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Volume 3

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The Ways of Synesthetic Translation: Design models for media accessibility

Dina Riccò
Politecnico di Milano, Italy
dina.ricco@polimi.it
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Abstract: Synesthetic translation, historically applied to artistic productions and in the twentieth century applied by scholars to neuroscience to explain the unity of the senses, is addressed, defined and illustrated in this paper with regard to designing access to content. In particular, the paper shows how the concept of accessibility, underlying every interlinguistic translation process, may be promoted by synesthetic translations, i.e. particular types of intersemiotic translation – among various codes (verbal, figurative, sonorous, etc.) – in which the original text (prototext) and the translated text (metatext) use different sensory registers. The goal is to achieve a form of design that grants everyone access to content (design for all). This paper compares synesthetic practices in typhlology, i.e. aimed at the blind, with extravisual communication design techniques. The conclusion is that all too often, despite having access to the necessary tools, visual designers tend to neglect the needs of the disabled.

Keywords: synesthesia; intersemiotic translation; tactile graphic design; design for all

Introduction: Translation and Accessibility

The theme of translation, especially in linguistic terms, has always played a fundamental role in the circulation of ideas. As stated by Tullio Gregory "The passage of a cultural heritage from one civilization to another, from a geographic context to another, is always tied to a translation [...] Translations are vital in the transition from one culture to another. It is not just a question of translating texts, but also of transferring experiences, myths, values, models. The history of civilization is a continuous translation, to facilitate access to texts that would otherwise remain unknown" (Gregory, 2015, my Engl-tr.).

The main concept underlying the main function of a translation, therefore, is accessibility to a text, or more generally to a content that, if it were not translated, would remain unknown. Gregory refers to the translation of texts from one language to another, but the same
principle also applies to every kind of translation, i.e. not only – with reference to Jakobson's tripartite division (1959) – to intralinguistic and interlinguistic translation, i.e. transfers between verbal systems, but also to intersemiotic translation, i.e. transfers between different codes (verbal, figurative, sonorous, etc.) that do not necessarily include the verbal code.

It is this aspect of translation that I wish to address in this paper: translation as an action that widens the potential user base, expanding the possibility of accessing certain content. Specifically, I propose to study and identify those tools, techniques, languages and explicative cases that enable the proposal of concrete solutions, achievable with current technology, to extend content accessibility to those cases where the barriers are of a perceptive rather than a linguistic nature, due to the presence of sensory disabilities.

**Synesthethic Translations: Definitions and Disciplines**

By synesthetic translation, I mean a particular type of intersemiotic translation in which the prototext – that is, the "original" text, according to the definition by Osimo (2010), and taken up by A. Popović – and the metatext – that is, the secondary, or translated text (Osimo, 2010) – require and target different sensory registers.

Compared to other expressions aimed at multiple sensory registers - such as audiovisual translations or multimedia translations – defining these types of translations as synesthetic not only helps us focus on the consistency of the relationship between languages, but also allows us to indicate translation processes that are independent of the media. These can include translations between audiovisual, paper, analogue or digital artefacts, regardless of the media or of technology.

The expression synesthetic translation has been applied in the study of both representation and perception:

1. In art and design theories and practices (Bornstein, 1964 "Synesthetic translation"; Riccò, 1999; Baule, 2015 "Sinestesie traduttive"), understood as a translation from a work or other artefact to another, the codes of which are targeted at different sensory registers;

2. In cognitive science, understood as the transferral of perceptions from one sensory register to another (Marks, 1978 "Synesthetic translation"), and often used as a synonym for "cross-modal translation" (Marks, 1975) and "inter-modal translation ",(Hameroff, Kaszniak, Chalmers, 1999; and many other authors).

The term synesthetic translation is flanked by others that, although they cannot be regarded as synonymous, are helpful keywords when searching sources and to circumscribe the study scope:

- Traduzione fra un’arte e un’altra (Pignotti, 1993)
- Traduzioni sinestesiche (Riccò, 1999; Cano, 2002)
- Synesthetic translation (Hunt, 1989; Hameroff et al., 1999)
- Synesthetic translation principles, Synesthetic translation ability, Synesthetic translation skill (Rader, Tellegen, 2013)
- Sinestesie traduttive (Baule, 2015)
- Inter-modal translation (Hameroff et al., 1999)
- Traduzione intersemiotica (Cano, 2002)
- Traduzione audiovisiva (Perego, 2005; Perego, Taylor, 2012; Fois, 2012)
- Cross-modal translations of sensory dimensions (Marks, 1975)
- Cross-modal synesthetic translation (Hunt, 1989)
- Translation of musical compositions into paintings (Ox, Franck, 1984)
- Audiovisual Translation (Chiaro, 2013; and many other authors)
- Audiovisual translation and media accessibility (Remael, Orero, Carroll, eds., 2012)
- Traduzioni multimediali (Bollettieri Bosinelli, Heiss eds., 1996)
- Traduzione visiva (Baule, 2009)
- Visual translation (Ox, 1993)

This varied set of terms reveals an interdisciplinary interest in the theme, from linguistics to semiotics, art, design, music and neuroscience.

