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A Game of Trails
Reflections on the affective power of scents

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Introduction

In any instant, we are immersed in a chemical soup as all the entities surrounding us constantly emit chemicals. It is no wonder that perceptual systems related to chemicals (olfaction, touch, and taste) were the first to evolve (Hoover 2010). It is likely that the earliest instance of olfactory systems developed when life was under water (Niimura 2012). Indeed, chemosenses are active in water as fish rely heavily on olfaction to navigate and detect predators, potential mates and food source (Kobayashi, Sorenson, & Stacey 2002; Hara 2005; Nosal et al. 2016). What are the evolutionary advantages offered by this kind of perceptual systems?

To reflect on this problem we have to realize that living beings cannot thrive or survive by simply finding out which chemicals float around them. There is little gain in knowing that the chemical compound passing through our nostrils is limonene (lemon odor) or trimethylamine (fish odors). After all, if our olfactory system had been able to perform a detailed evaluation of the chemical compunds we would not have the need to invent sophisticated technological equipments to ascertain the structures of chemical molecules. On the other hand, organisms need to exploit environmental resources and keep threats at bay. In other words, they have to balance the benefits of exploration against the threats lurking behind every corner. Therefore, chemical senses need to be granted with valence and meaning: organisms have to determine whether they are approaching a potential mate or a predator, nutritious food or toxic substances.

From this vantage point, olfaction seems a perfectly apt tool. First of all, unlike the other chemical senses, it is a distance sense as we can detect odors from meters off (mice and dogs even miles off). It allows us to predict what we will encounter and prepare to react accordingly. Second, odors have a strong motivational power: they push us away from adverse encounters and pull us towards potential gains. Our shoulders shiver in recoil at the presence of the acid whiff of rotten food: we feel an urge to distance ourselves from the source of the loathsome stench as we envision an unpleasant and potentially toxic encounter. Conversely, our stomach rumbles and our mouth starts watering when the sweet scent of apple pie is lingering in the air and, before we realize it, we are already heading towards the kitchen eager to savor once again our grandmother's baked treat.

Several properties of olfactory experience crop up from these examples. Smells are characterized by specific hedonic qualities, e.g. they can be disgusting or appetizing. These qualities are not ethereal features that merely represent the world in a particular way. Rather, they are directly connected to bodily reactions: the distinct feeling of nausea arising from the stomach or the secretion of saliva in the mouth. In return, these bodily sensations appear to be related to action tendencies, as we seem motivated to move towards pleasant smells and away from unpleasant ones. Therefore, odors strike us as relevant and motivate us to engage the world in particular ways: they affect us.

We can thus ponder on the nature of perception from a novel starting point. Do smells unveil disgusting or appetizing properties that exist independently in the environment or are they subjective internal features generated by the organism? Are the affective features intrinsic properties of the percepts or are they subsequently added to them? More generally, do odors accurately depict the external reality or are they tools used by organisms to engage with their surroundings?

In order to ponder these issues, which are relevant for understanding both olfaction and perception at large, we need to systematically analyze how smell works. Olfaction, however, is still an unexplored area and we do not have a firm grasp of its intricate nature yet. Smell can be regarded as the quintessential enigmatic sense as odors, invisible but vividly present in our life, have proved to be recalcitrant to rigorous definitions and conceptual understanding.

However, a new trend of study has emerged in recent years. Smell gained a new importance in different disciplines (neuroscience, psychology, cultural history, anthropology, to name but a few) and some of its intricacies have been unraveled. Philosophers also started to take olfaction as a legitimate and compelling object for their inquiries. These investigations have addressed classic problems in the philosophy of mind such as the existence and nature of representations, the dimensions of perception, the objectivity of perception, and the nature of consciousness. Since these problems have been usually examined by reflecting only on our visual system, this new trend of research showed how the particular structure of the olfactory systems can be helpful in raising novel questions and grasping a new understanding on how perceptions work. These fruitful investigations wanted to dismiss the derogative assumption which view smells as mere subjective experiences in the sole business of inducing fleeting

sensations. As a result, olfaction was ennobled as a rightful object of philosophical reflection for classic issues in the philosophy of mind.

The major philosophical contributions proposed in recent years have left aside a rigorous and systematic reflection on the affective dimensions that permeate olfaction. Many authors acknowledged that smell should be understood in light of the useful behaviors it guides and developed sophisticated analyses on its aesthetic dimensions (e.g. Smith 2007; Keller 2016; Barwich 2018). Nevertheless, they did not provide a systematic analysis of the relation between smell and affectivity.

The interconnection between olfaction and emotion is intuitively cross-culturally recognized (Ferdenzi et al. 2013a; 2013b) and it was epitomized by numerous poets and novelist who used the evocative nature of smell to convey the intricacies of human inner life. This interrelation was put under the microscope of scientific investigation, which confirmed the understanding shown by laymen and writers alike. On the one hand, a wide array of neuroscientific evidence has confirmed that smell and emotion share vast areas of brain networks, such as the amygdala, the insula, the hippocampus, the anterior cingulate cortex, and the orbitofrontal cortex (Soudry et al. 2011; Mohanty & Gottfried 2013). On the other hand, psychological studies pointed to the mutual influence between smell and affective states: odors induce moods (Seubert et al. 2009; Weber & Heuberger 2008), trigger ANS activity (Bensafi et al. 2002a; 2002b; Kuroda et al. 2005; Delplanque et al. 2009) and influence cognitive performances (Rotton 1983; Rodionova & Minor 2017); emotions, in return, regulate odor perception (Pollatos et al. 2007).

Nevertheless, these studies are scattered around and a coherent framework able to weave the different threads in a meaningful fabric is still lacking. The present work aims at contributing to this growing field of research by proposing a new theoretical framework able to give reason to the invaluable role smell plays in our affective life. In particular, the focus will be placed on the structural interconnection between smell, emotion, and related action tendencies. I think there is a kernel of truth in the intuitive notion that odors communicate brute sensations and provoke subjective feelings hardly sharable with others. After all, the porous border between the realms of odors and affectivity has been exploited multiple times by perfumers, food companies, and, above all, natural selection. Delving deeper in this interconnection will not prove interesting just to get novel insights on how smell works, but

also it might be a good starting point to study relevant issues for different trends of philosophical research like aesthetics, social philosophy, and philosophy of mind. I will provide a few examples.

Before we made a comparison between the reactions brought on by a rancid whiff and the creamy odor of apple pie. However, not all odors induce such clear-cut responses. Indeed, they may possess a more ambiguous connotation and prove to be both repelling and attracting. For instance, Italy and France are well-known for certain varieties of ripe cheese whose odor can be off-putting and enticing at the same time. To those who are able to appreciate such a delicacy, the odor creates a very subtle affective state in which rancid nuances play an essential role in its distinct full-rounded flavor. This idiosyncratic balance between reeking and savoring is even imprinted in the name of some cheese, like the Italian *Puzzone di Moena*, which translates as Great stinker of Moena. A name owed to the ammoniac hints lingering in its piquant odor. The appreciation of such a kind of cheese can rise fruitful considerations: Are the disgusting components of this food completely transmuted into a new sensory dimension or is disgust still present in this sensory experience? And if so, are we allowed to view disgust as a modular emotion solely in the business of rejecting noxious substance or can we make room for a broader understanding of disgust which recognizes in it a subtle aesthetic dimension?

This reflection on cheese can be extended a little further. Imagine presenting to a blindfolded person a container with a fat slice of smelly cheese inside. You open it without telling her the content of the box and ask her to judge the odor. It is likely that she will find the smell unpleasant at least. However, when you ask her to remove the blindfold, chances are that she would not mind tasting the cheese whose odor was so off-putting just a few seconds before. This ambivalent reaction is due to some chemical components – like isovaleric acid or butyric acid – which confer to cheese its distinct piquant smell. Interestingly, these chemicals give sweaty feet or vomit their typical nauseating scent as well. One may ask how it is possible that the very same chemical compound can elicit two opposite reactions. This puzzle is at the basis of clever-designed experiments which explored this issue (Herz & von Clef 2001; de Araujo et al. 2005). In these studies, participants were asked to evaluate the pleasantness of certain odors. Before having the chance to sniff the odor, they were told what kind of substance they were going to smell, for instance, "parmesan" or "vomit". Unbeknownst to them, in both the "parmesan" and "vomit" situation they were sniffing the same odorant (e.g. butyric acid). When the odor was under the label "parmesan" the pleasantness rating was much

higher than in the "vomit" case. And this different rating was correlated with different patterns of neural activity. What causes this evaluation? Were the subjects perceiving two different smells from the same odorant? Or were they having the same perceptual experience, albeit tinged with different hedonic tones? To what extent is the smell we perceive cognitively penetrable and influenced by our own past experience and beliefs? And, if so, how our own predispositions influence our perceptions? Finally, how an investigation of the neural reactions can help us scrutinize this phenomenon more thoroughly?

