

# Assessing the Impact of Anosmia: Review of a Questionnaire's Findings

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## Abstract

The inability to detect odours, anosmia, can cause profound psychological effects resulting in feelings of physical and social vulnerability and victimization. In addition, there may be unhappiness related to the loss of the ability to detect pleasurable food smells and, as a consequence, anosmics may develop problems relating to eating. These profound effects arise from a condition which can have a rapid onset and a very poor prognosis for recovery, and are largely treated with a lack of sympathy and indifference by people with normal olfactory ability. In an attempt to educate, inform and help sufferers, a questionnaire was developed in the early 1980s and sent to those who contacted the Warwick Olfaction Research Group. The responses from this questionnaire form the basis of this review. Feelings of personal isolation, lack of interest in eating and emotional blunting were common responses from these sufferers and it seems that we still have some way to go before an adequate recognition of problems associated with anosmia is gained by the general population and, more importantly, within the medical profession.

## Introduction

The first recorded scientific observations of anosmia were made by Hughling Jackson (Jackson, 1864), who wrote, 'In 1837 a gentleman of Sheepwash in Devon was struck from his horse. All the worst effects of concussion resulted—his sense of smell was lost forever'. Since this early paper there have been periodic accounts concerning the condition. Ogle (Ogle, 1870) discussed nine cases and reported variability in the ability in his anosmic patients to sense odours. Leigh (Leigh, 1943) analysed 1000 patients, reporting that 8.3% showed some recovery. Sumner (Sumner, 1964) reported a survey of 1200 patients, stating that in 12.3% of the patients, anosmia followed frontal blows to the head and in 2.08% it followed occipital blows.

As the earlier work suggested, it is important to remember that the condition of anosmia represents a continuum of impairment. It can arise from a nasal obstruction or neurological damage to primary olfactory processing up to the level of the olfactory bulb and tract. Furthermore, impairment of the sense of smell can be caused by a large number of diseases and there are several recent reviews related to the condition (Hendriks, 1988; Finelli and Mair, 1990; Doty, 1995; Sullivan *et al.*, 1995). In addition, clinical accounts have also been presented (Krmptotic-Nemanic, 1969; Hill and Jafek, 1989; Eloit and Trotier, 1994). It is the intention of this review to report and comment upon what anosmics say about their condition and to suggest ways in which they may be psychologically helped. Sumner (Sumner,

1964) reported that recovery from anosmia involved some relearning about the perception of odours. Mair *et al.* (Mair *et al.*, 1995) point out that by comparison with what is known neurologically about the visual sense, with its well-defined disorders such as achromatopsia, prosopagnosia and aperceptive agnosia, we are far from having an equivalent understanding of the olfactory sense.

## Anosmia

Smell is a sense whose value seems to be only really appreciated after it is lost. Forty-nine students were asked which of their five senses they would choose to lose if they were forced to make a choice. Seventy-eight per cent of them chose their sense of smell, yet few could explain what such a loss would entail and none pointed out the obvious potential aesthetic impairment to the lives of sufferers. In this they were reflecting the general state of ignorance about the sense of smell. In the early 1980s the Warwick Olfaction Research Group (WORG) began to receive requests from people claiming to be unable to detect smells. A desire to help and inform these sufferers led to the production of a questionnaire which was sent to all who contacted us. It was recognized from the start that the most important function of the questionnaire was to provide knowledge and support for sufferers. A recurrent theme in the letters we received from anosmics was the expressed feeling that each was the only person in the world to be affected by the condition.

This appears to be a direct reflection of the lack of sympathy that anosmics encounter concerning their condition. Although the responses reported in this paper are largely concerned with answers to the questionnaire, whenever possible we test subjects in our laboratory. The individually tested anosmics represent small numbers but they do allow for interesting comparisons to be made. Often the laboratory tests are made in connection with industrial and insurance claims.