Synesthetic Translation: History
The French philosopher Denis Diderot devoted an entry in his famous Encyclopédie (1751) to a particular invention of the time: the clavecin oculaire, or ocular organ, invented by the French Newtonian mathematician and theorist, Louis-Betrand Castel (1725, 1735). Formally similar to a harpsichord, the clavecin oculaire had a keyboard and made an analogy between sound and colour. When it was played, it freed coloured substances instead of music. The keyboard was not connected to hammers, but to the neck of vials filled with coloured liquids.

The colour effect was somewhat disappointing, as the liquids flowed into a single container, meaning that the visual translation of any music "played" always, and inevitably, produced a greyish result.

Diderot, however, was not so much concerned with the aesthetic effect, but with the idea of having conceived an instrument intended as a means of communication, and even more so, an instrument potentially usable by those who could not appreciate music with their own ears. He was so intrigued by the invention as to want to test the effects of ocular music on a friend who was born deaf. His friend's enthusiasm was even greater than his own: he imagined the instrument as being capable of transmitting – and therefore visually translating – thought, taking music as an expression with human communication as its primary function.

Diderot writes:

Our deaf-and-dumb friend imagined that the inventor [Castel] was also deaf and dumb, and that his harpsichord was the instrument by which he communicated with
other men; he imagined also that each shade of colour represented a letter of the alphabet, and that by touching the keys rapidly he combined these letters into words and phrases, and, in fact, spoke in colours. [...] The idea suddenly came into his head that he now grasped what music and musical instruments were. He supposed that music was a peculiar manner of communicating thought, and that musical instruments - lutes, violins, and trumpets - were so many different organs of speech." (Diderot [1751], 1916, p. 171)

The originality of Castel's instrument consists in having created a first interface for the visual translation of musical content, or, as Mario Costa writes, in being the first to have made a "transferral from the inside outwards, via an early 'interface' that is a true antecedent of the current 'synesthesia machines'" (Costa, 1999, p. 81, my Engl. tr.).

Between the late nineteenth and the early twentieth century, numerous research studies and theories were developed on the correspondence between sound and colour. These went hand in hand with many attempts to invent instruments that would put these theories into practice. One of the most notorious cases was the colour organ invented by A.W. Rimington (1895), who was asked by Scriabin to represent Prometheus (1910). To start with, the aim was mostly aesthetic, with the visual translation of musical texts laying the foundation for a 'total work', one that today we would place in the realm of 'multimedia' content. Later on, these studies evolved for communication and education purposes. Particularly worthy of note in the latter case is the Music Animation Machine software produced by Stephen Malinowski for learning music notation (http://www.musanim.com/). This synesthetic translation system first dates back to 1974 and still undergoes continuous development.

The idea of translating music into visual content for communication purposes played a central role in the research work of Luigi Veronesi (1908-1998), a painter and graphic designer, a leading exponent of Milan’s abstract art movement. In particular, Veronesi worked to define a code of correspondence between sound and colour. He then used this code to translate musical sequences into paintings, but above all the results of his theoretical and practical research were central to his "interest in communication through images and to the existing relations between various modes of communication" (Veronesi, 1977, p. 5, my Engl. tr., emphasis added).

Veronesi was keen to point out that these visual translations of musical works were not to be understood as "his" paintings, but rather as the "reading of a musical piece through a coloured picture" (ibid.). A means, therefore, of accessing content in a new way, namely, with an alternative sensory register.

**Synesthctic Translation for Content Accessibility**

Providing the opportunity to access content using a different sense means opening up access to content – texts, artefacts, and media in general – to people with a sensory disability.

The synesthetic translations that can overcome sensory barriers are based on three main transferrals:
1. From written language (verbal and/or figurative) to oral language (and vice versa);
2. From written language (verbal and/or figurative) to tactile language (and vice versa);
3. From sonorous/musical language to visual language (and audiovisual).

There are cases and practices of such synesthetic translations in the media, aimed both at a specific audience, with sensory disabilities, and in part also at a general audience. We have already given examples of the musical-to-visual type of translation in paragraph 3 above. Below, we will discuss a number of cases that illustrate the synesthetic translations of types 1 and 2, for a visually impaired audience.

