

## LIGHT CYAN BLUE

Breast of chicken, one per serving

Vanilla ice cream (high quality real vanilla, not cheap artificial stuff)

Vanilla extract or, preferably, beans

Frozen orange juice concentrate

Brown sugar

Corn starch

The breast of chicken can be with or without bone, or may be half of a split chicken, including a leg, etc. – it really doesn't matter. What is important is that the skin and fat remain.

For the orange sauce, in a small pot, on low heat, warm up half a can of the orange juice concentrate, mixing in a teaspoon or two of brown sugar. The sauce should be sour, not sweetened with the brown sugar; the sugar is only there to add a touch of flavour, not sweetness. Add corn starch to the sauce to thicken it until it the viscosity is similar to thick molasses. Maintain on very low heat or otherwise keep it warm until serving.

Grill the chicken to preference. However, the skin should be crispy and the meat should remain very fatty; retain the fat, rather than draining, as needed.

The vanilla ice cream should be very cold and hard, such that it scoops into balls and will take longer to melt.

The chicken should be served hot (but not excessively so), right off the grill (with a little pouring of fat over it, if desired), topped immediately with one or two scoops of ice cream sprinkled with just a bit of vanilla, this all topped with enough orange sauce to cover part of the chicken and ice cream but not to drown it. Speed is of the essence here, as the idea is for the diner to be able to experience the contrasting heat of the chicken and the coldness of the ice cream for as long as possible before temperatures equalize.

Serve with a glass of light (wheat) beer flavoured with lemon, and a glass of red wine.

## The Human Sensoria and a Synaesthetic Approach to Cooking

Sean A. Day,  
with contributions courtesy of  
James Wannerton

*[T]hat perceptions are not absolutely determinate and singular is obvious from the fact that each sense is an abstracting mechanism. Sight by itself informs us only of colors and forms. No one can pretend that the images of sight are determinate in reference to taste. They are, therefore, so far general that they are neither sweet nor non-sweet, bitter nor non-bitter, having savor nor insipid*

CHARLES SANDERS PEIRCE, 1868

### THE SENSES, COOKING, FOOD, AND EATING

Which sensory modalities are involved in 'eating'? 'Flavour' involves far more than just the sense of taste, or even the combination of taste with smell; we might also consider at least the components of temperature (which divides into at least two separate senses), vision (which itself is comprised of at least four

components),<sup>1</sup> hearing (which, in humans, separates speech sounds, musical sounds, and ‘other’ sounds), touch, pain, and kinetics.

This opens up the question of how many ‘senses’ there are as per the medical sciences. But, equally and perhaps more importantly, it raises the question of how many senses a given particular culture counts, how those senses are integrated, and, for that group of people, what the hierarchy of the senses is. The Aristotelian paradigm, for instance, which still infuses much of our thinking, holds that there are five senses, ranked from most to least important as follows: sight; hearing; smell; taste; and touch. However, it should also be noted that in *De Anima* ‘taste’ and ‘seeing’ are defined as forms of ‘touch’.<sup>2</sup> This model was later reaffirmed by Descartes. Thomas Aquinas, however, did argue for ‘taste’ to be placed higher than ‘smell’ (along with ‘touch’ ranking at the top, within certain structures), and Isidor of Seville attempted to (re-)assert the connection of *sapor* (‘taste’) with *sapere* (‘knowledge’) and *sapientia* (‘wisdom’).<sup>3</sup> Various Christian, Muslim and Jewish theologians equated touch with the body, and thus consequentially sex and lust; touch thus became deemed the most sinful or shameful of the

1. See, e.g., S. Zeki, *A Vision of the Brain* (Oxford: Blackwell Scientific Publications, 1993).

2. See S. Stewart, ‘Remembering the Senses’, in D. Howes (ed.) *Empire of the Senses* (Oxford and New York: Berg, 2005), 59-69.

3. See R. Jütte, *A History of the Senses* (Malden, Mass.: Polity Press, 2005).

senses. Since taste, unlike sight, hearing and smell, is also obtained via touching items, and thus also in direct contact with the world, taste also became sinful.

Yet, it is not too difficult for us to find other constructs of ‘the senses’. The Desana (Wirá), a Tukano people living in Columbia, for example, are extremely careful to discern between their five different senses of vision (or sight), smell, taste, hearing, and touch. However, for the Desana, what is essential to all of this is how the senses integrate in concordance with their cosmology, with a main focus being on colours.<sup>4</sup> As in many cultures throughout the world, Desana life is infused with a learned system of colour symbolism that operates synaesthetically. Thus, for example, conceptually, combining a certain colour with a certain temperature will result in producing a specific odour; that is, ‘odour’ is comprised of colour and temperature. Or, the sound of a small bone flute is perceived as red, hot, and having a male odour; these concepts combine such that a tune played on the flute evokes youthful happiness and the taste of a fleshy fruit, deemed very erotic by young women.<sup>5</sup> Flavour is thought to derive from odour, but is deemed less important; still, kin groups

