



# Music and its flavours

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## INTRODUCTION

Synaesthesia is a very rare faculty that only certain people have. It can be attached to the group of qualia, as it is an introspective, private experience. This dominant feature springs up since the very first childhood. Once a cross-sense linkage is established it can remain invariable for life.

Synaesthesia consists on experiencing particular sensations linked to a certain sense caused by stimuli linked to a different sense. However, these sensations -concurrent perceptions- can also be linked to the same sense. Among the different investigated kinds of synaesthesia, colour as concurrent perception is the most common one; being, however, smell or taste concurrent perceptions very rare. That is the reason why we try to deep into the research focused on concurrent perception between tone intervals and taste. We comment the case of a person who experiences different tastes in response to hearing different musical tone intervals.

In spite of the lack of information on this issue, we found that scientists from the Institute of Neuropsychology of the University of Zurich found out that a 27-year-old professional musician who was female, right handed and of average intelligence (IQ, 115) experienced a taste on her tongue that was consistently linked to the particular tone interval she heard (being an interval the difference of frequency between two musical tones). The intervals are quantitative measured in grades (natural tones) and qualitatively in semitones. In addition to this, music theory considers that first, fourth, fifth and eighth intervals are tonal and second, third, sixth and seventh intervals are modal. After the subject was repeatedly tested for over a year the scientists reached the conclusion that her interval-to-taste synaesthesia was unidirectional, i.e. she did not hear the tone intervals when exposed to taste. In addition, the musician applies her synaesthesia in identifying tone intervals (which is evidence of a synaesthesia-cognition cascade).

To assess the flautist's synaesthetic gustatory perception on her ability to identify tone intervals, the Stroop test was used. Se was intended to link four selected tone intervals with four different taste solutions (sour, bitter, salty and sweet) by pressing a particular key for each interval on a computer keyboard. Reaction times and errors were measured for trials in which the applied taste was either congruent or incongruent. After the test it was found out that tone interval identification was perfect and significantly faster during the congruent condition. Nevertheless, five non-synaesthetic musicians were tested as controls using the same procedure: no significant differences between both conditions were found. The reaction times of the controls were similar to those of the flautist in th no-taste condition (e.g. minor second interval is congruent with bitter flavour and incongruent with salty flavour).

The flautist was also put to conceptual tests being showed the word(s) describing each taste; no significant differences between the flautist and the controls were not found.

The scientists concluded that a synaesthetic person attributes the corresponding taste category to every of the different tone intervals. This makes this person have a higher ability to discriminate between tones in comparison to non-synaesthetic people (e.g. minor second interval is congruent with sour taste, etc.). In conclusion, she was more likely to get the answer right because of her extraordinary type of synaesthesia, in which a complex inducing stimulus always gives her a taste concurrent perception.

## CONCLUSIONS

In the first test -free association test-, although written food are different, we can see how different music styles are perfectly linked to specific flavours. We think that associations as regards pop, soul and classic (80%, 80% and 66.6% respectively) with sweet taste are significant. However, rock, disco and jazz are linked to sour taste (46.66%, 53.33% and 50% respectively). Flamenco and reggae are associated to sweet taste, closely followed by salty taste (see attached table 1).

As for the second test, where subjects have to link every music category to different adjectives, colours and flavours, we can say the outcome is very similar to the first test's. It can be clearly seen on the remarked data in blue and red. Jazz and rock are related to black; however, this colour is never associated with flamenco or classic. Red colour is significant in disco, flamenco and reggae while blue is hardly related to flamenco, disco and rock music.

We would like to underline that music styles with more votes for sweet taste (classic and soul) are also significantly related to the blue colour, while music styles considered to be lively (disco, flamenco, reggae, rock and pop) are associated with red.