These cunning scenarios are not just material that give philosophers new fuel to ignite their thoughts, they can also unveil psychological mechanisms which have profound social consequences. In the last decade, a new wave of racism and intolerance has spread in many countries. Far-right politicians and commentators have used several weapons in their rhetoric of violence and hatred. Among them, there was olfaction, which was used to ostracize immigrants and minorities. Jarid Bolsonaro, the new president of Brazil, spitefully declared that "Indian *smells*, are uneducated and don't speak our language". Tucker Carlson, Fox News host, slandered immigrants by stating that they were making "our own country poorer, *dirtier*, and more divided". This kind of rhetoric quickly picked up among the general population and several odor-based derogatory acts made the news in the last year. For example, in January 2019, in a restaurant in Milan, Italy, immigrant waiters were sprayed with deodorants by some colleagues who addressed them with racial slurs. Today it is not uncommon hearing locals complaining about the smell of migrants when they see them on a local bus or when they walk in neighborhoods with a high percentage of immigrant communities. To gain a better understanding of these phenomena, it is useful to investigate the mental social processes underpinning them. Which factors contribute to the odor of a person? And why do we find it disgusting?

Recent research highlighted that body odor is the product of different elements, the most prominent of which are genetics and diets (Havlíček, Fialová, & Roberts 2017). Both factors are substantially constant throughout one's own life. So, we should expect the aversion to the odor of an ethnic group to be equally consistent. However, when we reflect on it, we see that people react differently to someone else's odor depending on the situation they are experiencing. On the one hand, most of those who today openly complain about the stench of migrants did not seem to be affected by it a few years ago. Second, it is likely that those who complain about the smell of their immigrant neighbors are allured by the fragrances lingering in

the air of street markets of Marrakech or Mumbai, common travel destinations for Westerns albeit swarming with locals. How is it possible that the migrants suddenly became stinky? How is it possible that the same odors are repulsive if smelled in our neighborhood and enticing when we are immersed in the galaxy of fragrances of an exotic market? This case is useful in rising yet other meaningful questions: How much the belief that someone stinks contributes to the perception of the stench? How does the external context influence the meaning we confer to the odor we perceive? To what extent the recognition of the value of our fellow human beings is based on a cognitive and rational assessment and to what extent it is influenced by our affective and sensorial dispositions?

As these examples highlight, olfactory experiences encompass phenomena of different nature: neural, physiological, phenomenological, cultural, etc. Thus, the questions which arise from a reflection on the affective regard issues and topic which have been under the microscope of different disciplines. To properly address them, I will draw on a multidisciplinary approach. More specifically, in my philosophical analysis, I will employ three different approaches. First of all, the philosophical reflection will be empirically informed via a systematic analysis of research carried out in neuroscience and psychology. Secondly, I will rely on phenomenological considerations by implementing both careful descriptions of common first-person experience and analysis of extracts from novels and poems. Thirdly, to circumvent the constraints imposed by Western approaches and experiences, I will integrate into my study research carried out in cultural history and ethnography. This approach is akin to a new trend of research in philosophy of mind where rigorous philosophical reasoning is balanced against phenomenological reflections and empirical research carried out in different disciplines (e.g. Nanay 2013; Colombetti 2014).

Such an interdisciplinary approach because provides significant advantages to philosophical reflection. By evaluating philosophical theories against empirical data it is possible to comprehend which theoretical models still retain an important explanatory function in the light of the new scientific research. Empirical studies, in fact, can play a decisive role in validating or dismissing certain philosophical theses. A case in point regards the modular hypothesis formulated by Jerry Fodor (1981). According to the modular hypothesis, the mind is divided into highly specialized modules, each responsible for a single function. The mind is envisioned as a Swiss Army Knife, composed of modules that have evolved to perform a specific function like depth perception, facial recognition, language acquisition, etc. This theory

has been highly influential and allowed the development of groundbreaking research in different areas, especially evolutionary psychology (Barkow, Cosmides, & Tooby 1992). However, neuroscientific research was not able to individuate highly specialized areas of the brain. On the contrary, most of the brain areas underpin different mental states. Brain networks seem to be highly interconnected with each other, and each of them is devoted to multiple functions depending on the situation the organism is experiencing (Anderson 2014). A case in point regards the fusiform face area, located in the fusiform gyrus. Initially, fMRI hinted that his area was highly specialized for perceiving faces (Kanwisher, McDermott, & Chun 1997). However, recent studies highlighted that this area is activated when experts perceived objects of their expertise (e.g. cars or birds) (Gauthier et al. 2000) and that it plays a role in process of objects categorization (Adams & Janata 2002). In the light of these studies, philosophers (Prinz 2006) and neuroscientist (Pessoa 2013) alike are questioning the validity of the modularity hypothesis, which dominated the field of cognitive science and philosophy of mind a few decades ago.[1]

As this example shows, a philosophical reflection grounded on empirical research may avoid suppositions that hardly fit the most up-to-date research. What is more, neuroscientific and psychological research have developed sophisticated models which shed new light on the intricacy of perceptual systems and the questions raised in neuroscientific research are essential to illuminate the philosophical endeavor. Therefore, I think a philosophical reflection on perceptual systems must confront the study carried out by empirical disciplines.

On the other hand, I believe that to equate neural activity with first-person experience would be to commit a categorial error. Studying perception in all its complexity cannot be equivalent to reflecting only on the brain processes related to this activity. With no doubt, there is a correlation between the perceptual activity and the neural activity, but the former cannot be reduced to the latter. As I stated above, brain areas perform different functions and thus it is not possible to determine what a person is feeling by solely looking at a specific brain area. Our phenomenological experience is undermined by the thin and cramped neural data. By relying only on neuroscientific research we risk lacking a comprehensive explanation of the richness of the olfactory experience. Therefore, I intend to move beyond the neurocentric approach and scrutinize the dynamical interrelation between perception, emotion, and action. In fact, albeit

1 Modularity, however, is still a relevant concept in neuroscientific and philosophical research as well (Kurzban 2012; Sporns & Betzel 2016).

brain activity plays a determinant role in our perceptual processes, it might be questioned whether it is its sole constituent. New research 1) highlights how perceptions are so influenced by musculoskeletal activity – e.g. sniffing for olfaction (Mainland & Sobel 2006) – that the latter might be considered a constitutive element of the percepts themselves; 2) advocates the idea that perceptions are inherently affective phenomena (Barrett & Bar 2009) and thus, to be adequately understood, one needs to take into account physiological processes.

Finally, olfactory experience is not only a biological or psychological phenomenon. As Classen, Howes, and Synnott (1994: 3) emphasized, «smell is *cultural*, hence a social and historical phenomenon. Odors are invested with cultural values and used by societies as a means of and model for defining and interacting with the world». Cultures vary both on their olfactory lexicon and on the hedonic experience related to the same odors. Two examples regard the Maniq of Thailand and the Dassanecth of Ethiopia. The former posses a lexicon for odors which is as diverse as their vocabulary to name colors (Wnuk & Majid 2014), a surprising ability from the point of view of a Westerner, given our limited ability to name odors (Jönsson & Olsson 2003). The latter consider the smell of cattle and manure, which are usually regarded as universal unpleasant odors (Curtis & Biran 2001), as "ideal" and even use manure as an ointment (Almagor 1997). By taking into account ethnographical, ethnopsychological and historical studies it will be possible to mitigate one of the important limitations of current psychological research: the vast majority of these studies are carried out among WEIRD subjects (Western, Educated, from Industrialized, Rich and Democratic countries) and thus the generalization of their results is necessarily limited (Henrich, Heine, & Norenzayan 2010). On the other hand, a systematic comparison between the results of these different disciplines will help us assess more firmly the possible universality of their conclusions.

As a result, I will base my work on a pluralistic approach, as I think that integrating multiple models is necessary to adequately deal with the issues at stake. This approach is grounded in the belief that qualitative analysis of first-person experience, psychophysical research, neuroscientific research, and cultural studies are not inevitably in contradiction. On the contrary, I aim to build meaningful bridges between these disciplines and to highlight connections and interdependences between the different phenomena under investigation. However, when adopting this kind of methodology it is necessary to be aware of its possible pitfalls and shortcomings.

First, perceptual experiences, neural activity, and cultural practices are different phenomena irreducible to each other. For instance, a given cultural practice can inform the phenomenological experience of the individual to which a specific pattern of neural activity corresponds to. These elements can be correlated with each other, but they are not simply identifiable in terms of one another.

