

A World of Sound and Colour: Synaesthesia – is it just hearing colours and tasting shapes?

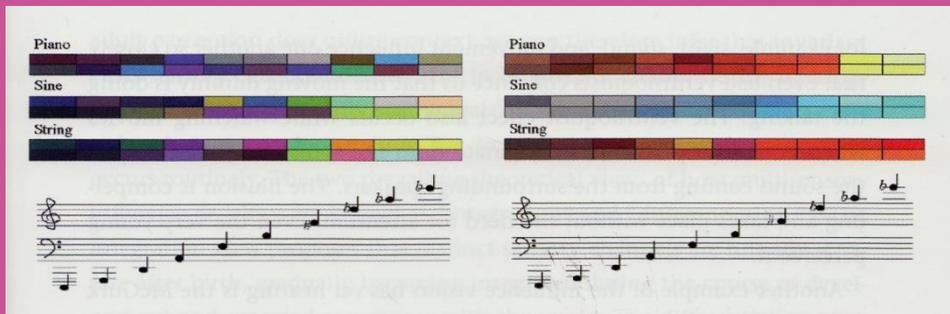


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Colours chosen on two occasions (stacked bars) for ten single piano, sine wave (pure tone), and string timbres for a control subject (left) and a synesthete (right). Note the far greater degree of consistency in the synesthete and the matching of higher notes to lighter hues.

Ward J., Huckstep B., Tsakanikos E. (2005)

Definitions of Synaesthesia

- A joining together of sensations that are normally experienced separately. Some synaesthetes experience colours when they hear or read words, whilst others may experience tastes, smells, shapes or touches in almost any combination

(Psychology Department website, University of Sussex)

- [Synaesthesia is a condition] in which [people's] senses seem to mingle or overlap: they may see sounds and hear colours

Sir Ken Robinson

- [Synaesthetes] have anomalous perceptual experiences that are triggered by activity in another sensory modality

Professor Jamie Ward (2008)

Are you a Synaesthete?

The connection between hearing sound but experiencing it as colour is one of the most common forms of synaesthesia (*audition colorée*).

Describe what you hear in the following two musical extracts. It may be helpful to write down some key words. We'll discuss your ideas after the second extract.

- Musical Extract #1



Are you a Synaesthete?

- Musical Extract #2



Extract #1

If I Was Your Girlfriend – Prince, *Sign 'O' the Times*

“Prince is a master of ‘leaving it black’. In other words, he knows how to use silence to create a void or emptiness in his music. One of the best examples is the song If I Was Your Girlfriend... the percussion is heavy, the synthesizer is compelling, and the guitar is almost absent. Between the percussion and the synthesizer are moments of silence... I see very clearly lots of black. The percussion does not sustain long; the circles are only visible for moments. The sounds of the synthesizer are super straight and the bars tumble over each other downward, though they are also only visible in moments. The result is hypnotizing beauty.”

Patrick, as quoted in van Campen, C. (2008) *The Hidden Sense: Synaesthesia in Art and Science*. Massachusetts: MIT Press

Extract #2

Bryce Canyon – Messiaen, *Des canyons aux étoiles...* (From the *Canyons to the Stars...*)

“Woodwind and brass, the massive theme of red-orange rocks. ‘Contracted chordal resonance’ (red and orange), mode three 1 (orange and gold), ‘transposed chord inversions’ (yellow, mauve, red, white and black) convey the different colors of the stones.”

Messiaen, as quoted in Messiaen, O. (1993). *Music and Colour: Conversations with Claude Samuel*. Portland: Amadeus Press

Preliminary thoughts

- Synaesthesia is usually *not* connected with other musical phenomena e.g. amusia (“unmusicalness”), rhythm deafness, tone deafness, pitch amusia/dystimbria (music transformed into other – usually unpleasant – sounds), amelodia (“tune deafness”), dysharmonia (vertical harmonic perception), musical dystonia (controlling physical movement when playing)
- However, synaesthetes are often dyslexic or display other different learning modalities (multilingual or ESOL)
- A “Test of Genuinness” (TOG) (Eagleman (USA); Ward/Simner (UK)) can be used to determine if a synaesthete is genuine or not
- It is often congenital (research suggests most children are born synaesthetes and as the brain develops it is lost) and hereditary
- Visual art and music share the same vocabulary e.g. colour, line, texture, shade, shape, harmony, “chroma” etc
- Light and sound are both waveforms. However synaesthesia also affects taste, smell and touch