4. See C. Classen, ‘McLuhan in the Rainforest’, in Howes, *Empire of the Senses*, 147-63.

5. See, G. Reichel-Dolmatoff, *Amazonian Cosmos: The Sexual and Religious Symbolism of the Tukano Indians* Chicago: University Press, 1971; G. Reichel-Dolmatoff, ‘Cosmology as Ecological Analysis: A View from the Rain Forest’, *Man* 2, 1976: 307-18; G. Reichel-Dolmatoff, *Beyond the Milky Way: Hallucinatory Imagery of the Tukano Indians* (Los Angeles: UCLA Latin American Center Publications, 1978).

are differentiated by flavours.<sup>6</sup> All of this integrates with the Desana's use of *Banisteriopsis caapi*, known as ayahuasca or yage, which contains harmine, harmaline, tetrahydroharmine, and the primary psychoactive component, dimethyltryptamine (with the addition of *Psychotria viridis*), combining to form a strong hallucinogen which frequently produces synaesthesia and sensory heightening.

Cooking is also conceived of as a colour process. Smoking meat is believed to transform the potentially dangerous yellow component of the meat into a safe red. After the meat is smoked it is cooked in a pot to render it an edible brown. The tripod structure used for smoking meat symbolizes this colour transformation: the lower part is said to be yellow, the grid in the center is said to be red, and the upper part, from which the processed food is removed, is brown, the colour of edible food. Fire itself is said to contain the yellow of the sun and the red of the earth in its flames, and the blue of the Milky Way in its smoke, making it a symbol of cosmic energy.<sup>7</sup>

There have been numerous experiments which have shown quite conclusively that the perception of a flavour can be enhanced by the intensity of a colour, even when the colour is not of a typical natural or

6. G. Reichel-Dolmatoff, 'Desana Animal Categories, Food Restrictions, and the Concept of Colour Energies', *Journal of Latin American Lore*, 4, no. 2, 1978: 243-91.

7. Classen, 'McLuhan in the Rainforest'. 157-8.

culture-based association with the flavour; given three beakers of solutions with equal amounts of strawberry flavouring, one coloured dark blue will be perceived as 'stronger' than one coloured faint blue, which in turn will be considered 'stronger' than a clear liquid.<sup>8</sup> Likewise, you can trick someone into perceiving the flavour of a white wine as being that of a red wine just by dyeing it red.

However, while the focus on colour's relationship to flavour is fairly common, other aspects of vision often get overlooked. For example, current research at the University of Edinburgh's Department of Psychology suggests that humans have an innate or early-learned tendency to associate round or spherical objects with sweet and square, cubic objects with sour. This extended to experiments in which equally sweetened candies were considered to be sourer if shaped as cubes rather than spheres.<sup>9</sup> We could extrapolate from this and, for example, consider the effects on the flavours of desserts served on round, triangular, or square plates.

Texture can also play a significant role: crunchy potato chips are different in flavour than soggy ones; there are reasons why certain pastas are served *al dente* or not; likewise for escargot and scallops. We could also

8. See, e.g., the episode 'De smaak van moeders stem', from the Dutch television series *Noorderlich*, for Donderdag 27 juni, 2002.

9. Simner et al. (forthcoming); preliminary findings from this research were presented by Julia Simner at the 8<sup>th</sup> Meeting of the American Synesthesia Association, Nashville, TN, Oct. 1 – 3, 2010.

look to the amount of masochistic pleasure induced by various chilies.

I present these issues so as to pose the following questions: What about when we create recipes where the edible creation is a spandrel<sup>10</sup> or secondary outcome of the process? What if the recipe does not focus primarily on ‘taste’ or ‘smell’?

The purpose might, for example, be tactile, and in the preparation, not in the actual eating: Consider making mud pies. If you are quite involved in playing, there will often be a specific recipe, which needs to be followed rigidly in certain aspects, but that can be modified in others (e.g., four different varieties of ‘spices’, and three of ‘toppings’). The main attraction of making mud pies might be squishing the mud, or feeling the little chunks of twigs, stones, bugs, and other items integrated in them; or the movements involved in rolling out the pie ‘dough’ and then shaping it into form. One can then also play at eating the mud pies, but that is often secondary to the play of preparation – you play at ‘cooking’ more than ‘eating’. We can extrapolate from this to consider that almost all human cultures have foods meant to be eaten by hand – from Huli in the Southern Highlands of Papua New Guinea eating sweet potatoes, to Hoosiers in the Midwest US eating cheeseburgers and fries – where

10. See S. Gould, ‘The Exaptive Excellence of Spandrels as a Term and Prototype’, PNAS 94, Sept. 1997: 10750-55.

providing the proper tactile experience is an essential part of the preparation, or ‘cooking’, process.

Let’s next take a quick look at the attraction of the kinetic: In the United States, where I currently reside, there are few foods deliberately eaten live. There are, of course, various bacteria cultures, such as those in yogurt and cheeses, and there are also oysters. But bacteria and oysters don’t wriggle. Elsewhere in the world, eating live things is far more common. In Germany, for example, we find Würchwitzer Milbenkäse, with live mites, *Tyroglyphus casei*, which are consumed; these live mites, but usually in smaller quantities, may also be found in other cheeses, such as Spanish Cabrales cheese and French Mimolette. However, again, one usually cannot feel the mites moving around on one’s tongue while eating these cheeses. But then there is Italian casu marzu, cheese, which comes with *Piophilha casei* maggots; these may be large enough to feel wriggling on your lips and tongue, especially as the maggots are also known to leap distances up to 15cm.