Second, the vast majority of the studies that I will scrutinized were not interdisciplinary in themselves. Hence, they did not take into account other dimensions apart from the one under the microscope of their research. For instance, in the vast majority of neuroscientific research, a careful phenomenological analysis of the lived experience of the participants was not undertaken. Therefore, the integration between these different levels of analysis is carried out *ex-post* and thus possesses an inevitable speculative nature.

Third, each discipline is characterized by its own specific methodologies and their inevitable constraints which can limit the generalization of the findings. However, a systematic comparison of their respective results can be helpful in identifying the points of convergence which, in their turn, can be a solid starting point from which philosophical theorizing can unfold.

In conclusion, I believe that an examination of research carried out in different disciplines guided by rigorous philosophical models and apt conceptual clarification might lead to a firmer grip on the phenomena under study than each of disciplines taken single handedly.

As regard the structure of the thesis, I begin my work by reviewing the up-to-date scientific and philosophical literature on olfaction. I then provide the philosophical model that I use in my study. Finally, I employ this model in the analysis of specific phenomena that pertain to the affective nature of smell.

In Chapter 1, I introduce the most up-to-date neuroscientific and psychological studies on the olfactory system and review the main philosophical considerations. In the beginning, I explore why smell has been an under-researched topic. Afterward, I present the main findings that the recent neuropsychological wave of studies in olfactics has produced. After this review, I briefly present the current philosophical debate regarding olfactory perception.

Chapter 2 is devoted to offering an alternative interpretation of how perception works by highlighting two important factors: its intimate connection with action and its intrinsic affective dimension. To achieve this goal, I draw on 4Es approaches (Newen, De Bruin, & Gallagher 2018). 4Es approaches to mind are a family of philosophical theories which aim at revolutionizing two important aspects of how we think about the mind. Their basic tenet is that the mind is Enacted, Embodied, Embedded, and Extended. On the one hand, they refuse to consider the mind skull-bound, rather they underscore how bodily or environmental components can play a constitutive role in its functioning. On the other hand, they envision mental states as enacted, as brought about by living organisms in their relationship with their surroundings. As a result, 4Es approaches understand perception as a form of action and underscore the intimate relationship between the brain, the body, and the environment. In my discussion, I draw attention to the affective dimension of the mind as a crucial bridge to funnel the perception-action circle highlighted by both theories.

In Chapter 3, the model presented in Chapter 2 is put to work. In the first part, I advocate why an enactive understanding of the olfactory system is legitimate by presenting a vast array of neuroscientific and psychology data which back up my interpretation. In the second part, I show how this interpretation can shed new light on the issues examined in Chapter 1 by interpreting olfaction from a novel point of view. I give particular consideration to the relationship between conscious and unconscious perception and to the role that attention, memory, and affectivity play in our olfactory percepts. The subsequent chapters focus on implementing the model to specific dimensions of olfactory affectivity: food, sociality, and environmental scaffolding.

Chapter 4 analyzes the relationship between olfaction and food. As it results from the study, smells affect food in a variety of ways. They regulate appetite by influencing the states of hunger and satiety, and they ward us off from potentiality dangerous food by triggering a sense of nausea. They are also essential in our aesthetic appreciation of food, as the vast majority of flavors are more dependent on olfaction than taste. Indeed, taste regards only the sensation of sweetness, saltiness, bitterness, sourness, and umami (savory). The vast majority of the subtle sensations we perceive while eating are due to olfaction. In fact, people who suffer from total anosmia (i.e. who completely lost their sense of smell) cannot distinguish the flavor of an apple from a potato or the flavor coffee from wine. This analysis, however, is tied to more general philosophical issues. For example, a problem involves cognitive penetrability of perception. In

this regard, the case of isovaleric acid examined above is crucial: Does the belief that I am smelling cheese or food alter the quality of my perception? What is more, the relationship between smell and food is a good ground to scrutinize the nature of both emotions and aesthetic experience. As we highlighted before, not only is olfactory disgust essential to keep nauseating substances at bay but it also plays a crucial role in food aesthetic. What does this role say about the supposed negativity of this emotion? Can we understand emotions as modular mental entities evolved to play a limited set of functions for which they have evolved? Or is it more profitable to view them as dynamic states that play different roles according to the situation in which an organism finds itself? To what extent can we regard the appreciation of food and beverages as a genuine aesthetic experience?

Chapter 5 addresses the social impact of odors. More specifically, I focus on two kinds of factors. First, I examine olfactory communication. The quest for finding human pheromones has attracted the attention of psychologists and perfurmers alike, albeit with scarce results. However, recent research has highlighted that humans seem to communicate emotions via smell. By taking into account these phenomena I aim to address general questions regarding emotional communication: To what extent emotional contagion is a necessary component of emotional communication? Does the communication of affective states necessarily involve a theory of mind or is it based on less cognitive mental mechanisms? Second, I scrutinize the social functions performed by odors in the ingroup/outgroup relationship. By analyzing historical and ethnographic data, I show that people from menacing or despised groups have been historically ostracized because of their smell. Conversely, people do not regard themselves or members of their own in-group as smelly. This investigation is fruitful in addressing the problem of social recognition. The recognition of the other has been historically studied from a cognitive and ethical standpoint. However, if the rejection of the other is grounded on smell, it may be possible to reflect on this dynamic from a sensorial dimension.

Chapter 6 is focused on olfactory scaffolding. I examine the different ways in which humans modify and architecture their olfactory surroundings. In fact, we do not simply perceive the odor around us. We also change our olfactory space to reliably induce specific emotional states. Think of the use of perfume to create a personal aura; the use of fragrances to soothe, energize or embellished a specific environment; the implementation of fragrances in theatre, movies, and art installation. The examination of these practices is useful to shed light

on crucial philosophical debates. To begin with, I consider how this study can illuminate how we engineer our surroundings to promote certain kinds of affective states. In addition, odors can be an ideal ground to ponder the elusive concept of atmosphere.

Chapter 1 - Western anosmia

Introduction

«Observe how noses were made to bear spectacles, and so we have spectacles» (Voltaire 2006: 4). This paradoxical sentence is one of the first phrases uttered by Pangloss in Voltaire's *Candide* in the attempt to manifest his firm belief that we live in the best of all possible worlds. The witty satire of Leibniz's optimism staged in Voltaire's masterpiece is a (perhaps involuntary) satire of the longstanding dismissal of our olfactory system. From the rationalist's eyes, the fleeting and visceral sensations induced by smell have no value in the human quest for knowledge. Consequently, the essential function of the nose is aiding sight – the very torchbearer of truth – by bearing spectacles.

This neglect characterized Western investigation of perceptual systems for centuries. Olfaction was thought to have little importance for human knowledge and even human life (Classen, Howes, & Synnott 1994; Le Guérer 2002; Jaquet 2010). The sense of smell was deemed as vestigial (Stoddart 1992) and its contribution to human life and civilization was scraped away. Odors have not been regarded as decisive elements for perceiving and engaging with the world. Conversely, they have been intuitively linked to fleeting and brute sensations which, in the less sanitized societies of the past, were often unpleasant (Reinarz 2014). Odors' connection to visceral reactions and the keen sense of smell showed by various mammals led to the belief that olfaction was a domain of animals rather than humans, a worthless dross of our bodily nature.

In the last years, thanks to the advancement in psychology and neuroscience, olfaction came under the microscope of scientific investigation. Albeit still being an underresearched area if compared to other sensory modalities, several studies started to shed new light on the structure and functioning of smell. An important step in this direction was the discovery of a large family of genes that code odor receptors (Buck & Axel 1991). This research earned Linda Buck and Richard Axel the Nobel Prize in Physiology in 2004. They proved that our genome devotes 3% of the genes to encode olfactory receptors (around 1000 genes that underpin an equal number of receptors). 3% might appear small but it is the second-largest gene pool after the immune system (Kelley et al. 2005). The enthusiasm sparked by the discovery propelled a

vast array of research on the olfactory system which helps us to gain a new understanding of the manifold way it impacts our mental life.

In the present chapter, I portray an introductory picture of the human olfactory system, of the psychological characteristics of smells and their neurological underpinnings. I review the reasons which led many thinkers to dismiss the importance of smell and explore how these beliefs stand against the findings of the new wave of research.

Nosing around the relevance of smell

Paris, France, 1830. A servant is preparing a soup when a decomposed arm falls into the kitchen through the skylight. The shocked woman promptly advises the local police who are called to untangle a seemingly unsolvable mystery. Besides the identification of the gender of the victim, little is known about this heinous crime as no attesting witness is found. To move the case outside the gridlock, in the absence of a K9 unit (police dogs) – a practice that will be established only later in Ghent, Belgium (Science Sifting 1902) – a policeman decides to act as a bloodhound. Taking advantage of the advanced stage of decomposition of the arm, he familiarizes well enough with the smell to track the location from which the foul limb fell: a room lodged by a medical student. The sharp stench of decay inside the room is sufficient evidence against the pupil who is only issued a fine since corpse dissection had been legal in France for a long time (Ghosh 2015).