Unlike the Connecticut Chemosensory Clinical Research Center (CCCRC) questionnaire reported by Gent *et al.* (Gent *et al.*, 1986), the WORG questionnaire was not given as part of a standard, controlled clinical interview situation. The majority of the 267 replies were obtained by sending out the questionnaire in the post and the findings on which this review is based represents phenomenological accounts of the condition by anosmic sufferers. An overwhelming number of the statements received from anosmics relate to the indifference they felt they had received from the medical profession in response to requests for advice and help. An extreme example of this is found in an ENT medical report received in 1996 containing the statement, 'the patient was able to detect odours because they were able to detect ammonia'. This quote suggests a total lack of awareness by an ENT specialist concerning the function of the fifth cranial trigeminal nerve (touch) as opposed to the first cranial nerve (olfactory). Anosmics stated that they had often been brusquely informed by doctors that there was nothing that could be done for them and they would just have to get on with their lives as best they could. This attitude of indifference demonstrates a lack of sensitivity and a poor understanding of possible psychological problems that could arise from loss of the ability to detect smells. This statement is supported by Mattes (Mattes, 1993), who, in a review of medical knowledge concerning smell and taste disorders, reports a lack of understanding by the medical profession. Also, Smith and Seiden (Smith and Seiden, 1991) report a lack of sympathy by the medical profession towards patients with smell and taste disorders. It is not known exactly how many sufferers there are, but Smith and Seiden (Smith and Seiden, 1991) and Smith and Duncan (Smith and Duncan, 1992) suggest that at least two million Americans suffer from disorders relating to taste or smell and we can suppose that this US estimate reflects the incidence pro rata in other countries.

The attitude displayed by the medical profession is important because it will certainly influence how anosmics respond when asked about their condition. An example from another area of medicine serves to demonstrate this point. It concerns the levels of emotion said to be experienced by paraplegics. Hohmann (Hohmann, 1966) reported that paraplegics described loss of emotional feelings following accidents which resulted in the transection of their spinal cords. However, McKilligott (McKilligott, 1959) in an earlier study of this same group of paraplegics claimed that they

did not suffer from loss of emotional feelings following their accidents. The solution to these contradictory results appears to lie in the fact that McKilligott was an ambulatory person to whom the paraplegics were attempting to present a picture of essential normality whereas with Hohman, who himself was a paraplegic, they presented a truer picture of their condition and admitted to difficulties. Of course the answer to such a question is complicated because if a period of time has elapsed since the accident, a 'yes' answer may merely be reflecting a diminution of feelings over time. This appears to be the case with the anosmics in that those with the greatest intervening time since their loss tended to report fewer problems.

One reason for this lack of empathy and sympathy related to loss of the sense of smell, as Mair *et al.* (Mair *et al.*, 1995) have pointed out, may be that flavour, incorrectly, is primarily associated with the sense of taste rather than that of smell. The assumption, presumably, is that because anosmics still have a sense of taste, their food flavour appreciation is not impaired. Flavour is a complex interaction of smell, taste, pH, temperature, food texture and mouth-feel, but it is to a very large degree dependent upon odour, and the statement 'it tastes good' really means 'it smells good'. This universal smell/taste confusion is paradoxical. For example, people entering a restaurant and savouring the cooking smells coming from the kitchen will usually correctly involve the sense of smell and say 'the food or the cooking smells good'. However, once the food arrives at their table they revert to saying 'it tastes good'. Anosmic people forced to rely solely upon their sense of taste, which involves sweet, salty, bitter and sour, are truly in a position to appreciate the actual value of the sense of smell in the eating process. Interestingly, the smell/taste confusion is also often found in anosmics. When they come to the laboratory for testing, they often claim to have lost their sense of taste as well as their sense of smell. A demonstration that they still retain their taste sense is often felt by them to be little short of magical. When testing taste levels in the laboratory, we use the concentrations and step sizes reported by Cooper *et al.* (Cooper *et al.*, 1959). Tests for anosmia in the WORG laboratory also contain checks for malingering as prescribed by Von Feldman (Von Feldman, 1976). These involve using odours mixed with trigeminal substances, and flavours such as coconut which have a sour or bitter taste added to them. The major problem when testing anosmics is that there is rarely information available concerning their former sensitivity and level of olfactory interest prior to the loss. When testing in the laboratory we attempt to estimate the former olfactory ability and interest.

