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Digital Sensing: The Multisensory Qualities of Japanese Interactive Art

Emilia Sosnowska
University of the West of Scotland

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The paper presents examples of digital art in Japan and examines its roots in traditional East Asian philosophy giving the senses a prominent role in perceiving the world and enabling a perfect symbiosis between humans and machines. The research reflects on the expansion of this culturally and traditionally inspired spirituality from its original context in the socio-cultural interpretation of the natural world to contemporary digitally mediated environments. This is accomplished through analysis of digital interactive work by specific artists located in Japan, such as Kumiko Kushiyama, Masaki Fujihata and Ryota Kuwakubo.

Introduction

Technological development has a chief influence on the way the world functions and how it is being perceived. Consequently, it has an impact on the way art is produced and plays an invaluable role in the future of art and contemporary cultural debate. The aim of this paper is to demonstrate the role of evolving new technologies, in extending human senses well beyond their traditional definition. It focuses on the nature of multisensory processes in interactive multimodal art and demonstrates an urgent requirement to develop and deploy innovative hybrid methodologies which reflect and come to terms with innovation, hybridity and complexity of the artworks in question. Walter Benjamin notes that human sense perception

“changes with humanity’s entire mode of existence. The manner in which human sense perception is organised, the medium in which it is accomplished, is determined not only by nature but by historical circumstances as well” (Benjamin 1936).

Today, the media are both concerned with engaging with the array of human senses to the extent that they are largely based on the very concept of sensory language. While technology is by no means the only factor influencing patterns of perception, its specific application leads to the reorganisation of our sensory perception and draws one’s attention to the sensual reception of digital interactive art. As a result of various techniques used by artists, works of digital art communicate via different senses and represent a range of different embodied experiences. Consequently, it is urgent to abandon visual determinism in the era of multimodal art created within it, taking into account not only the sense of vision, but also all the other senses.

Sensory research

Despite the fact that in the early 1990’s the focus of cultural studies shifted towards an anthropology of the senses, this area of social debate has still not taken into account the technological and scientific circumstances of artistic creativity. This reaction to the much vaunted “visual turn” aimed to transfer the foci of social sciences to more sensually versatile spheres. Among others, Classen and Howes assert that every society has its own sensory codes and patterns and its individual sensory order is manifested in material culture as artefacts, which accordingly should be examined with an appropriate attention to hybrid forms of art, culture, and media. Referring to McLuhan, “tactility is the

interplay of the senses, rather than isolated contact of skin and object” (1967[64], 335), which is why it should be investigated and treated like one among other human senses. As long as contemporary culture rejects or underestimates the multisensory nature of human perception, the challenge to develop an adequate theoretical framework which can come to terms with technologically focused media art and culture is almost insurmountable.

The subject of multisensory experiences has been considered in an approach akin to cultural anthropology. Constance Classen scrutinises sensory perception as a cultural, as well as a physical act, noticing that tactile sensations, similar to any other occurrences of our sensory nature convey cultural values on top of purely physical attributes. In fact, the world is perceived through the senses, and sensory perception is mediated by the cultural construction (1997). Furthermore, Karen Cham (2009) states that aesthetic value is culturally coded. Accordingly, since perception is traditionally connected with human evolution, the fact that present-day culture is centred on sensing and perceiving reality through a range of equally important senses cannot, and indeed should not be ignored. This, in consequence, can induce alternative methods of dealing with sensory perception of digital art within the visual or alternatively multisensory digital culture theory. In interaction, the physical engagement and a certain sensation become involved in action. In the era of digital culture we now inhabit, the hierarchy of the senses shifts and auditory or tactile experiences are becoming equally important as sight in the process of communication, connectivity or perception. As Marshall McLuhan stated nearly 50 years ago: “we had extended our bodies in space” (1964, 3). Taking this into account one can clearly see the effects of this expanded force of perception in today’s world, not only in novel military applications, but also in everyday devices such as vibrating mobile phones, e-books, among other tangible tools; or distinct examples from the world of art, such as *Tenori-On* by Toshio Iwai, or *Bitman* by Ryota Kuwakubo. Nonetheless, clear boundaries between individual senses are blurring into one sensory and versatile experience.

