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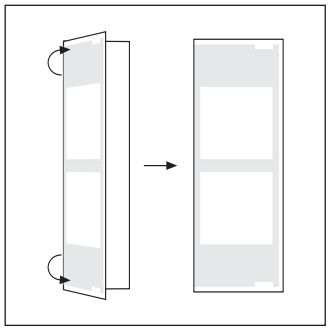

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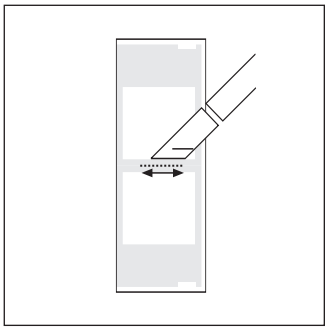

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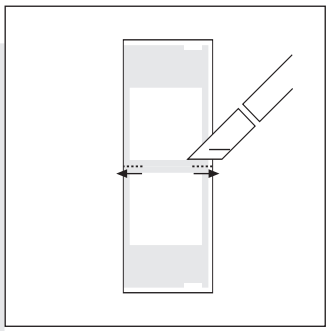

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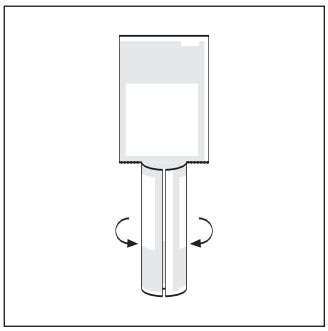

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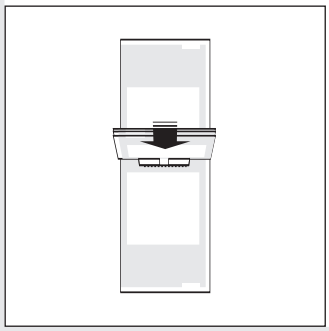

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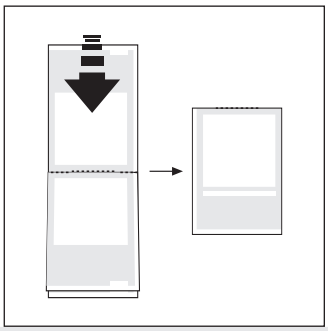

1: First, fold each A4 sheet in half along the vertical axis.

2: Using a craft knife or scalpel, cut a horizontal slot along the centre dotted line of the first A4 sheet. (pages 1/2/13/14)

3: Then cut along the dotted lines on all the other sheets. Make sure to cut to the very edges of the paper.

4: Stack the folded sheets in ascending order with the even numbers at the top. Curl the bottom half of the second A4 page (pages 3/4/23/24).

5: Thread the curled page through the centre slot of the first A4 page. Repeat this process with the third (pages 5/6/21/22), fourth (pages 7/8/19/20), fifth (pages 9/10/17/18), and sixth A4 sheet (pages 11/12/15/16) with the even pages in ascending order.

6: When all the pages have been threaded through, check the pagination. Finally, fold the booklets in half along the horizontal axis.

ON SPATIAL PERCEPTION

NINA CZEGLEDY

PROLOGUE

In the nineteen sixties the anthropologist, Edward T. Hall, suggested that people from different cultures not only speak different languages but what is possibly more important, they structure and experience space differently and as a consequence inhabit distinctly different sensory worlds (Hall, 1966). Nearly forty years later Lev Manovich proposed contemporary interpretations of space in: *The Poetics of Augmented Space: Learning from Prada* (Manovich 2002). These texts, although separated by time and place, were brought into a sharp relief on my recent visit to a Buddhist monastery in Tibet.

