

The Fifth Annual National Conference of the American Synesthesia Association, Inc will take place on October 28-30, 2005 at the UNIVERSITY of TEXAS, HOUSTON MEDICAL SCHOOL.

The American Synesthesia Association, Inc., Conference will be held in the UTH Medical School Building on conference room B.605.

Presentation Schedule

Friday, October 28

In the Leather Lounge,
on the ground floor of
the University of Texas,
Houston Medical School

5:30 - 6:30 p.m.
At the Door Registration

6:00 - 8:00
Reception

Saturday, October 29

In room B.605
in the University of Texas,
Houston Medical School

8:00 - 8:45 a.m.
At the Door Registration

Refreshments

8:45 - 9:00
Welcome by David Eagleman
Opening Remarks by Carol Steen, Pat Duffy, Sean Day

9:00 - 9:30
Ed Hubbard

9:30 -10:00
Greta Berman

10:00 -10:30
Lidell Simpson

10:30 -10:50
BREAK

10:50 -11:20
David Eagleman

11:20 -12:20 p.m.
Lynn Robertson, Keynote Speaker

12:20 - 2:20
LUNCH (On your own)

2:20 - 2:50
Carol Steen

2:50 - 3:20
Sean Day

3:20 - 3:50
Pat Duffy

3:50 - 4:10
BREAK

4:10 - 4:40
Carol Crane

4:40 - 5:10
Julia Simner

5:30 - 7:00
Reception

In the Leather Lounge
on the Ground Floor of
the University of Texas,
Houston Medical School

7:30 -
Dinner, BYOW (Bring your own wallet)

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The American Synesthesia Association, Inc., Conference will be held in the UTH Medical School Building on conference room B.605.
Greta Berman, The Juilliard School, New York City

Sunday, October 30

In Room B.605
in the University of Texas,
Houston Medical School

8:00 - 9:00 a.m.
At the Door Registration
Refreshments

9:00 - 9:30
Mark Paterson

9:30 -10:00
Mary Spiller

10:00 -10:30
Marcia Smilack

10:30 -10:50
BREAK

10:50 -11:20
Barbara Stephan

11:20 -11:50
Markus Zedler

11:50 -12:20
Julian Asher

12:20 -2:20 p.m.
Working Lunch (Topic to be announced)

2:20 - 2:50
Maria DeCordoba

2:50 - 3:20
Morgenstern/Film

3:20 -
Closing Remarks

Genuine Synesthesia vs. Metaphorical Synesthesia

During the year 2005, several art exhibitions have been mounted

under the rubric of "Synaesthesia." One of these, entitled "Visual Music: Synaesthesia in Art and Music Since 1900" shown at the Hirshhorn Museum, Washington, DC, and at the Los Angeles Museum of Contemporary Art deals almost exclusively with metaphorical synesthesia; another, at the Eyebeam Gallery in New York City, was called "What Sound does a Color Make?" Neither of these addressed the issue of genuine synesthesia.

I have been trying over the past few years to clear up some of the confusion between genuine and metaphorical synesthesia. Like many art historians, I, too, used to think that synesthesia meant simply the combining of 2 senses, as when an artist makes paintings that look like or suggest music to them, or vice-versa (well-known examples would be "Fugues" by Kandinsky and Klee, or Mussourgsky's "Pictures at an Exhibition".) However, we now know that genuine or structural synesthesia is simply a genetic predisposition, like handedness. You do not have to be an artist or musician to be synesthetic, but I do believe it is more common among artists than in the general population. And also, when the artist is aware of his/her synesthesia, it can be used to intensify his/her work. This talk will compare and contrast the work of a few known genuine synesthetic artists and composers with that of some I believe to be metaphorical. Special attention will be focused on Wassily Kandinsky, a very controversial case in point.

Carol Crane, Fielding Graduate University, California

A Neuropsychological and Familial Study of Developmental Synesthesia

Current synesthesia researchers generally agree that developmental synesthesia is unusual but neither abnormal nor pathological. However, the general consensus may have been predicated on small and biased samples, inconsistencies in the definition of synesthesia, and poor differentiation between synesthetes and nonsynesthetes. The current study provides a working definition of synesthesia and uses a formal screen for diagnosis; it objectively measures and compares the performance of 26 synesthetes with 25 matched controls on neuropsychological techniques. Results do not support the general assumption and suggest that synesthesia is at least more than unusual.

