EVENT REPORT

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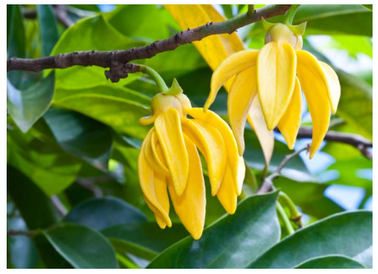
BSP/SCS Joint Webinar: The Science Between Scents and Emotion - a Firmenich presentation

'Everyone feels comforted by vanilla', 'lavender encourages relaxation', 'ylang ylang is the fragrance for seduction' etc. etc.: we are all familiar with these kinds of assertions in the popular press, on labelling for fragranced products and when we visit aromatherapists. Are these claims founded in any kind of science and can they possibly apply universally across cultural, gender and age boundaries? This fascinating lecture investigated a completely different aspect of the science of fragrance: the interface between scent and its effect on the mood of the individual. It was no less scientifically rigorous than the parosmia study (in the previous article) but delved into the complexity of psychological differences and how these are affected by our genetics and environment. This investigation combines techniques from both experimental psychology and cognitive science and was undertaken by Firmenich in conjunction with the University of Geneva.

In 2009, scientists began to look at how scent connected with all the senses in the cutting edge Brain Behaviour Laboratory at Geneva University including neuroscience, the VR lab and also developed new MRI techniques that combined with a novel odour delivery system. This eventually led to the creation of an inhouse Cognition and Behaviour laboratory at Firmenich in 2018. The research has been so ground-breaking that it has led to over 40 peer-reviewed publications, 6 book chapters and over 750 citations!

The initial findings demonstrate that the statements I gave at the beginning of the article are far from universal. Firstly and very importantly, there is no simple link between a scent or ingredient and the triggered emotional state. Secondly that individual experiences and the context of the fragrance matter. Thirdly, verbalisation of the individual's perception of scent is key. Lastly any solutions and formulations should be country and category-specific. So where does that leave perfumers in a global marketplace?

The Firmenich team unpacked their research and conclusions in stages beginning with attempting to define emotion; since in order to measure something it is important to understand what is being measured! This was the first difficulty since there is no universally agreed definition, however, most scientists agree that memory triggers emotions having been conditioned by life experience. This learning experience begins in utero through the exchange of scents and flavours with the mother; thus familiar fragrances are highly individualised by culture and location depending on what the mother eats and where she goes as can be seen in the image outlining the different response to strawberry in the UK and US. Add to this a lifetime of experiences and the connection between scent and experience remembered in the brain's limbic system as well as an individual's personality and you get a huge variety of responses to the same smell.



Important research at Oxford University using an MRI scanner showed that it was not only the individual that affected the perception of scent but also the context given for that particular smell. In the Oxford study the scientists used a cheese-like smell and one group of individuals were told it was body odour while another that it was cheese. Unsurprisingly there was a marked difference in the brain areas activated with the cheese group (more pleasure) than the body odour group!

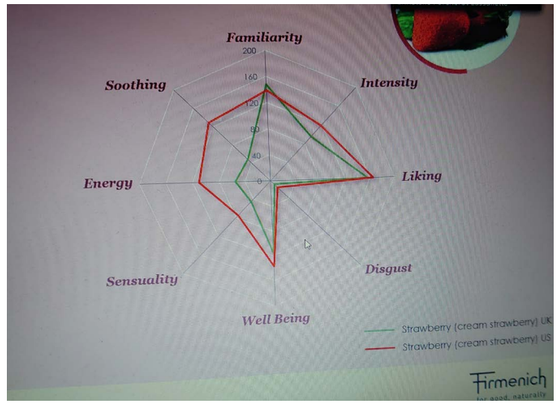
Further exploration in how to measure emotion was undertaken with both implicit (unconscious physiological) and explicit (conscious verbal) responses to fragrance examined. Researchers soon found that although they had a raft of techniques to measure implicit responses such as FEMG (facial expression mapping), EEG (measuring brain activity), ECG (heart-rate), GSR (sweat detection = arousal) and most precisely FMRI (which can focus on specific brain areas down to 10,000 neurons), none of these could actually explain any arousal. In other words was stimulation because the subject was experiencing something new, something complex or became more attentive or alert for some reason or because the fragrance was complex and that some kind of decipherment was occurring. The key to unlocking the implicit responses could only come from verbalisation thus making the explicit responses absolutely vital.

In order to establish some kind of universality with their results, the team collaborated with universities in the US, UK, China, Singapore, India, Mexico and Brazil, running the same three combinations of odour tests to try to establish some common ground in the verbal responses across the globe. In all, they identified 480 'affective terms' indicating a good deal of variation. However, they eventually isolated 37-35 adjectival terms that covered 6/7 categories which could be applied universally. They then developed a 'scent wheel *(see illustration)* that could be utilised for any new fragrance development which they then cross-checked against FMRI brain scans to check for correlation in brain activity. Providing the explicit tests had a rapid response time, they were found to be more accurate as a predictor of behaviour.

Taking all of this into account, Firmenich have been able to develop tools to provide a novel holistic approach to fragrance creation in response to a customer brief focusing on 14 emotions. Firstly they pick the best emotional positioning (they call this EmotiClaim™) for which they have the data for 10 thousands respondents from internet surveys along with concept and claim tests. Then they connect the chosen emotion to the product design (they call this Emoti360™) for which the data comes from 4400 respondents concerning ingredients, colour and brand association. Next they create the fragrance driven by the emotion (they call this EmotiCode™), informed by over 50 thousand consumers and according to the creation rules established. Finally they boost the emotional claim with accords validated by 8100 consumers (they call this EmotiBoost™) having used the fragrance technology developed in this study. In the presentation, a case study for a product that reflected the idea of wellbeing was explored, with not only the fragrance ingredients considered, but also the packaging and presentation of the product too, with certain colours reflecting specific drivers of emotion. Obviously the data used will be relevant to the target market with particular focus on culture and context but still leaves room for the creativity of the individual perfumers to formulate a bespoke fragrance that is not only popular but also fits the brief. Firmenich's work here shows how the very newest research in neuroscience can be used to create successful products for various global markets using a massive collection of intelligently gathered data.

I would urge all of our readers to look at some of the excellent online lectures that have been organised by learned societies such as the British Society of Perfumers, British Society of Flavourists and the Society of Cosmetic Scientists. Although travelling is tricky for many at the moment, there is a wealth of research presented online giving access to excellent webinars and seminars wherever you are.

Differences in response to strawberry between the UK and US



Scent wheel