Tibet – often referred to as the “Roof of the World”-, has an average elevation 4000 meters above sea level. The population is estimated at 2.7 million, scattered over a mountainous area of 1.2 million square kilometers. The setting alone might affect the spatial perception of the inhabitants. Moreover, the unique environment and the traditional semi nomadic life style of most Tibetans is further influenced by a deep faith in Buddhism – a religion, which holds that the reality we perceive is, but a distorted image of the true world, a construction of our sensory perceptions. In the ancient city of Lhasa it is common to see a throng of people circumambulating (clockwise) the sacred precincts of the monasteries, chanting and turning prayer wheels. I have followed the circular flow of the pilgrims' movements throughout the

AUGMENTED SPACE

Previously, architecture served as a boundary between private and public spaces, today however, mobile phones and the internet have blurred the boundaries between discretely private and extended public environments The SMS environment for example constitutes a temporary private zone and with its portable space offers easy access and flexibility. Despite the growing popularity of cell-space however, health and privacy issues remain a subject of public debate. Invasion of private space by camera phones for example sparked a new wave of controversy and so did the swell of unsolicited SMS messages. It has been predicted that so called “super phones” will become space controllers for “anything humans are coming into contact with” (Fulford 2004). In view of this prediction public authorities such as the Canadian and Australian governments are considering the possibility of licensing wireless phone silencers, or “jammers” with an eye toward eliminating the use of cell phones and other multimedia mobile devices in selected public places. The emergence of commercial, technologically facilitated location awareness is a further illustration of potential private space exposure.

In the entertainment industry, increased access to computer games has provided unprecedented opportunities for millions of youngsters. Many of these games feature virtual navigation space, stimulating a motion

inclusive experience. Wired or wireless communication devices such as mobile phones and especially SMS (short message service) messaging have aided this process. Artists have also incorporated a wide variety of mobile and game technologies in their projects. While there are numerous excellent examples, one of the most outstanding case in point is the *Can you see me now*? project by Blast Theory in collaboration with the Mixed Reality Lab, University of Nottingham. The inventors of this project created a mixed reality of private and public space, utilizing handheld electronic devices in hybrid environments consisting of physical, virtual and game space elements. According to the authors “with the advent of virtual spaces and, more recently, hybrid spaces in which virtual and real worlds are overlapping, the emotional tenor of these worlds has become an important question. In what ways can we talk about intimacy in the electronic realm?” (Blast Theory 2001) Indeed the combination of the circumstances encouraged the technological separation of corporeal identity from personal bases of knowledge and control. As a result of remotely controlled surveillance in public and even private spaces the use of monitoring biometric devices has become a hotly debated issue. This topic alone deserves a separate analysis, but at least it is important to note the significant number of artists investigating the subject. The most comprehensive expression of these art works, ranging from texts to installations to internet works was shown in the CTRL [space] exhibition in 2002 at ZKM (Center for Art and Media) Germany. (CTRL, 2002)

Beyond conventional circumstances the blurring of spatial boundaries is more and more noticeable in sur-

clothes is further enhanced by placing small flat electronic screens throughout the store on the horizontal shelves right among the merchandise. The clothes are equated to the ephemeral images playing on the screens and vice versa, the images acquire certain materiality as though they are objects, thus the blending of electronic data into physical space is becoming an everyday reality (Manovich 2002).

While the Prada store and the Jokhang monastery represent completely different geographical and cultural settings, the sense of pilgrimage, ceremonial participation and spatial augmentation seems to be shared by both. How the sensory perception of the pilgrims/ customers differs from each other remains an open question.

city. In the Jokhang Monastery, a site of holy pilgrimages since the seventh century, the devout continued their trek in the labyrinthine passages among hundreds of gilded and draped holy statues, sacred objects, prayer flags and offerings, contributing their own donations and supplications. While walking and praying in the yak-butter lit, mystical space, the pilgrims appeared transported into an enhanced, symbolic world – an augmented reality.

