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Language of smell: Tracing some cross-cultural insights from past and present

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It is assumed that the human sense of smell is inferior to vision. This framework of underdeveloped human olfaction can be mainly attributed previously to its historical demotion of it by the Western, quasi-scientific ideas, and evolutionary narratives or differences in reference to other animals, such as rats or mice. However, this notion of a comparatively poor sense of smell may have derived from the narrowly focused pseudoscientific practices of the past and needs to be revisited under more recent findings. Similarly, the generalization of language as poorly connected with the olfactory system needs more cross-cultural references to support or abolish this hypothesis. Humans' olfactory system is not inferior, but certainly different from other species and humans have excellent olfactory abilities. Humans are exceptional in detection and discrimination; in fact, they are more sensitive than rodents and dogs to some odors. Language does not constrain the naming of odors due to cognitive architecture, and the mapping of language on the senses is culturally related. *Jahai* hunter-gatherers were found naming odors as easy as colors. Plasticity and culture were found to have a huge influence on odor naming. No universal hierarchy of senses, such as if vision is more codable than odor, was found imposing on languages.

KEYWORDS

odor, olfaction, language, smell, culture, sensory, food

1 Introduction

The relationship between odors and language coincides with the relationship that language has with color as both strive for *object*1 information similarly (Olofsson and Gottfried, 2015) and subsequent similar strategies are used to express both (Majid and Kruspe, 2018). Familiar odors are known to be processed as perceptual *objects* (Wilson and Stevenson, 2003; Gottfried, 2010). Nevertheless, colors or visual perception can also be both objective and subjective as well (Brynjarsdóttir, 2010), like how the combinations of visual features are perceived as objects (Olofsson and Wilson, 2018). Advancing this idea, Smell-X, a sensory installation at the Figment New York City (NYC) festival, offered the visitors to create a shape out of clay based on one of the accords they smelled (Ataman, 2018). The recent findings debunked 19th-century Paul Broca's pseudoscientific belief that humans have a poor sense of olfaction due to phylogenetic reasons. In the context of the inadequacy of the human mind, olfaction has been considered the least significant of the human senses

1 Adjectives were italicized as they get easily confused with their counterparts.

until now (McGann, 2017), but recent work will lead to a more nuanced view of the principles governing olfactory-language interactions. Among the phylogenetic reasons cited for the poor human olfaction ability were that vison supplanted olfaction as humans became upright (Majid and Kruspe, 2018); large frontal lobes and smaller olfactory bulb (McGann, 2017); position of the bulbs in humans and rodents (underneath the frontal lobe and at the very front, respectively), smaller olfactory bulb volume in proportion to rest of the brain in humans versus mouse (0.01% and 2%, respectively) (McGann, 2017); proportionally smaller surface area of the nasal cavity is covered with olfactory epithelium (Majid and Kruspe, 2018); negative relation between smaller olfactory bulb size and odor-compelled behavior, smaller fraction of functional genes for receptor proteins in humans compared to mouse (390–400 and 1,000, respectively), higher fraction of functionally inactive olfactory receptor genes, i.e., pseudogenes (>60% or 600) (Gilad and Lancet, 2003); negative correlation between olfactory and visual brain structures (Barton et al., 1995); convergence of the orbits, stereoscopic vison (McGann, 2017); and the acquisition of full trichromatic vision at the loss of olfactory receptor genes (Gilad et al., 2004). Although the human olfactory system has turned out to have some biological differences, such as the large size of the olfactory bulb in absolute terms (vs. mouse), the large olfactory epithelium (5 cm^2 vs. 1.4 cm^2 in mice), higher glomeruli for information processing (16 vs. 2 in rodent), lack of "accessory olfactory system" and large, intricate orbitofrontal cortex, it is generally similar in its neurobiology and sensory capabilities (McGann, 2017). In fact, the often-touted reason for 'the smaller size of the olfactory bulb, in relative terms for human's impoverished olfactory system, found little support (Laska et al., 2005). Irrespective of phylogenetic differences, olfactory receptor genes are linked to perceiving odors, and not to name them (Majid and Kruspe, 2018). Odor-naming difficulties have been attributed instead to brain connectivity, either olfactory and language areas of the brain are too weakly connected (Engen, 1987), or too directly connected (Olofsson and Gottfried, 2015; Raspet, 2016), or their neural signals interfere with each other (Lorig, 1999). This suggests that if we were to look for a genetic basis for odor naming, the relevant genes would regulate neuroanatomical connectivity rather than odor perception, *per se* (Majid and Kruspe, 2018). Thus, the inability to name smells is not a biological limitation but a cultural domain.