The ability to sniff out this crime – reported in a letter by a British medical student, Thomas Southern Burman, and studied by historian Jonathan Reinarz (2003) – is all the more remarkable if we picture the olfactory state which characterized Paris at that time. Indeed, the city during the 19th century was struck by several Great Stinks, events in which the overwhelming stench that enveloped Paris led to social unrest (Barnes 2006). As Alain Corbin reports, the sources of nasty whiffs were so diverse and omnipresent that the city was permanently afflicted by a miasmatic atmosphere:

> the cesspool clearers made the street stink; to save themselves trips to the refuse dumps, they let the barrels empty into the gutter. The numerous police ordinances relating to this scourge were

> not enforced. Fullers' and tanners' workshops helped spread excremental odors. The walls of Paris houses were stained by urine. Louis-Sebastien Mercier waxed apocalyptic when he recalled the "amphitheater of latrines, perched on top of one another, adjoining stairways, next to doors, very near kitchens, and exuding the most fetid odor on all sides," or the frequency with which blocked pipes cracked, flooded the house, and blasted pestilence through stinking shafts that seemed like the mouths of hell to terrified children. In short, Paris, "center of science, arts, fashion, and taste," stood out as "the center of stench" (Corbin 1986: 27).

To discern and track the olfactory mark of the putrescent limb from the foul air of the city must have required a truly sharp nose!

A clever study carried out by a team at the University of California, Berkeley a few years ago attested that the striking olfactory skill demonstrated by our officer is not beyond the reach of laymen (Porter et al. 2007). To test whether humans possess a scent-tracking ability like dogs, the blindfolded subjects were asked to follow a scent trail of chocolate oil through an open grass field. Strikingly, two-third of the subjects were able to crawl their way towards the target source. Moreover, training in this task improved the scent-tracking ability of the subjects: after several trials the participants were able to find the odor source quicker and with less deviation. Also, the participants spontaneously increased their sniffing frequency as they become faster in following the scent, thus mimicking the olfactory tracking behavior of dogs (Thesen, Steen, & Døving 1993). Overall, this study suggests that the poor reputation of our olfactory ability might be more a matter of behavioral demands than ultimate ability. Were this true, we should expect that individuals who heavily rely on smell in their everyday life would have more refined olfactory abilities. To ascertain the validity of this supposition, I will now examine research on olfactory expertise (Calkin & Jellinek 1994) and several ethnographical studies (Classen, Howes, & Synnott 1994).

> Just as wine-merchant can recognize a vintage from the taste of a single drop; just as a hop-dealer, the moment he sniffs at a sack, can fix the precise value of the contents; just as a Chinese trader can tell at once the place of origin of the teas he has to examine, can say on what estate in the Bohea hills or in what Buddhist monastery each sample was grown and when the leaves were picked, can state precisely the degree of torrefaction involved and the effect produced on the tea by contact with plum blossom, with the Aglaia, with the Olea fragrans, indeed with any perfumes used to modify its falvour, to give it an unexpected piquancy, to improve its somewhat dry smell with a whiff of fresh and foreign flowers; so Des Essaints, after one brief sniff at a scent, could

> promptly detail the amounts of its constituents, explain the psychology of its composition, perhaps even give the name of the artist who created it and marked it with the personal stamp of his style (Huysmans 2003: 107-108).

With these wonderful words, Joris-Karl Huysmans captures the keenness of smell achieved by the leading character of his novel *À rebours*. At first glance, it might seem a literary fantasy, devised by Huysmans to emphasize Des Essaints' aesthetic achievements. However, if taken seriously, a careful reading of this description might shade doubts on the supposed weakness of human smell.

Recently, several studies have been carried out to ascertain the olfactory ability of perfumers, wine tasters, and other people who underwent olfactory training. The results showed that olfactory training increases sensitivity to specific odorants as experts manifest a lower threshold to perceive a given odorant. Moreover, it improves discriminatory and memory abilities related to odors: experts are better than controls in distinguishing between slightly different odorants and in remembering them (Royet et al. 2013). The improvement is reflected in functional and structural modification of certain brain areas. When examining a fragrance, experts show higher activation in regions related to the cognitive evaluation of stimuli compared to regular folks (Royet et al. 2013). On the other hand, experts display an increase in grey-matter in orbitofrontal areas involved in cognitive control in the presence of emotional stimuli (the bilateral gyrus rectus and medial orbital gyrus), and in the anterior piriform cortex, an area which processes the valence of olfactory stimuli (Delon-Martin et al. 2013). Consequently, it appears that advanced practice improves sensitivity to and cognitive evaluation of olfactory stimuli. As the legendary perfumer Jean Carles stated «the perfumer's only tool is his nose. I was first called "Mr. Nose" in the USA about 20 years ago. But any one of us is a potential Mr. Nose since, in perfumery, there just is no privileged "nose". Anyone may acquire a highly developed sense of smell, as this is merely a matter of practice» (Carles 1968: 14).

A similar enhancement has been verified in the blinds. According to popular beliefs, they are granted with refined olfactory abilities. From Helen Keller to Daredevil, real and fictional blind people alike are pictured with unnaturally enhanced olfaction. Interestingly, recent investigation ascertained a kernel of truth at the basis of these hearsays. When compared to sighted individuals, blind people show enhanced olfactory sensitivity and better discriminatory abilities (Rombaux et al. 2010). Blind people are also able to orient themselves in city by using their keen sense of smell (Koutsoklenis & Papadopoulos 2011). Again, the abilities are mirrored in brain function and structure. On the one hand, in odor identification tasks,

blind people show enhanced activation of brain olfactory areas if compared to controls (Kupers et al. 2011). On the other hand, they possess larger olfactory bulbs than usual (Rombaux et al. 2010), a neuroanatomical feature linked to improved olfactory abilities (Buschhüter et al. 2008).

While among Westerners the sense of smell becomes prominent only in peculiar conditions (e.g. as compensation of blindness or as a result of a specific profession), in other cultures a keen sense of smell is widespread in the general population. An illustrative example regards the Umeda, a cultural group located in the rainforest of New Guinea (Gell 1997). They are hunter-gatherers who depend on raiding in the forest for their survival. Tropical rainforests are dimmed and gloomy places with no open views, as the sunbeams have a hard time pushing their way into the thick vegetation (Goldsmith 1998). As a result, sight is not particularly useful to find one's own way through the wild musky trees. The Umeda developed a keen sense of smell to sniff their way into the forest. As Alfred Gell tells us, «they were brilliant at detecting the faintest hint of the smoke from a campfire in the depths of the forest, or at distinguishing by the freshness or otherwise the scent, whether pig-tracks were new or old, or where a cuscus might be concealed aloft. They were always on the alert for olfactory clues which might lead them to discover things otherwise kept hidden» (Gell 1997: 32).

This impressive olfactory ability is in stark contrast with the common-sense notion of olfaction as well as the traditional academic one. For instance, in a survey carried in 2018 among 20.000 American citizens, the sense of smell was considered as the most dispendable.[2] Interestingly, this view was shared by all the participants: young and old, men and women, rich and poor regarded smell as the least useful of all the senses. The interviewees seemed unaware of the psychological and existential toll brought about by the loss of smell.

A patient interviewed by Oliver Sacks perfectly depicts the dire consequences of losing the ability to smell: «"Sense of smell?" he says. "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 good deal of its savor — one doesn't realize how much 'savor' *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"» (Sacks 1986: 167). As Sacks points out, «there was an acute sense of loss, and an acute sense of yearning, a veritable osmalgia: a desire to remember the smell-world to which he had paid no conscious attention, but which, he now felt, had formed the very ground base of life» (Sacks 1986: 167).

[2] https://today.yougov.com/topics/health/articles-reports/2018/07/25/five-senses-majority-would-miss-sight-most.

Sacks' patient suffered from total anosmia induced by a head trauma which damaged his olfactory nerves. Anosmia is a condition wherein a patient loses the sense of smell. This condition can be total if the patient cannot smell any odor whatsoever, or specific if the patient is unable to perceive only certain odors. Usually, specific anosmia is fairly common and does not cause medical concern, whereas total anosmia can be highly problematic. When the sense of smell is not completely lost but it is weakened, the condition is called hyposmia. Other related disorders regard the inability of recognizing odors (agnosia), hypersensitivity to smells (hyperosmia) and distorted smell perceptions (dysosmia). All these conditions are usually caused by traumatic events, tumors, infections, and neurodegenerative diseases (Hawkes & Doty 2017).

