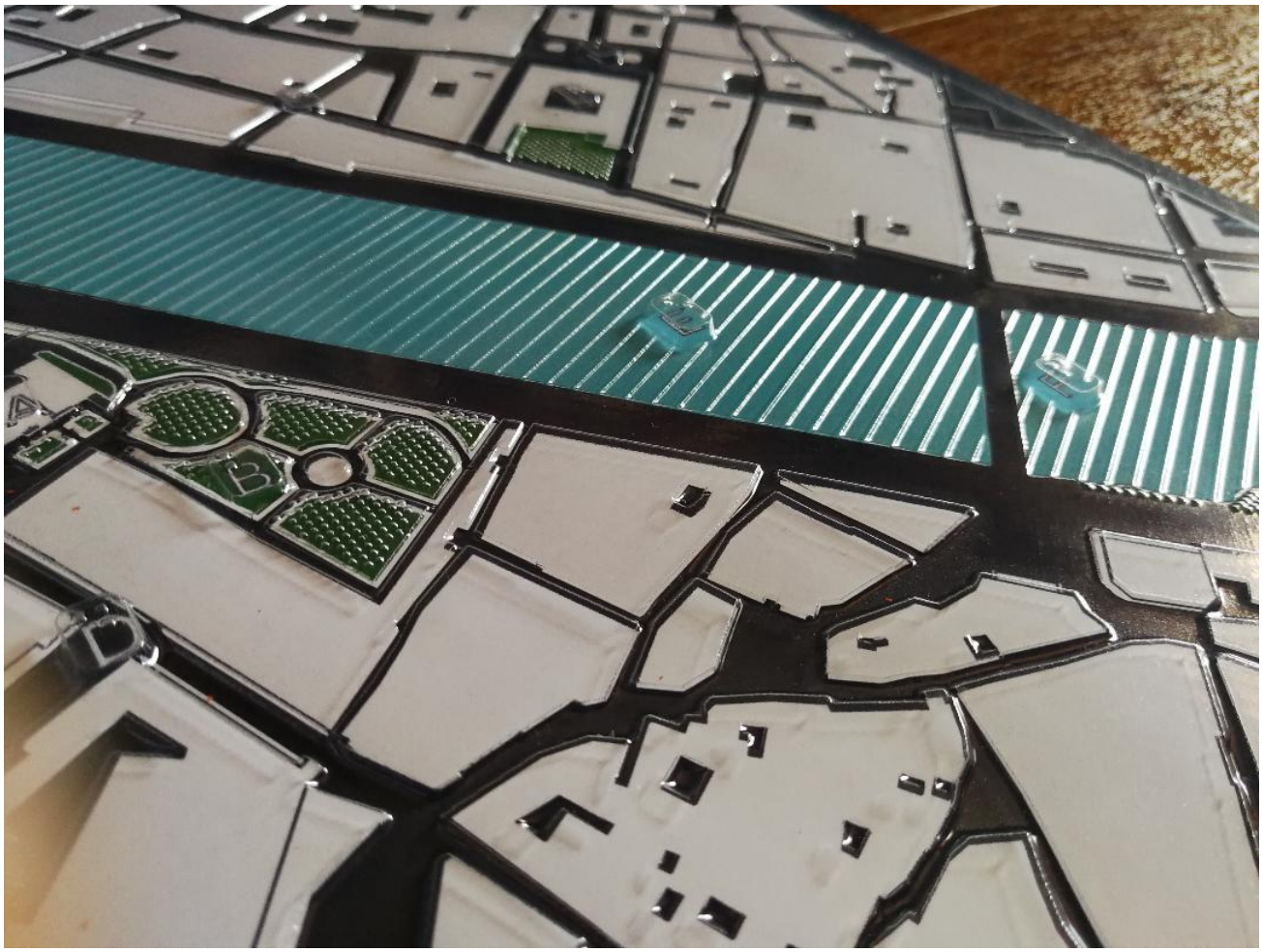

Fig. 7: Detail of a tactile panel representing a map of the gardens of Villa Farnesina inserted into the city

REFERENCES

Ceppi, E. (1981). *I minorati della vista. Storia e metodi educativi*. Roma, Italy: Armando Editore.

Cigola, M, Gallozzi, A, Ceccarelli, M., & Carbone G. (2014) Strategie robotiche ed informatiche per la fruizione museale. *SCIRES-IT - SCIentific RESearch and Information Technology*, 4(1), 59-68.

Empler, T. (2012). Rappresentazioni da esplorare. *XY Dimensioni del Disegno*, 10(26), 61-62

Freides, D. (1974) Human information processing and sensory modality. *Psychological Bulletin*, 81(5), 284-310.

Gentaz, E. & Hatwell, Y. (1998). The haptic oblique effect in the perception of rod orientation by blind adults. *Perception & Psychophysics*, 60(1), 157-167.

Hatwell, Y. (1986). *Toucher l'espace. La main et la perception tactile de l'espace.* Lille: Presses Universitaires de Lille

Istituto dei Ciechi Francesco Cavazza (2016). Lo spazio del non vedente. www.cavazza.it/invitobraille/

Klatzky, R. L., Golledge, R. G., Loomis, J. M., Cicinelli, J. G., & Pellegrino, J. W. (1995). Performance of blind and sighted persons on spatial tasks. *Journal of Visual Impairment & Blindness*, 89**,** 70–82.

Kennedy, J. M. (1997). Come disegnano I ciechi. *La Scienza*, 97(343), 54-57.

Kennedy, J. (1993). *Drawing and the blind: Pictures to touch*. New Haven: Yale University Press.

Lacirignola, A. (2015). Il disegno per le mani: castello del Valentino in rilievo. Torino UICI-011. *Rivista quadrimestrale dell'Unione Italiana dei Ciechi e degli Ipovedenti (sezione provinciale di Torino).* 18 (1), sp.

Levi, F. (2015). *L'accessibilità alla cultura per I disabili visivi. Storia e orientamenti.* Torino, Italy: Zamorani.

Merleau-Ponty, M. (1989). L'occhio e lo spirito (Traduzione di A. Sordini). Torino, Italy: SE.

Millar, S. (1994). *Understanding and representing space. Theory and evidence from studies with blind and sighted children*. Oxford: Clarendon Press.

Rock, I., & Victor, J. (1964). Vision and touch: an experimentally induced conflict between the two senses. *Science, 143*, 594-596

Sainte-Exupérie, Antoine de. (1943). *Le Petite Prince*. Paris, France: Gallimar.

Vercellone, F. (2017). *Il futuro dell'immagine.* Bologna, Italy: Il Mulino.

Virga, G. (2014). Considerazioni sperimentali sulla rappresentazione mentale dello spazio nei non vedenti. *Gruppo di Ricerca sull'Insegnamento/Apprendimento delle Matematiche.* http://math.unipa.it/~grim/virga-nonvedenti.