



A Sense of Smell

All seasons offer a range of tantalising smells to stimulate the senses. The spring is no exception. The air is filled with the fragrance of flowers, the rich loamy smell of wet earth, freshly mown grass, new leaves growing and wealth of other olfactory (smell) experiences. These smells are converted to electrical signals which reach areas of the brain involved in emotion and memory. This is why smells experienced in early infancy can bring on a flood of emotive memories in later life. No other sense has the same power to do this.

The sensory organs for smell develop as early as fifteen weeks gestation preparing the baby for olfactory experiences outside the womb. The amniotic fluid that passes through the nasal cavities is rich in smells from the mother's diet. These same smells will be recognized by the infant after birth. The newborn soon discovers which smells delight, settle and soothe him and which ones are unpleasant. In fact, the baby uses his keen sense of smell to learn about every facet of the outside world.

Science is increasingly showing us endless reasons for stimulating this important sense. If constantly challenged, certain smells can enhance communication, motivation, alertness and attention at every stage of life. They can also induce relaxation and reduce stress. Understanding how smell is perceived and how to make best use of it, parents and practitioners can introduce babies to the exciting world of smell from the very beginning.

The sense of smell

Odour molecules evaporate from every living and non-living object in the environment. The only exception is steel, which has no smell because nothing evaporates from it. As the molecules float through air or water, they come into

contact with the nose, where they are received by tiny hair-like projections at the top of the nasal passage. Specialized receptor cells recognize the unique shape and size of a particular odour molecule and form a bond with it. The information is then projected by nerve cells to the olfactory bulb, where they are processed and interpreted. Signals also pass through the limbic system, which is heavily involved with memory, emotion, mood, behaviour and basic thought processes. For this reason, smell has a strong association with learning ability. The limbic system is sometimes referred to as the 'smell brain' and is thought to be one of the oldest systems in the human body.

About 1,000 genes determine whether or not a smell is detected. If part of the receptor gene for decoding a particular smell is missing or damaged, it will not be possible to identify it. Factors such as hormonal imbalances, respiratory infections, dental problems, solvent and insecticide exposure, weather conditions and age are also reasons why there are enormous variations in smell detection between individuals.

Some scientists believe that the evolution of sight has weakened the sense of smell in humans. There is no doubt that the area of the brain dedicated to smell is significantly smaller in humans than in other mammals and primates. By comparison, humans have about 6 million receptor cells and a dog has 220 million. Even so, the human nose is capable of detecting over 10,000 different smells. It is one of the first senses to respond to dangers such as fire, dangerous fumes, pollution and rotten food. The sense of smell also helps us to make decisions about people, travel, products, places and food. The smell of spices, shells and seaweed, for example can conjure up fond memories of travel destinations or trips.

The sense of smell also plays a vital role in the sense of taste. Taste buds on the tongue can only distinguish four qualities - sweet, sour, bitter and salt. All other

tastes are detected by the olfactory receptors high up in the nasal passage. Because smell and taste are so closely linked, continual exposure to strong food aromas such as the smell of baking bread can satisfy hunger sooner than foods without odour. This is because the pervasive odour indicates to the brain that the body is satisfied and does not need to eat.

Birth to old age

Babies

At the age of about nine weeks gestation, the nasal cavity separates from the mouth and the sensory receptors for smell begin to form. By fifteen weeks gestation, brain connection to the olfactory nerves in the nasal passage is complete. Studies show that the foetus can detect smells in the amniotic fluid and that these same smells will be recognised by the newborn in the breast milk.

The sense of smell enables the newborn to locate the nipple and to perceive differences between the smell of the mother's breast milk and the milk of a stranger. Incredibly, the baby can also detect the mother's smell when she is in another room. This may help to explain why babies appear to be comfortable in the arms of family members, but are instantly calmed when held by the mother. The mother also recognises the scent of her baby. However, this may go undetected if perfumed products are used on the baby's skin.

Most babies are responsive to smells that they encounter daily such as breast milk, mother's perfume or a familiar blanket. Such smells are associated with comfort and security. Very often, preference is directed towards pieces of clothing that have been worn by the mother or a special blanket or soft toy that bears her smell. A comfort object can make a visit to the doctor less stressful and provide reassurance during periods of stress or illness. This is why it is so important not to detach babies and young children from their comfort objects

during periods of separation. It may help to know that most children typically give them up between 3 and 5 years of age.

