HEARING COLORS AND TASTING SHAPES: A PARADIGM SHIFT IN THE BRAIN
Richard E. Cytowic, MD. Washington DC.
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This overview reviews various varieties of synesthesia and describes a general brain mechanism as the result of inheriting a genetic mutation for hyper-connectivity among brain areas. The automatic sensory joining of perceptual synesthesia is contrasted to deliberate contrivances and metaphor, the former being involuntary, spatially extended, durable and generic, memorable, and affect laden. Demonstrations show that sensory coupling occurs early in perception. Despite focal activations seen on scans, synesthesia is not localized in the sense of classical neurology, but exists as the dominant process in its underlying neural network at a given time.

Synesthesia can help us understand more elusive aspects of human thought such as metaphor and creativity. Wassily Kandinsky and Paul Klee serve as examples of synesthetic artists, and sensory Form Constants are discussed.

Synesthesia has caused a paradigm shift in two senses. For a long time, it was dismissed as not real because it contradicted settled theory despite synesthesia's perceptual reality being easily demonstrated in a number of ways. Today it is no longer regarded as a mere curiosity but as a challenge forcing fundamental rethinking about how brains are organized.

The second shift is what synesthesia implies personally to everyone given that all brains have this latent capacity, and that systematic and lawful relations exist among sensory dimensions for synesthetes and non-synesthetes alike. Sensory substitution experiments, for example, demonstrate that cross-connection channels are already present. Explicitly, the senses feel separate enough to avoid confusion, but implicitly are more coupled than previously supposed.

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SYNESTHETIC ART VERSUS ART BY SYNESTHETES
Sean A. Day. Department of English & Journalism. Trident Technical College
North Charleston, SC, USA

As is apparent from the basic premise of this conference panel, synesthetic artwork is in resurgence, as is interest in the neurological condition synesthesia itself. When looking at the two realms, however, questions emerge: If synesthesia is a genetic-based condition, such that any type of person
might have synesthesia, and if that thus includes artists of all various sorts, what then are the differences between synesthetic artworks produced by non-synesthetes as opposed to artworks (synesthetic or not) produced by synesthetes? To what extent does artwork by those claiming to be non-synesthetes nevertheless perhaps reflect traces of latent synesthesia? Or, is it instead the unrecognized effects of surrounding culture(s)? To what extent, and in what varied ways, is artwork by synesthetes formed and modified by culture? To what extent do various media themselves limit the possibilities of synesthetic arts, regardless of who creates it? This talk addresses these and other questions – with examples – focusing not only on more "traditional" art forms such as painting, sculpture, installation, and music composition, but perhaps more so on unusual forms of synesthetic arts, such as those involving cooking, perfumery, and fashion design, as well as on the potential artistic products of those with rarer and more unusual forms of synesthesia.

WHEN BLUE IS LARGER THAN RED: COLOR MODULATES MAGNITUDE JUDGMENTS
Avishai Henik
Authors: Avishai Henik & Roi Cohen-Kadosh .Department of Behavioral Sciences and Zlotowski Center for Neuroscience, Ben-Gurion University of the Negev

Much research on synesthesia has examined the perceptual nature of the phenomenon. Recently, several studies have examined the effect of synesthesia on higher cognitive operations, investigating conceptual levels of information processing. In several experiments we employed a Stroop-like paradigm and presented synesthetes and controls with relevant stimuli (e.g., digits, lines) and irrelevant colors (e.g., the digit 4 in red). Participants were asked to compare the two relevant stimuli and ignore the irrelevant colors. Displayed colors were either congruent or incongruent with experienced colors triggered by the relevant stimuli in the synesthetes. Synesthetes showed the classical congruity effect. Namely, they were slower to compare the relevant stimuli when the colors deviated from their experience than when they matched their experience. Moreover, we found that irrelevant color distance modulated processing of the relevant stimuli. For example, participants were faster to compare two digits when the colors indicated a larger distance than the relevant numerical values (e.g., the digits 4 and 5 printed in the colors that induced 2 and 7, respectively). In contrast, performance by non-synesthetes was not affected by colors. This suggests that colors can evoke
magnitudes in some synesthetes, and that synesthesia may be bi-directional and not only uni-directional (e.g., from digit to color). Additional studies using the flanker paradigm suggested that these effects may be modulated by attention.