With Korean *sannakji*, you can readily see and feel the chopped octopus wriggling in your mouth; the small octopuses may instead be served whole, so that you initiate the killing of the octopuses with your teeth, which is far wiser than swallowing them whole live. Similarly, there are Japanese *odori ebi*, ‘dancing shrimp’, *Pandalus borealis*; and Chinese ‘drunken shrimp’; but, although they are live, they are often served stunned

and non-moving. We could also mention Japanese *ikizukuri* and Taiwanese *Ying Yang* fish.

But these are all ‘fancy restaurant’ things, quite a bit different than the general hunter-and-gatherer’s grabbing up some termites and popping them into her mouth, or finding a good-sized spider or beetle and chomping into it. For about eighty percent of the world, insects and arachnids are still a part of ‘common-folk’ cuisine; for example, ants in traditional mole sauces, termites in the African Kalahari area, or locusts in Arabia. Yet, insects or arachnids still haven’t appeared as the ‘secret ingredient’ on *Iron Chef*, or as a challenge item on *Top Chef*. As Tom Turpin, of Purdue University’s Entomology department points out,<sup>11</sup> shrimp, lobsters, and crabs, like insects and arachnids, are also crustaceans; these items turn up frequently on such shows. Turpin laments that the gourmet attitude seems to be ‘that if the creature lives in the sea it is edible, but if it lives on the land it is not’.

Tangentially, regarding the question of why we eat certain things, this also brings up the matter of eating things – such as worms, bugs, or spiders – for fun or on a dare. This also relates to such things as the Purdue Bug Bowl’s Cricket Spitting Contest,<sup>12</sup> at which many

11. <http://www.agriculture.purdue.edu/agcomm/newscolumns/archives/OSL/1994/January/011394OSL.html>.

12. <http://extension.entm.purdue.edu/bugbowl/events.html>.

(non-live, freeze-dried) crickets are unintentionally – or intentionally – consumed.

And, of course, from here we can consider the whole realm of aphrodisiacs, from absinthe to species of *Zygophyllum* and beyond.<sup>13</sup> In terms of what we are looking at here, aphrodisiacs are an interesting group of items: With some, the intent is to provide pleasure via the flavour, which is then expected to be extended into erotic pleasure. With others, such as certain chilies, the intent is oral pain or pain to the genitals or other body parts. Yet for others, the focus is mainly visual and tactile play, via the item’s similarity to a penis, vulva, breast(s), or other body part(s). While there are very specific recipes for the precise preparation of many aphrodisiacs, the resulting flavour of the product might be insipid, horrendous, or nauseating – but that’s not the point.

#### FLAVOUR-RELATED SYNAESTHESIAE

Synaesthesia<sup>14</sup> is the general name for two sets (or ‘complexes’) of over sixty related cognitive traits. In the first set, ‘sensorial synaesthesiae’, stimuli to one

13. See, e.g., R. Stark, *The Book of Aphrodisiacs* (New York: Stein and Day, 1980).

14. The word ‘synaesthesia’ comes directly from the Greek συν- (syn-) ‘union’, and αίσθησις (aisthesis) ‘sensation’, thus meaning something akin to ‘a union of the senses’. ‘Synaesthesia’ is the British English spelling of the word; in American English, it is often spelled ‘synesthesia’, without the first ‘a’. Both the American and British plural forms end with an ‘e’.

sense, such as smell, are involuntarily simultaneously perceived as if by one or more other senses, such as sight and/or hearing. For example, the sounds of musical instruments might make one see certain colours, each colour specific and consistent with the particular instrument playing. Or the taste of espresso coffee could make one see a pool of dark green oily fluid about four feet away. One highly documented case of synaesthesia involved Michael Watson, ‘the man who tasted shapes’,<sup>15</sup> who synaesthetically felt at or within his right hand shapes and textures corresponding to different flavours – the flavour of spearmint, for example, felt like cool smooth glass columns.

With the second group of synaesthesiae, which some call ‘ordinal sequence’ and ‘spatial sequence’ synaesthesiae, certain sets of things which individual cultures teach us to put together and categorize (and also usually serialize) in some specific way – like letters, numbers, or people’s names – also evoke some kind of sensory addition, such as a smell, colour or flavour. The most common forms of ordinal sequence synaesthesiae involve such things as coloured written letter characters (graphemes), numbers, time units, and musical notes or keys. For example, the synaesthete might see, about a foot or two before her, different colours for different spoken vowel and consonant sounds, or perceive numbers and letters, whether

15. See R. Cytowic, *The Man who Tasted Shapes* (New York: Putnam, 1993).

conceptualized or before her in print, as coloured. A friend of mine always perceives the letter ‘A’ as pink, ‘B’ as blue, and ‘C’ as green, no matter what colour of ink they are printed with.<sup>16</sup>