By examining the life of those who suffer from olfactory disorders, we can gain a better understanding of the impact smell has on our existence. In fact, since normally we do not pay much attention to our olfactory world, we do not realize how widespread and pervasive smell is for the enjoyment of our life (Blomqvist et al. 2004; Hummel & Nordin 2005). People who suffer from anosmia – on average 1-2% of the population under 65 years old (Hoffman, Ishii, & MActurk 1998) and more than 50% of the population over 65 years old (Murphy et al. 2002) – experience a decrease in their well-being which spans through several factors (Deems et al. 1991).

One of the most reported complain is the loss of taste. People with anosmia o severe hyposmia cannot enjoy food and beverage anymore: everything they eat and drink is completely tasteless. They are bound to a fate worse than Neo once he discovered that the only food eatable outside The Matrix is a gooey dull whitey blob. Consequently, it should not come as a surprise that anosmic patients are at higher risk of malnutrition than normosomic subjects (Aschenbrenner et al. 2008). This happens because the flavor we perceive is a multimodal experience and not the mere result of the activation of the taste buds placed in our mouth. Rather, flavor is highly dependent on the odorants released by the food while we chew it.[3] People with total anosmia are not influenced anymore by the odorants given off by the substances while they lay on the palate. Therefore, they are bound to taste only the basic taste sensations: sweetness, saltiness, bitterness, sourness, umami (savoriness). To get a vivid idea of this condition you just have to remember the last time you caught a bad cold. Since your nose was stuffed you were not able to perceive the articulated aroma of the food which appeared so

[3] I will delve deeper into this issue in Chapter 4.

dulled to make eating a boring activity, done just for the sake of ingesting nutrients. Likewise, anosmics cannot distinguish a potato from an apple or coffee from wine. However, in everyday language, we do not distinguish between taste and flavor. Since general population is not aware of the paramount role played by smell in the enjoyment of food, people generally attribute the dullness of the food to a "loss of taste" (Soter et al. 2008).

The psychological effect goes beyond the mere enjoyment of food. Anosmics are more prone to depression, their emotional regulatory abilities are impaired, and their social and sexual life is diminished. As a result, they lose interest in once pleasurable activities and are afflicted by a general lack of motivation (Miwa et al. 2001). The lack of smell can also generate anxious states. The patients can become obsessed with their own body odor because they cannot monitor it anymore. The anxiety pervades other aspects of their life as they become unmoved by bad odors, caused by gas leak, fires or rotten foods (Santos et al. 2004), an effect that increases their mortality risk (Devanand et al. 2015).

The poor consideration people generally have of olfaction is echoed in a vast array of academic research. Humans and all the other primates are conventionally conceived as microsmatic species (Turner 1891), namely, species with a reduced olfactory ability and a heightened sense of vision (Gilad et al. 2004). This conception is grounded in the reduction of the olfactory repertoire. Primates possess a significantly reduced genetic repertoire for olfactory receptors than other mammals (Gilad et al. 2003) and their olfactory bulbs are proportionally smaller (Baron et al. 1983).[4] As a result, olfaction should have little evolutionary significance for our species. This view echoes back to Darwin who, in *The Descent of Man* wrote that the sense of smell «is of extremely slight service, if any, even to the dark-colored races of men, in whom it is generally more highly developed than in the civilized races. Nevertheless, it does not warn them of danger, nor guide them to their food; nor does it prevent the Esquimaux from sleeping in the most fetid atmosphere, nor many savages from eating half- putrid meat» (Darwin 1981: 24). Thus, olfaction in humans would be useless even for the most basic animal functions of avoiding environmental threats and guiding eating behavior.

Nevertheless, in light of the research presented above, one can rightly ask where this disdain stems from. Olfaction poor reputation appears to have deep roots which encompass

[4] However, the validity of this view has been recently called into question due to the improper inferral from relative size of dedicated brain networks to level of ability (Smith & Bathnagar 2004).

anthropological, psychological as well as philosophical considerations (Classen, Howes, & Synnott 1994; Le Guérer 2002; Jaquet 2010; Smith 2015). In what follows, I compare these disregarding views with new findings produced by the blooming area of olfactory studies. I start with the relationship between smell and language.

On the tip of the nose

Imagine seeing in your desk a chocolate bar, a strawberry, and a lemon. If I ask you to name their color it would be easy for you to utter "brown", "red" and "yellow". On the other hand, if I ask you to name their smell you most likely will end up saying that they smell "like chocolate" "like strawberry" and "like lemon", respectively. If we think about it, our vocabulary is particularly poor for naming smells. A carton of rotten milk emits a *pungent* and *nauseous* whiff; if you walk in the countryside after a summer rainstorm you are surrounded by an *earthy* and somehow *refreshing* scent; the lemons you have just squished into lemonade to quench your thirst emit a *bittersweet* and *pleasant* aroma. As we can see, the words we use describe smells only indirectly. We refer to the psychological effects brought about by the odor (*nauseous*, *pleasant*, *refreshing*), to sensorial effects that pertain to other modalities (*pungent*, *bittersweet*) or to the source of the odor (*earthy*). To the best of my knowledge, only one of the previous smell is granted with a specific, abstract term to define it: *petrichor*. This word derives from the Greek *ichor* (ethereal essence) and *petros* (stones) and was a lemma coined by two Australian researchers to describe the nature of argillaceous odor (Bear & Thomas 1964). However, the term, albeit having a dedicated article on *Nature*, a couple of Youtube videos and a Wikipedia page, failed to take root in the English language and is not even listed in the Oxford English Dictionary.

Our poor ability to name odors led many scholars to view olfaction as a sense recalcitrant to language. Even Hans Henning (1916), a German psychophysicist who formulated an empirical system of classification of odor (Wilson & Stevenson 2006: 12),[5] viewed olfactory abstraction as «impossible» (Henning 1916: 66). In Henning's remark, one can read an echo of Kant, who, in a marginal note of his *Anthropology from a Pragmatic Point of View*,

[5] Several classificatory systems were created in the past. To the best of my knowledge, Theophrastus was the first to attempt the realization of such a system. In his treatise *On odours* (Theophrastus 1916), the classification of odours is related to the classification of the aromatic properties of plants (Sharples 1985). In modern times, Carl Linneus provided a similar classification in its 1752 treatise *Odores medicamentorum*. His work was driven by a medical interest since the smell were identified as a likeable sign of the therapeutic properties of plants. From their smell, so the argument went, it might have been possible to identify their medical effects (Linnaeus 2003).

states that «smell does not allow itself to be described, but only compared through similarity with another sense» (Kant 2007a: 270).

Westerners' poor linguistic abilities have been confirmed by several studies carried out in recent years. Actually, not only do we possess a poor olfactory lexicon, but we have also difficulties in identifying the smells in the first place. In these studies, participants with a normal sense of smell are able to linguistically identify the odors (even common odors like beer, rose or urine) in only less than half of the trials (Jönsson & Olsson 2003). However, when participants are told the source of the odor they immediately recognize it and are perplexed by their previous uncertainty as if the name was "in the tip of their nose" (Sulmon-Rossé, Isaanchou, & Köster 2005).

The poor linguistic performances have been usually interpreted as proof of the minor role odors play in our life. The British psychologist Edward Titchener underscores that «the very fact that odors have no settled system of names, like cold or pain, red or blue, shows that they have not been utilized in human life» (Titchener 1915: 51). Likewise, Howard Gardner, well-known for his theory of multiple intelligences, ruled out from the cognitive realm the sense of smell because «when it comes to keen gustatory or olfactory senses, these abilities have little special value across cultures» (Gardner 1983: 61). Therefore, the dominant reasoning viewed the lack of odor terms as symptomatic of the little importance smell has for human life. The linguistic repertoire is thought of as mirroring a poor cognitive ability linked to this sensory modality. The latter, in its turn, is taken as proof of the overall insignificance odors have for our life. However, one might question how much linguistic reasoning can unveil of human nature. As Rodney Needham (1972: 138) points out: «in that it was linguistic [. . .] and thus a matter of convention, it could not by definition qualify as natural». Moreover, as we saw earlier, smell does play an important role in certain cultures and professions. Does this influence their olfactory lexicon and their view of its role in human life?