Sixty-seven per cent of the replies came from females and 33% came from males. However, the average age of both groups was very similar. For females the average age was 57 years, with the median age being 60 years. For males the average age was 56 years, with the median age being 59.5 years. The youngest person sending in a completed ques-

tionnaire was 18 whilst the oldest was 87 years of age. Van Toller *et al.* (Van Toller *et al.*, 1985) investigated loss of olfactory ability due to ageing and found that between the ages of 20 and 80 years there was an average 20% loss in sensitivity to the odours tested. The study used nine common odours and one trigeminal compound. Unlike ageing losses in the visual and auditory senses, little or no compensations are made for olfactory losses in the elderly and olfactory deterioration often goes undetected. One reason is that ageing losses are often slow and insidious, and loss of the ability to detect odours is not intrusive on other family members. Causes of ageing losses are complex but may relate to cribriform plate thickening or increased degradation of olfactory receptors due to slower turnover of the olfactory receptors. It has been suggested that the loss of olfactory sensitivity through ageing should be referred to as presbyosmia (Van Toller and Dodd, 1987). It is argued that use of such a term would enable the condition of olfactory loss in the elderly to be clearly identified and sought.

One of the questions on the questionnaire related to the effects of anosmia on general mood states. The answers from the questionnaires were in sharp contradiction to anosmics interviewed in the laboratory who claimed generalized depression arising from their condition. However, as mentioned above, anosmics being personally tested were usually making industrial or insurance claims and as a consequence might have had a negative bias in terms of their responses. Also, in terms of time they were closer to the onset of the condition and more likely to be in a grieving mode and still coming to terms with their sensory loss. In other areas relating to insurance claims there is a recognized condition called 'compensation' neurosis where a marked improvement can take place after compensation has been paid.

As expected, questions related to cause of anosmia produced most problems. Some replies were definite while others were probably incorrect guesses. A number of respondents suggested multiple causations for their condition and many of the elderly respondents had probably lost their ability to detect smells as a result of a slow ageing deterioration. However, overall the replies agree with previously published accounts in that the most common causes were stated as a 'blow to the head' or 'viral infection'. It can reasonably be speculated that many of the replies in the large 'unknown' category would probably fall into one or other of these two groups. We were unable to measure directly, nor could we estimate the number of anosmics whose losses were due to age. As indicated previously, loss of the sense of smell can be particularly insidious and escape detection because, unlike vision and hearing, loss of olfactory sensitivity does not clearly manifest itself to relatives and friends. It is worth noting that insidious loss of hearing and vision can often escape notice by patients themselves. For example, peripheral visual field effects are often not detected, and marked unilateral hearing defects can be unnoticed by a patient. Under the medical/surgery heading

the cause of the anosmia was often stated to be 'due to surgery for removal of nasal polyps'.