Synaesthesia in popular culture

In 2009 Telecom NZ ran a competition to see if someone could invent yellow chocolate i.e. not banana-flavoured but chocolate that tasted “yellow” (it was advertising **Yellow Pages**)

Yellow[^]

Pat

Christchurch 10/11

Confectioners – Manufacturing & Wholesale Page 286

Distributors – Contract & Wholesaler Page 352

Public Relations Consultants Page 867

Courier Services Page 309

Graphic Designers Page 553

Printers Page 852

Food Ingredients Page 470

Research & Development Page 897

Food Machinery Manufacturers & Importers Page 470

Read Josh's Job done® story Page 4

Yellow Maps™ Page 5

Yellow Vouchers Page 11

yellow.co.nz 018® Yellow Mobile™ Yellow pages®

In August 2009 we picked Josh from over 80 applicants to take on a Yellow™ mission

Meaning he had to come up with a flavour, packaging, advertising, and get distribution.

We challenged him to create a chocolate bar that tastes of yellow.

This was certainly nothing like anything he'd ever done before.

The deal was he had to only use Yellow Books, Online, Mobile and Maps to make it happen.

He created the taste of yellow chocolate.

First off he needed to renovate and turn a provided office space into his home base.

Then over the next few months with the help of 45 businesses sourced in Yellow, he set about his mission...

What you might call scrumptious proof that with Yellow you can get any Job done.®

yellow.co.nz

yellow@yellow.co.nz

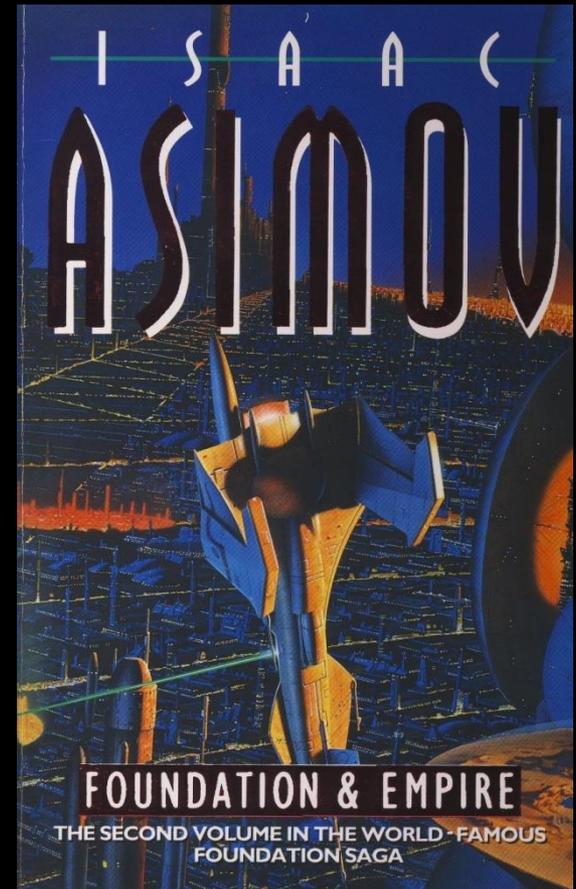
Synaesthesia in science fiction

NB both examples describe futuristic musical instruments

Magnifico drew his fingers in rapid, rhythmic jumps from end to end of the multikeyed instrument – and a sharp, gliding rainbow of light jumped across the room. A low, soft tone sounded – throbbing, tearful ...

... the music was suddenly brassy, evil – flourishing in high crescendo. The light flickered quickly, in swift motion to the wicked rhythm.