Richard Cytowic posited diagnostic features of neurological synaesthesia;<sup>17</sup> synaesthesia is: involuntary and must be elicited; durable; and generic regarding its perceptions. The majority (somewhere around 80%–85%) of synaesthetes who ‘see things’ do so ‘inside the head’, as if the image is projected onto a screen or just ‘in the mind’s eye’. The ‘screen’ is usually located ‘on the inside of the forehead’ or ‘in the eyes’, although for some synaesthetes it may be at the top of the head or even in the back, at the base of the skull. Or, for those in this group, there is instead a ‘feeling of the colour’; that is, for example, the sound of middle C on a piano ‘feels’ red.<sup>18</sup>

For those who do see things ‘out there’, the images may range from a half metre or less away to fifty metres or more, although most are around the one-half to three

16. For more regarding the different types of synaesthesia, see S. Day, ‘Some Demographic and Socio-cultural Aspects of Synesthesia’, in L. Robertson, N. Sagiv, eds, *Synaesthesia: Perspectives from Cognitive Neuroscience* (New York: Oxford University Press, 2005), 11–33; also <http://home.comcast.net/~sean.day/html/types.html>.

17. See R. Cytowic, *Synaesthesia: A Union of the Senses* (New York: Springer-Verlag, 1989); see also the second edition (Cambridge, Massachusetts: MIT Press, 2002), 67–70.

18. See M. Dixon, *et al.*, ‘Not All Synaesthetes are Created Equal: Projector versus Associator Synaesthetes’, *Cognitive, Affective & Behavioral Neuroscience* 4, no. 3, 2004: 335–43.

metre range. Members of this latter group of synaesthetes are currently commonly called ‘projectors’.<sup>19</sup> It is possible for a multiple synaesthete to be both a projector of one or more types and a non-projector of other types, or even for a synaesthete to be both in regards to one type, varying between projecting and non-projecting with situations.

‘Durable’ here means that the associations and relationships stay the same; this is also known as ‘consistency’. For example, if the sound of a piano is sky-blue, it always has been and always will be that synaesthetic colour. ‘Generic’ primarily pertains to synaesthetically perceived visual shapes. The shapes are basic geometrics, like circles, triangles, curves, spirals, clouds, or blobs, rather than complex structures such as, say, Winston Churchill’s face, the Notre Dame cathedral of Paris, or the Chicago skyline.

Currently, there are two main theories as to the cause of congenital synaesthesia: the cross-activation theory and disinhibited feedback theory. The cross-activation theory, previously often called the ‘adjacency’ theory, proposes that congenital synaesthesia emerges from cross-activation of adjacent regions of the brain. For example, a region of the brain involved in identifying graphemes lies adjacent to region V4 of the visual cortex, which handles colour processing; cross-activation might result in ‘coloured letter’

19. Ibid.

synaesthesia.<sup>20</sup> The cross-activation might be occurring due to atypical pruning of connections during infancy; that is, synaesthesia might be the result of neotenic retention<sup>21</sup> of neuronal connections. The disinhibited feedback theory, on the other hand, proposes that synaesthesia results from a reduction in the amount of inhibition along neural pathways.<sup>22</sup> The rate of feedback from association areas (e.g., the parietal lobe and limbic system) to primary sensory areas of the brain is usually regulated by a set balance of excitation and inhibition. However, if this rate were atypical due to developmental aberrance (genetic or epigenetic causes) or disrupted via drugs such as LSD or mescaline, synaesthesia might result. (I will note, though, regarding drug-induced synaesthesia, that while there are indeed cases both of flavour as the inducer [triggering sensation] for synaesthesia, and flavour as the concurrent [resulting synaesthetic perception], such occurrences are extremely rare, even in terms of the rarity of synaesthesia itself.) We need to keep in mind

20. See e.g. V. Ramachandran, E. Hubbard, ‘Synaesthesia: A Window into Perception, Thought and Language’, *Journal of Consciousness Studies* 8, no. 12, 2001: 3-34; R. Cytowic, D. Eagleman, *Wednesday is Indigo Blue* (Cambridge and London: MIT Press, 2009).

21. See S. Gould, *Ontogeny and Phylogeny* (Cambridge, MA: Belknap Press of Harvard, 1977).

22. See P. Grossenbacher, C. Lovelace, ‘Mechanisms of Synaesthesia: Cognitive and Physiological Constraints’, *Trends in Cognitive Sciences* 5, no. 1, 2001: 36-41.

that the cross-activation and the disinhibited feedback theories are not mutually exclusive.

It should be pointed out that congenital synaesthetes do not get to choose their associations between things, and which things get associated with which has nothing to do with likes or dislikes, ‘good’ or ‘bad’ or any other emotional aspects. For example, I like the sound of French horns, but dislike the school bus yellow colour they synaesthetically evoke. I also like the sound of saxophones, and love the electric neon purple shapes they evoke. I dislike the flavour of certain colas, along with the synaesthetic colours produced. That is, likes may go with dislikes, or *vice versa*, or likes may go with other likes, etc. And this holds throughout the synaesthete’s entire life.

One of the classic scenes of synaesthesia research occurred on 10 February 1980, as neurologist Richard E. Cytowic accompanied artist Michael Watson while the later finished preparing dinner for a party.<sup>23</sup> Tasting a sauce for a roasted chicken, Watson suddenly declared, “Oh, dear [...] there aren’t enough points on the chicken.”<sup>24</sup> With some persuading, he went on to explain to Cytowic: “I know it sounds crazy, but I have this thing, see, where I taste by shape. [...] Flavors have shape, [...] I wanted the taste of this chicken to be a pointed shape, but it came out all round. [...]