In the third test associations behave similarly to the previous ones (remarked again in red and blue) Jazz is strongly related to sour taste and it is not linked to other tastes like spicy, bitter or salty. Pop and reggae are strongly associated with sweet taste and they are not so with bitter, spicy and sour ones. Soul and classic are considered to be sweet and not salty, sour or spicy. Disco and rock music are not linked to sweet taste; they both show a high percentage of votes for sour and spicy tastes. Flamenco is considered to be sweet and not bitter.

After having reflected on the outcome of this piece of research and having into account that our subjects were not synaesthetic people, the similarity of the different tests' outcome has to be due to other factors. Because of this, after having finished the tests, we checked the results out and, according to them, we asked the subject a question to know the reason for his or her associations.

According to the answers and after discussion, we have reached the conclusion that culture and our environmental factors play an important role on the final outcome. This refers to the kind of music we listen to at every stage of our lives. For example (according to the results we have collected), soul, classic and pop music are usually played in romantic films, love intercourse, family meetings, etc. All these situations are pleasant and calm, that is why those music styles are considered to be sweet. They are also related to colour blue, which is a pleasant gentle colour that reminds of the sea or the sky.

However, if we follow the idea of the culture's influence, disco, jazz and rock music are considered to be sour. These music styles are usually more stressing and louder and they are also usually played in lively contexts, like red colour, to which they are linked.

This study allows us to continue advancing in the investigations, through science, to know the connections that exist between the gustatory perceptions or specific tastes of food before a certain sonorous stimulus. And this way it will be tried to deepen in the causes of these cognitive effects to which we called synaesthesia with the intention to solve some cognitive problem.

### References

- Beeli, G., Esslen, M. & Jäncke, L. Synaesthesia: When coloured sounds taste sweet. *Nature* 434, 38 – 38 (2005)
- Rich, A.N. & Mattingley, J.B. *Nature Rev.Neurosci.* 3, 43-52 (2002)

## METHOD AND MATERIAL

The sample consists of thirty subjects (15 male and 15 female) chosen at random, who are students from the Faculty of Psychology of the University of Granada aged between 20 and 24.

The test will be carried on in a room where it can be rightly performed being isolated from any noise or distractor.

Information and data are collected by three kinds of test, namely:

1. free association test
2. music style association with colours, adjectives and flavours according to a Likert scale
3. multiple selection: association of eight music styles with five flavours

The research procedure consists of applying individually the three tests to the subjects without time limit in order to avoid the subject is not "polluted" by any strange variable and make their association as objective as possible. First, every subject is explained what the different test they are going to be put on consist of. Then, they are given a sheet where they will have to specify their gender and age, and where they will be presented questions about their taste discrimination quality and about their knowledge of the different music styles.

The first test consists on an audition of 8 different music style samples (pop, reggae, soul, jazz, rock, flamenco, classic and disco) to let the subject associate them freely with flavours. The second test consists on linking the different music categories to different adjectives (sad, happy, crazy), colours (black, red, blue), and flavours (yoghourt, sunflower seeds, ketchup, lemon) using the Lickert scale (1 to 5). Finally, the subjects are put on an association test between the 8 music categories and the 5 flavour ones (sweet, salty, bitter, sour and spicy).

## RESULTS



Table 1: Free association test

	Sweet	Salty	Bitter	Sour	TOTAL MUESTRA
Flamenco "Vol. 1"	50%	43,33%	0%	6,6%	30
Rock "Satisfaction"	0%	33,33%	20%	46,66%	30
Reggae "Satisfy my soul"	46,66%	40%	6,6%	6,6%	30
Disco "Buika"	6,6%	13,33%	26,66%	53,33%	30
Pop "Como lo tienes tú"	80%	16,66%	0%	3,33%	30
Jazz "New release"	13,33%	3,33%	33,33%	50%	30
Soul "Sunrise"	80%	6,66%	0%	13,33%	30
Classic "7th symphony of Beethoven"	66,66%	0%	26,66%	6,66%	30
	142,92%	19,59%	14,16%	23,33%	240