*Asimov, *Foundation and Empire* (1952)*



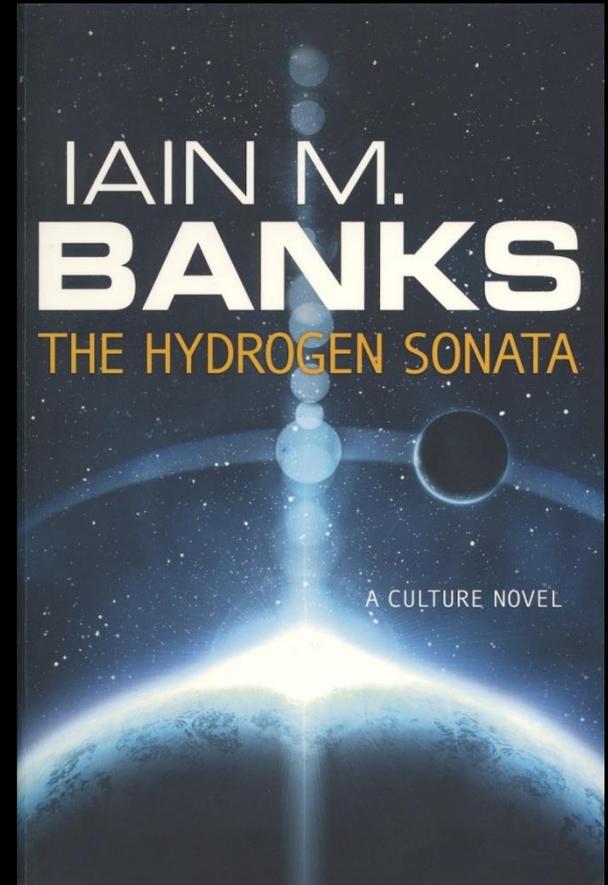
Synaesthesia in science fiction

With the drug, he could synaesthesise experience too, translating it into other senses while another part of him was still in real time, as though watching all this.

* * * * *

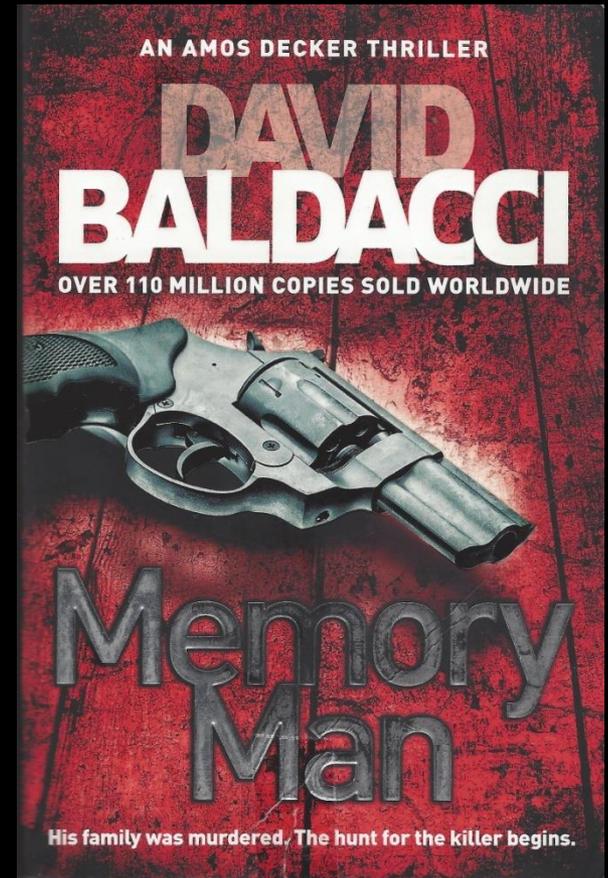
Words were still coming haltingly to him. His mind was struggling to adapt to speaking again after decades of slow singing and the transmission of thoughts and feelings by singular, though complex, sonic images.

Banks, *The Hydrogen Sonata* (2012)



Synaesthesia in crime fiction

I am Amos Decker. I'm forty-two years old.... I used to be a cop and then a detective but am no longer gainfully employed in either occupation. I have hyperthymesia, which means I never forget anything..... And it seems my sensory pathways have also crossed streams so that I count in colors and see time as pictures in my head. In fact, colors intrude on my thoughts at the most random times. We're called synesthetes.....Many people with synesthesia are also autistic or have Asperger's syndrome.



Baldacci, *Memory Man* (2015)