Human perception embodies a fast and constantly active processing of multiple present sensory modalities. For many years psychologists have undertaken exhaustive research in this area (Gregory 1970, 1974; Gibson 1966, 1972); however our knowledge of the significance of new means of science on sensual perception of art is still to be vastly expanded. In this context Laura Marks considers sensual experience and multi-sensory perception in compilation of essays, focusing on the notion of ‘haptic visuality’ in films and video works. Other works reflecting on sensual research oscillate in the historical and anthropological scope of

art (Classen 1993, 1994, 2005). Further works elaborating on sensoriality, in relation to various human senses are being conducted in other areas of applied research, such as film study and visual anthropology (Grimshaw, Ravetz, 2005). The matter of sensual perception has also been an issue for the sociology of the senses as it has been initially proposed by Georg Simmel (1924; 1997). In his essay *Sociology of the senses*, Simmel not only argues about the meaning of sensory perception and its influence on social life and human coexistence, but also about its enormous influence on human interaction. Intellectuals, as for example the psychologist Gibson who worked on the ecological theory of perception (Gibson, 1966, 1979), tried to question the body and mind dualism by treating the body as not only a source of experience but of knowledge as well (See Lera Boroditsky and Michael Ramscar research, 2002). Therefore the paradigm of this embodiment designates an integration of body and mind. Consequently the notion of embodiment, to some extent, changed the approach to body and mind duality. Many contemporary theoreticians try to challenge the domination of the sense of vision; as David Howes calls it “the hegemony of vision in WESTERN CULTURE” (2003, *Foretaste XII*). Furthermore, he continues, that “this dominance is primarily due to the association of sight with both scientific rationalism and capitalist display and to the expansion of the visual field by means of technologies of observation and reproduction” (Ibid.). While the text focuses on analyses the multisensory experience, it also contributes to the debate on sensual anthropology in investigating the means of perception in the field of interactive installation art. Although for many centuries the sense of sight has continually been favoured, the importance and significance of other senses is surely undoubted. Furthermore, apart from the fact that human perception is based on the multisensory experience, where all the senses play an equally important role, sensory perception remains a vital element of all aesthetic experiences (DeWitt H. Parker 2004, Hekkert 2006). Accordingly, most of the human knowledge has its beginning in the sensual realm. In other words, one could say that every experience starts from the senses, as the sensory organs serve as receptors through which human beings are able to know and feel the external world.

Interactive Art in Japan

As the ‘Device Art’ movement originated in the land of the rising sun, this paper focuses exclusively on Japanese artists. The presence of the Japanese artists related to the new media scene has been evident since the growth of the digital media environment. Major international festivals in Europe, the most established being

Ars Electronica in Linz, Austria or SIGGRAPH organised across United States and Asia, are the main events bringing together digital media artists and theorists from the Western, as well as the Eastern corners of the world. The potential of art created in an Asian context is acknowledged in works by various new media art scholars, such as Lev Manovich (2003), Marshall McLuhan (1998), or Ryszard Kluszczyński (2010). While Manovich observes that Japan has a strong voice in digital media debate, McLuhan refers to the Japanese approach to technology inspired by Zen Buddhism, and Kluszczyński elaborates on an instrument strategy, relating it to 'Device Art'. Accordingly, the names of artists, such as Toshio Iwai or Masaki Fujihata are internationally renowned and recognized also outside Japan. Paradoxically, media art discourse reflects almost exclusively on the Western perspective. There has been relatively little theoretical debate, with literature in the field, limited to several names and writings. As such, one of the most prominent voices in the discourse belongs to Machiko Kusahara (2001), Japanese artist and new media art curator, philosopher Hiroshi Yoshioka (1997), Tomoe Moriyama (2006), or Mauro Arrighi (2011). In short, Kusahara introduced the notion of 'Device Art' to the international art world, Yoshioka comments on the concept of media art in the West and Japan, Moriyama shares her perspective on Japanese media art scene, and Arrighi contributes to a debate on Japanese media art and animism.

