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Visual art experiences through touch using haptics

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Abstract

Dual-sensory impaired person's perception of visual art (paintings, photos, statues etc.) may differ to those who are sighted. In such cases approaches defined as environmental description can be used to enable experience of different art forms. Environmental description can be portrayed through touch. (Lahtinen, Palmer & Lahtinen, 2010.) Art elements are portrayed through haptics i.e. touch messages during interaction between two people. Haptics are formed by combining haptemes, i.e. they obey the grammar of touch. This originates from social-haptic communication (Lahtinen, 2008). In this article these grammatical elements of touch are analysed further, especially in connection with experience of perspective.

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1. Introduction

One part of social-haptic communication approach consists of either drawing or mapping out the core elements of the particular art exhibits onto a person's back or arm. This research was designed to experiment the possibilities of drawing two and three dimensional objects as well as distance, depth and perspective experience.

This article will examine and reflect how visual art can be experienced by touch and body drawing with an acquired deafblind person using social-haptic communication. Social in this context means sharing visual information between two people, the deafblind person as a receiver and the sighted person as a describer. When the hearing and sight deteriorates due to an acquired deafblindness condition,

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communication consists of multi-layered and adaptive methods. A person's expressive language, be it spoken or signed, usually remains unchanged, but the methods of receiving information could change many times during a person's lifetime. Lahtinen's (2008) research work explains how information shared by touch can be used and adapted either as an augmentative method to language description or independently.

One aim of this research is to expand the social-haptic communication (basic haptics and haptemes) from its original use, i.e. as a support for verbal communication (Lahtinen, 2008) to include environmental description in connection to visual arts (paintings and still photographs). The other aim is to investigate how to interpret visual arts onto the body using these methods and thus enhance the art experiences through touch. This project is a pilot study in order to evaluate how compatible and flexible the haptics are in interpreting visual arts. This being a pilot study we experimented several different approaches to the study question and categorised them according to compatibility or applicability for a certain group. For example touch is used differently when describing pictures to a totally blind person versus to a person with limited field of vision. The use of social-haptic communication enhances the portrayal of the image through touch.

1.1. Background of description

Description has always been used for persons with visual impairment. Various professional groups use description in their work in order to clarify their actions and support their instructions. They verbalise their visual view, for instance mobility instructors describe the space and routes, IT instructors describe the computer screen, keyboard and other equipments, while physical education instructors describe body movements.

Description is included in the curriculum in education in various professions such as in sign language interpreter and audio describer education. The audio describer education started in Finland in 2005 with the support of Ministry of Education organised by Cultural Services for the Visually Impaired. (Turunen, 2005.) Traditionally, description for persons with visual impairment includes audio description of visual arts, movies (DVD) and theatre. This method has made visual culture available for persons with visual impairment. Interest towards description has been increasing, for instance due to descriptions (narration tracks) inserted to movies (DVD) (see Kulttuuritapahtuman kuvailu näkövammaiselle 2010; Kuvailu, 2010). There are no studies on wider, multimodal use of senses as part of receiving description.

In sign language interpretation for people with dual-sensory impairment or deafblindness, environmental description is included in the interpretation. It supports language interpretation for the deafblind (signing in free space, hands-on-signing) and guiding a person or it can be a separate action, such as an independent description of a target. Thus, description was included in the sign language interpreter education as early as in 1980's.

Description is used to present visually-impaired person with an additional supply of knowledge about visual events, such as colours, shapes, sizes, locations of objects within a room, placement of different items within a picture and relations between objects. In this context we discuss the element of touch within the description process.

1.2. Environmental description by many means and senses

In the field of deafblindness and dual-sensory impairment, the concept includes descriptions of general, physical, personal and social space and action, where visual (sight), auditory (hearing) and other sensory information is shared with the receiver either by language (spoken, written or sign language), vocally or in another agreed form (pointing, touch, drawing, movement, etc.) (Lahtinen & Palmer, 1996,

1997; Raanes, 2004). Possibilities to use various senses (sense of touch, movement) during description should be considered as well as how well the person's own personal sensory perceptions can form a basis for the description.

Environmental description supports the multimodal sensory perception of a person with visual impairment. Description supports visual information for partially sighted and blind persons, auditory information for hearing impaired persons (text description) as well as both visual and auditory information for deafblind persons. These can be connected with exploring targets haptically, such as feeling various objects, statues, by hands (Klatzky & Lederman, 1993).