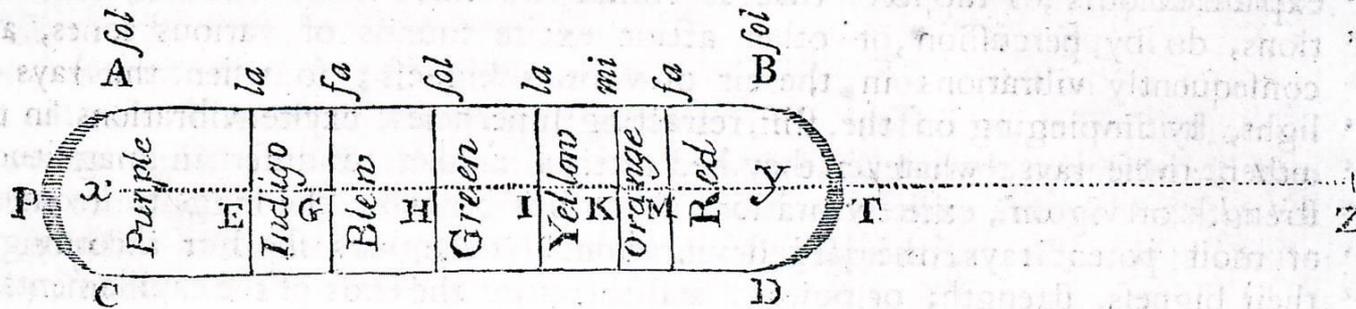
Music and Synaesthesia

675.]

ROYAL SOCIETY OF LONDON.

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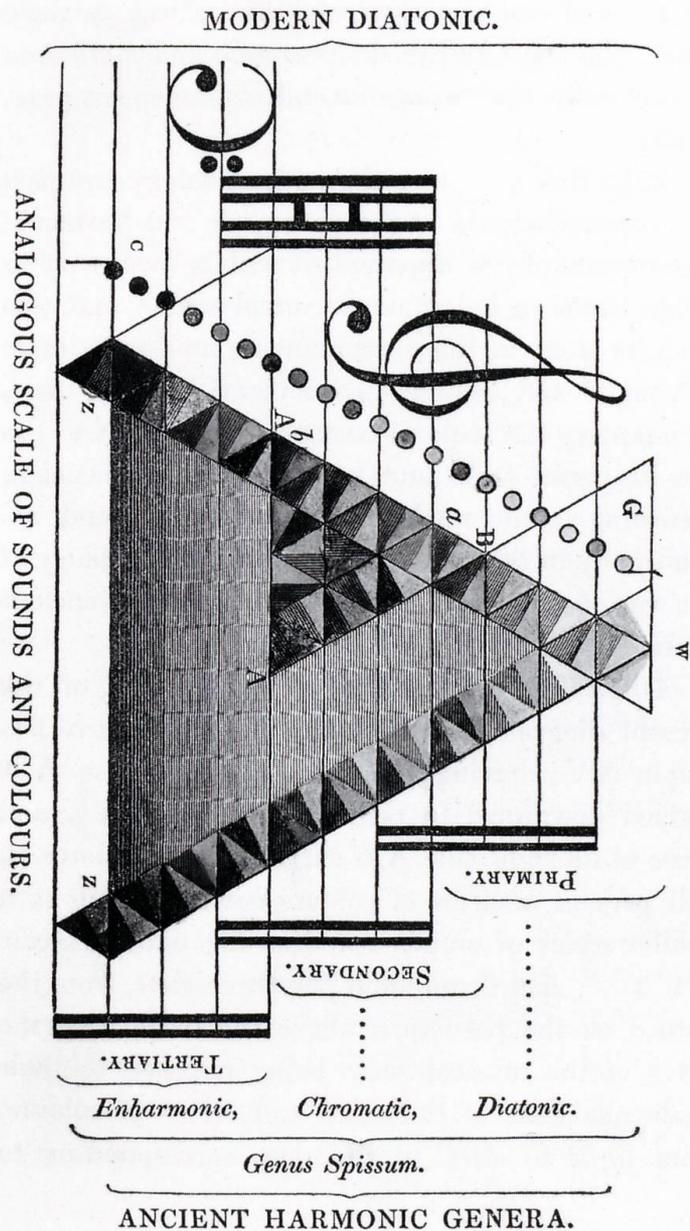
Y the centres of those semicircles, X Z the length of a musical string double to