This study sets out to examine the interface between digital creativity and human sensory features enacted in interactive artworks in this culturally specific context. The following section provides a brief overview of relevant Japanese ritual and spiritual belief, making reference to Japanese thinkers such as Machiko Kusahara and Tomoe Moryama among others, in order to demonstrate the significant impact of such perspectives on a potential aesthetic reading of digital media art from and in East Asia and Japan in particular.

Tradition

Outlining the background for artistic practices adopting technology and interactive interfaces, and considering their historical background, must acknowledge the unique character of Japanese philosophical thought. Japanese culture with its foundation in a broader East Asian philosophical tradition, giving priority to a monism of body and mind connected with Zen Buddhism and Shinto ideology, fully recognises the importance of the senses in engaging with and perceiving the world. Eastern philosophy implies that between the subjects and the object, as well as mind and body, exists a relationship which induces harmony, and the

human being is treated as a complete organism, unified in mind and body. By means of interactive technology certain aspects of art have gone through a transformation. To name but a few shifts: new tools have been developed, creative collaborations have brought together art and technology. Artists and engineers in Japan often team up with major electronics companies like Canon and use their funding to implement their prototypes. Despite this modern industrial and commercial setting the influence of Shinto on current Japanese art is clear and is confirmed by artists and intellectuals who declare their inspiration deriving from the body of Japanese traditions comprising Shinto belief. Academics such as Moriyama, Kusahara, or Yoshioka stress this notion in their writings concerning contemporary research in art (Moriyama 2006, Kusahara 2001, Yoshioka 1997). Shinto belief has its foundation in the ancient heritage. This tradition of Japan asserts the “existence of spiritual life in objects or natural phenomena called *mi* (the god) and *tama* (the spirit)” (Kitano 2006, 1). Many theoreticians of contemporary art in Japan refer to Shintoism as a major influence on Japanese sensibility (Arrghi 2011, Kitano 2006, and more tentatively Kusahara 2013). This applies to the natural world and inanimate objects and devices which are after all, at least at a molecular level, made from natural elements and substances, metals, and even plastics which come from hydrocarbons formed from organic materials. This holistic view of life also prevails in the perception of artefacts. Consequently, the majority of Japanese religions eschew notions of dualism and embrace elements of animism (a view that sees spirit in every component of the world, not only human beings). Referring to Kenny KN Chow (2012), I suggest that this culturally distinct and traditionally inspired spirituality is transposed from natural or social environments to a present day technological environment of sophisticated multimedia devices and tools used widely in interactive art and digitally mediated environments. Moreover, in such multimodal environments, interaction enables and promotes multisensory experience and intersects with the fluidity of aesthetic experience. All of the examples discussed refer to physical engagement with an artwork and multisensory experience is often an integral part of artistic creations.

Japanese electronic art and Device Art movement

Technological development has always been a great inspiration for human beings, a factor of progress, and a possibility for new experiences. As McLuhan states: “(o)ur new electric technology that extends our senses and nerves in a global embrace has