Bidirectionality in grapheme-color and music-color synesthesia.

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PERCEPTUAL AND NEURAL MECHANISMS OF SYNESTHESIA
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Synesthesia is an automatic experience of sensations in one sensory modality in response to sensory stimulation. This second experience can either be in the same (such as seeing colors when viewing black and white letters and numbers) or different modality (such as seeing colors when hearing sounds). Recent investigations of various forms of synesthesia have demonstrated that 1) synesthesia is a perceptual phenomenon, and 2) there are reliable differences in patterns of brain activity between synesthetes and non-synesthetes. I will discuss research that I have conducted to date examining number-color synesthesia, and ongoing research into the neural mechanisms of "number-forms." These results suggest that the brains of synesthetes differ from those of non-synesthetes in specific ways. However, the impact for these differences for other areas of perception and cognition, such as creativity, remains to be explored.

Over the past five years, we have accumulated a variety of evidence that suggests that synesthesia is a perceptual phenomenon and that there are reliable differences in patterns of brain activity between synesthetes and non-synesthetes. I will discuss research that we have conducted examining grapheme-color synesthesia, which shows that synesthetic colors can improve performance on two tests of perceptual processing. In one experiment, we show that synesthetic colors aid in the identification of “embedded figures” in a display composed of letters or numbers that elicit synesthetic colors. In another experiment, synesthetic colors reduced the magnitude of the crowding effect for three out of six synesthetes.

Using fMRI, we then showed that color selective regions in human visual cortex are more active in grapheme-color synesthetes than in controls. Further analysis of these data show that there are substantial variations in both behavioral performance and fMRI responses and that these variations are correlated, such that synesthetes who perform well on the crowding task also show greater activation of
color selective regions, suggesting important differences between synesthetes. These studies begin to identify the perceptual and neuronal mechanisms of grapheme-color synesthesia, and we propose that similar mechanisms may underlie a variety of other forms of synesthesia. Finally, I will discuss recent work we have conducted investigating anecdotal claims that synesthetes are more creative than non-synesthetes. Preliminary data suggest that college students who also experience synesthesia are more creative than matched college students who do not experience synesthesia, but future investigations are required.

SYNESTHESIA’S MULTI-COLORED HISTORY MEETS THE TWENTY-FIRST CENTURY
Amy Ione. The Diatrope Institute. Santa Rosa CA. USA

It is generally agreed that synesthesia occurs when an individual receives a stimulus in one sense modality and experiences a sensation in another. Historical difficulties of subjecting cross-modality to rigid scientific analysis led commentators to cast the phenomenon in terms of abnormality, philosophy, and metaphor. This paper will outline the historical record of synesthesia, explain how recent brain research has allowed us to discern patterns of correspondence that were not obvious historically, and introduce case studies that document what we can learn from artists. The studies include the case of Jonathan I., who lost his synesthesia upon becoming color blind and more general research that has allowed researchers to explore the neural mechanisms of synesthesia from a number of perspectives.

SYNESTHESIA AND ART AT THE 'FARBE-TON-KONGRESSE' IN GERMANY
1927 UP TO 1936.
Dr. Jörg Jewanski. Germany

Georg Anschuetz directed four conferences which dealt with color-light music and synesthesia in 1927, 1930, 1933 and 1936. At these conferences,
for the first time in history, synesthetes had their ‘coming-out’. For the first time in history, a huge exhibition of ‘Synesthesia and Art’ took place. Painters exhibited their so-called ‘psychic paintings’, colour-light-music, colour-organs and absolute films were introduced to the public: 600 people visited the first conference. Not all of the works of art were synesthetic in our modern terminology. Many of the works of art are lost, only some photos survived, but it was a fascinating time, which sets the (unknown) historical roots for the new euphoria of synesthesia of the last few years.

ASSOCIATING COLOURS TO LETTERS: WHAT IS A TYPICAL SYNAESTHETIC ASSOCIATION?
Dr. Julia Simner; University of Edinburgh, Scotland, UK.