A priori tests compared group means on scores of intelligence, memory, attention, and emotional well-being using independent sample t tests. Highly explorative tests and a logistic regression analysis assessed predictive patterns of variables among the two groups. Synesthetes demonstrated superior verbal reasoning skills,

significantly discrepant from average nonverbal reasoning skills. Memory skills were not significantly different from normal controls; however, ability to sustain attention for complex auditory stimuli was weak compared with nonsynesthetes. Synesthetes reported greater emotional instability, both personally and in extended family members, than did nonsynesthetes. Two variables, migraines and WAIS-III VCI, successfully predicted group membership.

Sean A Day, Trident Technical College, South Carolina

Synesthetic arts in some non-Western cultures

Synesthetic art may be created in different ways, depending upon one's type of synesthesia and intentions. Nevertheless, for any of these methods, art will be created and presented within a cultural system. Most creators of synesthetic art want the audience to 'get it', at least to some degree. The easiest way to do this is to work within pre-established codes of correspondences already within a given culture; however, these vary drastically between cultures, and do not always translate readily. Moreover, since a particular culture might have a different organization and ranking of the senses, this can also result in a focus on different forms of art than what we are used to in "the West". This paper explores and compares synesthetic art between "Western" and non-"Western" cultures. For example, the Shipibo-Conibo of Peru weave patterns based upon drug-induced visions. Synesthesia enters in that patterns may be read as musical structures, and are also associated with specific synesthetic odors. Thus, in order to produce cloth, pottery, and other patterned works, a Shipibo-Conibo invents visual patterns that sound good and have a desirable smell. For the Aymara of Bolivia, touch, color, and sweetness interconnect synesthetically, again expressed via cloth weaving. For male Desana, a Tukano Indian tribe of Columbia, composing music operates heavily within their culture's intertwining cosmological, religious, and color symbolism systems; the object is to create a song which will produce a desired synesthetic color, of a specific desired temperature, which will create a desired odor.

Maria Jose de Cordoba Serrano, Artist; Foundation Artecittà, Grenada, Spain

Synesthesia Sound/Image/Color – Proposal for the study of a mathematical model of the synesthetic processes

A brief description of an investigation derived from and relating to artistic work, where sound/color synesthesia is experienced, mainly, creating a central problem, and a search for synesthetic answers in

other people's investigations and products. Are the eidetic images induced by sound synesthetically, or pseudo-synesthetically, of low, medium and high intensity?

The results of investigations made in the last ten years suggest that a certain synesthetic capacity lies at the base of our creativity; this confirms, in part, the conclusions arrived at in my 1988 personal investigation. The mystery generated around this capacity takes us to the necessity for an interdisciplinary study, and its analysis to continuous reframing of approaches to these studies. The confusions that our cerebral activities experience in global perception of the world, which have shot down the little that we know from the Aristotelian approach to the study of the senses, create other points of reflection regarding their importance in the beginning of human knowledge of the world or epistemology, like an aspect of existential philosophy. Here, we will reflect between synesthesia and art, from a more scientific than artistic plane, in attempt to make this investigation necessarily more interdisciplinary. Also, we will look for the possible physical correspondence between light and sound waves (with the aid of experts in electronics and physics), a correlation of mathematical values, and whether these values are perceived by the people who have this condition.

Patricia Lynne Duffy, Author; United Nations Language and Communications Programme, New York City

Image of the Synesthete in Modern Fiction

With the growing body of research into the phenomenon of synesthesia in recent years, a number of new works of fiction with synesthetic characters have appeared. This raises the question of how the synesthete is represented in literature, i.e., what is the developing image of the synesthetic character in fiction? Are there common personality features in the portrayals of synesthetes in different works of fiction? Do portrayals differ depending on whether the author of the given work is a synesthete or non-synesthete? Also, do portrayals of synesthetes in contemporary fiction differ from those in works written prior to the flurry of research activity in recent decades?