## Genetic factors

The group claiming 'no sense of smell from birth' is difficult to evaluate because the loss could have occurred from a fall or a blow to the head at a very young age. The respondents were asked to indicate if any other family members were known to have suffered from anosmia. Overall, 49% of the returned questionnaires had something written in this particular box. Many of the statements related to coincidences and some were clearly not genetic in origin; some replies indicated 'son in law' or 'husband'. However, there were some replies that suggested a family link. For example: 'maternal cousins' (four replies were in this category), 'paternal grandfather', 'mother and son', 'sister and daughter' and 'siblings' (overall, six sisters and two brothers; also, three sons and two daughters were reported as being anosmic). Patterson and Lauder (Patterson and Lauder, 1948) in their discussion of 'smell blindness' included accounts of families who were unable to detect smells. Singh *et al.* (Singh *et al.*, 1970) reported a family with anosmia extending over three generations. Their report consisted of a grandfather, father and three sons, all claiming an inability to detect smells as far back as they could recall. In addition, one sister was said to be unable to detect odours. Lygonis (Lygonis, 1969) reported anosmia in a Faroe Isle family extending over four generations. The condition included both male and female members, and Lygonis reported that the anosmia caused distress for the females but not for the males. He described using water and ammonia as control substances but failed to comment on the family members' ability to detect the trigeminal stimulating ammonia. Sparkes *et al.* (Sparkes *et al.*, 1968) considered familial hypogonadotropic hypogonadism which was linked with anosmia. More recently, Leopold *et al.* (Leopold *et al.*, 1992) have discussed problems related to congenital inability to detect smells. When confronted with a claim of anosmia from birth it is necessary to try to establish if the person could have sustained an injury as a baby or a young child.

Sixty-three per cent of our respondents indicated that the onset of their anosmia was sudden and 37% that the onset was slow. Sumner (Sumner, 1964) reported the remarkable case of a chef who, whilst carrying a tray of chickens along a passageway, struck his head. By the time (said to be 30 s) he reached the end of the passageway he realized that he was unable to detect the smell of the chickens. Sumner reported that 2 years later the chef was still anosmic. From our laboratory testing of anosmics we have found that realization about loss of the sense of smell can be very slow, particularly if the loss is connected to a traumatic accident requiring hospitalization.

## Eating behaviour

One question asked respondents to state their current food preferences relative to their former likes. Replies to this second food preference question were: 'same', 24%; 'different', 46%. Nutrition and food preferences is one of the most important and controversial questions concerning anosmia. A recent review of clinical physiology of taste and smell can be found in Schiffman and Gatlin (Schiffman and Gatlin, 1993). Gilland (Gilland, 1921) tested an anosmic in an attempt to show increased sensitivity in her taste sense. He reported that he was not able to demonstrate any such compensatory changes due to loss of the sense of smell. Crosland *et al.* (Crosland *et al.*, 1926), using themselves as controls, tested a single anosmic person's ability to taste food. They stated that under blindfold conditions the anosmic person's ability to detect food placed into his mouth did not differ from, or may even have been superior to, that of a person with a sense of smell in the normal range. Clark and Dodge (Clark and Dodge, 1955) tested a 44-year-old single female anosmic using various flavours. They pointed out that the psychological state of the person was an important factor in eating. They found that the woman they used was able to detect many of the foods they placed in her mouth, but not all the foods were correctly named. They required the woman to close her eyes when they presented the food, but like Crosland and his colleagues, made no attempts to disguise the textures of the foods. Clark and Dodge pointed out that the woman they tested might have been exceptional. An alternative explanation was that she was a partial anosmic. Doty (Doty, 1977) examined the food preference ratings of 15 anosmics and 15 controls. He concluded from his survey of a 94-food-item checklist that for some of his listed foods his controls gave statistically significant larger preference ratings. However, this was not the case for most of the items on the food checklist. Doty stated 'overall, these data indicate that congenital absence of olfaction does not result in markedly aberrant food preferences in human beings'. Ferris *et al.* (Ferris *et al.*, 1985) stated categorically that anosmics did not have nutritional problems.

However, some reports (Mattes *et al.*, 1990; Mattes, 1993, 1995) are contrary to the earlier suggestions that anosmics do not experience problems related to their food intake. These authors report that ~14% of anosmic patients experienced a body weight gain exceeding 10% while ~6.5% experienced a loss of at least that amount. The authors point out that weight changes of this magnitude would not be expected in healthy, non-dieting individuals. The effect of the sense of smell on food intake is also indirectly reported by Griep *et al.* (Griep *et al.*, 1996). These authors examined the variation in nutrient intake with dental status, age and odour perception in the elderly. They found that eating was correlated with olfactory ability and elderly people with a poor sense of smell tended to eat less. Similarly, Devore (Devore, 1992) discussed olfactory defects in 50 elderly

people living in the community. He found that olfactory dysfunction was present in 39% of his sample, with 18% unable to detect smoke. Importantly, Devore stated that he found no correlation between olfactory and cognitive dysfunction.