Places of worship – such as cathedrals in the Christian tradition or Buddhist monasteries – convey spiritual meanings not only by frescoes, statues and incense but also through their spatial structure. In the contemporary cathedrals of consumerism – as Manovich noted – visual display and spatial architecture has a similar albeit technologically modified role. The Prada store designed by Rem Koolhaas is located in New York, a densely packed, trendsetter city of new creeds. The interior of the store is completely filled with electronic and visual information. Murals featuring human-size robotic creatures cover the walls. A cavalcade of sculpted mannequins placed on the shop floor echoes the theme. An animated repeat of the same motif appears on the deftly distributed plasma screens. On the day of my visit devotees on a shopping mission, observed the surroundings with amazement and dutifully donating their contribution to Prada crowded the store. Manovich describes this augmented space as follows: "On entering the store you discover glass cages hanging from the ceiling throughout the space. Just as a church would represent the relics of saints in special displays, here the glass cages contain the new objects of worship – Prada clothes. The special status of Prada

Urban Tapestries: http://urbantapestries.net
Witherspoon, Gary. 1977a. Language and art in the Navajo Universe. Chicago, University of Michigan Press,p.31
Ibid. p.49

Species of Spaces

ON SPATIAL PERCEPTION
Nina Czegledy

Series Editor: Giles Lane
Design: Studio Tonne

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Free

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This publication is one of a series of essays commissioned by Proboscis for the series Species of Spaces – inspired by and in homage to George Perec's eponymous book. The series contemplates how we occupy space in the contemporary world of the twenty-first century – the virtual and physical, emotional and social – what Perec called the "infra-ordinary". Species of Spaces questions the trajectory of contemporary urban existence, intervening in current debates on how the virtual and the physical relate to each other, and how technological advances affect cultural and social structures.

www.diffusion.org.uk

SPATIAL COGNITION

Spatial perceptions may show cultural specificity, yet certain properties of spatial sensing remain characteristic of human existence. What are these features? How much do we know about spatial cognition? The private spaces we all inhabit include our visual, auditory, tactile and olfactory biosphere. In our every day existence new visual and auditory sensory inputs are continuously presented to our brains. Spatial perception allows us to reach for an object, by reflex, without consciously assessing its location in space. This ability also assists in finding our way after becoming disoriented, contributes to the recall and visualization of remote or virtual places and informs our reflexes in a variety of situations (Colby 1998). In short, many of our daily tasks and frequently, our safety are dependent on the accuracy of our spatial perception.

Processing and storage of spatial schemas form a central element of human intelligence, yet despite 75 years of intense investigation it remains an inaccurately defined process.

Are spatial schemas mere metaphors or are they actual internal mechanisms? According to Gattis spatial cognition is the essential foundation of more abstract cognitive tasks (Gattis 2003). To complicate this hypothesis, factual interpretations by cognitive scientists constitute only a partial explanation of our capacities as sensory beings. Furthermore, contrasting the static "object"

oriented materiality of the industrialized world, certain scientific concepts as well as some traditional beliefs such as that of the Inuit and Navajo propose an alternate a process-based and essentially dynamic perspective of Spatial cognition and practice has become a topic of great interest lately, evidenced by the encyclopedic variety of interdisciplinary investigations. Recent discoveries aided by rapidly developing technologies seem to contribute to a seemingly endless list of publications and a thriving spatial practice. Many of the issues connected to this topic are outside the scope of this discussion, hence spatial perception will be first deliberated from a bioscientific point of view followed by an exploration of technological and cultural notions. Finally, an alternative process based interpretation will be outlined through the indigenous Navajo concepts of time and space resonating in current scientific speculations.

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BIOSPHERE- BODY SPACE

In 1938, Thurstone first defined a "space" factor representing the ability to mentally operate on spatial or visual images (Thurstone 1938). Nearly forty-five years after this landmark publication, Gardner (1984, 1993) has suggested a multifaceted model of spatial intelligence including the ability to think in pictures and images, the ability to perceive, transform and recreate different aspects of the visual-spatial world. In addition to a scientific break-through, this model supports certain traditional cultural beliefs as well as re-emerging theories proposing a pliant and interconnected view of the universe.