A noir, E blanc, I rouge, U vert, O bleu : voyelles... (Rimbaud, 1886) Arthur Rimbaud’s Les Voyelles describes the colours of the five vowels, and has been held as evidence for the poet’s own experiences of synaesthesia. I present evidence to suggest that his descriptions are more indicative of artistic license, by showing that his colour associations are unrepresentative of genuine synaesthetic reports.

Although letters-colour associations vary greatly from synaesthete to synaesthete, patterns have been observed from a meta-analysis of the historical literature, and from a sample of self-referred synaesthetes (Baron-Cohen, Harrison, Goldstein, et al., 1993; Day, 2001). We extend these findings by examining a large number of objectively tested synaesthetes (n=70) and controls (n=375), and show that biases exist in the association of letters with colours across individuals both with and without synaesthesia (Simner, War, Lanz, Jansari, Noonan, Glover, Oakley, 2004). Although synaesthetes were significantly more consistent over time, there were remarkable inter-subject and inter-group agreements in the assignment of colours (e.g., a tends to be red, b tends to be blue, c tends to be yellow). This suggests that letter-colour synaesthesia, whilst only exhibited by certain individuals, stems in part from mechanisms that are common to us all. In addition to shared processes, however, each population has its own distinct profile. Synaesthetes tend to associate higher frequency letters with higher frequency colour terms.

Control participants are influenced by order of elicitation, and by colour prototypicality. Rimbaud exhibits characteristics that more closely resemble reports
of non-synaesthetes, suggesting that his writings employ pseudo-synaesthetic descriptions as a literary device, rather than biographical comment.

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ART AND SYNESTHESIA: IN SEARCH OF THE SYNESTHETIC EXPERIENCE
HTTP://WWW.DOCTORHUGO.ORG/

Dr. Hugo Heyrman. Belgica

The objective of this study is to come to a better understanding of the 'synesthetic experience', especially in the context of art. It consists of two parts: in the first part, I review naturally occurring synesthesia. In the second part, I discuss created forms of synesthesia in art. My starting point is the hypothesis that 'synesthesia-phenomena' are at the roots of all artistic practice. The approach is multidisciplinary and from a philosophy of art perspective. It will be argued that 'art as a synesthetic experience', and 'synesthetic experiences by synesthetes', share certain basic concepts: the making of new connections between the senses. In the arts, the search for correspondences and complementarities between the senses is essential. Artists have brought the 'synesthetic experience' to the surface -to share their vision with the world. The intention is to analyze the impact of synesthetic approaches as experiments in art. The focus will be on a visual presentation of artworks by artists/pioneers, (*) as study case examples of early modern art movements; Expressionism, Futurism, Dada, Surrealism, De Stijl and Abstract Expressionism. The 'Manifesto of Surrealism' has improved on the Rimbaud principle that "the poet must turn seer". Art and synesthesia go hand-in-hand. (*) I shall discuss the work and thoughts of twelve key figures: Edvard Munch, Piet Mondrian, Francis Picabia, Paul Klee, Umberto Boccioni, Luigi Russolo, Marcel Duchamp, Anton Bragaglia, Man Ray, René Magritte, Mark Rothko and Meret Oppenheim.

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BEYOND COLOR: A WIDER LOOK AT SYNESTHETIC EXPERIENCE.

Noam Sagiv, PhD. Department of Psychology. University College London. United Kingdom
Color is the most common synesthetic experience and indeed much of research into synesthesia focused predominantly on vision. While studies of other senses are beginning to emerge, the spectrum of synesthetic experiences is even broader and not strictly limited to simple sensory experiences. I will discuss two different examples of synesthetic experiences involving (1) A spatial sense, and (2) Personification of concepts or objects. I will discuss how these fit within a broader definition of synesthesia, how these phenomena are studied in our laboratory, and the broader implication to our understanding of the human condition, cognitive development, and brain function.