2 Language role in olfaction

Biologically, individual differences in verbal and non-verbal responses to smell for *intensity*, *pleasantness,* or description were attributed to the polymorphic nature of functional genes (Ferdenzi et al., 2017). However, the olfactory gene repertoire is not the only source of variation. Instead, many other factors, such as age, sex (McGann, 2017), personality, beliefs (Herz and von Clef, 2001), exposure or experiences (McGann, 2017), culture (Ferdenzi et al., 2017), and so on, related to the individuals and their interactions with the environment play a significant role in odor perception. Similarly, the evolutionary development of sight at the expense of smell intrinsically gave more accessibility to consciousness and object recognition, but the notion of language is not constrained only to the intrinsic cognitive architecture instead mapping of language onto senses is also culturally driven (Majid et al., 2018b). Recently, it was found that olfaction abstraction (Majid et al., 2018a) and patterns of brain activation (Reilly et al., 2020) do vary across cultures and languages, foremost contradicting the previously suggested notion of universal disposition (White et al., 2020). Language is not a sheer recapitulation of brain structure, in fact, it drives evolutionary changes in brain structure by language-brain feedback mechanisms (Reilly et al., 2020). English speakers used more source-based descriptions for culturally salient and pleasant odors (Poulton, 2020). On contrary, *Amis* language speakers were found using more abstract odor terms for the strong and repulsive smells (Lee, 2015). A similar trend of greater differentiation for unpleasant smells was observed in *Thai* odor terms (Wnuk et al., 2020). This further infers that abstract odor terms may be primed by psychological effects triggered by abrupt unpleasant smells (Lee, 2015), but again depending upon the culture fewer abstract terms were provided for unpleasant smells by English speakers (Poulton, 2020). The deeply rooted fear of the invisible vis-à-vis odors in Western societies, its frantic urge to clean the surroundings (Bingham, 2020), smell good and taboo culture (Poulton, 2020) kept it away from unpleasant smells (Allan and Burridge, 2006; Poulton, 2020), which could be a reason for less communication. Unpleasant smells have been perceived as less familiar and more intense (Pichon et al., 2015).

Jahai is an Aslian language that belongs to the Austroasiatic family and *Jahai* speakers of the hunter-gatherer community in the Malay peninsula demystified the often-tout claim of 'olfactory-abstraction is impossible' by providing the faster (2.7 s versus 17 s) and shorter responses in the abstract language (Majid et al., 2018a). The Aslian-speaking communities have been termed 'smell cultures' (C. V. Classen et al., 1994) and *Jahai* is not the only example among these languages with smells as a prominent cultural feature (Lee, 2015). Another genetically related language, *Semai*, uses 'expressives' (ideophones or mimetics), a distinct category of words in the form of a string of consonants serving as a template for describing sensory phenomena (Lee, 2015). Agreed-upon nature in hunter-gatherers' vocabulary gave them a communication advantage over hidden dangers in the *jungle*, which could otherwise cost their life. On contrary, western societies with slash-and-burn metaphors do not rely much on an integral part of their communication to avoid hidden danger, which could be a possible reason for longer and different descriptors used for odor identification. The *Jahai* language terms abstract away from the actual sources typically associated with them, enabling them to use for any source whose odor approximates such a quality (Burenhult and Majid, 2011). Besides, *Jahai* odor verbs were found monolexemic, i.e., the meaning is not predictable from the meaning of its parts, psychologically salient, and abstract-based (Burenhult and Majid, 2011). In contrast to the fluent abstract response of *Jahai* speakers, western participants predominantly tried to find a source or a situation corresponding to the aroma. This difference in reference identification (concrete versus abstract) was a sharp contrast between cultures. The same authors found that odors were initially treated similarly to facial expressions across cultures and this finding contradicts the previous notion of abstract concepts are more detached from sensory experience.