How does then our spatial information processing and storage work? While processing details remain obscure, it has been agreed, that sensory and motor information construct together an internal representation how we perceive space. The nature of this representation and the neural mechanisms underlying it has become a topic of great interest in cognitive neuroscience (Colby 1998). It seems that the combination of orientation and visualization serves as the basis for spatial ability and the capacity for understanding and manipulating three-dimensional mental imagery. Sighted people depend entirely on the feedback received from their bodies to stabilize their visual surroundings. Once this communication is seriously disrupted or lost many people loose contact with everyday reality and some even

might begin to hallucinate. The concept of subjective vision i.e. that no two people see exactly the same thing in a natural setting might be astonishing, yet these differences help us to translate experience and meaning from one perceptual world to another. Certain brain injuries for example cause a diminished ability for spatial organization. The injured patients can speak intelligibly, and are able to recognize objects; however, they cannot structure their images into a connected system. They cannot find their way in they own rooms.

Memory of course plays an important role in spatial guidance as spatial perception is often mediated by prior representation of the environment. It seems that humans create mental spatial models based on verbal descriptions and observations. It has been argued that this process is facilitated by a distinct spatial representational system created from a variety of inputs, linked to both the perceptual and linguistic systems (Bryant, 1992). He noted how remarkable it is that we can conceive large spaces at once in our mind as integrated images and not piecemeal as they are often experienced. Mental imaging has a long-standing history (McNamara1997). In ancient cultures it has already been realized that one's memory could be reinforced if objects or actions are visualized. This process has been widely used for healing by native Americans, Hindu yogis and the ancient Greeks. The question of how do "mental pictures" conform to the theory of cognition remains a persistent puzzle.

In our visually privileged world we take it for granted that vision provides the major source of spatial information. This belief is due to the generally accepted rule that

2000). They have also suggested a strong interconnection between space and sensory perception, stressing the importance of direct and instantaneous communication determinants and proposed a return to greater creativity and communication in the sciences. Evoking concepts of Tibetan Buddhism, Bohm proposed that "what we call empty space contains an immense background of energy ... the things that appear to our senses are derivative forms and their true meaning can be seen only when we consider the plenum, in which they are generated and sustained, and into which the must ultimately vanish."

CLOSING NOTES

In conclusion, sensory awareness including spatial perception presents a key factor in our existence and relates significantly to social and cultural developments of direct and instantaneous communication. This is of special interest, as space is perceived - beyond our immediate corporeal environment- as an aspect of science, art, commerce and culture. Over the last decades in addition to the conventional notions of physical space, we have broadened our spatial categories to include the "virtual" in our vocabulary, such as: cyber space, surveillance space, data space, and smart space. The growing disenchantment with the virtual however, prompted a return to the "real", albeit in a modified form leading to hybrid, electronically augmented spaces. In this continuously and constantly changing environment it is curious to note that the examination of alternate trends of spatial cognition reveal a more process -orientated universe than it was imagined and acknowledged previously. It might be useful to consider Bohm and Peat's proposal to a new perception of science, an "order of between and beyond" which could guide us to a deeper awareness of society and the human condition. Invariably, the different zones of human existence include physical, psychological and spiritual spaces. Whilst it remains to be seen how this contributes to a fundamental shift in human perception, technologies (as described by Manovich) have had a significant impact on our spatial awareness in ways that artistic and creative practices are just beginning to tease out.

defined as the temporary withdrawal of motion. The primary metaphysical assumption on which the Navajo view of the world is constructed is the opposition between active and static phenomena or active and static phases of phenomena. The Navajo perspective as Witherspoon noted "is a cosmos composed of process and events as opposed to a cosmos composed of facts and things" (Witherspoon 1977b)