In contrast to the above findings, many of the anosmics personally interviewed expressed concerns about eating. They would mention noticing that their hands were shaking and realize that it was many hours, in some cases a day or more, since they had last eaten. It seems that in a normal situation anosmics eat regularly because they are subjected to food pacing; colleagues, friends or the family eat and they join them. However, left on their own they may forget about the need to eat. Thus, for some anosmics eating seems to have become a refuelling exercise which they may easily overlook. It is important to note that when asked about their eating habits anosmics are often concerned to present a picture of normality and probing may be needed to discover lapses. It is not unusual for an anosmic to recall former pleasures of dining out and then go on to state that eating out is a recreational activity in which they no longer engage. Complete anosmics cannot experience the normal pleasurable pre-eating smells of food cooking.

One question was used to draw attention to the fact that foods have different textures and mouth-feel qualities, and that these can be used by anosmics to provide some limited variety when eating. An example would be the use of curries for chemical hotness and other foods for coldness. When asked if they were using more sugar since the onset of their anosmia, 70% said 'No' and 30% said 'Yes'.

## The trigeminal sense and sensory interaction

A set of questions was included to find out how well respondents detected trigeminal stimulations. As with other questions, this one was also used to help increase awareness and to draw attention to the important touch sense which should remain relatively unimpaired in anosmics. The trigeminal nerve (the fifth cranial nerve) innervates the nasal passageways and is also found mixed in with the olfactory receptors. It has extensive innervations throughout the mouth, nose and facial areas. Often confused with the sense of smell, the trigeminal nerve is separate from the olfactory nerve. For example, trigeminal innervation on the cornea of the eye is responsible for tearing when volatile lacrimator chemicals are released when peeling an onion. Odours are sometimes mixed with trigeminal compounds, e.g. smelling salts contain eucalyptus oil. From our experience of testing anosmics in the laboratory, we find that they have increased thresholds to trigeminal substances. The reason for this trigeminal/sensory interaction loss is not known, but other investigators have similarly reported decreased trigeminal sensitivity in anosmics (Hummel *et al.*, 1996).

Doty *et al.* (Doty *et al.*, 1978) tested normals and anosmics with 47 compounds and asked the subjects to rate



the odours by using psychometric scales. The control subjects from both categories used in the study were instructed to concentrate on trigeminal sensations which were carefully explained to them. The authors stated that 45 of the compounds were detected by at least some of the anosmics. Unfortunately the authors did not use the trigeminal stimulant CO<sub>2</sub>, which has the advantage that it is odourless and can be administered in controlled and measured doses. The concentrations of the compounds used by Doty *et al.* are not clear from the report but they were obviously at suprathreshold levels. Hummel *et al.* (Hummel *et al.*, 1996) tested normal controls against patients with reduced olfactory sensitivity and reported decreased chemosensory event-related potentials in their patients to CO<sub>2</sub>.