large implications for the future of language” (McLuhan 1967, 80). In Japan, extensive research on novel technologies and their creative use has among other things resulted in the notion of ‘Device Art’. Hiroo Iwata, engineer and artist initiated Device Art Project in 2004. The idea for the title of the project ‘Device Art’ derived from Iwata’s research activities and blending media art and interactive technologies. The name itself was inspired by Ryota Kuwakubo – discussed below – who once called himself a device artist. ‘Device Art’ has evolved into a new artistic movement at the leading edge of cultural and creative thought in Japan and elsewhere. Its principal characteristics indicate the use of mechatronic devices, new materials and the convergence of innovative technologies, and new ideas in art and design. Artists using everyday components assemble them together with the most recent technologies creating artworks in the form of devices (Kusahara 2008). The concept of ‘Device Art’ is conceived as a modern take on traditional Japanese culture. In line with the critical perspective offered by Kusahara (2008) and Arrghi (2011), the above concept reconsiders relationships between science, technology and art, taking into account historical as well as contemporary perspectives. As such, this form of media art combines art and technology with popular culture, design and playfulness. An open minded, ludic approach to creativity allows these artists to engage with developments in new technology and the possibilities given by new materials as well as acceptance of the very fluid border, or rather lack of it, blends amusement, art, technology, design and popular culture. As we will see in the analysis of work by Ryota Kuwakubo this approach is well developed in Japanese art. Furthermore, Mauro Arrhgi has taken a similar stance. The artist and researcher argues that the religious basis present in Japanese culture are an essential element which underpins the development and popularisation of new media art in its specific forms of hybrid art and Device Art in Japan (2011). Theoreticians, such as Mariyama (2006) and Kusahara (2001) among others, repeatedly refer to the historical foundations on which their work is built, including ancient religious beliefs, folk culture and linguistic structure, as a significant determinant of the characteristic approach these artists have developed.

While some of the artists use new technologies as tools assisting in their project design, for others the new technology itself is a new medium carrying aesthetic values and enriches participants’ experience. Nevertheless, what all of them share is that they represent a current of digital art which routinely deploys multimodal technological devices. All of the works presented here serve as practical examples of the potential for embodied experience and multisensory engagement with an artwork. They

illustrate particular aspects of interactive artwork, such as individual artistic strategies used in their production, the processes involved, modes of participatory engagement, and the potential avenues and opportunities they present for the bodily experience.

Sensory engagement in interaction

Each of the works further discussed in this paper demonstrate a variety of applications and critical standpoints. Yet, they all constitute the extensive array of artistic representations which in their aesthetic perspective take into account human senses in art perception. The range of artists presented in this paper ranges from those who started experimenting with technological devices in the early 80s – like Masaki Fujihata, to those who are specifically focused on a particular sensory feature - the sense of touch – like Kumiko Kushiyama, to Ryota Kuwakubo, for whom multimodality of an object determines spectators’ or users’ multi-sensory experience, and who exemplifies the ‘Device Art’ movement. All of these artists challenge the classic artist-artwork-audience relationship and are part of the notion of a paradigm shift from the art object as something to be observed or hung on a wall to something to engage with directly through multi-sensory experience and aspects of embodiment. It is also appropriate to characterise two different sides of the bodily engagement: the body, as a foundation of immersive experiences and processes of cognitive interpretation of this interaction and immersion (Siemanowski 2010).

Ryota Kuwakubo

is a digital artist and a pioneer of Device Art movement. At the beginning of his career he had been working on electronic toys. The artist’s initial fascination was chiefly related to actuators and sensors. The earliest works that he created were not considered art objects, but rather electronic devices and games. Throughout the years his creative explorations have led to projects which have more critical and questioning character, but nevertheless remain grounded in the basic concepts of ‘Device Art’. The work examined here, *Nicodama* (2009) is an interface in a form of two half spheres, resembling hyper-realistic eyeballs. The participant is invited to lift the ‘eyeballs’ and place them freely in the space. The only limitation in order for the work to function is that both small hand held devices need to be arranged in a straight line – just like ordinary eyes.



Fig. 1 Ryota Kuwakubo, *Nicodama*, 2009, Courtesy of the artist

The work is comprised of a small transceiver based on an infrared principle. On account of a magnetic mechanism installed at the back of the work, *Nicodama* can be aligned anywhere in the

space. To interact with the artwork the devices need to be held and actuated accordingly by the participant, giving the user control over an animated creature, and enabling physical engagement. In the text accompanying the Device Art exhibition the artist refers to Japan's historical past and that people

“felt [that] each of the objects around them had a spirit, and treated them with respect and care. Today we share a more objective and scientific approach in seeing things. While there is no doubt that it is important to maintain this attitude, the capacity for empathy is equally important” (Kuwakubo 2009).