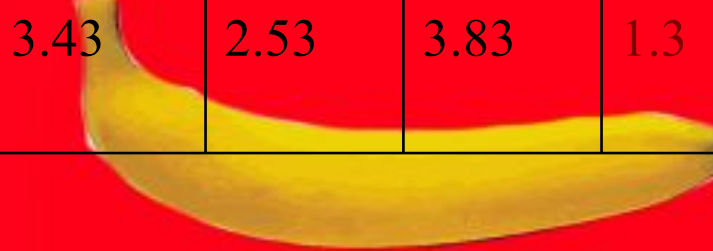
Table 3: Multiple selection

	Sweet	Salty	Sour	Bitter	Spicy	T
Pop	63.33%	20%	10%	0	6.66%	30
Reggae	50%	36.66%	3.3%	3.3%	6.66%	30
Soul	73.33%	0	6.66%	20%	0	30
Jazz	30%	6.6%	53.33%	10%	0	30
Rock	0	33.3%	33.33%	6.6%	26.66%	30
Flamenco	40%	26.6%	20%	0	13.33%	30
Classic	56.66%	3.33%	10%	23.3%	6.66%	30
Disco	3.33%	10%	40%	20%	26.66%	30
	35.83%	17.08%	17.5%	10.41%	10.83%	240

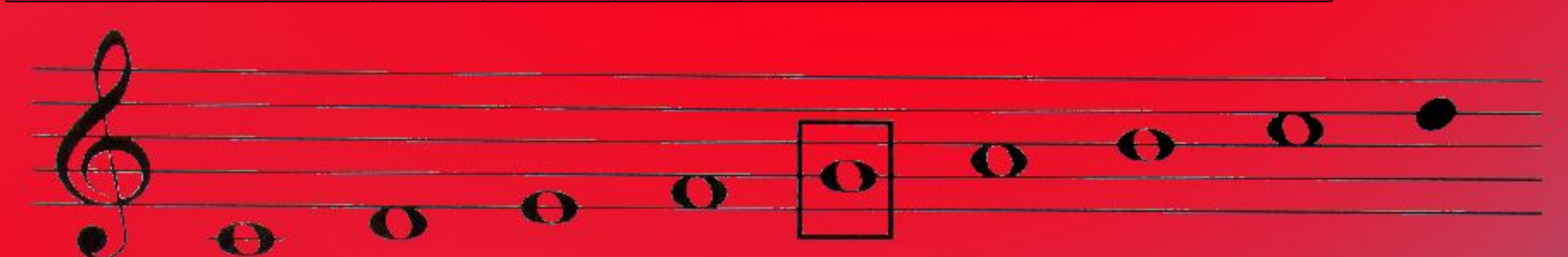
Table 2: music style association with colours, adjectives and flavours according to a Likert scale

	Jazz	Pop	Rock	Classic	Reggae	Soul	Disco	Flamenco
Black	4.1	2.16	4.63	1.56	2.23	3.43	2.03	1.5
Red	2.2	3.23	3.3	1.9	4.56	1.9	4.03	4.46
Blue	2.2	2.26	1.96	3.23	2.5	3.73	1.86	1.66

	Jazz	Pop	Rock	Classic	Reggae	Soul	Disco	Flamenco
Yoghourt	3.6	3.06	1.63	4.06	3.63	4.23	1.66	4.7
Sunflower seeds	1.53	3.8	3.83	1.2	3.73	1.23	3	4.1
ketchup	1.33	3.86	4.13	1.2	3.86	1.3	4.46	2.06
Lemon	3.43	2.53	3.83	1.3	3.16	1.36	3.6	3.13



	Jazz	Pop	Rock	Classic	Reggae	Soul	Disco	Flamenco
Sad	3	1.13	1.13	3.5	1.23	3.2	1.03	1.7
Happy	1.9	4.4	4	1.7	4.56	2.4	4.56	4.13
Crazy	1.5	1.33	4.63	1.13	2.96	1.23	4.43	2.83



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