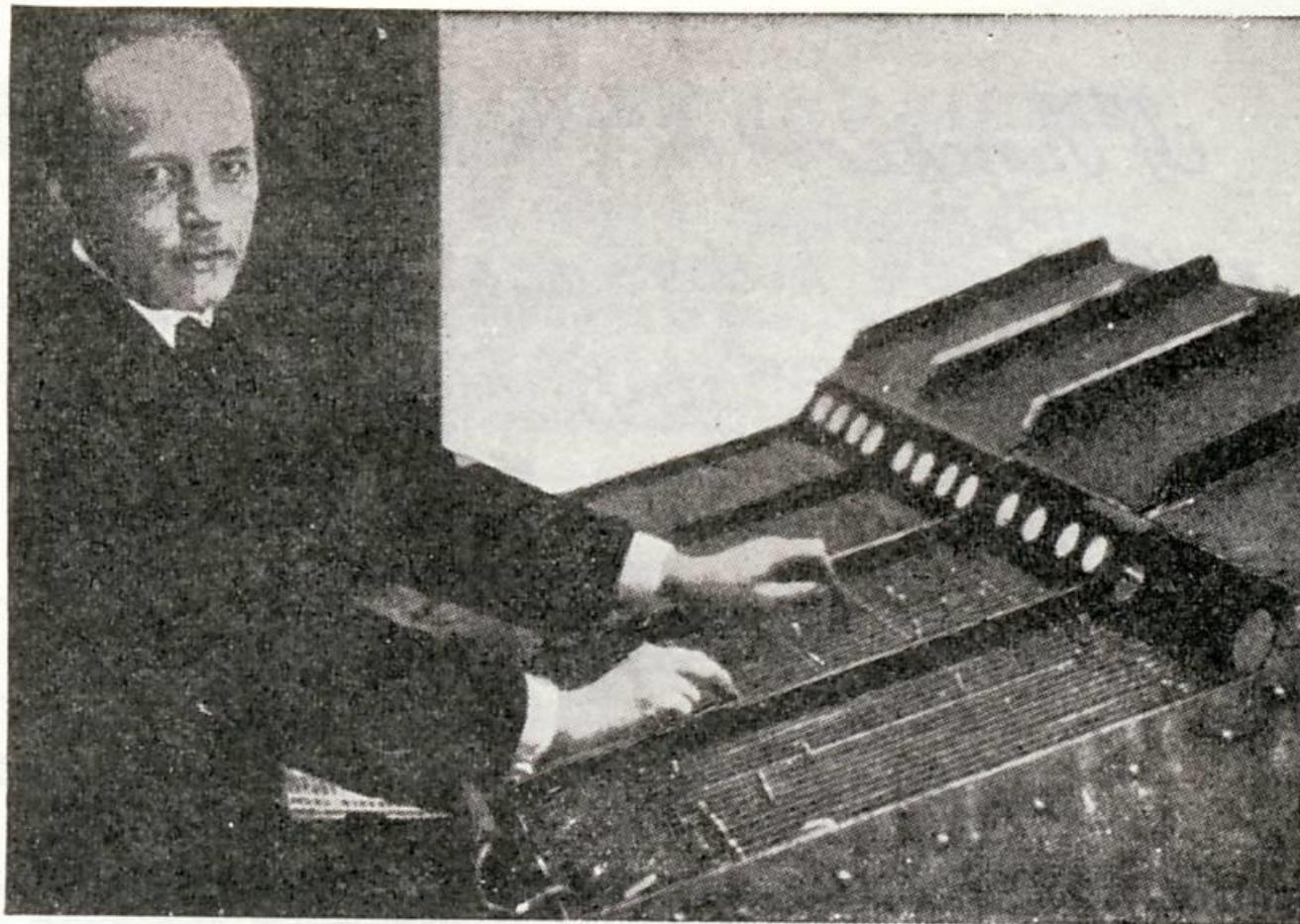


X Y, and divided between X and Y, so as to find the tones expressed at the side (that is X H the half, X G and G I the third part, Y K the fifth part, Y M the eighth part, and G E the ninth part of X Y) and the intervals between these divisions express the spaces which the colours written there took up, every colour being most briskly specific in the middle of those spaces.

Sir Isaac Newton, *Opticks* (1704)