The blinking pair of ‘eyes’ reacts to the participant’s engagement and the work can only operate and indeed exist fully through this physical interaction. This artwork, along with some other works by Kuwakubo have been developed and made available as a commercial product, proving to be one of many examples of blurred boundaries between art and entertainment in Japanese culture. Production of gadgets and toys by artists is a common practice in Japan (Kusahara 2006). This is a two-way process including those digital devices as exhibits shown within art galleries as well as being mass produced by large companies and exhibited during art fairs or in commercial spaces. When interviewed about his work Kuwakubo declared that multisensory experience of the recipient serves as one of his inspirations, whether the work deploys complex software or simple manual mechanism (Kuwakubo 2013). Throughout his career Kuwakubo’s inspiration and artistic practice have evolved and slowly started to concentrate on the behavioural side of an artwork and the spectator’s daily relationship with electronic devices. A continuing concern with how people react to innovations in technology is what often motivates his creations. The artist is interested in the whole bodily experience and multimodality of it; by his reckoning, no aesthetic experience can be removed from its multisensory aspect. The experiences being provided by technologically aided artworks lie at the core of his interest in establishing communications between the people and machines. This physical engagement in order to complete the artwork is at the core of the concept.

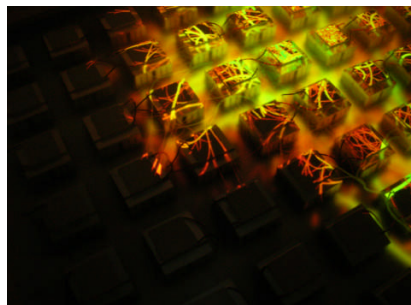
Kumiko Kushiyama

is another example of an artist who combines an interest in the human body with technologically aided objects and machines. Her engagement encapsulates all stages of creative development, from coming up with ideas to designing and engineering completed, leading edge artworks and devices. Kushiyama uses hybrid

practices and fuse elements of science, engineering and fine art practice. In the early 2000's her works began to oscillate predominantly between the sense of touch and different qualities of haptic experience. From the year 2003 she started developing and using tactile displays, focusing directly on a tactile interaction. The work exemplifying this research is called *Thermoesthesia* (2006).

In order to provide a whole spectrum of sensory stimuli when touching the artwork, and to give the recipient a real sense of temperature occurring in the natural world, Kushiyama uses original thermal sense-displays. This enables her to create installations which not only give the possibility to interact by touching the surface of an interface, but also to sense other haptic qualities of the given piece, such as its temperature. By adding actual thermal properties to the images representing warm or cool substances the artist tries to recreate all the sensory features as faithfully as they occur in everyday life.

Fig. 2, 3 Kumiko Kushiyama, *Thermoesthesia*, 2006, Courtesy of the artist



Thermoesthesia gives the recipients the opportunity to touch the work and experience the physical tactile engagement and also to interact directly with the images being part of the artwork. The displayed imagery ranges from leafy visualisations with warm toned floral patterns to cold ice crystals and snowflakes in wintry whites. The interaction with these simulated physical phenomena allows recipients to experience the nature occurrences in a different manner, in an artificially created environment, which resembles the natural one. As such, if the image represents cool temperature, the touch sensation feels cool as well. The intention of Kushiyama is to provide the opportunity for rediscovery of the world as we know it in the immediate embodied engagement with the work (Kushiyama 2006). The artwork encourages the playful exploration of perception processes through haptic interaction between computer generated images and participants. The work represents an attempt to engage the recipient in sensory immersion. What influences perception of this artwork is the fusion of the aural and tactile in the form of gentle sounds, mechanical touch and the temperature recognition. The artist ascribes her inspiration to engineering, new technologies as well

as development of robots, humanoids and virtual reality in Japan. She uses all of these elements as basis for her own ideas as well as means of implementing her creative concepts. Paradoxically, these artworks enabled by sophisticated engineering and technological developments, based on a physical contact with machines, stimulate immediate bodily contact and awareness of its sensory modalities. When thinking about prevailing and broadly Western approaches to art and art history, Kushiyama notices the importance of historical context, social and theoretical background which always appears to be an essential part of the artistic debate. In Japan on the other hand, interactive art and media art in general seeks light and entertaining engagement with engineering and technological developments. It relates to the social background and the way art is valued and what is regarded as art around the world.