Indeed, a refine olfactory ability is also reflected in the lexicon employed to map one's own olfactory world. A case in point regards two hunter-gatherers communities of the Aslian-speaking community (i.e. belonging to the Australasian languages): the Jahai of Malaysia and the Maniq of Thailand (Wnuk & Majid 2014; Majid & Burenhult 2014). The research carried out by Asifa Majid shows that these cultures possess rich odor vocabularies. The words they use do not refer neither to general qualities which encompass several sensory modalities (e.g. pleasant

or delicate) nor to odors in an indirect way (e.g. when we state that a shake has a fruity odor we describe the smell on the basis of its source, the fruits which are present in the shake). These cultures are able to reliably and consistently name smell by implementing words which refer to specific abstract odor qualities, in a similar vein in which we employ color-words to identify different qualities of light. For instance, in the Jahai language the word *ɛŋɛs* «is used for the smell of petrol, smoke, bat droppings, and bat caves, some species of millipede, root of wild ginger, leaf of gingerwort, wood of wild mango, among other odor sources» (Majid & Burenhult 2014: 267). Likewise, the Maniq word *lspəs* refers to the smell emitted by objects as diverse as tubers, bearcat, clean and dry clothes, and a new shelter (Wnuk & Majid 2014).[6] In light of these findings, one can ask what is the reason for this linguistic specificity. Is such an olfactory lexicon a characteristic of the Aslian languages or is it present in other linguistic families? Does it depend on the fact that these populations live in the tropical rainforest, an environment in which, as we saw, the utility of sight is diminished? Or does it depend on the fact that they are hunter-gatherers?

To sound out this question, Majid embarked on additional research projects. First of all, she discovered that extensive odor lexicons can be found in groups who speak markedly different languages, such as the Cha'palaa, a hunter-gatherer culture settled in the tropical rainforests of Ecuador (Floyd et al. 2018). This finding ruled out language family as a decisive aspect. However, the full weight of the external environment and the ways of living of these people was not clear.

To ascertain the impact of these factors, she and her team compared two cultures that shared a similar language and lived in the same environment. The study was carried in the tropical rainforest of Malaysia, where both the hunter-gatherer Semaq Beri and the swidden-horticulturist Semelai live (Majid & Kruspe 2018). Members of the two groups were asked to carry out an odor and color-naming task and the results were highly significant. The Semelai (swidden-horticulturist) struggled to find appropriate words to describe the odors they were sniffing but identified colors quite uniformly. On the contrary, the Semaq Bari (hunter-gatherers) coded colors equally well than odors, and in doing so employed a similar number of abstract domain-specific terms. Therefore, the study concluded, the variation in the odor

[6] The word *lspəs* can be roughly translated as "fragrant" but, as Wnuk and Mjid warns us, «Maniq smell terms are not easily rendered into English, so glosses such as 'fragrant' must not be interpreted as direct translations» (Wnuk & Majid 2014: 127).

vocabulary is to be attributed to the way these groups relate to their external environment. Hunter-gatherers spend more time in the dark and dense rainforest, whose humidity and temperature increase the volatility of molecules, thus emphasizing the importance of smell (Burenhult & Majid 2011).

These ethnographic researches hint that the development of linguistic olfactory ability is not completely determined by our neurobiological endowment, but rather it develops through usage. A similar conclusion is supported by studies which investigated the linguistic abilities of olfactory skilled individuals in the West, like perfumers and wine connoisseurs. These workers, in virtue of their everyday smell practice, develop a sophisticated lexicon to designate odor categories which overshadow those employed by laymen (Zarzo & Stanton 2009).

Taken together, these studies highlight that when smell comes to play a crucial role in someone's life this person will become better at recognizing, categorizing and labeling odors. It is also possible to imagine that the populations studied by Majid will display a neural configuration like the one identified in perfumers. In this regard, the possible convergence of ethnolinguistic and neuroscience can be a fruitful new area of research which might unlock new olfactory codes (Olofsson & Gottfried 2015).

An elusive sense

The inability to verbalize odors might be linked to another reason which led several philosophers to dismiss the importance of smell. Since odors are not anchored to words, they are unlikely to be regarded as a solid basis to reflect on the nature of reality. In point fact, odors have usually been conceived as fleeting sensations, unable to give us reliable knowledge of the external world.

According to Barry Smith (2015), the traditional differentiation between higher and lower senses is based on the kind of information they are thought to provide. So-called lower senses (olfaction, gustation, and touch) are proximal senses, restricted to bodily feelings. They supposedly do not grant us with a clear knowledge of the external world, but rather with personal and short-lived sensations. On the contrary, higher senses (sight and audition) would

present us with a detailed picture of the external world, the firm ground for our knowledge. Smith traces back this idea to Thomas Aquinas and Immanuel Kant.

Aquinas thinks that sight and audition are richer and more complex sources of information than the other senses, and thus contribute more to our knowledge (McQueen 1993). Aquinas (1.91.2.ad 1) believes our poor olfaction is the product of our neuroanatomy. According to his speculation, the condition stems from the dimension of the brain. A large brain grants great freedom and massive intellectual power but, being it a dry organ, necessarily hampers human sense of smell which, in Aquinas' vision, requires dryness.[7] To sum up, in Aquinas a high cognitive capacity is linked, albeit indirectly, with an impoverished smell which is consequently regarded as unimportant to knowledge.

Kant presents a more explicit dismissal of human olfaction. In his *Anthropology from a Pragmatic Point of View*, he defines smell as «the most ungrateful and […] the most dispensable of our senses» (Kant 2007a: 270). According to Kant, the sense of smell is «more subjective than objective» (Kant 2007a: 268) because, in order to provide us with sensation, the chemical elements need to penetrate in us. For this reason, smell is not able to lead us «through reflection to cognition of the object as a thing outside ourselves» (Kant 2007a: 268).

The hierarchy of the senses was thus traditionally based on the objective knowledge they were supposed to provide us with. Due to its visceral and subjective nature, smell was relegated to the last place. Contemporary philosophical reflections employed two strategies to counter this argument.

On the one hand, an objectivist account denies the validity of Aquinas' and Kant's arguments and argues that odors can provide us with reliable knowledge about the properties of the objects which inhabit the external reality. A similar position is held by Barry C. Smith (2007). In his view, the aroma of a Chardonnay is a property of the wine. In virtue of that property, the wine is able to induce in us certain psychological experiences. These subjective experiences cannot be equated with the feature of the wine because the latter exists whether we experience the Chardonnay or not. Since these properties are *in* the wine, they extend beyond

[7] Unlike Aquinas' intuition, recent neurophysiological studies attested the necessity of humidity for olfaction to work properly (Pelosi et al. 1990). Odorants, to be detected by the olfactory receptors, need to be absorbed by the thin stratus of mucus which envelops the olfactory epithelium. The presence of mucus is crucial for the perception to the point that, as everyone who had colds or allergies perfectly knows, nasal dryness is an important cause of olfactory impairment.

our experience and so we can also fail in encountering them. If we smell a wine in non-optimal conditions, for instance when we have a mint in our mouth, we will fail to fully appreciate its complex aroma.

On the other hand, a pragmatic account acknowledges that smells do not provide us with accurate information about the external world. However, this is for the better. The olfactory system, so the argument goes, did not evolve to grant us with correct depictions of the physical reality, rather it is in the business of guiding behavior. Andreas Keller (2016) employs an effective metaphor to illustrate this idea. Think about New York City subway map. It was not created to represent the exact physical location of the subway stations but rather to assist people who intend to use the subway system. To produce the most effective tool the creators sacrificed geographical accuracy: the distance between certain stations is exaggerated to make them more visible on the map; Manhattan island is broader to make room for a clear distinction of the different lines; the track lines are cleaner than they actually are to improve the readability of the maps. In the same way, smells do not grant us with an objective picture of our olfactory surroundings, rather they inform us about the properties of the environment which are more relevant to us. As Keller (2016: 109) exemplifies «Whether a given chemical is toxic for the perceiver depends on the perceiver's physiology. A substance that is toxic for a human is not necessarily toxic for a trout and the other way around. The similarity in perception does not reflect the similarity of the chemicals, which would be the same for all perceivers, but the similarity in toxicity, which depends on the perceiver and differs between different species».

These contemporary views are markedly different from each other. In Chapter 3 I will explore the problem of the function and the objects of olfactory perception in more detail. For now, suffice it to say that they are both able to overcome the hindrances posed by the previous thinkers.

Far from the nose, far from the mind

Another consideration which led many authors to dismiss the importance of smell was a unique feature of humankind: the erect posture. Most famously, Sigmud Freud (1989) believed that when we adopted an upright position, odors started to become less relevant for our mental life.

This shift brought about a profound consequence: the enticing sensations elicited by smell became disgusting. As a result, the diminished olfaction led to a withdrawal from our sexuality and was a crucial step in the development of human civilization (Le Guérer 1996).

