

The Importance of Odour Memory in the Fragrance and Flavour Industry

Humans perceive sensations. The sensations though apparent for a short duration, leave behind a mental state that is sensitised to the stimulus of the same kind. Human memories are such that it is capable of relating to the recurrent successive stimuli and classify them individually. The degree to which one is able to use this mental power will depend on the available prerequisites required to achieve it. This general consideration of memory applies to all types of sensory perceptions, including human olfactory memory.

We are all aware that the ability of an individual to succeed in the fragrance and flavour (F&F) industry depends on the possession of a good olfactory memory. Without doubt, hard persistent work, artistic creative feelings, good knowledge of aroma chemicals, an excellent memory and imaginative capacity with respect to olfactory properties of aroma chemicals, are equally important.

A good olfactory memory is a prerequisite, for carrying out odour analysis, and for creating a mental

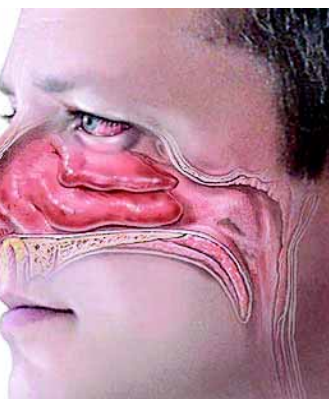


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of a large number of aroma chemicals one will have very limited success. Beginners should follow the tried and tested, practical slow and steady approach to achieve expertise. Perceive the smell of an odorant first as a whole, mentally grasp it and embed it well in the olfactory memory so that it remains there for a longer time. Very similar to optical or acoustic perception, we can remember odour far better if we classify the sensory perception mentally, understand it well enough, unlike those we notice transiently. One also needs to study the characteristic odour of any individual aroma ingredient thoroughly by understanding the various aspects of its complexity.

conception of the fragrance chord. If the olfactory memory is comprehensive, then it is possible to vary the fragrance harmony more easily. More precise the conception of the aroma chemical's odour, the easier it is to experiment various odour



ideas in the human mind. Human olfactory memory functions on the cooperation between the

knowledge of odour and the capacity of the brain to remember them. To develop a comprehensive olfactory memory, the knowledge of odour and the capacity to remember them is necessary.

How should one acquire a comprehensive knowledge of odours?

If one tries to acquire odour knowledge by quick indiscriminate smelling

One can describe an odour in different ways. Every person has his or her own unique concept to characterise the odour of a particular chemical. A beginner does not have the requisite knowledge of different aroma chemicals and so to conceptualise the odour characteristic becomes difficult. A beginner will have to review and supplement the characterisation undertaken at the beginning of the study all over again at a later stage, when his or her experience increases. All odorants, including uniform chemicals, have different aspects in olfactory effect. All these different aspects will not show up when we merely assess a sample. Moreover, the odorant in combination with other substances may present a very different odour profile, unlike when assessed alone. In order to get a precise knowledge of odours, it is also necessary to prepare odorant com-



positions and judge their combined effects.

Another method useful in obtaining a comprehensive odour memory is to make comparisons of odorants of similar types of smells. Minor differences present in aromatic ingredients in an odour complex manifest themselves as different odour shades that facilitate easy characterisation of the odorants. A good example is geraniol, nerol, citronellal or ionone isomers and its homologues, different musk types etc.

Likewise, a comparison of odorants more distantly related to one another can also help in recognising an odour by its individual components.

Odorants and their nature

Most odorants are multifarious in nature. This diverse aspect manifests itself both during individual comparison and in combinations with other odorants. We will obtain a more comprehensive knowledge, if we judge it professionally from different standpoints namely as a synthetic chemist, as a quality control evaluator or as a perfumer. A perfumer or flavourist is acquainted with an aroma chemical in the commercial form that is suitable for use in a fragrance or flavour creation. However, a suitable odour need not necessarily be olfactively identical with a chemically pure product. The technical reasons for this dichotomy can be many. It can even be a necessary impurity.

Research chemists, on the other hand, will have a more complete knowledge of the odour quality, along with the nature of the possible secondary odours acquired by the aroma chemical because of the impurities present in it. Researchers will also be able to identify the transition in odour profile from a pure fraction obtained during the first run, with the product of the



last run that could contain undesirable impurities, and thereby obtain a particularly sound basis for assessment.

In the similar fashion, a quality control evaluator will check conformity with quality standards or with other rival products. Without doubt, one can understand the profile identity of an odorant along with its variations completely only if one views it at every single opportunity with a correct approach and perspective.

Odorant study

The fragrance industry uses very many odorants and a clear concise, easily comprehensible system is necessary to study them all. Ironically, there is no universally acknowledged system of classification. At the same time with prolonged handling, it is also not very difficult to recognise common factors in the odour profiles of many group compounds. If a person is able to go into the theoretical connection between smells and their chemical compositions it becomes much easier. Esters frequently smell sweetish fruity, or sesquiterpene derivatives smell a shade woody along with a note resem-

bling plums. Likewise, musky odour of macrocyclic and polycyclic musk can be associated chemically with the size of the rings.

In any case, these are not sacrosanct rules, as there are many exceptions. Constant acquaintance with aroma items can only facilitate the olfactory study or classify unknown substances into groups of compounds. To hone the skills further it is important that whenever a person encounters a new odorant one should always try to deduce the constitution from the odour profile before studying the product details. A good knowledge of the odour of the substance is the first pre-requisite for olfactory memory training and the second important factor is the extent to which one can keep this odour knowledge alive in the memory.