By analyzing the synesthetic characters in several works of fiction, such as Vladimir Nabokov's *Invitation to a Beheading* and *The Gift*, Holly Payne's *The Sound of Blue*, Katherine Vaz's *Saudade*, and Clare Morrall's *Astonishing Splashes of Color*, this question will be explored. As more information about synesthesia filters into the mainstream community, what is the popular image the synesthete could have in the eyes of the reading public?

David Eagleman, University of Texas, Houston Medical School

David Eagleman^{1,2,3}, Arielle Kagan^{1,4}, Steffie Nelson^{1,2}

1. University of Texas, Houston Medical School

2. Rice University

3. UT Austin

4. Harvard University

The Genetics of Synesthesia: Linking Genes to Perception

While synesthesia has been explored in behavioral and neuroimaging experiments, what remains unknown is its genetic basis. Synesthesia is an ideal condition for genetic analysis for 3 reasons: (1) A battery of perceptual tests allows confident phenotyping of synesthetes, (2) synesthesia clusters in families and current data suggests it may be inherited as a dominant X-linked gene, and (3) synesthetic perception may result from functional over-connectivity between neighboring neural areas, which suggests a set of candidate genes. As for the last point, the over-connectivity may either be anatomical (implicating genes involved in neuronal pruning, arborization or apoptosis) or it may be functional (implicating genes involved in the balance between inhibition and excitation). We are currently performing a family linkage analysis to map the gene(s) that are correlated with synesthesia. To this end, we have developed a battery of psychophysical tests to quickly phenotype synesthetes; i.e., to distinguish them from control subjects. We have obtained pedigrees from several families with multiple cases of synesthesia, and we have obtained DNA samples from almost 100 people in these families. A genome wide scan of the family will be completed using 100 highly polymorphic microsatellite markers. The most probable genetic region responsible for synesthesia in these families will be identified. Within the mapped region, candidate genes will be sequenced and screened for a segregating synesthesia-causing variation. When a probable variation is observed, 100 banked controls will be sequenced for the same variation to eliminate the possibility of a general population polymorphism. The objective of this study is to better understand and characterize the genetic basis of synesthesia.

Edward M Hubbard, INSERM Unité 562 - Neuroimagerie Cognitive
Service Hospitalier Frédéric Joliot CEA, Orsay, France

Edward M. Hubbard¹, Shai Azoulay², Catherine Mulvenna³, Dana Sanders² and V.S. Ramachandran²

1. INSERM UNITE 562
2. Center for Brain and Cognition, UCSD
3. University College London

The Impact of Synesthesia on Memory and Creativity

Few studies have investigated the potential consequences of synesthesia for cognitive functions such as memory and creativity. We have begun to investigate these questions in two separate lines of research.

1) We tested a synesthete, Arithmos, who currently holds the European record for the most digits of pi memorized (22,515). He reports that each number elicits an elaborate three-dimensional shape that incorporates size, color, texture, and sometimes movement or sound, all of which had high (>95%) retest reliability after several days. To test whether Arithmos' synesthesia contributes to his savant-like feats of memory, we presented him with arrays of 100 random numbers to memorize in three conditions: neutral, congruent, or incongruent. Arithmos recalled more than 50 digits in both the neutral and congruent conditions but less than 20 in the incongruent condition. In surprise retests 24 and 72 hours later, Arithmos demonstrated perfect retention in the neutral and congruent conditions, but not in the incongruent condition.

2) We measured creativity in synesthetes and matched non-synesthetes in UK and US populations. Synesthetes were identified using a questionnaire and ten-week retest reliability. Creativity was measured using the Torrance Test of Creative Thinking. Synesthetes and non-synesthetes were matched for age, gender, and major. In the US population, intelligence was also assessed using the Raven's Progressive Matrices. Nine synaesthetes were identified, and scored higher than matched non-synesthetes on all three measures of creativity (fluency, flexibility, and originality). These findings provide the strongest evidence to date that synesthetes may be more creative than non-synaesthetes.