Although Freud's theory was based on armchair intuition, as Lieberman (2011) highlights nowadays it is commonplace to believe that the development of the erect posture had a significant impact on the downgrading of our smelling abilities, tearing us away from a time when

> the savannah, the forest, the swamp, when they were a network of smells, and we ran along, heads down, never losing contact with the ground, using hands and noses to help us fin the trail. We understood whatever there was to understand through our noses rather than through our eyes: the mammoth, the porcupine, onion, rought, rain are first smells which become distinct from other smells […] everything is first perceived by the nose, everything is within the nose, the world is the nose. […] the odor tells you immediately and certainly what you need to know. There are no words, there is no information more precise than what the nose receives (Calvino 2009: 71-72)

By elevating our face, we opened our sight to the distant horizon and lost contact with the rich panoply of odors that populates the ground. In fact, our receptors can detect only those molecules which are light enough to float up to our nostrils. Our eyes expanded and conquered the center of the face while the snout beat a retreat and started to inhabit a smaller portion of our face by becoming a daintier nose (Lieberman 2011). As a consequence, the number of functional olfactory receptors declined (Gilad et al. 2004) and our sense of smell weakened. One can rightly ask how accurate this anthropological reconstruction actually is.

At first glance, our pets seem to have a far more sophisticated olfactory apparatus than us. Dogs seem to be able to identify more smells and at lower intensities than we do. After all, K9 units, and not humans, are trained by the police to find explosives and narcotics. But even untrained dogs show an impressive familiarity with their smellscapes. When you walk out your dog for his evening stroll it is easy to notice him sticking his quivering snout in the air and then nuzzling it on the ground as soon as he exits the building. After sniffing around the surroundings for a few moments, he picks the scent trail which sets his night ramble in motion.

The odors mark the pace of his wandering: a whiff can make him feel unease and increase the speed of his journey while another waft can capture his attention and detour his path.

While observing dogs navigating their surrounding one sniff at a time, every dog-owner has wondered of how rich and multifaceted the smell-world of her pet might be. Especially if compared to the little impact odors usually have in directing our walks. However, if we spare a minute to reflect on the number of smells we perceive they can reach an impressive quantity. Think of having a walk-in Manhattan, from Central Park to Downtown. During your journey, you will encounter swarms of smells: the intoxicating smell of car exhaust is spaced out here and there by the fragrant aroma of a marijuana joint or the fried smell which saturates from the kitchen of the restaurants. Some odors, like bakery, pizza or urine, are almost omnipresent and tinge the slightly metallic air in different areas of the city. Others are confined to particular spots and contribute to defining their specific signature: while you are approaching the MET staircase the delicate scent of pale lavender in central park laces with the savory aroma of roast sausages which lingers over the food carts in front of the museum; the sweet smell of strawberry candies from Sockerbit welcome you to Christopher Street; the acrid smell of ginkgoes tree create an almost impenetrable barrier around the area of the Brooklyn College.[8] These examples are just a few of the odors we can encounter. But how many odors can we actually smell? And is it possible to compare our olfactory abilities with the ones possessed by other animals?

As stated above, while the human genome devolved an impressive amount of genes to olfaction (Buck & Axel 1991), we are still outnumbered by several species (Gilad et al. 2004). Moreover, in the human genome, 60% of olfactory genes are pseudogenes (Sosinsky, Glusman, & Lancet 2000). However, several studies highlighted that up to 80% of the genes regulating rats' olfactory bulb map can be removed without witnessing any modification in olfactory abilities (Bisulco & Slotnick 2003). One might wonder what is the advantage of having so many receptors if so much of them appear to be inessential for the actual perception of odors. According to Shepherd (2004), the reason lies in the peculiar characteristic of most mammals' nose. When dogs and rats stick their nose on the ground, besides the odorants, they inhale bacteria and other pathogens as well. The snout of many species is equipped with a filtering apparatus that cleans, warms up and humidifies the air. This protective mechanism which decreases the risk of infection might have a negative impact on olfaction since it clears away

[8] Smell characterizes cities so much that it is possible to design maps of urban smellscapes (McLean 2017).

many odorants. The higher number of olfactory receptors might have been a strategy to counterbalance this potential negative effect.

Therefore, the number of genes alone does not seem a reliable indicator of olfactory ability. To investigate the matter further we need to focus on psychological indicators of olfactory abilities. However, this research presents various methodological issues. First, people proved to be unreliable in judging their own olfactory abilities (Philpott et al. 2006) and therefore their subjective impressions need to be validated by more objective measures. To make matters worse, there is substantial variability in the results of the research (van Gemert 2011) which might be due to the different methodologies employed in the studies (Martin 2013: Chap.4). Moreover, most of the papers report only mean performance and not the distribution of the data, a relevant concern for a sensory modality affected by a high degree of individual variability like smell (Keller et al. 2007; Laska & Righ 2010).

Regardless of the difficulties in investigating people's olfactory abilities, I think it is important to present a brief overview of the studies to get a firmer grasp on these apparently elusive phenomena. As regard human smell capability, the estimates present in the literature vary from 10.000 to more than a trillion odors. However, as Avery Gilbert comments, most estimates were simply tossed out by journalists, scientists, and engineers alike, without being ascertained in an actual scientific study (Gilbert 2008: 8-13). The most recent of such estimates, which has established a new gold standard, was carried out by a team at the Rockefeller University, New York. To carry out their study, they created odor mixtures with different shared components (out of a collection of 128) and carried out a psychophysical test to see how much the mixtures have to be different to be distinguished by participants of different ethnicities. According to their study, humans are capable of distinguishing an incredible amount of odors. We can detect more than a trillion odors, a quantity that vastly outnumbers our ability to discriminate colors (up to 7.5 million) and tones (340000) (Bushdid et al. 2014). Moreover, this number is viewed as the «lower limit of the number of olfactory stimuli that humans can discriminate» (Bushdid et al. 2014: 1370).[9] But how do we compare to other mammals?

The scientific comparison of olfactory abilities among species presents yet more methodological pitfalls. Inevitably, given their different somatic and psychological

[9] This research generated a lively debate which regards both the mathematical model used and the philosophical assumption from which these estimates are built (Magnasco et al. 2015; Meister 2015; Keller 2016: Chap. 1).

characteristics, animals of different species require specific adaptations to measure their olfactory abilities. All the more so as using a standardized test, specifically tailored for certain species inevitably underestimate the abilities of others. Moreover, animal studies employ only one or two individuals at a time and therefore their representative value might be questionable (Laska 2017). Notwithstanding these problems, the state of art allows measuring certain differences and commonalities between human and animal olfactory systems.

A first factor to investigate is olfactory sensitivity, which indicates the lowest concentration at which one is able to perceive an odor. Even if it seems that humans can detect an outrageously high number of odorants, we might have a weaker sense of smell than most animals. For instance, we might have a higher detection threshold, meaning that we can detect odors only at higher intensity levels if compared to them. Human studies testified that humans are also able to detect odorants at extremely low concentrations. A case in point is represented by ethyl mercaptan, a sulfur compound that has a pungent and nauseating odor and is added to natural gases, which are normally odorless, as a warning signal. We are able to detect ethyl mercaptan at a concentration as low as 0.2 part per billion (Whisman et al. 1978). To give you a proportion, given two Olympic swimming polls, if I pour three drops of ethyl mercaptan in one of them you should be able to detect by smell alone which pool contains the compound (Yeshurun & Sobel 2010). But as impressive as this might be, how do our abilities weight against those of other species? A recent review which compared the olfactory capability of humans and animals (Laska 2017), showed that humans outperformed most of the primates and even other mammals – like rats, mice, and bats – which are usually regarded as having a keener sense of smell. The only animals which showed a higher sensitivity than humans are dogs, which are able to distinguish the smell of different individuals and follow their scent trail after hours (Harvey & Harvey 2003). Still, it has been showed that humans and dogs possess a comparable sensitivity to odorants that dogs are usually trained to detect, such as methyl benzonate, the dominant odor component of cocaine (Lorenzo et al. 2003).

Humans also show comparable discriminatory abilities, i.e. the ability to selectively respond to different odors presented in succession. Humans, in fact, proved to be able to distinguish the blanket in which their dog slept from one in which another dog slept (Wells & Harper 2000). They are also able to match the odors of the mothers and their children to whom they were not related (Porter 1998) and to distinguish the subtle effects that different wood sticks have on ice-cream (Jiamyangyuen, Delviche, & Harper 2002).

But if our nose is such a sophisticated chemical detector, how come we do not seem aware of its full potency? In fact, we are not usually aware of these smells: people who walk every day through Chinatown become accustomed to its peculiar mélange of odors and rarely pay attention to the five spices cuisine aromas; at best they start to notice the smell of cheese and ham that signal they have crossed to Little Italy. A provisional answer to this problem might regard one of the hypothetical function performed by smell. Our sense of smell seems to be geared to identify changes in the environment, rather than providing us with a detailed picture of the panoply of molecules which constantly surround us (Köster, Møller, & Mojet 2014). For instance, we rarely pay attention to the odors of our home: even if each room smells differently they usually appear odorless to us. However, whenever we go to a friend's house to visit her, we easily notice the olfactory mark of her house (and sometimes of each room). This happens because familiar odors do not cross the threshold of consciousness and we do not become aware of their presence. On the contrary, novel odors, which cause an abrupt change in the background landscape, capture our attention. This would explain why we are rarely fully aware of the smellscape around. The economic value of this explanation is clear: in this way attentional resources are free to be employed by other mental faculties. However, it will inevitably limit the appreciation of our olfactory landscape because we rarely focus on it.