1.3. Haptic and touch

Concept of haptics related to the exploring of the target includes the sense of touch and exploring the environment, where skin, muscles and joints are part of the data collection system. There is no specific sense for that. Then a reciprocal interaction is experienced in contact with the environment. (Gibson 1962, 1966/1983) In exploring the target model haptic information is used. The person can with her hands distinguish for instance, size differences, forms, surface qualities and materials (Hirn, 2009; Klatzky & Lederman, 1993, 603-604). Haptics as part of description means either receiver's independent exploration of targets by herself or together with the describer. In the latter case the person's perception is combined with her touch and movement information. This is related even with information from gravity.

A touch event can be an independent action or it may happen in interaction with another person. In an independent event a person touches an object or s/he is touched (Katz, 1925/1989). In communication situation it is a question of an active, meaningful touch, when the sender touches the receiver. In this research social-haptic is strongly connected to the sharing of art information and holistic orientation of the body. Haptic is a generic concept and tactile is a more limited subconcept. Social-haptic touch includes interaction between skin, active touch and environmental orientation-touch. (Lahtinen, 2008.)

2. Haptics and haptemes

Lahtinen (2008) describes widely how various targets can be conveyed and described onto the body by touch. Single messages shared by touch on the body are called haptics. Along with verbal information they are related to holistic movements, sharing of functionality and perceiving the environment as well as orientation. A haptic consists of variables of touch i.e. haptemes. A hapteme is received through a body channel, within this framework the whole body is capable of transmitting touch information. A hapteme is a grammatical variable related to touch, an element for building and identifying haptics and of separating individual haptics from each other. Haptemes of movements are recognised as the direction of movements, change of directions on the body, directions between people, pressure, speed, frequency, size, length, duration, pause, change of rhythm and shape. Figure 1 shows the relations between social-haptic communication, haptics and haptemes.

An example of haptics and haptemes in relation to an art exhibition would be a picture frame drawn onto the body. It consists of a square shape drawn onto the body. That is the haptice of the picture frame. When moving in the shape of the square the haptemes (variables of touch) included are: number of fingers drawing it, length of the movement horizontally, changes of direction in the corners, length of the movement vertically, amount of pressure used.

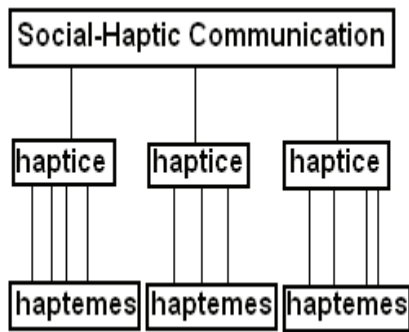


Fig. 1. The relation between social-haptic communication, haptices and haptemes (Lahtinen, 2008, 147)

Haptices include sharing a personal body space, meaningful touch-contact, context and using different communication channels. Social body space includes the body areas involved in sending and receiving haptices. One or two hands can produce messages by using different hand shapes and orientations. Haptices can be used in sharing multidimensional meanings. A single haptice consists of many layers of messages at the same time (simultaneous multidimensionality). With training the use of haptices the body areas used in perceiving widened and the perceivable movements became smaller. Haptices are divided into categories, which include: confirmation system, social quick messages, body drawing, contact to the people and the environment, guiding and sharing art experiences through movements (Lahtinen, 2008).

2.1. Extension of art experiences

Body drawing is carried out spontaneously in real time, in joint action systematically. Interaction between the describer and receiver may be a one-way description or a dialogue. It can be divided into functional dialogue, reciprocal description supporting sensory perceptions, telling and pointing in front of the target, reciprocal description by drawing or movements and exploration of objects. Drawing onto back is presented as an example of how to use body in receiving description. The elements of haptemes were used in describing different forms. We experimented on how two and three dimensional information (photos of aeroplanes) could be expressed and interpreted through touch by visually impaired people. The method included drawing different shapes and pictures onto the back by one hand or two hands.

Art description can also be examined as an interactive process (Figure 2) when a describer describes a target, e.g. a painting, photo or statue. When the receiver is an active person who asks questions and acts upon the answers, the description becomes interactive. A functional description gives the receiver an opportunity to move and make the described movement with her own body. Sharing or teaching art gives an example of an active listening to a description while carrying out a certain performance. The describer may also connect her/his own body movement into a description, and let the receiver feel it. There are 8 different categories of description methods and interactions in figure 2 and out of those 7 categories can be augmented with the use of touch.