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INTER-SUBJECTIVITY OF THE SYNESTHETIC PERCEPTION
A DIDACTIC AND RESEARCH EXPERIENCE WITH THE AUDIOVISUAL
COMBINATIONS
OF ABSTRACT FILMS

Dr. Dina Riccò. Politecnico di Milano University. Faculty of Design. Italy

The studies on synesthesia – in their triple nature of perceptive phenomenon, metaphor and representation, artistic or not, where you have a relation between various registers - represent a useful support to define interlinguistical factors that maintain an intersubjective value (Riccò, 1999). If it is true that the subjectivity is a peculiarity of synesthetic perception, as we see in the history of synesthesia, for particular compositive factors and visual/auditory elements (shapes, rhythm, texture, vocal sounds, etc.) – as Gombrich said, referring to the luminosity of vocal phoneme (Gombrich, 1965) – we can see that there are amazing agreements. This paper presents an experience of cross-observation, led in the Design Faculty (Politecnico di Milano, Italy), that confirm the intersubjectivity of the synesthetic perception.

Object of observation has been the initial sequences (the first 60 seconds, without the audio) of two abstract films by Oskar Fischinger: a colors film (Composition in blau, 1935), and a black and white film (Studien n. 12, 1932).

The students have repeatedly observed the sequences, and they have written a description with the perceptive characters, visual and auditory (colors, shapes, kinetism, rhythmic course, lento and grave, vivace and moderate, and so on), of the sequences. The students have chosen, in consequence, a musical composition (between the three available) congruent with the visual sequence.
The results have been amazing: for one of the two sequences the 100% of the students have chosen the same musical composition. Evidently such factors, chromatics, of the shapes, kinetic, have characters that overcome the individuals sensorial registers and that have common audiovisual combinations.

COLOUR ASSOCIATION IN THREE STAGES:
THE SYNAESTHETIC EXPERIENCES OF A PRACTISING MUSICIAN

MUSIC AND COLOUR: AN ILLUSTRATED LECTURE-RECITAL

Connections between music and colour are so well entrenched in everyday language that they have almost become unrecognisable as such. “Tone-colour” is the standard expression for the more precise but less homely “timbre”. Listeners often speak of the “light and shade” in a performance. The musically adventurous might discuss the “deep chromatic hues” of a piece of Scriabin. Indeed, the term “chromatic” itself, a word that has acquired a clear and specialised meaning in the field of music theory, traditionally and etymologically refers to colour and not to sound. Many musicians feel that more potent associations between colour and sound may exist than those implied in everyday language. My own idiosyncratic feelings about music and colour are an example of what has been termed “pitch-colour synaesthesia". My interest, as a performing musician, in how such feelings might lead to a greater understanding of the meaning of music is primarily a practical one. A desire to experiment with ways in which such an understanding might be gained and subsequently imparted to others has led me to wonder whether pitch-colour associations might offer a new way in which to look at music or, at the very least, a worthwhile lens through which to view existing methods.

The first half of the presentation I offer for this conference will focus on my own experience as a musician and a synaesthete. It will begin with a survey of the early development of my synaesthesia, and will then consider a number of situations in which synaesthesia confirms or amplifies a sense of what is significant or meaningful in particular pieces of music. Although my associations are different in quality from those experienced by other synaesthetes, I am convinced that the amount of overlap is sufficient to make such a discussion relevant to anybody interested in synaesthesia. I am equally convinced that such a discussion, concerned as it is with musical meaning and not with colour association as an end in itself, is likely to be of value and interest to any general music-loving audience.

One of the most difficult things to establish in connection with synaesthesia is to what extent the phenomenon might be related directly to
sensory experience and to what extent more abstract cognitive categories of perception might play a part. The discussion I offer will chart the development of my own synaesthesia from a simple system of coloured tags attached to the concept of keys on a piano, through a labelling system based on the pitch of sounds, to a much more elaborate experience that allows me to capture complex environmental sounds and extended pieces of music in a single visualisation. I will discuss each of these stages of development in turn, giving many anecdotes and illustrations at the piano.

I possess absolute pitch (AP), an ability to identify the pitch or frequency of any sound without first being given an external reference point. AP will be discussed at some length during the presentation. In particular, I will explain the ways in which childhood experiences might influence any subsequently felt relationship between AP and synaesthesia. My own early memories of piano playing were of a series of poorly maintained instruments that had been allowed to fall significantly below concert pitch. My synaesthesia was fully established at the time of these experiences whereas my AP became entrenched some years later. The implications of this staggering of the development of the two abilities will be discussed fully during the presentation, and in this connection I will also touch on the experiences of one or two other musical synaesthetes to whom I have spoken.