23. See R. Cytowic, *Synesthesia*.

24. *Ibid.*, 3.

Well, I mean it’s nearly spherical, [...] I can’t serve this if it doesn’t have points.” Watson went on to state that he mainly felt things synaesthetically rubbing against his face or sitting in his hands. “When I taste something with an intense flavor [...] the feeling sweeps down my arm into my fingertips. I feel it – its weight, its texture. Whether it’s warm or cold, everything. I feel it like I’m actually grasping something.”<sup>25</sup>

Regarding ‘flavour to touch’ synaesthesia, the primary gustatory cortex, which is the first cortical area to be involved in taste, lies directly posterior to the somatosensory cortex (S1). If we consider the adjacency theory of synaesthesia causation, this could be a factor in why ‘the man who tasted shapes’ had such synaesthetic perceptions. This area also lies directly above the insular cortex, another area of multimodal convergence.

I myself have ‘flavour to visual/spatial’ synaesthesia; rather than being ‘in the mind’s eye’, I ‘project’ my synaesthetic perceptions as coloured, textured geometrical forms to precise locations in front of me.<sup>26</sup> Other types of gustation-related synaesthesiae also exist, although they are extremely rare. One of these other types is ‘musical sounds to flavour’. Sound is processed in the upper portion of the temporal

25. *Ibid.*, 4.

26. A very preliminary ‘work-in-progress’ attempt to depict some of my synaesthetic perceptions for various flavours and smells may be seen at: <http://home.comcast.net/~sean.day/sean-foods.htm>.

lobe, taste in the lower portion; again, for the ‘sound to flavour’ synaesthete, there could be connections between these regions. The character Des Esseintes, in Huysmans’s *À rebours* (‘Against Nature’), built a type of ‘musical timbres to (liquor) flavours’ keyboard, with which, for example, the sound of a clarinet was equated with the ‘sour’ and ‘velvety’ taste of dry curaçao, the flute with mint and anisette. However, as stated in the story, this was not a display of any type of actual synaesthesia on the part of Des Esseintes but rather an attempt at synthesizing a new form of artistic expression.

A subscriber to the Synesthesia List<sup>27</sup> wrote to tell me:

I’ve always had a connection between music and taste. I associate certain tastes in my mouth associated with particular instruments and notes. It is strongest when I listen to individual instruments and the clearer and less ‘muddy’ the pitch, the stronger the taste. Some examples: Violins taste like lemons. Cellos can be orange, or cherry if they play very low.

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27. The Synesthesia List is an international e-mail forum I have operated for the past eighteen years. Currently, it has over 660 members, from over 46 countries around the world. More than half of these are synaesthetes, of many different types. Other members include neurologists, psychologists, medical doctors, linguists, musicians, and people from many other academic disciplines. The main language of the group is English, but other languages do appear from time to time.

Bass is cherry. Woodwinds tend to be ‘herbal’ – like mint or some kind of herbal tea.

An e-mail from a ‘touch to taste’ synaesthete reported:

Peaches, when I touch them, taste nothing like peaches. There are many foods I don’t eat with my fingers because the synaesthetic taste produced by the texture of the object clashes so badly with the taste of the food itself. I also have the smoothest eating utensils I could buy so they don’t affect the taste of the food as much. Conversely, there are some foods (seasoned octopus salad, for instance) which I prefer to eat with my fingers because the synaesthetic taste enhances the taste of the food. Truth is, most things don’t ‘match’.

However, it is not just a matter of the feel of food items. Cameron La Follete wrote the following to me:

I’m picky about which cats I pet, because, depending on the coarseness of their fur, I taste different things. The softest fur tastes of rich butterscotch pudding. A coarser fur tastes of sweetened oatmeal. My own cat is pretty good; he tastes of butterscotch, not so very rich, and mixed with some tapioca. [She added:] I’ve always liked flannel and silks best because of their tastes [...] The flannel skirt I’m wearing tastes of a

rich pumpkin/squash soup. I hate washing flannel for the first time, because it causes the fabric to become less soft and the taste changes. I wear wool sweaters next to the skin, but they taste of meat and potato stew – heavy and filling and rather coarse, so I tend not to be very hungry when I am wearing them.

### PHONEME TO FLAVOUR

A very interesting type of synaesthesia involves speech sounds or whole words evoking synaesthetic flavours.<sup>28</sup> Speech sounds for a given language are called the ‘phonemes’ of that language, so this type of synaesthesia is called ‘phoneme to flavour’ synaesthesia. If the word, as a whole unit, evokes the flavour, that’s called ‘lexeme to flavour’.<sup>29</sup> Now, here, we are not just talking about something like the word ‘coffee’ making you *think* of the flavour of coffee. We’re talking about someone actually tasting the flavour, in their mouth, in high detail. (Keep in mind that, just as it is the brain that sees, and not the eyes, likewise it is the brain that constructs ‘flavour’, and not the tongue, nose, throat, and such.) But, furthermore, we’re also talking about

28. One of the earliest – and perhaps the first – recorded case of such synaesthesia may be found in G. Ferrari, ‘Una varietà nuova di sinestesia’, *Rivista di Psicologia* 3, 1907: 297-317; see also G. Ferrari, ‘Una nuovo caso di sinestesia uditivo-gustativa’, *Rivista di Psicologia Applicata* 6, 1910: 101-4.