Recollection power

Many times, we notice odours that we have already smelt at some previous occasions but not able to place the source or its attributes correctly. Sometimes, we have a mental conception of the odour profile of an odorant, but on checking, we could find that this conception is not identical in every detail with the real odour. This happens because the human power to recollect is liable to change with time. The longer the time elapsed since the odour was first perceived, the more uncertain the mental conception in human memory. Thus, the olfactory picture retained by human memory is not the same at all times. Many times, it may be due to the influence of smells associated by chance. The more frequently one smells the aroma ingredient the longer it will be remembered. Is it not very similar to a new language we learn? The more we use words of a new language, the more fluent we become in speaking and understanding the new tongue. Although constant and continuous repetition of the odour

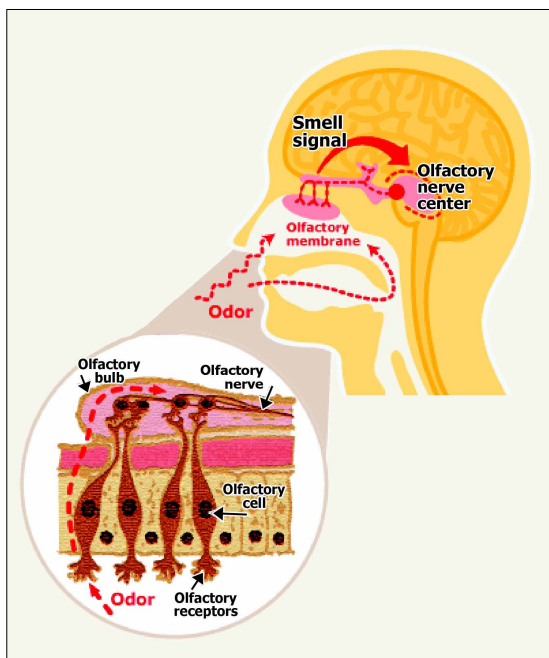
picture is, without fail, an automatic learning process, this is difficult as our physiological reasons prevent us from using our olfactory memory as frequently as we use our language memory.

Odour recollection

Whenever we connect odours with our personal experiences, it registers clearly in our memory. Linking occurrences that we encounter during our routine also behave as suitable mnemonics, supporting our powers of recollection. Characteristic smells, like music can arouse memory. Smelling vanilla makes us remember ice creams, even before we remember the chemical ethyl vanillin. In this sense, sometimes very personal experiences are effective mnemonics as well. Cyclamen aldehyde reminds me of my childhood experiences with rubber gas balloons, whereas isovaleric acid reminds me of the unpleasant odour emanating out of my earlier neighbour's smelly socks.

Olfactory experiences linked with holidays in our childhood days are deep rooted in our memory. It is not important as to whether isovaleric acid smells like used socks or cyclamen aldehyde smells like gas balloons, but what is important is to realise how the odorant uses this recollecting power of the human mind making us remember.

Recording odour characteristics and experiences in a mentally reproducible form is very useful even though astonishingly we make little use of this in real practice. Aromatic ingredients lists are more than 1000 odorants for use in perfumery industry, however one cannot remember all of them, as only around 400-600 raw materials are frequently used in regu-



lar fragrance compositions. Speciality aroma chemicals that we use very rarely for creation are difficult to memorise with a precise conception of their odour picture. Nevertheless, even this amount permits us an extraordinary number of combinations to create innumerable fragrance profiles. It is a proven fact that our power of recollecting odours of substances largely depends on the frequency of use. It is imperative that to become an expert in this industry one has to be constantly in touch with perfumery raw materials.

Preserving and expanding odour memory

The manifestation of an artistic inspiration does not require a specific work place as idea's can come anywhere. However, transforming the idea into a finite fragrance requires the precise conception of the raw material smell. Frequent practice with odorants keeps one alert to remember smells.

It is advisable to practice the smelling of odorants daily for several minutes in a systematic smelling exercise and keep on adding odorants incrementally during the programme. Try-

ing to find common traits or typical differences observed, in essential oils of similar odour, in the sesquiterpenes series, in various green scents, several musky substances, typical woody notes, or else several compositions related to types are other methods to improve and augment odour knowledge.

Another option is just take aroma chemical at random from the shelf and without looking at the label, try determining the content present in the bottle. This will also force us to keep ourselves alert, for characterising raw materials even when used very rarely.

No methodical trade school can give a through knowledge on perfumery and only continuous practice as an industry professional, usually relying on oneself can help in acquiring specialised knowledge of the trade. The advice and guidance of teachers available for the student during the study period will determine the time required for training. Even though much will depend on the working conditions, under usual circumstances generally about 8-10 years experience of handling odorants will be necessary for an individual to carry out a complicated scent analysis efficiently.

Olfactory memory, a pre-requisite for any perfumery personnel, is a harbinger to imitate nature or provide new ideas and only honest sincere effort in practicing the craft will preserve and expand it.

ADDITIONAL READING

- 1 Career in the Fragrance and Flavour Industry by Sitaram Dixit; *Chemical Weekly*; Aug. 11, 2009.
- 2 The Sense that Excites by Sitaram Dixit; *Chemical Weekly*; Dec. 23, 2003.
- 3 The Incredible Sense of Smell by Sitaram Dixit; *Chemical Weekly*; Dec. 30, 2003.