4.1 Visual to Oral Translation: Audio Description

Audio description a technique for making any visual/figurative content, often a movie, accessible by means of voiceover added to the original sound track – in the case of a film, voices, music, sound effects – in order to describe what is happening on screen, requires synesthetic translation. This is a complex task, not only because of the multiplicity of possible descriptions – of a scene, the characters, their actions, the events occurring on the screen – and the uncertainty of their being able to suggest visual mental images; but also because things can be seen in a variety of ways, and therefore any description requires a preliminary observation, a visual exploration and interpretation by one party in favour of another observer.

For a specific example, see Blindness (Director: Meirelles, 2008), a film based on the novel Ensaio sobre a Cegueira (1995) by José Saramago, for which an audio description is available both in the novel's original language, Portuguese, and in English.

On comparing entire scenes with the corresponding audio description, Bustamante (2011), a Portuguese native speaker, intent on drawing up his doctoral thesis, revealed a number of strange incongruities. In one scene, for example, in which a plate is filmed up close (20'54"), the Portuguese audio description says "Na mesa, um prato com batatas cruas" (On the table stands a plate of raw potatoes), while the English version of the same scene tells us that what is being represented are "oranges". In actual fact, the roughness of the surface might suggest the latter, but in any case, this means that the visual mental image induced in the viewer by the audio description depends on how another observer has seen and perceived the scene, and is therefore a doubly mediated image: first, by the perception of a third party; and secondly, by the language, words and style used by said third party in making the description (Riccò, 2012a).

4.2 Visual to Tactile Translation: Tactile Graphics

Les mains regardent, the title of a famous exhibition held in Paris in the late ’70s and in Italy a few years later (at the National Gallery of Modern Art, in Rome, in 1980), clearly expresses the concept and the possibility of sensory transfer of content.

According to curator Danièle Giraudy, the exhibition was inspired by the curiosity of a blind child, who asked her an odd question: "What colour is the wind?" According to Giraudy: "our
five senses don’t work properly, while the blind's four senses work miracles”, teaching them to "find their way by following a scent, detect a smile with their fingertips, and tell from a person’s voice if they are feeling tired, or if they are gentle and kind" (Le mani guardano, 1980, p. 9, my Engl. Tr.). The exhibition was the product of discussion among blind people, researchers, architects, physicians, sculptors and animators on how the blind can enjoy art. The project was created as an opportunity to reflect on the potential of the tactile sense and on the way it was inhibited by the communicative environment, at a time when “do not touch” was an imperative everywhere. You could “touch” at the supermarket, but not in the museum.

Table 1  Relationship between sensory qualities and printing techniques. The list includes the special printing techniques of two Italian companies: Grafiche dell’Artiere (known for the high quality of its prints) and Gruppo Cordenons (producer of technical papers employing innovative sensory solutions). The printing techniques are listed in increasing order of the potential they offer for extra-visual recognition.

<table>
<thead>
<tr>
<th>Printing techniques</th>
<th>Visual sensations</th>
<th>Extra-visual sensations (tactile, proprioceptive, olfactory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset printing + scented silk screen</td>
<td>Maintains the visual properties of offset printing</td>
<td>Use of scented inks permits orientation and providing of information on the subject represented. Not always perceptible to the touch</td>
</tr>
<tr>
<td>Hot foil stamping</td>
<td>Glossy/matte contrast is easily perceived</td>
<td>Texture is perceptible to the touch, but relief does not permit recognition of letters or shapes with eyes closed</td>
</tr>
<tr>
<td>Offset printing + glossy/matt varnish</td>
<td>Glossy/matte contrast is easily perceived</td>
<td>Texture is perceptible to the touch, but relief does not permit recognition of letters or shapes with eyes closed</td>
</tr>
<tr>
<td>Letter press printing</td>
<td>Maintains the visual properties of offset printing</td>
<td>Surface print is perceptible to the touch, but not sufficient to permit recognition of the object represented</td>
</tr>
<tr>
<td>Blind embossing</td>
<td>Relief is visually perceptible depending on the angle of the light</td>
<td>Letters and drawings can easily be interpreted with proprioceptive exploration, both on the front in relief and on the engraved back</td>
</tr>
<tr>
<td>Offset printing + blind embossing</td>
<td>Has the visual properties of offset printing, with the addition of relief, which is visually perceptible depending on the angle of the light</td>
<td>Letters and drawings can easily be interpreted with proprioceptive exploration, both on the front in relief and on the engraved back</td>
</tr>
<tr>
<td>Offset printing + thermography</td>
<td>Very marked contrast between glossy and matte</td>
<td>Relief can easily be interpreted with proprioceptive exploration</td>
</tr>
</tbody>
</table>
The Ways of Synesthetic Translation: Design models for media accessibility

| Laser engraving | Engraving is visually perceptible under light at all angles | Letters and drawings can easily be interpreted with proprioceptive exploration, both on the front in relief and on the engraved back. Great flexibility in texture solutions |