29. See J. Ward, *et al.*, ‘A Comparison of Lexical-Gustatory and Grapheme-Colour Synaesthesia’, *Cognitive Neuropsychology* 22, no. 1, 2005: 28-41.

a word like ‘confess’ having the flavour of coffee, or the word ‘microscope’ evoking the flavour of carrots. Lexeme-to-flavour synaesthesia may be due to cross-activation or increased connectivity between an area in the anterior insula (lying below Broca’s area) involved in speech perception and production and the adjacent primary gustatory area of the brain.<sup>30</sup>

A friend of mine living in England, James Wannerton, has this type of synaesthesia. For James, certain specific speech sounds produce corresponding flavours in his mouth. The hard /g/ sound in the words ‘argue’ and ‘begin’, for example, produces the flavour of yoghurt; the combination of the /s/ and /p/ sounds in the words ‘super’ or ‘peace’ results in James tasting tomato soup. This happens to James whether he speaks the word, hears the word, reads it, or just thinks it.

This synaesthesia emerged in James when he was young, and was fully established and set before his mid-teens. Because of this, the flavours that he tastes for words are all from foods he ate as a young child; not flavour experiences he had later on as an adult. So, for example, he experiences synaesthetic flavours of candies he has not actually consumed since he was a teenager. This is an excellent example of how cultural factors may overlay the neurological underpinnings of synaesthaesiae and shape their products.

30. *Ibid.*

The names of food items themselves will tend to taste like the food being named. Thus, for example, the word ‘sausage’ will taste like sausage. Then certain phonemes of that word will be taken, and those sounds will extend into other words. So, for example, the ‘j’ – /d<sub>3</sub>/ – sound in ‘sausage’ also appears in the word ‘college’, making it also taste like sausage.

So, I decided to ask James what flavours the phrase ‘Culinary Institute of Charleston’ evoke. He replied:

A thick slice of cucumber, a dash of semolina mixed with a thin type of bland flavoured meat of some description. The strongest flavour though is one I can only describe as sweaty, cheesy feet. Not the sort of thing I’d like to hear before breakfast!

So, what about the phrase ‘Trident Technical College’? James replied:

This is okay. Semi-soggy Sugar Puffs, a metallic paint type of flavour, an odd, watery taste very much like the left-over vinegar you’d find in a pickled onion jar. Then the deal-breaker – a lovely, lingering flavour of a slightly cold sausage sandwich. [He added:] The way it ‘works’ for me is that I get taste after taste constantly. Some are weak, some strong. It’s the strong ones that cause problems for me as they tend to linger – a little like the afterglow when a halogen

bulb is switched off. These lingering flavours mix with new ones. This sometimes tastes horrible!

‘Phoneme to flavour’ synaesthetes often also report aspects of texture and temperature as part of their synaesthetic experiences; that is, for example, the word ‘rake’ not only tastes like fried bacon, but it is crisp, oily and rather cold.<sup>31</sup> These sensations are felt on the tongue and in the mouth.

Unlike ‘grapheme to colour’ synaesthesia, in which, for example, the word ‘red’ might induce a synaesthetic perception of green – a phenomenon known as the ‘alien colour effect’<sup>32</sup> – ‘phoneme to flavour’ synaesthesia apparently displays no such effects for the names of foods, such as the word ‘bacon’ tasting of spinach.<sup>33</sup> However, note that, contrariwise, with my own ‘flavour to visual/spatial’ synaesthesia, I cannot think of a particular instance which does *not* display the alien colour effect, even when the *name* of the food, in English, is a colour word. For example, ‘oranges’ and ‘limes’ produce synaesthetic shades of blue; turnip and salad ‘greens’ create shades of purple; ‘white’ and ‘red’ wines both make shades of blue; ‘white sauce’ and ‘brown sauce’ both produce shades of greyish puce and

31. See *ibid.*

32. J. Gray, *et al.*, ‘Implications of Synaesthesia for Functionalism’, *Journal of Consciousness Studies* 9 [2002]: 5-31.

33. See Ward, *et al.* ‘A Comparison of Lexical-Gustatory and Grapheme-Colour Synaesthesia’.

lavender; and egg ‘whites’ do not produce any colour. I do note that bleu cheese is a purplish-blue colour; however, that is because cheeses, and dairy products in general, are usually blue. The particular flavourings of bleu cheese push my resulting synaesthetic colour towards purple.

James Wannerton wrote to members of the Synesthesia List:

I [also] experience colour to taste synaesthesia. Red: liquid jam; the stuff you find at the top of jam jars that have been sitting for a while. Orange: oranges. Yellow: Opal Fruits (Starbursts). Green: wine gums. Blue: thick ink. Indigo: a taste of rubber mixed in with the kind of meat you find in meatloaf. Violet: powdery, slightly inky. I get tastes for most colours, although, unlike my word/taste synaesthesia, it doesn't seem to me to be as specific. For example, all shades of red give me the same taste, the strength altering depending on how ‘primary’ or bright the colour is. [...] Most of my colour tastes appear to be sweet or tart, and texture plays a very important part in the process.