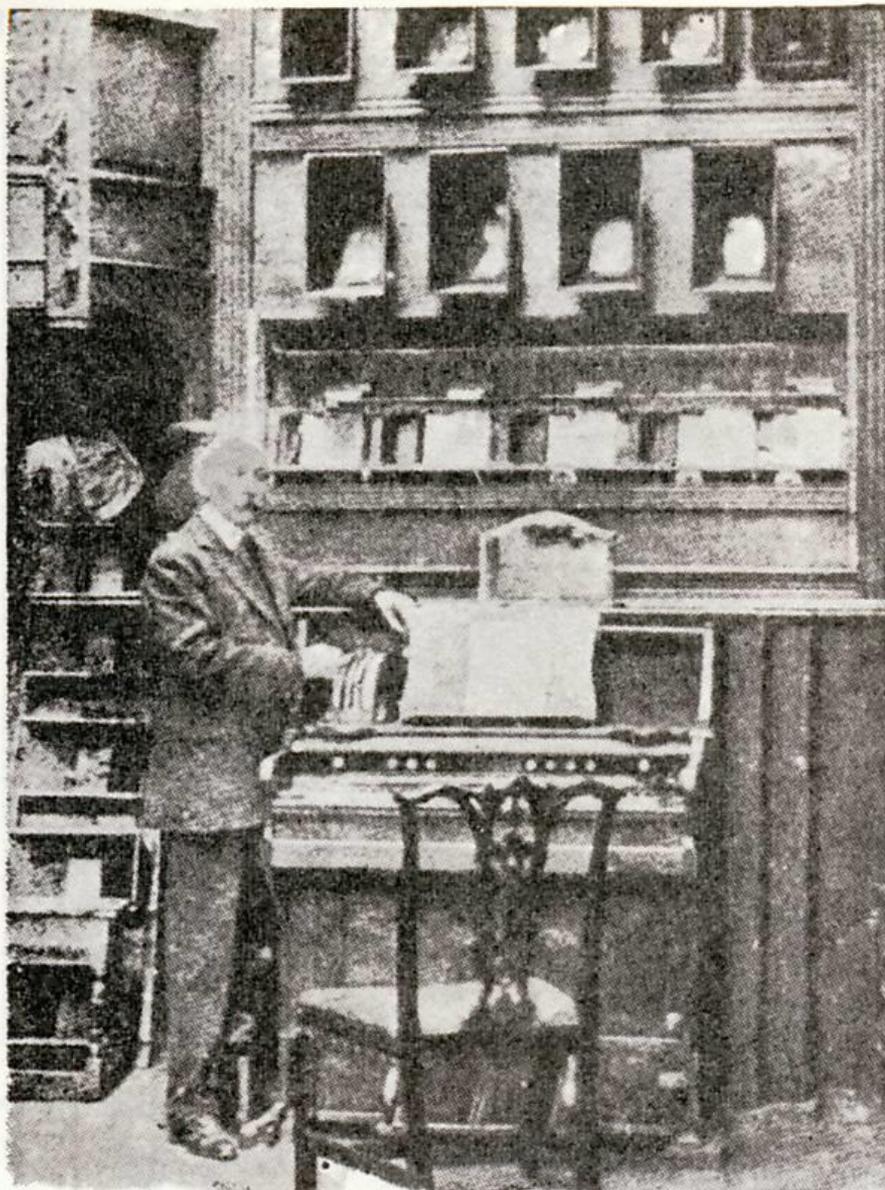
George Field, *Chromatography* (1835)





2. THOMAS WILFRID AND HIS CLAVILUX of 1925

Thomas Wilfrid and his clavilux (1925)



A. Wallace
Rimington in front
of his colour
organ (1893)

1. RIMINGTON AND HIS COLOUR ORGAN,
1893. See *Colour and Music* 7

Musical Synaesthesia

- Synaesthesia often manifests itself as hearing colours (*audition colorée*), tasting sounds, or attributing colours to words and numbers
- Synaesthesia is a condition experienced by many famous creative people e.g. Kandinsky, Messiaen, Mondrian, Scriabin, Ligeti, David Hockney, Michael Torke

SCORE IN C
...squeeze the orange
and throw away the skin...
MICHAEL TORKE 1985

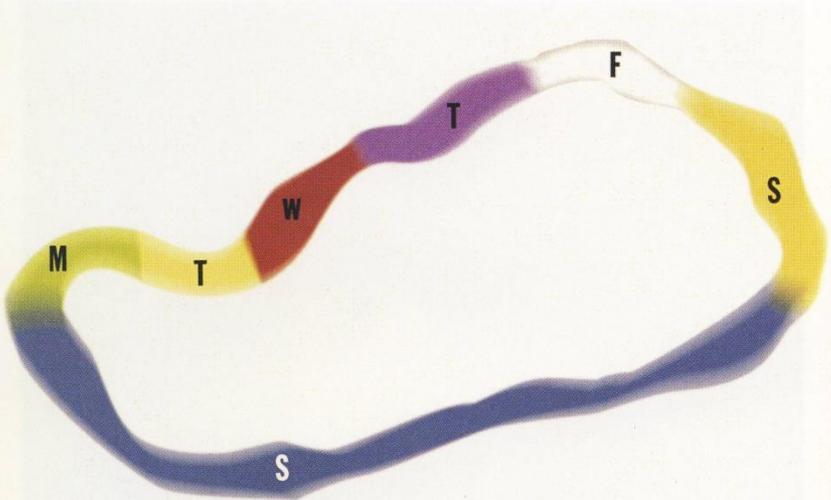
Ecstatic Orange

Orange with damsons

Carrot

Absinthe and apricot

Excerpts from the score for "Ecstatic Orange," by New York City Ballet composer Michael Torke. The music evokes different shades of orange (noted in the score) for the synesthetic composer.