These findings point to sensory interaction being an important area of research that still awaits scientific exploration. A recent paper by Laska *et al.* (Laska *et al.*, 1997) reported testing 20 congenitally anosmic subjects and 50 normal controls using six odorants believed to have strong trigeminal components—menthol, 1,8-cineole, acetic acid, acetone, ethanol and *n*-propanol. The authors hoped to determine whether or not it was possible for anosmics to use trigeminal components to judge aspects of odour quality. As pointed out by von Skramlik (von Skramlik, 1926), trigeminal components can be classified as 'cooling/fresh', 'warming/burning' or 'pungent/painful'. In the Laska *et al.* study, control and anosmic subjects were asked to assign verbal adjectives, selected from a list, to the odours, and were also tested for their ability to discriminate between intensity-matched pairs of the six odorants. The authors found that the normal subjects judged menthol and cineole as cool and fresh, acetic acid as pungent and sour, and acetone as pungent. They gave no clear descriptive profiles for either ethanol or propanol. The descriptive profiles given by the anosmics correlated significantly with those given by controls for menthol, cineole and ethanol. In an 'odd-ball' discrimination task control subjects correctly identified eight out of the nine items presented, with most mistakes occurring when they were presented with pairs of odours having similar trigeminal profiles. The anosmic subjects, with an average of 7.2 of the nine items correctly judged, were not significantly different from the control subjects. The anosmic patients used by Laska *et al.* were suffering from Kallmann's syndrome and, although control subjects were stated to be matched for age, it was not reported if they were matched for IQ. The authors concluded that the trigeminal components of odours could contribute significantly to odour quality for anosmics.

An important fact for anosmics is that any increased threshold in their trigeminal sense would result in less sensitivity to trigeminal stimulants such as combustion odours found in smoke. Many of our respondents reported fear of not being able to detect burning and/or escaping gas. Trigeminal levels within combustion smoke might need to

be well above normal threshold levels for detection by the majority of anosmics.

## Conclusions

Anosmia is a continuum, with sufferers showing degrees of olfactory disability ranging from a blunting of the sense to total loss of olfactory ability. At the present time we lack suitable labels to describe and characterize the anosmic continuum. Douek (Douek, 1974) suggested the word panosmia to describe total anosmia, and the word hyposmia to describe partial anosmia. However, at this time even this crude twofold distinction is not made. The term presbyosmia has been proposed to describe olfactory sensory loss arising from ageing processes (Van Toller and Dodd, 1987). From various individual tests carried out in our laboratories there is little doubt that loss of the sense of smell can radically and adversely affect the quality of life and in some cases can lead to severe depression.

Mair *et al.* (Mair *et al.*, 1995), in a chapter dealing with the neuropsychology of odour memory, make a number of important points relating to anosmia. The authors distinguish between reception and perception of odours. Using computed tomography scans of 354 patients suffering from hyposmia and/or hypogeusia, they draw attention to the fact that anosmia arises from lesions of the olfactory nerve, bulb or tract, i.e. lesions or compressions in the primary olfactory processing areas. The effect of these primary olfactory lesions is to reduce the ability to detect odours. The authors argue that lesions affecting the more central olfactory pathways of the brain alter olfactory perceptions such as discrimination, recognition and identification but leave the ability to detect weak odours intact. The fruitful suggestions put forward by these authors require future investigation.

Despite the fact that most anosmics need advice and help, it is rare to find an anosmic who has received counselling about his or her condition. Varney (Varney, 1988) has written: 'Among 40 patients who developed total anosmia as a result of closed-head injury, virtually all had major vocational problems during the two or more years after being medically cleared to return to work'. None of the cases Varney reported had major motor or sensory deficits and, importantly, the majority were above average in terms of cognitive abilities. An anosmic tested in the laboratory at WORG said that since his anosmia he thought that he had become maladroit as a teacher. Initially this statement was puzzling because he was perceived as a sensitive person. However, on reflection it seems that he was indicating that, because they were no longer appropriate to him, he had stopped using common olfactory similes and metaphors in his teaching and had intuitively come to recognize his diminished communication skills.

Tennen *et al.* (Tennen *et al.*, 1991) have discussed the important psychological and social consequences that may arise from the condition of anosmia. The authors state that

a feeling of vulnerability is the single most stressful aspect of living with a smell and taste disorder. They report that 28% of anosmics answering the CCCRC questionnaire quoted vulnerability as their major problem. Problems like 'Is this food OK to eat?' and 'Is there a gas leak?' leave anosmics feeling vulnerable. Twenty-six per cent of the CCCRC respondents in the above study mentioned some disruption of their marital, sexual and social relationships. Although the problems quoted above may not be solely related to the anosmia, the WORG studies have also identified these types of problems. Anosmics often state that their interest in sex has dwindled and, as we have already pointed out, many report that they no longer dine out. It is also common to find anosmics obsessed with bodily hygiene.