Stephanie Morgenstern, Actor, Filmmaker; Toronto, Canada

Remembrance (35mm color film, fiction, 18 min. 45 sec.,
cinemascope)

1942. Alfred Graves, a man cursed with a perfect recollection of his every experience, lives a cautious life touring his one-man memory show. One night, he becomes spellbound by an attractive stranger in the audience who has come with a serious proposition for him. Remembrance is an unusual wartime romance, inspired by two true

stories. The first is of Shereshevsky, Luria's famous synesthetic subject whose rare memory condition literally prevented him from forgetting. The second: Camp X -- a top-secret intelligence facility near Whitby, Ontario, that was used to train Canadian and Allied spies during World War Two. Against this backdrop, two strangers meet and, each for their own reasons, must struggle against an unexpected and dangerous attraction. Shot in 35mm Cinemascope with an original music score, *Remembrance* tells the story entirely through the heightened senses of its synesthetic protagonist. It is co-written by Stephanie Morgenstern and Mark Ellis, who also play the two lead roles. Morgenstern, herself a synesthete, directs.

"Beautifully done, with quiet beauty and dignity -- combining clinical verisimilitude with a very human predicament." - Oliver Sacks

Mark Paterson, University of the West of England, Bristol, UK

Molyneux's question: cross-modal perception in enlightenment philosophy

The question of spatial perception in the congenitally blind was raised by William Molyneux in a celebrated letter to John Locke in 1749, and subsequently involved Berkeley, Diderot, Condillac and Voltaire in subsequent speculations on blindness. The 'Molyneux question' concerned the hypothetical case of a congenitally blind man who is made to see, at a time before cataract operations could empirically answer this. Molyneux asks: if the man was previously able to tell the difference between a cube and a sphere by touch alone, with his new-found vision, would he be able to differentiate between them without touching?

Being an empiricist, Locke could allow no transcendence of the immediacy of experience, and he therefore sided with the incommensurability of the sensory systems. The specificity of the senses, especially touch and vision, foreshadows the beginnings of the psychology of blindness. Molyneux's question is extremely important for later theories of the psychology of blindness, like von Senden's in 1932. As Josipovici observes, in thinking about blindness after Molyneux, "we are all heirs of the seventeenth century" (1996:69).

In contrast to Locke, Descartes and Diderot both leapt upon the analogy of 'seeing with the hands' based on speculative experience of blind subjects. To convert the haptic into the visual calls for a unifying faculty, an Aristotelian 'sensus communis' or common sensibility. But the philosophical assumption remains: What is the role of synaesthesia in this cross-modal spatial perception? Bringing

the historical debate into more recent psychological context, how have these philosophical discussions informed current thinking about synaesthesia? Questions of amodality and cross-modal perception cut right to the heart of the philosophical debate between rationalism and empiricism, and exposes synaesthesia to philosophical scrutiny.

Lynn C. Robertson, University of California Berkeley and Veterans Administration, Keynote Speaker

Binding color and shape in synesthetes and non-synesthetes

Although color and shape are represented in the same or nearly the same place in the eye and early visual cortex, neurobiological evidence has shown that these are soon separated and processed by different specialized neural populations. In other words, features of a unified visual stimulus in early vision become separated within the brain. Yet most people do not see colors and shapes in different places or free floating. Instead they are bound together in normal perception. A central question in neuroscience has been how the visual system reunites such signals to account for perception of integrated objects. This is known as the "binding problem". In the context of the present talk, the question is how two visual features such as color and shape become bound in conscious awareness. I will first discuss findings from a neurological patient with lesions in symmetrical areas in each hemisphere (dorsal occipital-parietal cortex), which led to a real life binding problem between color and shape. Although color signals were induced by wavelength, as is the norm, they were assigned to the wrong shapes, producing the perception of objects that were the wrong color. On the surface, this case would seem to have little in common with synesthesia. However, such phenomenon as color-graphemic synesthesia may represent the other end of the binding continuum. How does the brain assign a location for wavelength induced color vs shape induced color, or for that matter, hearing induced or tactile induced color? I will argue that space is the tie that binds, whether in normal or synesthetic perception. I will discuss evidence suggesting that the space associated with parietal function is involved in both synesthetic and non synesthetic color/shape binding. This leads to the intriguing possibility that differences in a relatively large subset of individual synesthetes may be at least partially explained by the brain's insistence that neural signals that represent features such as color be placed somewhere within the space constructed by the visual spatial system.