Composer Michael Torke's colored view of the days of the week and, opposite, the author's colored year.

The study

- This is part 2 of a proposed multipart study
- These are findings looking at 12 participants showing very clear musical synaesthesia
- Funding through UC Summer Scholarship 2010/11 and 2011/12 enabled me to recruit 2 research assistants for 400 hours each season
- Methodology:
 - i. Ethics clearance (initially for 18+ but needed revisiting as several respondents were significantly younger)
 - ii. Media articles calling for participants
 - iii. Interview on national radio calling for participants
 - iv. Participants required to take TOG
 - v. Participants take part in semi-structured interviews
 - vi. Narratives transcribed
 - vii. Aspects iv – vi collated
 - viii. Trends identified
 - ix. Foci for stages 2 and 3 identified

Quotations from participants

- When I was studying to do my audiology postgraduate thing, we had to do a – oh, God, I don't know what it was. We had to listen to something, and you were trying to detect – um – gaps between the sounds and the sound got quieter and quieter and quieter, even after I couldn't hear the sound I could see – um – the flash of light that the sound produced.

[A02 – artist; synaesthesia largely number/letter related]

- I don't have anything coloured with – um – music. Even if I listen to music I don't have anything in colour happening.

[A03 – synaesthesia largely word-colour association, especially names. Put a name to the condition in her late forties during a casual conversation]

- [The notes are] just like black and white... So yeah, just like anyone else would see. Um – but I don't know, it could be that if I had learnt them earlier they might have had a colour, but I don't know.

[A04 – number/word synaesthesia; also days of the week and months of the year e.g. April is yellow; grandmother was a synaesthete]

Quotations from participants

- I love music... and particularly enjoy classical singing . . . but I can't see that. I always thought that it could be useful, kind of like the Cuisenaire rods.

[A05 – number-gender association; numbers have direction e.g. 1-5 go straight up then turn right; days/months as pattern; good memory aid; sees in the “mind’s eye”, not externally; found out about a year ago after watching a programme on TV]

- [Musical triggers] I think it's got something to do with the timbre.... F sharp makes my teeth hurt... C sharp invokes almost the same feeling in me as a prime number; it makes me quite anxious, it makes me quite edgy
- [Listening to music at an early age (pre-school) I remember] I was painting a line in the air going up and down with the music...like a line graph, a skinny black line
- There's a richness I get from my music – it's almost like there's a third dimension

[A06 – music teacher; speaks German, French & Italian; colours for numbers but not when represented as words e.g. “one, two” etc; gets left and right confused]

Quotations from participants

- I used to [play the bagpipes], and I just yeah, I never really got to the reading [of] the musical notes... Not that I was confused with them with the synaesthesia part, but like cause they didn't like project an image or anything, it didn't affect it.
- [No colour connection reading lines and dots] because it's just like lines and dots there's not much of a difference with them.

[A07 – numbers and words, but number-colour relationships stronger; however colours can change according to the other letters in the words, which is unusual

Quotations from participants

- My own flute has different colours to my friend's flute
- If a violin is quite thin normally it'll have a really different sound, like, shade, to a viola, more rich and warm and the colours will be deeper
- [When listening to a chord] For instance, a normal C chord, the colours are, like... you have each different colour but they're almost the same colour at the same time so, like, you'd have a little range of colours instead of just one singular... They're more blended
- My E [on my flute] is normally a light purple colour – lilacy. It always stays around that colour... If I'm sad it may seem to be more blue and if I'm happy it'll be lighter – brighter. It'll always stay around the same
- An F sharp would normally be in the middle between, like, a dark yellow and a green. A G would be... I think it's still a green but quite a dark – like, not exactly dark but a lot deeper
- I don't think I'd have been so into music when I was little if I hadn't seen the colours

[A08 – student; no letter/colour association; colours have personalities; poor speller; “I don't want people's opinion of me to change because they think I'm being smart”; right handed; colours “all around me”]