Having given an outline of my own childhood experiences, I will present a pitch-colour synaesthete’s perspective on the interpretive questions likely to be faced by any performing musician. I will explore some of the musical insights that can be gleaned from examining music in a “synaesthetic” way, and I will demonstrate that synaesthesia can sometimes throw up more questions than it answers. I will also discuss the ways in which focusing on one’s synaesthesia might enhance or detract from one’s enjoyment when listening to music. As before, I will compare my own experience to the experiences of other musical synaesthetes. This section will make detailed reference to abstract musical concepts, but the whole will be explained and illustrated at the piano in such a way that those unacquainted with music theory will be able to follow the discussion.

I will conclude the first half of the presentation with a series of miscellaneous anecdotes describing, among other things, some of the problems that can arise from possession of AP. I will also explain how it can feel if part of the synaesthesia-AP system on which some musicians may come to rely should, for any reason, temporarily cease to function properly.

The second half of the presentation will be given over to a series of more extended performances, which I will present as though they were part of a conventional recital programme. Although there will be a greater amount of playing than talking during this part of the presentation, I will give brief pointers, during my introductions, to any feelings I have about the music that derive from my synaesthesia. It is hoped that the more detailed discussion that will have taken place during the first half will allow
members of the audience to arrive at an impression both of how thinking in
terms of pitch and colour might feel, and of the ways in which such thinking
might contribute to enjoyment and understanding of the performances given.

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**ENTORNO INTERMODAL**
José Antonio Fernández Fernández. Galicia. España
A software sets out "ad hoc", done in Action Script and space Web, to document a
project that turns on the implications educative, therapeutic and artistic of the
sonorous, motor Inter-processing and graph.

INTRODUCTION
Practical Session: (Supervision Facultative).
"Initiation and access to basic the intermodales aspects ".
A. En first place is come to the vision of schemes graphs, originating of previous
tests.
B. Later it follows the listening of the sound sequences.
C. Simultaneously to hearing it is asked for, to make free graphical _expression.
D. It follows vision ado of the graphical work done by other subjects in these
assumptions.
E. A continuation the participants, write their impressions.
F. They read those of previous participants.
G. It is allowed them to analyze the drawings made by each one of the participants
as well as his commentaries written made a length of session.

colloquy
The integrated interstimulation leads to a productivity it puts cognitive of quality
and to a instrumental dad of new plant.
Interpráxica axiology. Criteria and Phases.
Each computer science application, it reveals the level of formation and ethical
commitment of the authors, giving rise a original indicatives norms, as a result of
the activities and innovating experiences associated to the knowledge of new
possibilities of action, relation and communication, production and creativity

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**"SINESTESIAS CROMÁTICAS"**

En esta intervención, intentaré esbozar la convergencia que vislumbro en ciertos
aspectos de mis estudios acerca de las sinestesias cromáticas, los cuales
corresponden a dos tipos de conocimiento muy diferentes.
Por una parte, me propongo exponer determinados contenidos del conocimiento
científico, acerca de los colores y coloridos sinestéticos, que he venido adquiriendo
en transcurso de los últimos veintisiete años. Por otra, me gustaría intercalar
algunos elementos especiales, ilustrativos de mi propia experiencia de las sinestesias cromáticas.

Los recuerdos más antiguos que conservo de mi experiencia sinestética se remontan a 1961 o 1962, cuando tenía más o menos cinco años de edad, y creo que la mayoría de las percepciones plurisensoriales que vivenció entre aquella época y los ocho años de edad constituyeron las sinestesias más genuinas de cuantas experiencias de esa índole conservo en mi memoria.

Aunque mi interés por esta clase de percepciones aumentó de modo repentino poco después de cumplir los doce años de edad, sólo llegó a vincularse a una necesidad expresiva, pictórica, cuatro años más tarde. Poco después supe que aquellas sensaciones eran llamadas sinestesias.

