

# Pattern Recognition

NeuroScentz™ Fundamentals



## How We Process and Recognize Fragrances.

### Key take-aways:

- The brain processes a fragrance as a pattern of molecules, rather than analyzing each constituent molecule within that smell to decide what it is smelling.
- The brain “pattern matches” incoming smells against a pattern “database”, built from past experience, to work out whether a smell is familiar or novel.
- Patterns matching means that the brain can cope with imperfect odour information.

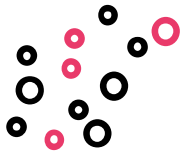
### The human brain is excellent at picking out patterns from it’s surroundings.



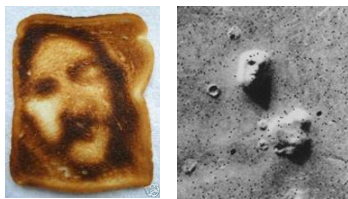
Can you see the hidden image in this pattern of dots?



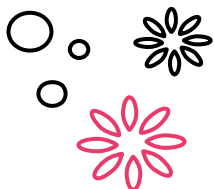
Instead of analysing the world “dot by dot”, your brain uses a short-cut method. It looks for **patterns**. Patterns of colours and shapes, patterns of sounds and patterns of odour molecules.



It is so good at seeing patterns, it even sees them where they don’t exist...

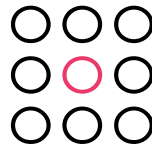


### A Fragrance is a Pattern of Molecules



Fragrances themselves are molecular patterns. As odour molecules arrive at the nose at different times and in different amounts depending on the airflow or concentration, a molecule-by-molecule based approach would rapidly overload the brain.

*The human brain is an incredible pattern-matching machine - Jeff Bezos*



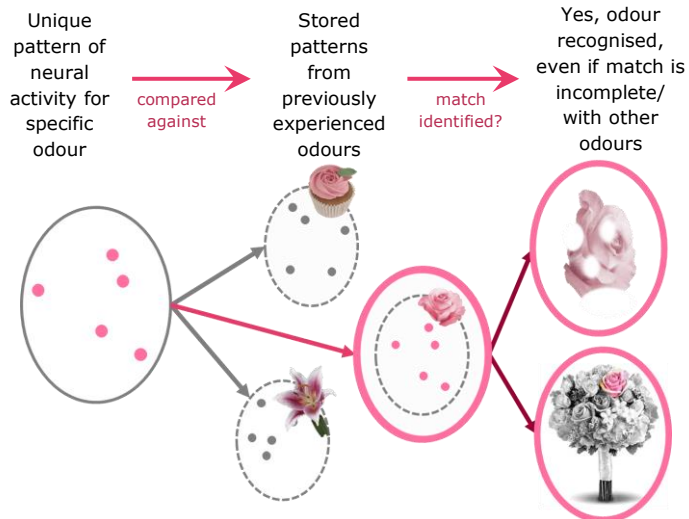
### We recognize smells using a “pattern matching” technique.

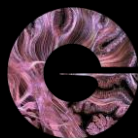
The brain recognizes smells using a *pattern matching* technique. It looks for patterns of molecules and compares them against pre-stored smell “templates” that it has experienced previously (like a database search).

### Aha!



When it gets a pattern “match” it can then recognize the smell as being familiar. Each individual has their own personal set of smell patterns, stored and ready to be retrieved, based on their own previous experiences.





### Small formulation changes may go unnoticed

Pattern matching can mean that small changes in a fragrance formulation might not actually be noticed by the brain, especially in naïve consumers.



### Context and Training help odour recognition and discrimination.

Training increases the likelihood of noticing formulation changes and helps recognition. Context also plays a role in helping (or hindering) identification depending on whether it is congruent (or incongruent) with the fragrance message.



### The brain is designed to cope with imperfect odour information.

When smelling a fragrance from a distance, or when creating a 'stripped out' formulation, the core fragrance skeleton (not just a few key ingredients) has to be perceivable to get a successful pattern match, and therefore fragrance recognition.

### The Brain Fills in the Gaps to Make Sense of the World.

To cope with the complexity of our sensory world, the brain "fills in the gaps". This means it does not need to notice every single detail, but instead creates an overall impression in the mind, compensating for missing information. This happens for images (see right), as well as for fragrances.

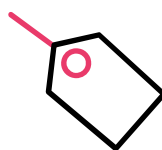


### People are generally poor at naming and describing fragrances without prior training.



Although people are usually good at making hedonic judgements about fragrances, untrained consumers are generally very poor at naming and describing them. This is because there is a unique interaction between olfaction and language systems in the brain which is different from our other sensory systems.

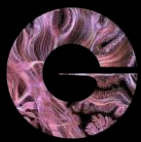
### But names can have a powerful effect on fragrance perception.



When relevant non-olfactory cues are provided, the likelihood of naming a fragrance is increased. This name can have a powerful effect on the way the odour is perceived.

### Summary:

- The brain processes a fragrance as a pattern of molecules, rather than analyzing each constituent molecule within that smell to decide what it is smelling.
- The brain "pattern matches" incoming smells against a pattern "database", built from past experience, to work out whether a smell is familiar or novel.
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## Get Involved!

Try out the suggestions below to explore the ideas outlined in this fact sheet.



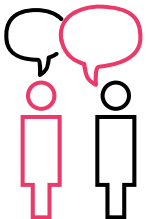
**Aha!** Think of a problem or a puzzle that you have solved recently which required you to come up with the correct answer. How did you come to the right solution? How did it feel in your mind when you suddenly knew what the right answer was?



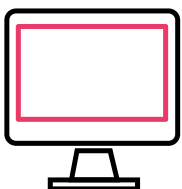
**Whole is greater than the sum of its parts.** Select some ingredients from the supermarket and create a meal with them (e.g. spices for a curry) as an illustration of how the end product is greater than, and different from, the sum of its parts.



**Matching Game.** Play a blind matching game with your colleagues. Select a fragrance and two very similar mods. Present one fragrance to them, then 3 fragrances one of which is the original, two of which are the similar mods. Get them to select which is the correct “match”.



**Spot the Difference** Find a image online which has lots going on in it (e.g. busy street scene, an untidy room). Make a small edit to it in Powerpoint that you don't think they will be able to spot (e.g. add a small shape). Show both images to a colleague or friend. Can they spot the difference? How big a change can you make before they actually notice it?



**Movie Time.** Watch this [TED talk](https://www.youtube.com/watch?v=NgZpDolr148) by Professor Donald Wilson, a consultant for Givaudan:  
<https://www.youtube.com/watch?v=NgZpDolr148>