Wannerton also wrote the following to me in a personal message:

Creating a virtual meal using just words is something I automatically do whenever I write or say anything. Every word has to pass through my own personal ‘synthesaurus’ before I commit it for posterity. It gives writing an extra dimension for me although it does lengthen the creative process somewhat. Writing is the only occasion whereby I have some modicum of control over what I synaesthetically taste. While working as a freelance journalist back in 1998, I was asked to produce a full page feature on the possible cultural impact of changing from pounds sterling to the euro. I wrote the article as if it were a banquet: The intro consisted of *hors d'oeuvres* tasting words, the article body was the main course (I even managed to squeeze a sorbet in there as well) and the closing paragraphs were made up of sweet, dessert tasting words. This took me the best part of all night but I was immensely pleased with the final article. The thing that really appealed was the fact that no one else had any idea whatsoever!

The word ‘dinner’ itself actually has the taste and texture of the traditional English Sunday Roast but all mashed up together into a smooth puree kind of dish. ‘Lunch’ tastes of very thin ham slices and ‘breakfast’ tastes of crunchy bacon – the thin kind that you have all the time in the States. When people ask me about the ‘worst’ tasting word I’ve ever heard, I always default to ‘cook’, or even worse, ‘cooking’.

I'd never ever use those words unless forced to as I am now! Very, very strong – taste and texture of the horrible black, crunchy burnt bits you get around the top of pans. Yuk!

#### FLAVOUR TO COLOUR

If we are looking for causations for the specific correlations between foods and colours in my own synaesthesia, unfortunately I have not yet discovered much. I have conducted many experiments upon myself, but almost all would probably not pass current standards of scientific rigour; as to experiments conducted by others, I have only participated as a subject in about seven. About the only things found so far are good reasons to speculate that it is citric acid which produces the sky blue colour I see in all citric fruits I have tried so far; here, I have been tested, and citric acid alone in water will produce the same synaesthetic colour, the intensity of the perceived colour correlating with the intensity of the solution. Less certain is what might be producing the shades of blue I see for dairy products; it may be lactic acid, but this has not yet been adequately tested. Likewise, there is the frequent orange colour seen for fish and some other sea foods, and the shades of purple seen for many green, leafy vegetables; I have no clue yet regarding these, although, for the sea food, there might be early childhood cultural experiences

involved. On the other hand, I now have reason to think that the shades of pink and purple I see for cucurbits might tie to one or more chemicals found in most, rather than to a cultural connection with the pink flesh of watermelons.

But, again, we need to keep in mind that we cannot always just look towards a reductionistic neurochemical answer to this question. Keep in mind, for example, that James Wannerton's synaesthetic flavours for phonemes are culture-based: they are only food flavours from his childhood, and for example, the flavour of bacon turns up not only in the word 'bacon' but also specifically in certain other words with the same /k/ sound in a similar phonetic environment.

However, also note that Wannerton's synaesthesia operates here a bit different than my own: For Wannerton, with his 'phoneme to flavour' synaesthesia, all of the correspondences were shaped during childhood. While new words might be encountered, the underlying phonemes remain the same, and connect to the same flavours established during his teen years. For me, on the other hand, with my 'flavour to visual/spatial' synaesthesia, even now at the age of forty-eight I can still encounter new flavours, and, with them, new, unique synaesthetic colour combinations.

My 'flavour to visual/spatial' synaesthesia does have a little bit of influence on my behaviour when shopping for food items. For example, dairy products

produce shades of blue for me. The grocery stores here sell different types of milk in containers with different coloured labels and caps. I tend to most commonly buy ‘2%’ milk. At one store I shop at, this comes in blue-labeled cartons; at another, 2% has a green label, and it is ‘skim’ milk which has the blue label. So, at the second store, I frequently find myself grabbing the blue carton, only to have to put it back and take a green one instead. I’ve examined my line of thinking, asking myself if it is just the case that I’m used to the blue label, so that is why I go after it. But no; that’s not how it works. What goes through my head is not initially a matter of the label at all. Rather, it is ‘milk is blue’, so I am looking for blue milk. Thus, likewise, I will tend to focus on and often at least consider grabbing containers of sour cream, any type of cheese, or ice cream in blue containers, regardless of the brand or whether it is a flavour I really care for. I am more likely to focus on coffee if it is in dark green packaging; more likely to grab beef if it is in dark blue packaging, chicken if it is in sky blue, spinach if it is in purple. However, I do note that I don’t look for beer or wines, nor for orange juice, with blue labels or packaging.