Of late "whole system" theories such as the concept of inter-connectedness proposed by David Bohm have found new currency. Bohm, noted physicist and originator of the casual interpretation of quantum theory, challenged established notions concerning the nature of reality and the order of the universe. In contrast to firmly entrenched views, he saw the infinite universe as an undivided wholeness: a world of interconnection and interdependence. By confronting conventional theories of quantum mechanics he provoked the re-examination of prevailing scientific methodologies. In his introduction to *Wholeness and the Implicate Order*, Bohm wrote "I would say that in my scientific and philosophical work, my main concern has been with understanding the nature of reality in general and of consciousness in particular as a coherent whole, which is never static or complete but which is an unending process of movement and unfoldment (Bohm, 1998). Bohm and David Peat have published extensively on this subject and in their latest book, *Science order and creativity*, the authors argued that while scientific thinking in the last century favoured an abstracted, fragmented approach, nature presents us with a process based order of reality (Bohm and Peat

our sensations tend to be dominated by the perceptual tool that provides the most reliable facts in relation to our surroundings. Vision in this case is considered to provide the most detailed information about significant properties of objects in our environment. Consequently it is often used as a spatial guide, informing (and sometimes misinforming) our senses. Auditory or olfactory spaces seem to have different properties and while they belong to our most basic senses, are rarely considered in industrialized societies.

Tactile space is viewed as "friendly" maybe because touching implies intimacy - a controversial notion in an age when direct contact is increasingly replaced by remote control devices. The dictionary definition of the verb touch includes "to hit, wound, injure, mark, play" and "to affect with emotion". These terms evoke physical familiarity and insinuate sensuality, eroticism, brutality - taboos in the so-called "developed" societies where emotions are frequently hidden behind euphemisms (Czegledy 1999)

For the longest time our senses were considered entirely autonomous 'perceptual modules', each functioning independently. Recent studies have shown however, that our perceptual experiences are formed by manifold, complex interactions between sensory modalities (Eimer 2004). Clinical tests indicate that the senses are not only fundamentally connected but also that our perception of visual, auditory or tactile events can be altered dramatically by information from other senses.

PUBLIC/PRIVATE SPACE

Beyond strictly corporeal space, the concept of public and private space has also mutated over time. In the sixties, when Edward T. Hall has established the field of proxemics, he already noted that social distances have been modified by the use of communication and visualization devices. The changes are readily observable in our everyday life, by the intimate, yet public use of mobile phones and other forms of electronically facilitated communication. Thirty years after Hall published his studies on proxemics; renewed interest has been shown in issues of space across the social sciences. Anthropologists set in motion a paradigm shift to foreground the spatial dimensions of culture in contrast to other considerations. While the terrain of sociopolitical and migratory space has become a topic of great interest to urbanists and political scientists alike, the consideration of these studies is outside scope of this text.

Recent studies in personal and public territorial behaviour provided new clues concerning spatial perception. Territory in this context is meant as an extension of organisms imprinted by visual, vocal and olfactory markers. Current interest in psychogeography has re-focused attention on mental imagery and mapping. Cognitive mapping is considered a complex process, composed of a series of psychological transformations by which an individual acquires, codes, recalls and decodes

ALTERNATIVE CONSIDERATIONS

Contemporary research as well as pragmatic applications reflect spatial concepts prevalent in industrialized societies. It might be useful at this point to consider a contrasting worldview such as the traditional Navajo concepts of time and space. In the Navajo universe each element moves continuously in an interrelated mode and the notions of time and space have distinctly different interpretations from those embraced in "Western" cultures. (Witherspoon, 1977a). In this world of motion the perspective of movement dominates and pervades the classification of the world and is inherent in all phenomena. The fundamentally dynamic or active nature of this environment is hard to comprehend in the conceptual framework of the Westerner for whom the conservative static view proved an easy and reliable method to divide space into segments, to structure the world according to types of objects. In contrast, the Navajo world is perpetually progressing through phased cycles and processes of deformation and restoration, unsuited for segmenting. In this environment all beings are either acting or being acted upon. It is a world of things in motion and things at rest, but one in which even things at rest are defined by the withdrawal of motion and are classified according to their ability or potential to move or to be moved. The underlying assumption is that nothing is totally inactive, space here is presented by an action or motion, the static being