Tennen *et al.* asked anosmics to complete the Beck Depression Inventory (BDI) (Beck *et al.*, 1961) and the revised symptom checklist 90 (SCL-90R) (Deragatis, 1987). They reported that 17% were moderately depressed, scoring significantly higher on the SCL-90R than the normal sample used in the construction of the scale. Higher scores were recorded in patients with the most recent onset of anosmia. A significant correlation was found between the SCL-90R index of global distress and the degree of olfactory functioning index. However, it is important to point out that the correlation obtained accounted for only 5% of the shared variance. Tennen and his colleagues argue that a person's psychological well-being is to a large degree determined by his or her ability to cope with a loss. Accordingly, a large part of their chapter is concerned with coping and appraisal mechanisms. Clearly individuals vary in the way they are affected by anosmia, and our findings indicate that males are more likely to deny that loss of their olfactory ability is a problem. Often there is a suspicion that a stereotypical male machismo response is being made. However, some anosmics cope reasonably well. One was proud of the fact that neighbours called him in whenever they had a problem with their drains. Peatfield *et al.* (1981) stated that of 16 cigarette smokers, both male and female, who developed what they called complete anosmia, eight were unchanged in their smoking habit, four had increased their cigarette consumption and four had decreased. Tennen *et al.* are to be congratulated on their pioneering study, and for drawing attention to the very real and often overlooked disadvantages that can be experienced by people suffering from olfactory complaints.

A valuable heuristic approach when advising anosmics has been found to be Maslow's (Maslow, 1954) hierarchical system of human needs, shown in Figure 1. Maslow placed physiological needs, which include food and drink, at his most fundamental level. As indicated from the findings quoted in this review, both of these basic needs can be adversely affected by anosmia. Normal salivary and pancreatic/gastric anticipatory secretion increases in response to food smells are presumably absent or severely attenuated in the panosmic. The unpalatability of food when it arrives

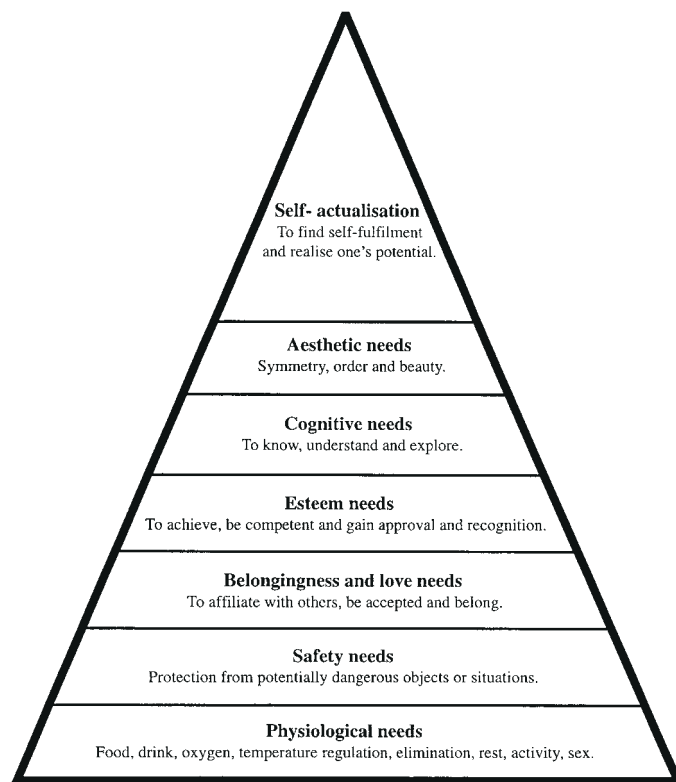


Figure 1 Maslow's heirarchy of human needs.