3 Dimensions of the olfactory lexica

Initial affective responses to odors, measured by odor pleasantness, have been found supporting valence theory and these pleasantness judgments were consistent across cultures (Khan et al., 2007; Majid et al., 2018a). Similar findings were reported for *Thai* and *Maniq* languages, where alike odors were grouped, suggesting a primary semantic dimension of pleasantness (Wnuk et al., 2020). However, the notion of pleasantness varies significantly across cultures, for instance, the odor of fresh cow dung could be pleasant for some while unpleasant for others. Cow dung is frequently used to purify (emphasizing, purify but not cleanliness) the floor and walls for devotional ceremonies in the north India region of Punjab state, and it is a pleasant odor for locals, including myself but may not be so for Western or indeed the urban population of India. Mud walls and grounds with freshly smeared cow dung cakes drying lazily have a rustic beauty and exude an earthy essence. A shred of buttressing evidence can be located elsewhere (Sahu et al., 2021). This could be attributed to what Cerulo (2018) stated in her work *non-declarative* culture, a concept that does not involve conscious awareness and is acquired slowly from everyday activities. Here, non-declarative culture may be associated with quick, automatic, and unconscious association of first impressions of smell, such as pleasantness. Cow, being a sacred symbol of life in a demarcated boundary, the use of cow dung, auto qualifies it to be a symbol of purity, and associates it with "public culture" which one might use to organize his/her cultural meanings independent of personal beliefs. The "everybody knows" quality of these initial reactions to scents or aromas illustrates the relationship between non-declarative culture and public culture and its importance in deciphering smells. Public culture provides people with a consensual definition of relative values of smells, here in this case, of cow dung. Similarly, clove and cardamom, which are pleasant odors for northern Indians, and used regularly in *chai* or *kheer* (pudding), were found unpleasant for native English speakers of Australian origin (Poulton, 2020). These cultural capitals challenge generalizations of odor space to generate *collective* odor space, and for the same reasons, others suggested a non-paradigmatic conceptual space of more locale scope rather than otherwise (Jraissati and Deroy, 2021). In contrast to the earned status of 'most repulsive in the world,' the smell of fermented herring as a delicacy for the Swedish populous would be a fitting illustration of locale scope (Nygaard, 2019). The frame of references evoked at the moment of smelling is often get manifested by individual subjectivity and can provide very distinct objects of conceptual identity (Barwich, 2019). The olfactory definition of the space, which we inhabit as human beings, depends on the prevailing culture of the inhabiting humankind, their sanctioned cosmology that further manifests topography, flora, and fauna of the geography, and together they construct an olfactory landscape, where the smell of wintergreen may evoked a strikingly distinct frame of reference, i.e., of ointment (medicine/not edible, e.g., Iodex™, India), rather than that of the mints (Excitemint™ wintergreen mints, a brand of German supermarket chain—Aldi Inc.). . Relatedly, a panelist of Asian origin was referring to mustard green as a frame of reference for a boiled potato type while others of North American origin were to cauliflower (Sharma et al., 2020). Both cauliflower and mustard share the same taxonomy and sulfurous compounds, still, both ethnicities were differing in a very specific or narrow way. It may evoke an impression of high intersubjective agreement that can be achieved with the chemicals, but the same chemical may appear as medicine to one whereas a mouth freshener to another, especially in cross-cultural studies (below mentioned). Likewise, whether butyric acid is characterized as part of comestible (parmesan cheese) or vomit also depends on the subject in question.

Hedonic valence (degree of pleasantness or unpleasantness) has been closely linked to familiarity (Moss et al., 2016; Poulton, 2020). Though the patterns of brain activation for the respective senses precede the ontogeny of the language (Reilly et al., 2020), the cultural guidance of first impression allows one to move back and forth between first impression and culturally connected valued settings to build olfactory meaning (Cerulo, 2018). Odor classifications have been found particularly affected by the linguistic or semantic arrangements of (supposed) odor sources rather than the sensory characteristics of odors (Chrea et al., 2005; Kaeppler and Mueller, 2013). The most basic attribute of an odor, i.e., pleasantness (Kaeppler and Mueller, 2013), may be an aftereffect of innate prenatal learning. Mammals begin learning how to classify visual information in the womb because of spontaneous retinal activity (Garson, 2014). Prenatal chemosensory experience of anise flavor was found to influence oral and facial expressions in newborns, with a preference for anise odor (Schaal et al., 2000). Given that previous exposure and learning play crucial roles (Lee, 2015; Olofsson and Wilson, 2018), it would be no wonder the typicality and salience of odors play roles in odor categorization (Poulton, 2020). Active olfactory training based on cultural obligations shapes not only olfactory language but also odor perception (Olofsson and Wilson, 2018) and categorization (Chrea et al., 2004). In fact, cultural salience was identified as a secondary semantic dimension of the olfactory conceptual space followed by hedonic valence (Poulton, 2020). By looking at *Thai* and *Kapsiki* languages' shared primary semantic dimension and salience, it may be concluded that smell terms might in fact be a relatively common feature within the linguistic area of Mainland Southeast Asia (MSEA) and further research would help establish a typology of smell terms, consonant for that suggested for color (Wnuk et al., 2020).