Fig. 2. Description according to interaction and methods (Lahtinen et al., 2009, 43)

The extension of description may vary depending of the extent of the target's contents. It can be naming a target using one word, or an extended description. Lahtinen, Palmer & Lahtinen (2009, 22) divide description into four entities. Description of basic characteristics is carried out almost by everybody on daily basis. For example "There is a picture on the wall." Then a target is named and something is told about it. Basic description includes the expression of basic information on the target. A more detailed description means a more precise description of the target for example "There are sunflowers on the painting." An extended description can even comprise of information that is not immediately visible of the target, such as background of an artist, family history or events during different eras for example "The painting was made by Vincent van Gogh, who was not only well-known artist, but who also suffered from manic-depression on various occasions." Description can vary a lot with respect to time. Those who use drawing onto back usually agree the use of the method beforehand.

Description can be divided into different areas. In Figure 3 description is divided according to language and methods. In the figure, we treat all language-based description methods as verbal. This includes spoken, signed and written language forms. The model of the target here means a physical reproduction of the object in question but it may have a different shape, size, and surface material. To support the art description, miniatures or three dimensional tactile pictures may be constructed, if the exploration of the target with hands is inconvenient or nearly impossible, such as with large statues. Drawing onto back and body has given new and different possibilities to experience for instance art. Targets are drawn onto the person's back; paintings, drawings, pictures. As a large surface, the back gives possibilities for describing even big targets compared with the small size of a palm of a hand. (Lahtinen et. al., 2010.)

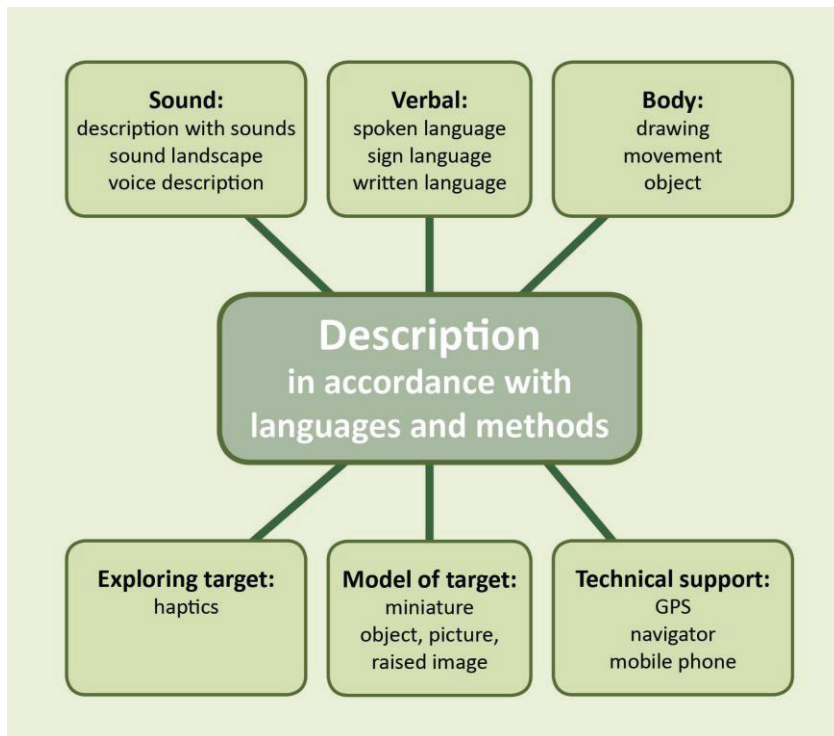


Fig. 3. Description according to language and methods (Lahtinen et al., 2009, 42)

3. Results

In this pilot study we wanted to investigate which methods of description would be best applicable for visually-impaired people. Then we narrowed the scope of the research to the different uses of touch in relation to other types of description. The use of for example verbal and touch-based methods in description enables a describer and a receiver to interact and share different visual art experiences and forms through haptics. This allows the sensory impaired person to gain unique insight into how small or large the object is in reality and enables the person to have a more realistic experience of the arts as a whole. A haptice can be active and meaningful action where visual and auditive information is interpreted through touch either independently or supporting language information. In this study the shape and sizes were produced by fingers applying pressure and movements to map out the particular objects. Speed of the movement, order of shapes and object distances gave different interpretations.