Masaki Fujihata

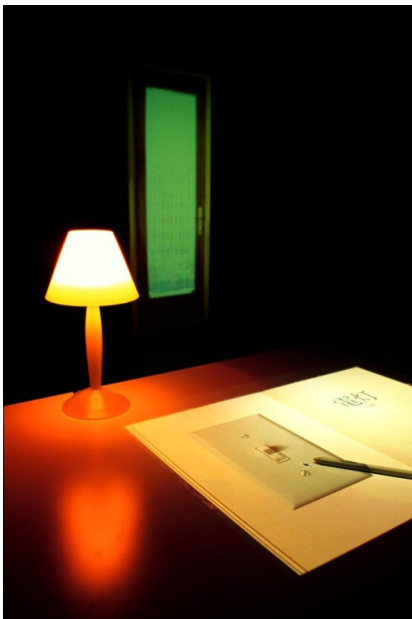


Fig. 4 Masaki Fujihata, *Beyond Pages*, 1995, Courtesy of the artist

is considered one of the first artists who contributed to instigation and establishment of interactive digital art within the framework of contemporary art in Japan. His installation *Beyond Pages* (1995-1997) remains the most recognisable and iconic of his oeuvre and digital interactive artworks in general, as it serves as a classic example of interactivity in art.¹ *Beyond Pages* is a digital interactive installation created to fit into a small darkened room, in which the real interweaves with the virtual. A desk, a chair and a lamp are the actual objects in the space and a book (the actual haptic tablet) lying on the desk, is an interface between a human and a computer.

The illustrated, virtual book, just as any other, contains words and visual images. Pictures of leaves, an apple, a stone, a door, a lamp switch, an hourglass and a simple text, can be browsed through and animated with the use of a special pen - a wireless electronic device. All of this is presented as an assembly of digital images in conjunction with acoustic signals. In this work, Fujihata deals with the fusion between the real and the virtual, combining actual objects in the room with an interface and a digital projection. As a result, he creates a coherent yet hybridised environment where physical objects are blended into an imaginary world of the artist. *Beyond Pages* requires human touch as well as involvement of the other senses. The interactive and multimodal qualities of the work enable an embodied approach to the work. Wielding an instrument which employs tactile and empowering sensation allows the participant to engage with the piece bodily and initiates auditory and visual sense perception. The experience is further dependent on implemented technology and digital

¹ Interactive art is understood as art involving participant's bodily engagement and the giving the user sense of control and a power of creation.

representation of the sensations and human experience. Participants are making sense of the works and experimenting with the medium using information processing systems in the form of an interactive book.

Conclusion

As presented in the above examples, interactive media can enable humans to externalise the whole central nervous system and engage physically with an artwork. The human physical body is treated as a whole and as such takes part in the aesthetic experience. Through interaction and embodied perception participants are able to observe and examine the space around them and perceive it in the most natural way with the aid of human multi-sensory properties, as well as by interaction between man and the machine. Moreover, every time that a human being takes part in the exploration of shared phenomena through these works created and operated by sophisticated integrated technologies, they do so from a subjective perspective of the participant. As such, the work is unique and in some sense is created anew. Each medium has some assigned qualities to it and each of the media approached differently has a particular effect on the human perception. Objects created by Fujihata exist as communication tools and are determined by the individual human sensorium and approach to interactivity. Like all the works analysed here, Fujihata's artworks do not convey aesthetic meaning unless they are being activated, explored and perceived sensorially by participants. The role of the spectator is to participate physically in the art piece and explore its interactive potential - something essentially dependent on implemented technology and digitally recreating human sensations. Participants are making sense of the works, and experiment with the medium. They use information processing systems in the form of interactive installations and objects. In conclusion, an effective critical understanding of particular artistic approaches to multisensory perception should be taken into account when investigating sensory relations in perception of multimodal art. The implications of new technologies or notions of engagement should encourage exploration of culturally rooted creative practices and acknowledge sensory features of human body in reception of artefacts. This paper only points out more effective ways of thinking about global change in communication, perception and awareness of expanded sensuality and it should be considered as a starting point to further investigation.