Though higher cultural convergence has been shown for unpleasant odors, such as decaying organic matter, feces, and body odors, higher cultural variability drives the hedonic ratings of pleasant odors, such as nature, cosmetics, and food (Ferdenzi et al., 2017). In the series, *Dogon* of Mali rubs fried onions, all over their bodies, as a highly desirable perfume (Fox, 2006). The essence of onion could never enjoy success as a perfume in the West, although it does in Senegal and elsewhere in Africa. This example underlines the fact that the categories of the fragrant and the foul are not given in nature, but rather derive from culture (Classen et al., 1994). The perception of odor and pleasantness is a complex process and involves both innately tuned and learned components (Khan et al., 2007). Thus, the Western notion of aesthetically pleasing fragrances is by no means universal (Fox, 2006).

Following pleasantness, *alertness* or *dangerousness* has been recognized as the second dimension of olfactory perceptions (Wnuk and Majid, 2014). *Toxicity*, a concept closely related to dangerousness was likewise reported elsewhere (Haddad et al., 2010) as being the other dimension of olfactory perceptions. Similarly,

another study reported soft/active and rich/fresh dimensions (Zarzo and Stanton, 2009). These 2-dimensions can instantaneously provide a *coarse categorization* of smells in question, but simultaneously these dimensions seem not to suffice enough to capture the phenomenal differences between, say two equally pleasant and equally edible smells. For instance, following coarse categorization, further odor identification may involve diverse factors, especially if we consider humans as cultural beings. One can refer to a particular place (grandmother's closet, geography—*jungle*, village), experience (bright yellow colored mustard fields of Punjab, India), source (flora and fauna—guava, java plum), properties (dark fruit, brown, sweet, etc.), etc. Together, they make it hard to build a general odor categorization scheme. However, considering the small number of odor terms reported in cross-cultural studies, say 14 for *Wanzi* (Mouélé, 1997), 21 for *Totonac* (Enríquez, 2004), 15 for *Maniq* (Wnuk and Majid, 2014), and 12 for *Jahai*, Jraissati, and Deroy (2021) suggested that odors can be compared only if the size of odorants is *closed* or determined, which actually is, in a *local way*. A low dimensional space, i.e., 2-dimensional in nature, was suggested rather than a complex multidimensional one. The smells in Wanzi olfactory culture are sorted between domestic and wild contexts, for instance of a total of 14 smell terms, five refer to domestic odors, two to wild odors, and eight for both domestic and wild odors (Mouélé, 1997).

Ethnographic data illustrate that smell terms have detailed semantics tapping into broader cultural constructs. Contrary to the widespread view that languages cannot encode odors, the *Maniq* speakers showed that odor can be a coherent semantic domain (Wnuk and Majid, 2014). For example, the term *lspɔs* denotes a fragrant smell quality characteristic of a wide range of different objects, such as wild yams, bearcats, medicinal plants, forests, various trees, and fruit (Wnuk et al., 2017). Gilad and Lancet (2003) found significant differences in the size of the intact olfactory repertoire between Pygmies and Caucasians, as the former has more intact alleles or higher functional genes. Similarly, non-African individuals were reported to have significantly fewer functional olfactory receptors than did African American individuals and these results substantiate previous reports suggesting that different evolutionary pressures may have shaped the chemosensory repertoire in different human populations (Menashe et al., 2003). Genetically, this highly diverse repertoire of olfactory receptors across species and individuals can contribute to unique olfactory experiences.