Figure 1 Examples of tactile translations of visual pictograms made by students (Visual Design Studio Laboratory, Proff. D. Riccò, L. Gunetti, A. Andriani, Degree in Communication Design, Politecnico di Milano, A.Y. 2015/16). Students: G. Pinotti, L. Ferrari, C. Cocchetti, A. Pavesi (above); A. Candido (below). Photos: D. Riccò.

The exhibition is of interest to us because it demonstrates the potential and the variety of ways in which content can be transferred from visual to tactile. These are translations in which the “continuum ranging from the literal to the poetic” that Darnell speaks of (Darnell, 2002, p. 372, my Engl. tr.) with reference to interlinguistic translation is inevitable, as it is in any kind of translation. In other cases, we also find solutions in which translation faithfulness is easier to achieve, even between different registers (the visual and the tactile).

Fabio Levi (2015) – a historian with twenty years’ experience studying access to culture for the visually impaired – perfectly describes and illustrates the communicative potential of translations into tactile relief drawings. Tactile translation inevitably requires simplification over the original visual prototext, as our capacity for tactile discrimination is much less refined than the corresponding visual sense. But a process of simplification takes place even when we translate a text from visual to visual, proceeding, for example, from iconic representation to abstraction of representation of the same concept, or object. Levi notes that, even though we have been dealing with relief drawing for almost two hundred years, it is still underused in communication with the visually impaired (Levi, 2015, p. 63). This is due to prejudice about the ability of the blind to perceive images, but is in fact inexplicable given the tactile solutions offered by today’s printing techniques (Table 1).
Our teachings as part of the Degree in Communication Design (Visual Design Studio Laboratory, Proff. D.Riccò, L. Gunetti, A. Andriani, Politecnico di Milano, A.Y. 2015/16) have offered us an opportunity to experiment with translation of simple objects in a progressive process of simplification of representation that begins with a photograph, moves on to graphic representation and pictograms, and ends with verbal and tactile translation of the configuration of an artefact. The techniques employed – as they are intended for creating a single specimen – are necessarily manual (and digital), but they are inspired by industrial printing techniques (Table 1), and they sometimes offer stimuli for coming up with alternative technical solutions (Figure 1).

**Final Considerations**

The technical solutions for printed material targeted at the sighted could also be perceptible, from a tactile standpoint, by the blind. Communication strategies, however, privilege the aesthetic pleasure of exploration, the surprise, the identity and originality of the solution, all too often neglecting the opportunities for transferring information from a tactile standpoint to printed material, making it more accessible and usable in certain conditions of sensory disability. The authors agree with Levi (2015) when he says that the blind and visually impaired face concrete and specific problems; however, we also believe that certain communication design solutions targeting the blind – for example, communicative artefacts that employ embossing techniques – could, with a targeted design, and at no additional production costs, be made accessible to everyone, whether or not they are affected by sensory disabilities.

**Acknowledgements:** my colleagues of the group of research “Design and Translation” (Department of Design, Politecnico di Milano), and my students of the Visual Design Studio Laboratory (Politecnico di Milano, A.Y. 2015/16).

5. References


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Castel L.B. (1735). Nouvelles expériences d’optique et d’acoustique, Journal de Trévoux, August (pp. 1444-1482/1619-1666), September (pp. 1807-1839), October (pp. 2018-2053), November (pp. 2333-2372), December (pp. 2642-2768).


Dina Riccò


About the Author:

Dina Riccò, Ph.D. Degree in Architecture, Ph.D. in Industrial Design. She is a Researcher at the Department of Design and a Professor of Communication Design at the Politecnico di Milano. Her main research areas are visual music and synesthesia.
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“Over fifty years the Design Research Society has been fundamental to developing and supporting the field of Design Research. In that time many influential and innovative conferences have been held and the 50th Anniversary in Brighton conference continues that tradition. The breadth and depth of design research represented in these proceedings is extremely impressive and shows, I think, not only how important design research has become, but also the considerable potential that it holds for the future.”

- Professor Nigel Cross
PRESIDENT OF THE DRS