Quotations from participants

- Most of my musical inclinations are in singing . . . So I've done piano and flute as learned instruments for short periods of time . . . [and] choral singing, band singing – um – pretty much quartet stuff
- [And reading the words for songs do you find you get synaesthesia experience with that or not really?] No, no

[A09 – linguist; discovered synaesthesia when studying for a Masters degree; at school thought the other children were writing out the alphabet incorrectly but dismissed it that “they mustn't have learned that yet.”; strong number-colour, letter-colour association as well as day-colour and month-colour association; also smell; synaesthesia is handy for study notes and remembering telephone numbers]

Quotations from participants

- C changes – if it's a hard C it's sort of a darker yellow and if it's a soft C it's a brighter yellow
- [How educators in music could help] I think it's almost up to the individual, you'd have to work with – for example, if I was 6 years old and the music teacher wanted to know how to teach me music, if I had no background in music or whatever, she might have been able to – she could have made the notes the colour that I see for music. ABC in music are different to ABC in the alphabet

[A10 – music therapist; very specific association of colour (i.e. shades) for letters, numbers, months and days; right handed; perfect pitch; born with vision impairment – couldn't see for the first year of her life; synaesthesia good for PIN and telephone numbers]

Quotations from participants

- Um, with pitch I can, yeah I remember thinking about this recently actually. With pitch I can see the pitch of things, as elevation... Like a vertical line . . .
- If I'm singing ... I can see the notes as an elevation thing. So it's a spatial thing.
- So if I'm focusing on singing in tune . . .if there's a lot of noise around me I sort of see it as a um, as I hit an elevation it has like a height or an altitude, or a level. And I see that as much as I do, I'm not sure of the mechanics of singing in pitch, but...that seems somehow very important to get the right pitch.

[A11 – mountaineer; numbers and letters with “personalities” and a strong spatial element]

Quotations from participants

- But I love classic, I love modern, I love – um – jazz, all, all types of jazz, but there'd be times when I want to have jazz on and I'll want to listen to jazz. And sometimes there'll be a colour about it when I'm hearing it, but it's not as major as when I'm thinking of numbers and colours. For instance, I'll give you a specific example. When I hear Muddy Waters – um – I don't know if you know them; they're a classic jazz band from the 1920s/30s, that have a very classical – no, they have a very low beat, well I see purple when I hear that music.

[A12 – florist/artist; developed a colour “formula” by giving colours a numerical value (i.e. the reverse process of “normal” synaesthesia); used it to develop a “second language” with her sister; dyslexic; left handed

Quotations from participants

- [Taught piano by her mother at around 6 years of age] When I saw, for example, a written C I would – I don't know the right word – imagine, or view, or whatever, a picture and a colour... I think it was always that a C was yellow
- From what I've read from various other people's synaesthesia or something, it's kind of different, so that's why I'm not sure if it would generally be classified as synaesthesia... When I look at a C on the piano, or the C as in the music, yeah, or maybe if my mum were to say, "Can you play a C or something?" then it would be like I would automatically think of a picture – it's okay, I have these kind of pictures always of like a little cartoon kid and a colour associated with it [Interestingly, this doesn't occur when Subject C plays the double bass]. So, for example, C is yellow and it's a little girl in a yellow dress

[A13 – tertiary student teacher; cartoon image of colours; dyslexic; right handed; gets left and right confused; poor navigator; has trouble remembering names and faces; no letter/number colour association. Had never heard of synaesthesia before it was mentioned in a lecture]

Conclusions (so far)

- Most synaesthetes are very specific about the types and shades of colour they perceive. They are very specific in their descriptions and are often irritated by irregularities e.g. cuisenaire rods, colour selections by other synaesthetes etc.
- Colour association is consistent for each synaesthete e.g. if C sharp is dark blue, it is always a dark blue for that person, but there is no consistency between synaesthetes
- The strong colour association invariably does not change for a synaesthete (TOG)
- Synaesthesia affects people in very different and often very inconsistent ways i.e. colour hearing does not automatically come with taste association; combinations are not universal nor similar
- Synaesthesia is stronger in young children; there is no evidence for “mature onset” unless through head trauma or illness
- Synaesthesia can equally be a help or a hindrance – there is no evidence (Ward et al) to suggest that it makes you any more or less creative. It certainly does not help or hinder your innate musicality
- Many synaesthetes use it as a memory aid e.g. telephone/PIN numbers
- Knowing somebody with a similar view of the world helps – it “normalises” the condition. Most of the participants in this study learned of the condition through family or friends