Physiologically, the inability to name objects based on their olfactory compared to appearance may be explained by the brain circuitry involved in associating olfactory and visual object features to lexico-semantic representations (Olofsson and Gottfried, 2015; Olofsson and Wilson, 2018). It was reported that incoming olfactory signals are primarily directly connected to the *higher* (associated with highest functions of consciousness and intellect) neocortical centers (other senses are first processed by the thalamus of the brain), which causes a delay in sending information to the language center of the neocortex (Raspet, 2016). Secondly, the aroma (say, cherry) may enable less distinctive features (sweet, fruity) than its visual counterpart (small, round) before the object is mapped onto a source name *via* designated sensory-specific language hubs (Olofsson et al., 2014; Olofsson and Wilson, 2018). This biologically limited olfactory feature extraction may be explained by physiology, but the explanations citing physiology do not exclude roles for culture and plasticity (Olofsson and Wilson, 2018; Reilly et al., 2020). The push and the prevalence of the use of *concrete* (referential) words over *abstract*, especially in the case of olfaction in Western dialogue could also be a reason for this so-called inability. For example, most of the aroma or flavor wheels or in other words lexicons are based on *concrete* words, where *abstract* words are intentionally and consciously replaced with concrete words. Thirdly, the commodity of interest (or disinterest) has a huge influence on whether one can extract distinctive features or not, for instance, if one wishes to compare mango with guava or *alphonso* mango with *dasheri* mango. Likewise, one can easily sniff or extract distinguishing features of a hint of asafetida among *garam masala* (a blend of ground spices - cumin, black pepper, cinnamon, coriander, etc.).

Rather, sensory-cognitive systems can be best characterized as biological systems that develop under genetic as well as an environmental influence (Olofsson and Wilson, 2018). Language-brain feedback mechanism found driving the evolutionary changes in human brain structure, which may convey firstly that language could reiterate the sensory hierarchy framework in the brain or secondly that language and brain function could mirror one another through co-evolution (Deacon, 1998; Reilly et al., 2020). Linguistically, access to odor labels is known to facilitate identification (Cain, 1979). This abovementioned bio-cultural interaction is observed in *Semaq Beri* hunter-gatherers (Majid and Kruspe, 2018) who have extraordinary olfactory capabilities. Aforesaid recent findings contradict the idea of White and co-workers (2020) that language and chemosensory perception appear poles apart and there is a "weak link" between language and olfaction. This "weak link" notion was supported by the statements/findings that: 1) language is unable to effectively interact with the olfactory system, 2) odors presented without verbal cues are notoriously difficult to name, 3) people found it profoundly difficult to name familiar smells, 4) describe odors in terms of their sources, 5) easily conjure up appearance with the label compared to odor, 6) easier to match a name to an odor than *vice versa* 7), and generalization of abovementioned reasons to conclude that it may be a universal disposition. Despite its fame as an elusive domain, the claims about smell do not generalize to all languages (Wnuk et al., 2020), as the inability to name odors is a culturally contingent fact related to subsistence mode (Majid and Kruspe, 2018). *Jahai* and *Maniq* appeared to have the most elaborated odor lexicons, with 12 (*Jahai*) to 15 (*Maniq*) terms, yet the highest number, 21 terms, was observed in *Kumam* speakers (O'Meara and Majid, 2016). Aforesaid examples of *Jahai*, *Semaq Beri*, *Maniq*, and *Thai* speakers support cultural influence on odor-language interaction. Many reasons could be responsible for the absence of smell lexica in English, such as deodorization of the environment (Wnuk et al., 2020), the rise of civilization (Burenhult and Majid, 2011), derogation of smell in the West by the 18th and 19th-century philosophers (Fox, 2006; Wnuk et al., 2020). The intellectual elite of the 18th and 19th centuries decreed sight to be the all-important, an index of the civilized world while the sense of odor was deemed to be of a lower order, an index of uncivilized, ill-mannered, primitive, aboriginal people (*Adivasi*). In the theory of psychosexual development, Sigmund Freud described the anal and oral stages of early childhood, which centered on smell, taste, and touch, as