serves further to decrease food enjoyment. The condition of anosmia is relevant to Maslow's second level, which is related to 'safety' in that the ability to detect warning odours is diminished and many anosmics show great concern about safety. The third and fourth levels of Maslow's hierarchy, which relate to 'belonging' and 'esteem', are applicable to anosmics in relation to their fear of unpleasant levels of personal body odour. Wariness and a feeling of social vulnerability seem to be characteristics of many anosmics. The highest levels of Maslow's pyramid, relating to 'cognitive' and 'aesthetic' needs, can clearly be adversely affected by anosmia, and the dramatic and pleasurable olfactory stimulations are denied to anosmics. When testing an anosmic it is important to attempt to gain an estimate of the role of the sense of smell prior to the loss. For comparison purposes, attempts should be made to estimate the importance of the visual and auditory senses. An aesthetic analogy with monochromatic vision, with its loss of hues and textures, can be used to highlight and illustrate anosmia. Anosmia is often likened to colour blindness.

It is frequently stated that anosmics do not suffer from problems related to eating. However, it is suggested that 'meal pacing' or 'food pacing' may mask real problems for these sufferers. Eating has ceased to be the pleasurable experience it is for people with a normal sense of smell, and when deprived of 'food pacing' an anosmic may overlook the need to eat. When alone, anosmics may go for long

periods without feeling the need to eat. In support of this view, one anosmic claimed that as a result of his condition he had become 'greedy', stating 'eating had become a mere refuelling exercise to be got over as quickly as possible'.

There is clearly a large variation in the way that individuals react to loss of the ability to detect odours. Some anosmics realize the nature of their loss and have discovered that they still have their taste sense, but surprisingly many are not aware of the taste/smell distinction and come for testing stating that they do not have a sense of taste. For many the demonstration that they can still taste is often a revelation. When counselling anosmics there is a need to draw attention to this by emphasizing the basic taste senses and pointing out that textures, mouth-feel and temperature (both chemical and thermal, hot and cold) can be used to make eating more attractive.

Using a cognitive/emotional hierarchical distinction, Schiffman has written, 'Olfaction disorders are not taken seriously because they are viewed as affecting the "lower" senses—those involved with the sensual and emotional life—instead of the "higher" senses that serve the intellect' (Schiffman, 1983). Similarly, in a postscript to an account of an enhanced olfactory episode induced by drug use in a medical student, Sacks (Sacks, 1985), in what he calls an 'osmalgia' account, quotes a gifted man who had lost his sense of smell following a head injury, saying, 'Sense of smell? . . . I never gave it a thought. You don't normally give it a thought. But when I lost it—it was like being struck blind. Life lost a lot of its savour—one doesn't realise how much "savour" is smell. You smell people, you smell books, you smell the city, you smell the spring—maybe not consciously, but as a rich unconscious background to everything else. My whole world was suddenly radically poorer . . .' Anosmia may not be the catastrophe in humans that it would be for the majority of the animal kingdom, but we must begin to gain a wider recognition that it can be a very traumatic condition and that anosmics may be seriously affected at many psychological levels by their sensory loss. Odours are semiotic messages (Van Toller and Kendal-Reed, 1995) and deprivation of them can affect us in subtle ways that we are only now slowly coming to comprehend.

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In some European countries the condition of anosmia is recognized as a disability, and a proportion of the total disability pension is paid to sufferers. At the moment this is not the case in the UK. The UK anosmic self-help group is the Aguesic and Anosmic (AA) Association. The present organizer is: Dr J. Beazley Richards, 2, Quarry View, Whitehill Road, Crowborough, East Sussex TN6 1JT, UK. The method of collection and lack of validation of the WORK questionnaire precludes a detailed presentation of the findings in this review but the author will send detailed copies to interested people.

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