Julia Simner, Department of Psychology, University of Edinburgh, UK

Julia Simner¹, Jamie Ward², Catherine Mulvenna², Noam Sagiv²,
Monika Lanz², Ashok Jansari³, Elias Tsakanikos⁴, S. Athene
Witherby², Christine Fraser¹, Kirsten Scott¹, Krist Noonan², Louise
Glover¹, David A. Oakley²

1. Department of Psychology, University of Edinburgh, UK.
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The prevalence and principles of synaesthetic grapheme-colour
mapping

In this paper, I describe the prevalence of grapheme-colour synaesthesia (from Simner, Mulvenna, Sagiv, Tsakanikos, Witherby, Fraser, Scott, Ward, under review) and show how particular letters come to be associated with particular colours. Although letters-colour associations vary 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, 2005). 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, Ward, Lanz, Jansari, Noonan, Glover, Oakley, 2005). Although synaesthetes were significantly more consistent over time, there were remarkable inter-subject and inter-group agreements in the assignment of colours. By considering cognitive and linguistic properties, we show the underlying mechanisms that give rise to these preferences, and illustrate how some mechanisms are shared between synaesthetic and non-synaesthetic populations, while others are particular to each group. Synaesthetes tend to associate higher frequency letters with higher frequency colour terms, while control participants are influenced by order of elicitation, and by colour prototypicality. Both populations, however, exhibit a significant tendency for initial letter priming (e.g., b=blue; r=red), and such findings suggests that letter-colour synaesthesia, whilst only exhibited by certain individuals, stems in part from mechanisms that are common to us all.

Lidell Simpson, Ridgeland, Mississippi

The sound of silence

I have profound sensorineural nerve deafness since birth. I did not start wearing hearing aids until I was 5. I have vision to sound synesthesia, which is the most prominent form. I also, to a lesser

degree, have sound to vision synesthesia. I also have touch/taste/smell/emotions to sound and sound to touch. I am presenting some musical compositions based on the synesthetic sounds I hear around me, in a semi-random sampling of a normal setting. Other compositions reflect the sounds of migraine and "migraleptic" seizures. The music focuses primarily on the synesthetic sounds of lights/colors and contrasting images to sound. Carol Steen once described my composition as "Sound Artistry".

Marcia Smilack, Photographer, Martha's Vineyard, MA

When a Window is also a Mirror

A Dream: I am sitting at a semi-circular desk wrapped around my waist snug as a baby's highchair. The desk is like any desk except for where it is: the middle of the ocean. I am dry as a landlocked scribe from the waist up, but from the waist down, my body is submerged. My chair is actually a bicycle, my feet touching pedals underwater. I discover a button on my computer that catapults me into live music without my having to get up from the chair, or bike, or out of the water. I am a female centaur, hooves replaced by aquatic wheels - half rider, half writer - which is why in waking life (I think later), when I mean to type "write" I see "ride" appear on my computer screen, as though my fingers think in homonyms and take dictation from voices I can't hear.

This dream provides the perfect metaphor for how synesthesia feels, although in waking life, I have no magic button to initiate the experience. I look to Nature instead, specifically reflections on water where light, at certain times of day, sends me into multiple modalities. I experience sound, texture, and motion but never voluntarily, so I put myself in the vicinity of where I know it might occur. My images elicit the same synesthetic responses every time I see them. By sharing them, I hope to transform Nature's mirror into a useful window for us all.

Mary Jane Spiller & Ashok S. Jansari, University of East London, UK

Fading into the background: Mental Imagery in Synaesthesia

Does a mental image of an inducer in alphanumeric synaesthesia result in a synaesthetic experience? Subjective reports have suggested that it does but, to date, little objective evidence exists. As perception and mental imagery have been found to use similar neural mechanisms (Kosslyn, 2005), a synaesthetic experience from a mental image might not be surprising. The current study uses