information about the relative locations and attributes of phenomena in his/her everyday spatial environment (Downs 1973). Intriguingly, psychogeography experiments – dubbed “the science of the drift” – are usually facilitated via non-scientific methods such as aimlessly strolling through an urban environment while trying to record the emotions given by a particular place; and using the mental mapping towards the construction of mood-based maps. In the arts, locative media practice traces its roots to the Situationist Movement of the 1950s, although present interpretations by artists are rapidly shifting the paradigms towards an electronically augmented spatialising practice. Simon Pope’s informative text, *The Shape of Locative Media* (Pope 2004), as well as the art projects by Proboscis (Urban Tapestries) and the Locative Media Lab (RIXC Latvia) have markedly contributed to the understanding and the growth of this increasingly popular art form.

The advance of ubiquitous computing has been partly responsible for the expansion of enhanced or collapsed spaces furnished with smart objects, wireless networks, surveillance technologies and tangible interfaces. In this landscape, the development of increasingly sophisticated and often remotely operated sensors changed the spatial component of a wide variety of specialized technologies ranging from medical to military applications. In clinical practice, telemedicine bridges distances, while certain medical procedures allow magnified “non-invasive” bio-journeys within the human body. The use of ultra microscopes and enhanced imaging technologies in clinical medicine reveal formerly invisible spaces. Considering

these bio-technical innovations, the lengthening of our vertical perspective has simultaneously created the illusion of diminishing distances.

Over the last decade – not surprisingly – the widespread use of communication, information and virtual reality technologies have on one hand influenced our perception of space and spatial abilities and concurrently allowed the development of computer-based tools to improve spatial aptitudes. Virtual reality (VR) technology is emerging as an affective tool for mental health applications including spatial cognition tests. Of course the controversial impact of these technologies on our corporeal space have been questioned widely by cultural theorists such as Barbara M. Stafford (1991) Kim Sawchuk (1996) and examined in the *Digitized Bodies, Virtual Spectacles* project by the author (Czegledy& Czegledy, 2000, 2002).

veillance, war or combat situations. Remote sensing is increasingly employed by the military, especially in the US Army where currently a wide variety of military tools mostly operated by remote sensing for automated functions are either being developed or already in use. Many of the products utilize remote spatial sensing and evaluation of spatial abilities. The Tactical Mobile Robot (TMR) has been developed for remotely controlled vehicles that can perform reconnaissance missions and other tasks in areas considered too dangerous for manned patrols as reported by Duffy (2001). These robots orientate themselves, negotiate space, detect, avoid and generally maneuver obstacles on their route. Over the last couple decades pervasive televised images often from war or disaster situations, provide camera views installed on weapons guided by a laser sensor, have also contributed to an alteration of our spatial perception. As an alternative ironic intervention into military space, the *Afghan eXplorer* a semi-autonomous mobile robot developed by the MIT Culture Group directed by Chris Csikszentmihalyi, can provide journalistic reportage in hostile, off-limits environments. The robot consists of a remote, teleoperated robot, and a high-speed digital data link viewable over the Web, and a Cambridge-based operations center, controlling its activities in hybrid space. “The Afghan Explorer looks like a cross between a lawnmower and a robotic dog and has been designed to travel to war zones to provide images, sound and interviews from hostile environments off-limits to human reporters” commented the BBC on the robot (BBC).

In contrast to military use, an innovative approach

towards “intelligent space” has been developed for the Portland Square Development of the University of Plymouth, UK. The system uses a range of embedded technologies to capture audio-visual and raw digital data from the building via the Building Management System; its computer and communications networks; the flow of people within it; changing noise levels; weather, light and temperature changes. This vibrant data is then manipulated (using computer simulation, visualization and audio technologies) and replayed through projection systems incorporated into the architecture and broadcast using streaming internet technologies. (Speed 2004)