#### CONCLUDING STATEMENTS

The culinary arts are rapidly expanding as they increasingly turn to incorporate the latest cutting edge science

and technology. This can readily be seen with the current draw of new techniques emerging via chemistry and physics into Molecular Gastronomy.<sup>34</sup> It is my sincere hope, however, that, in *addition* to this (emphatically as an addition; not as a replacement), attention may also be turned to the latest cutting edge findings from the neurosciences, including psychopharmacology. Consider, for example, that, from research on macaques, there is implication that the posterior area of the orbitofrontal cortex is one of many places in the brain of humans and allo-primates which apparently acts to converge gustatory, olfactory and visual sensory data.<sup>35</sup> Not only are there neurons in this region found to respond to stimulation in each of the three modes but also (at least) bimodal neurons which respond to both taste and olfaction, or to taste and visual stimuli. I am looking to prominent figures in the culinary arts to be on the forefront of leading what I hope will be a revolution resulting in a drastic paradigm shift of our model of the human sensoria, bringing in new, experimentally-supported concepts of the integration and interactions of sensory modalities, and incorporating the current ‘embodiment’ approach that ‘the mind’ – and thus ‘the senses’ – have components in

34. See, e.g., H. This, *Molecular Gastronomy* (New York: Columbia University Press, 2002/2006).

35. E. Rolls, L. Baylis, ‘Gustatory, Olfactory, and Visual Convergence within the Primate Orbitofrontal Cortex’, *Journal of Neuroscience* 14, no. 9, Sept. 1994: 5437-52.

interplay throughout the entire body, and not just within the skull.

Investigations into the effects of LSD, ayahuasca, and other drugs have given us indications that the disinhibited feedback theory of synaesthesia causation has merit; this is further supported by research on synaesthetes involving amyl nitrite<sup>36</sup>, hormones such as melatonin and effects on serotonin receptors<sup>37</sup> (which has expanded to also looking at SSRIs such as Prozac), but also on such ‘basics’ as alcohol, aspirin, caffeine, and codeine. Added to this, studies on altered states of consciousness (ASCs) indicate that virtually all people – congenital synaesthetes and non-synaesthetes alike – experience synaesthesia at least four or five times per year, while entering into, within, or emerging from an ASC; most frequently, this is during hypnagogic stages. The implication here is that virtually all people – congenital synaesthetes and non-synaesthetes alike – can and do experience synaesthesia from time to time; and thus ‘food’-induced synaesthesia; and, from time to time, perhaps synaesthetic flavours. And this doesn’t have to be via, say, the addition of harmine to your beef stock. Instead, it could result from the proper mixture of chilies, fruits and roasted ants in a

36. See R. Cytowic, D. Eagleman, *Wednesday is Indigo Blue*; R. Cytowic, *Synaesthesia*.

37. See D. Brang, V. Ramachandran, ‘Psychopharmacology of Synesthesia; The Role of Serotonin S2a Receptor Activation’, *Medical Hypotheses* 70, no. 4, 2008: 903-4.

mole sauce. Or even just getting the right wine and cheese combination.

#### A SYNAESTHETE’S COOKBOOK

I gained a certain notoriety in the Netherlands<sup>38</sup> for my synaesthesia-based recipe for grilled chicken topped with ice cream and orange sauce, which prefaces this text.

This recipe, which I have prepared many times for myself and at least three times for others, is an exercise in subtlety and extreme precision for me. Every ingredient except the brown sugar synaesthetically produces a shade of light cyan blue<sup>39</sup> for me; but each shade just so slightly different! There are also difference in the appearance of texture or viscosity for what I synaesthetically see for these flavours: for the chicken, the texture is like ceramic tiling with a slightly oily sheen (the skin and fat of the chicken are essential here); ice cream produces a texture of thick latex paint; vanilla, of a thin oil-based paint, such as used for painting plastic model airplanes; oranges and lemons, the inside white flakey part of a lemon peel; beer, watery milk; red wine, whipping cream. Note again that all of these are of almost –but not exactly

38. See *Red Mondays and Gemstone Jalapeños*, directed by J. Fowler, for the Research Channel, <http://www.youtube.com/watch?v=6vs-ez62DVC>

39. Around RGB 180, 255, 255.

– the same shade of sky blue. The brown sugar adds just the faintest trace of faint light grey with a lavender tinge. I could use pumpkin (pie) flavoured ice cream instead of vanilla, and this would add a light lavender instead of the sky blue of vanilla. Putting together this recipe is like composing a Maxfield Parrish painting, with one shade and texture of blue carefully and exactly blending into the next.

So, here, a recipe is totally personal, verging on the creation of visual art; the resulting flavour combination is a spandrel – quite secondary. However, I do actually enjoy the flavour very much. This recipe was recently revived as a classroom discussion topic by Dr. Romke Rouw, of the University of Amsterdam’s Department of Psychology.

In addition, James Wannerton proposes the following set of ‘phoneme to flavour’ recipes:

“Bicycle parts are usually small.” This sentence contains words that create a lovely taste of breakfast. Rice Krispies, covered in sugar and doused in milk, not cold milk but not warm either. Crunchy in part but on the whole, slightly soggy in texture.

Asking someone called Debbie (doughy bread) if she’s noticed (salad leaves and sticks) that Thomas (tomato slices) is a popular name for boys this year, would summon up the perfect hors d’oeuvres salad dish.

My companions for the main course would ideally have the names Ian (lamb), Colin (cauliflower), Hilary (sliced potatoes) and Stephanie (sage & onion balls). With someone called Stockard pouring the gravy. Pudding could be: Simon (sliced apple), query (single cream) with a dollop of Block (ice cream) and a France (thin wafers) or two. The cheese and biscuits would be best served by a waiter call Richard. Coffee would be coffee!