Children

Smell detection in toddlers is not as discerning as an adult's, which is why they will snuggle up to a loving parent even if they haven't had a chance to shower! It is also the reason why toddlers cannot distinguish between safe and dangerous cleaning products. Some researchers believe that three-year-olds have the same smell sensitivities as adults while others have found that children do not develop sensitivity to certain odours until they reach puberty.

Adults

Studies show that smelling ability is most acute between 20 and 40 years of age, but can remain stable until the age of 60 years. Even so, very healthy 80-year-olds can have the same smelling ability as younger adults if the sense is regularly exercised.

Many women report increased smell sensitivity or distortions in smells during the final stage of pregnancy. Changes are largely attributed to increased levels of the hormone oestrogen. Some scientists believe that increased sensitivity results in the rejection of foods that may be potentially harmful to the developing foetus.

Until recently, it was thought that the sense of smell was keener in women than in men, particularly after giving birth. However, research at the University of Munich in Germany has shown that men are more sensitive to the smell of newborn babies than women. This is surprising since the limbic system in females is believed to have evolved from the need to smell-bond with their young. A possible explanation could be that the smell of a newborn evokes protective behaviour in the male.

Contrary to popular belief, blind people do not necessarily have a keener sense of smell than sighted people. Research shows that reinforcement is the factor most likely to enhance smelling ability.

The power of smell

Smell perception can add to the enjoyment of everyday activities and have a beneficial effect on all aspects of life. This is why smell detection is at the forefront of most research programmes. The perfume industry for example, relies on scientists finding out how humans interpret different fragrances and scents.

Other studies have concentrated on plant, herb and flower fragrances to relax and soothe the body and the mind. Pleasant fragrances such as the smell of pine needles have been used at London Airport to ease stress levels before flight. Hotels also use scents to make the environment a pleasant place to be. Fragrances are often used in the workplace to enhance performance and productivity. In the home, scented candles, potpourri and room sprays can set the mood for a multi-sensory experience.

Numerous studies have shown that pleasant smells can:

- Increase alertness
- Improve performance
- Enhance memory
- Sustain attention
- Aid problem-solving
- Encourage helpfulness
- Improve creative thinking
- Enhance reasoning ability

- Encourage healing by reducing stress which is known to suppress the immune system

What is so interesting is that very often, smells experienced in early infancy are responsible for the sense of *déjà vu* or the feeling that you have been somewhere before. The smell of cooking, the scent of the Christmas tree or mown grass can be instrumental in conjuring up fond memories of childhood. In fact, the smell of baking bread or roasting coffee beans is so positive, that potential house buyers are more inclined to fall in love with a house because it smells of 'home'.

Developing the sense of smell

In addition to memories, smells can trigger positive physical, emotional and mental responses and play a pivotal role in keeping the brain and body fit and well. Some are well-known for their effect on mood and behaviour. Others are known for their effect on enhancing concentration and motivation. Some of these may include the following:

- Tuberose, hyacinth, lily of the valley and lavender can induce relaxation and feelings of happiness.
- Vanilla can reduce anxiety and stress.
- Douglas fir can lower depression and apathy.
- Peppermint and lemon can enhance attention and concentration.
- Spices can ward off a panic attack.
- Herbs can induce appetite
- Jasmine can relieve sleeplessness.
- Nutmeg, valerian and garlic can reduce blood pressure and stress.
- Cedar or cypress can relieve tiredness.
- The aroma of freshly baked bread and freshly cut grass can improve mood and behaviour.

Notes for parents and practitioners

Unless babies and young children are overly sensitive to a particular odour, there are numerous opportunities to learn more about the environment using the sense of smell. In the spring and summer months, take them outside and introduce them to the smell of cut grass and the fresh smell of rain, vegetables, fruit and flowers. In the autumn and winter months, introduce them to the earthy odour of damp soil, fallen leaves, apples, pine needles, cinnamon and spices. Other experiences might include a trip to a farm, or to the herb section at a supermarket.

An odour does not have to be very strong to have an effect, so avoid over exposure. Offer 'smells' in moderation and alternate them to increase perception. Although it will be trial and error finding out which ones appeal most, facial expressions should indicate whether or not a particular odour is preferred to another. Remember that smell sensitivity varies between individuals. The experiences of no two babies will be the same.

Arum lilies, black mustard, horse and verbena should be avoided as these scents can cause a severe allergic reaction. Avoid essential oils, which may contain a high phenol content which can irritate the skin. Always check out the smell or scent that you are going to use.

The smells that you introduce can leave a long-lasting impression. If the experiences are good, they may be associated with fond memories in years to come!

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