'harkening back to early animal forms of life' (McGann, 2017). Indeed, the emotional potency of smell was felt to threaten the impersonal, rational detachment of modern scientific thinking, and eventually, this demotion of smell has had a lasting effect on academic research, with the result that we know far less about our sense of smell than about more high-status senses such as vision and hearing (Fox, 2006). Just now, it was found that smell lexica, which was considered restricted to a handful of small languages of (*linguistic rarum*), is in fact more common than suggested previously (Wnuk et al., 2020). The *Thai* language, with millions of speakers, challenged this assumption and the prevalence of smell-related terms reflects the importance of smell in the everyday life. The high incidence of smell-related vocabulary in the *Thai* National Corpus and the relevance of smell across several cultural domains question the weak-link notion between olfaction and language. Similar findings were reported in *Amis*, an Austronesian language spoken in Taiwan, which exhibits abundant odor terms (Lee, 2015).

A direct test of Aristotle's claim that sensory hierarchy is dominated by vision and audition was only recently made possible in 2020, where it was empirically proved that English word ratings, the world's most-spoken language, reflected the consistency with Aristotle's claim of sensory hierarchy: vision > audition > haptic > olfaction ≈ gustation (Reilly et al., 2020). However, odor lexicons in other languages such as *Jahai*, *Thai*, *Farsi*, etc., are contradictory to this hierarchy, suggesting that this distributional linguistic evidence is not a human universal. The implications from the foregoing studies suggest that despite the weak neural connections between the limbic system and the language processing areas, the sensual dominance of vision in Western societies over the other senses may be culturally biased (Lee, 2015). Cultural contexts and social constraints play vital roles in olfactory responses, which tend to trigger a mnemonic process while describing a perceived odor (Lee, 2015). Thus, we will be taking a step further into understanding just how our conceptualizations and our cultural preoccupations affect how we verbalize our sensory experiences (Poulton, 2020).

4 Other cultural insights on olfaction

Both, language and food habits are cultural capitals, and consequently, both are deeply interiorized as the very basic values by the members of every nation. Like most other forms of non-verbal communication, the reliance on smell is cultural (Griffin and Bone, 2013). Freud (1978: 318) famously proclaimed "the organic sublimation of the sense of smell is a factor in civilization." Olfaction has been relegated to a merely rudimentary function in the human sensorium by many great Western thinkers over the centuries (Burenhult and Majid, 2011). However, the connections among odor, creator, desire, space, time, memory, and loss have been emphasized in indigenous societies and texts. Furthermore, the ancient science of Ayurveda speaks about the deeper holistic science behind the exhilaration of senses when individuals met fragrances and experience their healing properties (Marathe, 2009; Iyengar, 2017a; Iyengar, 2017b). The significance of fragrance in worship, as a vehicle of spiritual connection, has been explained in classical Indian texts. In Hinduism, the odor of earth, in *Mahabharata* (महाभारत), has been characterized as nine-fold, namely, desired, undesired, sweet, pungent, diffusive, compact, smooth, rough, and pure (McHugh, 2007). This nine-fold characterization could imply to intensity as noted by one of the reviewers. Similarly, in *Hitopadesha* (हितोपदेशः) fables, betel nut was described as a bitter, hot, sweet, spicy, binding, alkaline, demulcent, and astringent. Similar examples can be found in other holy texts, such as ਧੂਪੁ ਮਲਆਨਲੇ ਪਵਣੁ ਚਵਰੇ ਕਰੇ ਸਗਲ ਬਨਰਾਇ ਫੂਲੰਤ ਜੋਤੀ || in *Guru Granth Sahib* (गुरु ग्रंथ साहिब). It is believed that the art of honing the magic of scent through creating perfumes and incense was first pioneered in ancient India (Iyengar, 2017a). Incense sticks and *dhoop* are the paragons of this age-old practice. Moreover, fragrance plays a role in not only beautifying Sufi practices but also in providing the mystical powers of healing (Sahu et al., 2021) and spiritual inspiration through its myriad avatars (Iyengar, 2017b). Jalaluddin Rumi, one of the loftiest Sufis/*Dervish* and mystic of all times, characterizes "love" as a "bore the fragrance of musk!"