experimental methodology as used in the mental imagery literature (e.g. Mast & Kosslyn, 2002), with the added condition of colour, to find an objective measure of a synaesthetic experience from an internally produced mental image of an inducer. Alphanumeric colour synaesthetes (n=4) and matched controls formed a mental image of a series of letters and made a size-based decision about each letter, whilst looking at a computer screen. The independent variable was the colour of the screen, either being white (baseline), or filled with a colour, congruent or incongruent with the individual's colour for that letter. It was predicted that, when looking at the congruent colour screen, synaesthetes would take significantly longer to make an accurate decision than with the other conditions, when compared to the controls. This is because the image would almost become 'lost' within the background colour of the screen, a camouflage effect that previous studies have found with external presentation of inducers on coloured backgrounds (Smilek et al, 2001). The results will be discussed in relation to previous findings, and what these findings can tell us about the interface between mental imagery and synaesthesia.

Carol Steen, Artist; Touro College, New York City

In pursuit of the 'internal landscape'

My presentation will explore two groups of paintings whose images were triggered by synesthetic experience – the first group has images triggered by touch and the second has images triggered by sound. I will discuss how my experience and process differed in creating each group.

While my paintings have always had synesthetic imagery as their source — for most of my life, I was not fully conscious of this – these images were just “second-nature” to me. After I became more aware of the phenomenon of synesthesia, I began to pay closer attention to the “landscape” of my internal imagery and to become more conscious of which of its elements I was drawing on in creating my art. For several years, I paid close attention to synesthetic images triggered by touch, specifically by acupuncture treatments. These images were often intriguing but I was able to perceive them only as long as the acupuncture needles were inserted in the meridian points; when they were removed, the images disappeared, and I would have to paint the images from memory later. I then began to paint synesthetic images triggered by sound, specifically music; the advantage of this was I could listen to the musical piece that triggered the synesthetic images several times in succession as I painted.

My presentation will explore the differences in the experience of

making the touch-inspired and the sound-inspired paintings, but also the difference in the complexity of images each experience yielded.

Barbara Stephan The Institute of Transpersonal Psychology, Palo Alto, CA

A Study of Synesthesia in Children

This talk presents new data related to the incidence rates of synesthesia and the experience of synesthesia in children. The data was gathered through a study which explored the incidence of synesthesia in 92 dyslexic and 87 nondyslexic students ages 7 to 14, including 103 males and 76 females. Although the research did not reveal a significantly higher number of synesthetes among dyslexics than nondyslexics, a serendipitous finding did reveal a significantly higher number of synesthetes in a group of advanced/gifted students. Of the 179 participants, 29 (16%) of both genders expressed some form of synesthesia, with colored-hearing being the most commonly reported. This was the first study to be done with children; additionally, this study found higher prevalence rates of synesthesia than has previously been documented. Qualitatively, synesthetic experiences were explored through interviews and case study reports. The experiences of two children who learned of this characteristic through their involvement in this study will be shared. Furthermore, implications for future research and applications will be addressed as they relate to child development and education.

Markus Zedler, Medical School Hanover, Germany

The A is Red - Genuine Synesthetic's Letter-Colour Chart

Synesthesia is a perceptual condition in which the stimulation in one sensory modality elicits a concurrent sensation in another, a perception which is perceived as real. These sensory experiences from different modalities occur in otherwise neurologically and psychologically completely healthy individuals. Any of such combinations of the senses are theoretically possible; however, the most common type of synesthesia is "coloured hearing". Genuine synesthesia, however, is characterized by a very high degree of consistency over time. Until now, there was unanimity that any of the synesthetics has his own randomized code of cross-modality. We tried to prove the coincidences of the unions of senses and got some really different results than expected. The evaluation of 71 individuals with consistent letter-colour synesthesia brought significant frequencies of combinations.

The synesthetes filled in what they see in a black and white alphabet (German letters without umlauts). They were free in describing the quality of their co-percepted colours. Three independent examiners tried to categorize the colours in twelve groups (red, orange, pink, violet, blue, green, yellow, brown, black, grey and white). Only the unanimously categorized colours were computed. Significant similarity was found. Using the methods of Chi2-Test ($p < 0.001$) and intervals of confidence (95 %), the letter A is significantly binded with the colour red (49.1%), I with white (36.4%), K (46.2%) and R (39.5%) with brown, S with yellow (51.1%), V (40.5%) and X (45.9%) with grey.