A pesar de las clases de aquella época en la Facultad de Bellas Artes de San Fernando, tanto mi actitud artística como mi modo pictórico fueron evolucionando, en los años siguientes, primero hacia el expresionismo y luego hacia la abstracción.

Por consiguiente, en el otoño de 1978, ya me hallaba pintando coloridos sinestéticos con un resultado pictórico expresionista abstracto. Fue entonces cuando comencé a estudiar las sinestesias cromáticas, de manera sistemática, como miembro del seminario de creatividad dirigido por el Dr. Julio Fernández, profesor titular de Psicología cognitiva de la Facultad de Psicología de la universidad Complutense.

Entre los estudios de aquellos meses hasta las navidades de 1979, puedo citar la documentación de toda clase de antecedentes históricos de diversa índole, cierta distribución global de los modos sinestéticos descritos por Ludwig Schrader y la documentación de las obras de Henri Lagrésille y de David Raymond halladas en la Biblioteca Nacional.

A mediados de enero de 1979 conocí a Sergio García-Bermejo, autor del Código Forma-Color, estudioso de la interrelación de las artes y director del Grupo Color de Madrid, de quien recibí algunas interesantes aportaciones, entre las que debo destacar el hecho de haberme presentado al Dr. Lorenzo Plaza, quien más tarde sería mi profesor de investigación y de ciencia del color.

Lorenzo Plaza era físico, trabajaba como investigador del color en el Instituto de Óptica Daza de Valdés, del Consejo Superior de Investigaciones Científicas y, por aquellas fechas, era el presidente del Comité Español de Color de la Sociedad Española de Óptica. Gracias a él, tuve la oportunidad de estudiar la ciencia del color, así como de planificar y desarrollar de forma óptima mi primer proyecto de investigación de las sinestesias cromáticas, desde marzo de 1981, en el Departamento de Color del Instituto de Óptica y como miembro del Comité Español de Color. Asimismo, a instancias de Lorenzo Plaza, aunque indirectamente, conocí al Dr. Javier Sánchez, ingeniero de telecomunicaciones, fonetista y músico, quien trabajaba como investigador en procesamiento de síntesis verbal en el Instituto de Acústica Torres Quevedo, también del CSIC. Sin la ayuda de Javier Sánchez, nunca hubiera podido desarrollar una gran parte de aquel primer proyecto, titulado “Programa de investigación para el conocimiento descriptivo y analítico de las sinestesias cromáticas conscientes”.

En aquel estudio, las líneas generales de investigación fueron seis, dos de las cuales, la quinta y la sexta, se refirieron al diseño y desarrollo de sistemas para la de modelización de sinestesias. La muestra total estuvo constituida por 2.625 sujetos. El desarrollo completo del programa de investigación duró cinco años y
siete meses, hasta mediados de diciembre de 1986. El trabajo de campo y el trabajo de laboratorio se simultearon, desde primeros de mayo de 1981 hasta mediados de abril de 1985. Mientras que el trabajo de campo fue realizado en los diversos ambientes de trabajo y de estudio de las personas participantes, todo el trabajo de laboratorio se desarrolló mediante su asistencia a los laboratorios de Lorenzo Plaza y de Javier Sánchez, bajo la implícita tutela y la inmensa paciencia de ambos. La publicación de los resultados de la investigación fue parcial en El lenguaje del color (Madrid, 1985, Hermann Blume Ediciones) y completa en El libro del color (Madrid, 1993, Alianza Editorial).


Cuca Curci. artist | architect | International ArtExpo . Bari. Italy

My introduction and all videos I will show will explain some concepts that are the bases of the contemporary communication with technology and new media in art.

Introduction.

History has shown that every new invention in communication creates its own unique subculture. Just like the shift from radio to tv, the evolution from traditional mail ("snail mail") to electronic mail ("email") signals the beginning of a new era in communications. This sudden immersion into contemporary culture covers every field, thus changing the role of the artist, and is further enriched by structural components, criticism and ideas. This is not a war on the status quo, but rather a
true interpretation of the current scene as it visibly evolves. The Internet or "cyberspace", the "fourth dimension" of language, is the new NO-PLACE in which everyone is searching its own No-IDENTITY. Video and new technology are changing some relations between human perceptions of body and the city, colours, places, spaces.