The Önge, Andamanese indigenous people, are highly attuned to odor, their Universe, and everything in it is defined by smell (Fox, 2006). Their calendar is based on the odors of flowers that come into bloom at different times of the year and indeed each season is named after an odor and possesses its distinctive aroma force. Indeed, Classen (2005, p. 156) sums up, "the heart of Önge cosmology is ordered by an olfactory model: the inhaling and exhaling of breath" (Classen, 2005). In contrast to the western world, where space is static, within which things happen, Andamanese conceives space as a dynamic environmental flow (Classen et al., 1994), where the sense of smell is highly valued, and odor is the essence of personal identity, interpersonal exchanges or mixing of odors is often carefully regulated (Fox, 2006). In comparison to the English language in which vision has been a prominent source domain for metaphor (O'Meara and Majid, 2020), olfaction has been found serving, metaphorically, in a variety of ways in other languages. For example, in Punjabi, Hakim Mirza Allah Yar Khan Yogi, a Punjabi poet, portrayed the creator (ਕਰਤਾਰ) as a pleasant odor (ਸੁਗੰਦ), ਕਰਤਾਰ ਕੀ ਸੁਗੰਦ ਹੈ ਨਾਨਕ ਕੀ ਕਸਮ, ਜਤਿਨੀ ਭੀ ਹੋ ਗੋਬਦਿ ਕੀ ਤਾਰੀਫ਼ ਵਹਾਂ ਹੈ ਕਮ ||—wrote in the devotion of Guru Gobind Singh, last human guru of Sikhism. Unlike English where the word 'smell' is supposed to have a dual-purpose (bad and good smell), the Punjabi language has two separate words for positive and negative connotations for

TABLE 1 A few examples of using nose as a metaphor of positivity in the Punjabi culture.

Original sentence	Meaning in english
ਨੱਕ 'ਚ ਨਕੇਲ ਪਾਉਣਾ	here nose (ਨੱਕ) is untamed, wild
ਨੱਕ 'ਤੇ ਮੱਖੀ ਨਾ ਬੈਠਣ ਦੇਣਾ	here nose (ਨੱਕ) is dignity, arrogance, intelligent
ਨੱਕ ਨਾਲ ਲਕੀਰਾਂ ਕੱਢਣੀਆਂ	here nose (ਨੱਕ) is repent
ਨੱਕ ਰੱਖਣਾ	here nose (ਨੱਕ) is pride, honor
ਨੱਕ ਵੱਟਣਾ	here nose (ਨੱਕ) is abandon, leave
ਨੱਕ ਥੱਲੇ ਨਾ ਆਉਣਾ	here nose (ਨੱਕ) is status, reputation
ਨੱਕ ਚਾੜ੍ਹਨਾ	here nose (ਨੱਕ) is hate, dislike
ਨੱਕ 'ਤੇ ਗੁੱਸਾ ਰਹਣਿਾ	here nose (ਨੱਕ) is outspoken, blunt

odor (ਗੰਧ), such as bad odor (ਬੋ, ਬਦਬੂ, ਮੁਸ਼ਕ, ਦੁਰਗੰਧੀ), good odor (ਖੁਸ਼ਬੋ, ਸੁਗੰਧ, ਵਾਸ਼ਨਾ). In sharp contrast to the English language's discourteous status of the nose (schnozzle, conk, hooter, snoot, snout) (Fox, 2006), the Punjabi language gave the nose a huge admiration in literature and folklore, indeed it has been used in a variety of contexts (Table 1).

5 Future trends

In the light of expanding cross-cultural understandings of the nature of smell and the way locales use or communicate them, many bright spots can be traced, which would be less Anglocentric and broader in scope. The rise of crowdsourcing marketplaces, such as MTurk, Prolific, etc., is paving the way for more linguistically diverse engagements along with cross-cultural field studies that can provide critical data about the smell.

6 Conclusion

Olfactory perception is a heavily learned process that critically depends on exposure, past, and ongoing experiences. The dynamics of this dominant aspect of olfactory perception will put biological limitations in the olfactory system into question. Learned components get influenced by several aspects such as culture, subsistence, and multisensory convergence, to name a few. Thus, deciphering smells involves a fully entwined system including neural operations, corporeal experience, and the cultured environments in which bodies are embedded. We have seen that culture and language play a major role in odor description; where odors are used in subsistence and ways of life, this facilitates a higher odor description frequency, degree of abstraction, and codability. Finally, based on the abovementioned more recent findings would not it be very tempting to suggest that there is a "weak link" between olfaction and language?

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CS compiled the whole work.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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