It is possible to use receiver's back in order to draw and describe different art forms, such as an air show (Clacton Air Show, 2012). Drawing is most often done onto the upper part of the back when both the receiver and the describer are facing towards the target. This allows the receiver to use his functional vision with the support of haptices being drawn to his back. Still photos which have "visual movement" can be produced by one or two hand movements. The use of haptices presented new quality for the receiver when different expressions of moving aeroplanes were concerned.

Example in Figure 4 shows, how a serial of photographs of rapid and changing movements of aeroplanes can be indicated simply by drawing with fingers and two hands. The area of a back works as a

whole scene of a photo and visual clues of the aeroplanes and their functions i.e. flying areas. By drawing you can describe the flying routes, speed of the planes by adjusting the speed of the movements and amount (one, two or more planes) of the planes by drawing with both hands. The receiver will even perceive the forms of the flight paths, locations, directions (from left to right, right to left, downwards, upwards), changes in directions (same direction, different directions) and relations between the aeroplanes, height, length of flight paths, simultaneous actions and size of the flight area.

In the experiment there were two informants. They were able to perceive a perception of depth when the so-called orientation point, the point in front of the action was in their lower back (more on orientation point, please see Lahtinen, 2008, 136) and the aeroplanes were drawn flying onto their shoulders. Another way of describing depth and perspective was also using the peripheral areas in the body that is the sides of the informants. The default in drawing onto the body is to use body maps, i.e. 2D mapping of a 3D space, for example when describing a room space. The picture where the aeroplanes are flying inverted was drawn with a slow changing orientation of the hand. This was interpreted as a case of inverted flying.

This scenario was also tested in a real air show. In this case one of the dual-sensory impaired informants was taking pictures from the aeroplanes flying overhead (Palo, 2002; Lahtinen et al., 2010; Figure 4). The point in time when the aeroplanes were in focus for taking a picture was indicated by an addition in pressure of the hands when drawing the picture online on the back.

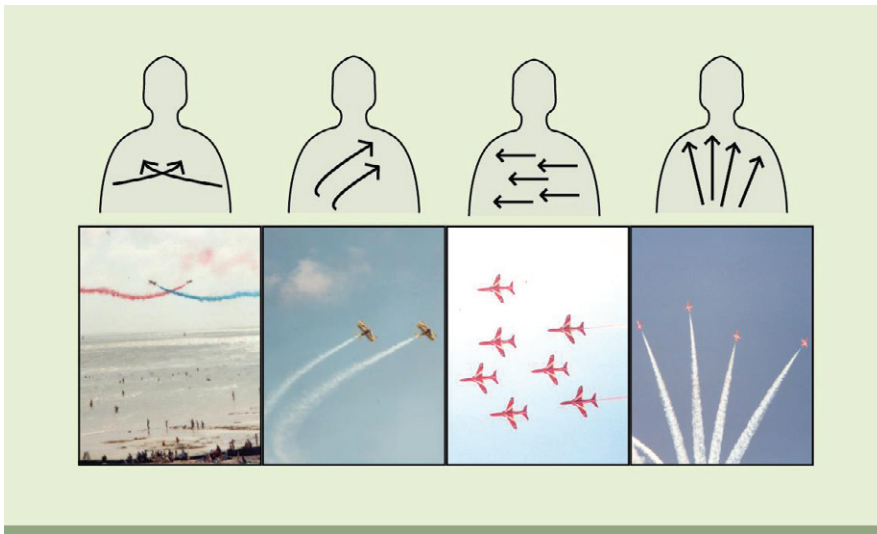


Fig. 4. Photographs of aeroplanes and drawing onto the back (Lahtinen et al. 2010, 127)

4. Conclusions

Art experiences are more than an output expressed by spoken or written language. Development of art describing by touch onto the body will give the persons with visual impairment completely new possibilities for equal services of accessing visual arts through description by touch. However, just as the availability of different description methods and their education is yet in its start phase, so are the accessible services for persons with visual impairment, which are meant to be arranged by the society.

Receivers of environmental description in all age groups can be deafblind, dual-sensory impaired, hearing impaired and visually impaired children, youth and adults. In addition, elderly persons and people

in different ages with learning problems will find the clear instructions, often as descriptions of actions, useful.

Further studies by the authors are being carried out on how many various things it is possible to describe onto back at the same time and what information receiver can differentiate in the touch. In the future, interesting areas of further research studies are for instance how two and three dimensional targets, pictures, can be drawn onto body, how shared movements are produced and interpreted and what kind of grammatical structures are connected with these.

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