References

- Arrighi, Mauro.** Japanese Spell in Electronic Art, CreateSpace Independent Publishing Platform USA, 2011.
- Berque, Augustin.** Some traits of Japanese Fudosei. The Japan Foundation Newsletter XIV (5):1-7, 1987.
- Benjamin, Walter.** The Work of Art in the Age of Mechanical Reproduction, New York: Schocken Books, (1936) 1969.
- Boroditsky, Lera & Ramscar, Michael.** The roles of body and mind in abstract thought. *psychological Science* 13 (2): 185–188. 2002.
- Calza, Gian.C.** in: Arrighi, Mauro, Japanese spell in Electronic Art. Kindle Edition. 2011, Accessed June 2011. 2007.
- Cham, Karen.** Digital Visual Culture: Theory and Practice, ed. A. Bentkowska-Kafel, Intellect books Bristol, 2009.
- Chang, A & Sullivan O, C.** An audio-haptic aesthetic framework influenced by visual theory, In *Framework*, 2008.
- Chow, Kenny. KN.** Toward Holistic Animacy: Digital Animated Phenomena echoing East Asian Thoughts, *Animation* 2012: 7, 2012.
- Classen, Constance.** Foundations of the anthropology of the senses, *International Social Science Journal* Volume 49, Issue 153, pages 401–412, September 1997
- Daniels, Dieter.** Strategies of interactivity, in: *The Art and Science of Interface and Interaction Design*, Sommerer, CH et al. Springer-Verlag Berlin Heidelberg, 2008.
- Dewitt H. Parker.** *The Principles Of Aesthetics*. Kessinger Publishing, 2004
- Howes, David.** *Sensual Relations. Engaging the Senses in Culture & Social Theory*. The University of Michigan Press, 2003.
- Huhtamo, Erkki.** Twin-Touch-Test-Redux: Media Archaeological Approach to Art, Interactivity and Tactility, in: *Media Art Histories*. Edited by Oliver Grau, Cambridge, Mass: The MIT Press, 2005.
- Ishii, Hiroshi.** <http://tangible.media.mit.edu/> Accessed February 2014
- Eco, Umberto.** *The Open Work*, trans. Anna Cangogni, Cambridge, MA : Harvard University Press, (1962) 1989.
- Eisenstadt, Shmuel, N.** In: *Asian Perceptions of Nature: A Critical Approach*, eds. Ole Bruun and Arne Kalland, 48–62. Nordic Institute of Asian Studies, *Studies in Asian Topics*, No. 18. Surrey: Curzon Press, 1995
- Fujihata, Masaki.** Interview with Emilia Sosnowska, 2013.
- Gibson, James. J.** *The Senses Considered as Perceptual Systems*, Houghton. Mifflin Company, Boston, 1966.
- Gibson, James. J.** *A Theory of Direct Visual Perception*. In J. Royce, W. Rozenboom (Eds.). *The Psychology of Knowing*. New York: Gordon & Breach, 1972.
- Gregory, Richard.** *The Intelligent Eye*. London: Weidenfeld and Nicolson. (1970).

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- Gregory, Richard.** Concepts and Mechanisms of Perception. London: Duckworth, 1974.
- Grimshaw, Anna and Ravetz, Amanda (eds.)**. Visualizing anthropology. Bristol and Portland, OR: Intellect, 2005.
- Hekkert, Paul.** Design aesthetics: principles of pleasure in design, Psychology Science, Volume 48, 2006 (2), p. 157 – 172.
- Kitano, Naho.** Animism, Rinri, Modernization; the Base of Japanese Robotics. In: ICRA, 07 IEEE, International Conference on Robotics and Automation, Rome, Italy, April 10 –14. www.roboethics.org, 2006, Accessed April 2014.
- Kluszczynski, Ryszard.** Strategies of interactive art, in Journal of Aesthetics & Culture, Vol. 2, 2010 DOI: 10.3402/jac.v2i0.5525, 2010.
- Kusahara, Machiko.** Being Japanese/Being Universal- Japanese Contemporary Media Artists and the Presence of Cultural Heritage, Kobe University (Originally published in Art, Asia Pacific, 2000. This is a new version, 2001, to be published in Poland in 2002) Accessed 20. November.12 <http://www.f.waseda.jp/kusahara/beingjapanese.html>, 2001.
- Kusahara, Machiko.** Intelligent agent Vol. 6 No. 2, Special Issue: Papers presented at the ISEA2006 Symposium, Available online and Print-on-Demand at <http://www.intelligentagent.com>, 2006. Accessed February 2014,
- Kusahara, Machiko.** Digital by Design Ed. Troika Thames and Hudson, Device Art? Media Art Meets Mass Production, <http://deviceart.vrlab.esys.tsukuba.ac.jp/Kusahara-digitaldesign.php#fragment-12h> 2008, Accessed 02 February 2014
- Kusahara, Machiko.** Device Art: A New Form of Media Art from a Japanese Perspective, 2002. Intelligent Agent, Accessed on 15 December 2013.
- Kusahara, Machiko.** Interview with Emilia Sosnowska, 2013.
- Kushiyama, Kumiko et al.** Thermoesthesia: About collaboration of an artist and a scientists. SIGGRAPH'06 Proceedings, New York, 2006.
- Kushiyama, Kumiko.** Interview with Emilia Sosnowska, 2013.
- Kuwakubo, Ryota.** Catalogue text: Device_art 3.009 <http://www.kontejner.org/video-bulb--nicodama-english> 2009, Accessed on 12 November 2013
- Kuwakubo, Ryota.** Interview with Emilia Sosnowska, 2013
- Laurel, Brenda.** Computers as theatre, Addison-Wesley Longman Publishing Co., Inc. Boston, MA, USA, 1993.
- Manovich, Lev.** New Media from Borges to HTML - Introduction to The New Media Reader, edited by Noah Wardrip-Fruin and Nick Montfort, The MIT Press, 2003.
- Marks, Laura.** Touch: Sensuous Theory and Multisensory Media, University of Minnesota Press, 2002.

- Masao, Yamaguchi.** Karakuri: The ludic relationship between man and machine in Tokugawa Japan, in: *Japan at play: the ludic and the logic of power* / edited by Joy Hendry and Massimo Raveri, Routledge, 2002.
- McLuhan, Marshall.** *The Global Village: Transformations in World Life and Media in the 21st Century*, Oxford University Press, 1998.
- McLuhan, Marshall.** *Understanding Media*, London sphere books, 1967(64).
- Moriyama, Tomoe.** Curating Digital Media-Next Generation of Japanese Media Art & Exhibition. IV 2006: 664-670, Accessed on 12 December 2012, 2006.
- Robles-De-La-Torre G.** Principles of Haptic Perception in Virtual Environments. In: M. Grunwald (Ed.), *Human Haptic Perception: Basics and Applications*, Basel: Birkhäuser Verlag, 2008.
- Simanowski, Roberto.** Event and Meaning: Reading Interactive Installations in the Light of Art History. In: *Beyond the Screen: Transformations of Literary Structures, Interfaces and Genres*, edited by Jürgen Schäfer, Peter Gendolla, transcript Verlag, Bielefeld, 2010.
- Simmel, Georg.** Sociology of the Senses, in: D. Frisby & M. Featherstone (eds.) *Simmel on Culture*. London: Sage, 109-120, 1997.
- Wargo, Robert. J.J.** Japanese ethics: Beyond good and evil, *Philosophy East and West* 40 (4):499-509, 1990.
- Yoshioka, Hiroshi.** *The Present Tense of Thought: Complex Systems, Cyberspace, and Affordance Theory*, Published in Japanese, 1997.