If this view were true, it could imply that regardless of our impressive smelling abilities, odors do not have such a huge impact on our life. In fact, if they impress us only when we become conscious of olfactory novelties in our environment, they have little room to affect our life. Quite the contrary, much research testified that odors have a deep effect even if we are not aware of their presence (Haviland-Jones, Wilson, & Freyberg 2016a). Several studies ascertained that perithreshold odors, (odors presented at a so feeble intensity that they cannot be consciously perceived) influence participants in manifold ways: they impact emotional processing (Lübke & Pause 2015), facial expressions (de Groot et al. 2015); cognitive processes (Holland, Hendriks, & Aarts 2005), and social behavior (Haviland-Jones et al. 2013). This feature is practically implemented by a nursing house in hospital emergency waiting rooms. In order to reduce potential aggressive behaviors and induce calm and friendly states in the visitors, undetectable pleasant odors are sprayed in the environment; a strategy which helps to reduce aggressive behavior towards the personnel or between visitors (Köster, Møller, & Mojet 2014).

Taking into account these studies can be useful to investigate several problems in the philosophy of perception. In the last decades, olfaction attracted the interest of several philosophers who started to ponder on its enigmatic nature. As regards philosophy, the most recent research on the nature of smell has addressed classic problems in the philosophy of mind (the existence and nature of representations, the dimensions that perceptions, the objectivity of perception, the nature of consciousness). Since these problems have been usually investigated by bearing in mind only our visual system, this new trend of research showed how the particular structure of the olfactory systems can help us in raising novel questions and grasping a new understanding of how perceptions work. These fruitful investigations were able to nobilitate the sense of smell as a rightful object of philosophical investigation for classic questions in the philosophy of mind. The main problem which has troubled philosophical reflections regards the olfactory objects. What do we perceive when we smell? And what is the relationship between our perceptions and their physical causes? For instance when we smell a strawberry what do we exactly smell? The strawberry, the cloud of molecules it gives off, the odorants which bind to our receptors emitted by it (Lycan 2000)? Or alternatively, is it better to conceive of odor objects as affective reactions of the organism? As pure subjective hedonic states which inform the organism on the pleasantness or on the edibility of the physical objects encountered (Yeshurun & Sobel 2010)? Or should we discard the notion of olfactory objects altogether (Barwich 2019)? Maybe odor objects are free-floating properties (Batty 2010a) or maybe olfaction is related to measuring the changing of signal ratios of odorants against prior expectations (Barwich 2018)? The problem of the olfactory objects is intimately linked with the functions performed by the sense of smell. What the sense of smell is for? Did our olfactory system evolve to accurately represent certain chemical properties of the physical objects (Smith 2015)? Or did they evolve to guide our behavior and to detect changes in our olfactory environment (Keller 2016)? To delve deeper into these questions, in Chapter 2 I will outline the philosophical approach I will use for my investigation. As for now, I want to focus on one last issue that, given the empirically-informed approach I intend to use in my work, is useful for my analysis: the neural basis of olfaction.

The olfactory brain

The objects around us constantly give off odorants, i.e. chemical molecules which are processed by our olfactory system. Our olfactory system enters in touch with these chemicals via two paths: the orthonasal and retronasal routes.

The orthonasal route is the usual way we think about smell. The odor plumes emitted by the objects turbinate in the air and eventually are inhaled by our nostrils. A tiny part of the air (5-10% ca.) is able to clear itself a path and reach the olfactory epithelium (Rawson 2000), a structure situated at the top of the nasal vault. The epithelium is a neural structure that contains the endings of the olfactory sensory neurons, the only part of the nervous system directly in contact with the external world. The receptors contain the biological pillars of our remarkable ability: a family of protein receptors that are located in the membrane of the primary sensory neurons and are able to detect the molecular structure of the odorants (Mori 2006).

The retronasal route involves the mouth (Salles & Benjamin 2017). When we insert food or beverages in our palate they give off odorants that pass through the oral cavity and reach the olfactory epithelium from behind. This path can be counterintuitive but to picture it more vividly just remember the last time when you laughed while drinking and blew some liquid out of your nostrils: in that case, the liquid followed the retronasal route.

When the chemicals which float to the epithelium bind with the olfactory receptors, they trigger a cascade of biochemical events which eventually lead to the experience of smell (Firestein 2001). Each olfactory neuron is characterized by only one type of the thousands of different olfactory receptors we are able to express. Thus, each neuron binds only to specific odorants, even though the same odorant can bind with several kinds of receptors (Zhao et al. 1998). So, each odorant binds with different receptors in different degrees, thus causing a unique pattern of activation which is transmitted to the olfactory bulb. It seems that the olfactory system uses a combinatorial code which allows it to recognize thousands of different molecules by using for a relatively small number of receptors (Malnic et al. 1999). After having bound with the odorants, the receptors send a pattern of neural activity to the bulb.

The bulbs are the first stage where olfactory information is processed. It should not surprise that their volume is a good predictor of olfactory ability (Seubert et al. 2013). Interestingly, the same type of olfactory receptors (those who share the same receptor gene) projects in the same glomeruli, spherical structures located in bulbs which are the initial sites of neural processing. Therefore, the activity pattern elaborated by the receptor is neatly conveyed

to the bulbs which express a well-organized activation (Mombaerts et al. 1996). For instance, the neural activity triggered by the molecule isomayl acetate (banana-like odor) will be different from the one caused by the molecule of furaneol (strawberry-like odor). The bulb activity is regulated by a series of top-down connections. Several cortical areas cognitively and emotionally modulate the processing of the incoming percepts (Gottfried 2006). In fact, while the bulb was historically regarded as relay stations, recent studies highlighted that they are involved in the initial cognitive (Weiss & Sobel 2012) and emotional processing (Kobayakawa et al. 2007) of the stimuli.

The bulb fires to several cortical regions which collectively contribute to the elaboration of the odors (Patin & Pause 2015). There are two cortical areas involved in the elaboration of smells: the primary olfactory cortex, directly linked to the olfactory bulb, and the secondary olfactory cortex, connected to the primary olfactory cortex. A peculiar feature of the olfactory system regards precisely the route from the bulb to the cortical areas. In fact, the olfactory system is the only system which transmits directly to the cortical areas, without relaying it to the thalamus, the most important sensory and motor relay station in the brain (Stockhorst & Pietrowsky 2004).[10] The absence of thalamic relay might serve two functions. On the one hand, it might be useful to maintain the fidelity of the percepts to compensate for potential changes in background noise, the concentration of the stimuli, and respiratory patterns (Mohanty & Gottfried 2013). On the other hand, it might allow for a quick affective elaboration of the stimuli thus allowing the organism to react more promptly to salient ones. This second function is related to another unique neuroanatomical feature of the olfactory system. Compared to vision and audition, the processing of olfactory stimuli directly involves limbic areas responsible for emotional processing since the beginning (Gottfried 2006).

The largest structure of the primary olfactory cortex is a pear-shaped area called the piriform cortex (Gottfried 2010). A recent meta-analysis ascertained that it is the main area involved in processing olfactory stimuli (Seubert et al. 2010). In virtue of its dense connections with the olfactory bulb, it has been historically thought as the area where the different olfactory signals are combined to give rise to the formation of the olfactory object, which is the odor we consciously smell. Therefore, it was expected to express a similar topographic organization to

[10] Thalamic routes related with olfactory processing have been discovered lately (Sela et al. 2009; Plailly et al. 2008; Courtiol & Wilson 2014, 2015). However, it seems that these routes are not in the business of conveying information to the cortex from sub-cortical areas, but rather are involved in the complex orchestration realized more generally by thalamocortical processing, a function which has been recently highlighted by novel research (Sherman & Guillery 2013).

the visual cortex (Patel et al. 2014). On the contrary, the pattern of neural activity individuated in the piriform cortex is much more erratic than the neat one located in the olfactory bulbs (Stettler & Axel 2009). Thus, it is likely that the formation of olfactory objects is distributed among a wider neural network area (Gottfried 2010).

The piriform cortex processes odor valence (Gottfried et al. 2002), reward value (Gottfried & Dolan 2003), and mediates learning (Li et al. 2008). In the piriform cortex, the perceptual quality of the odors appears to be modulated by attention (Zelano et al. 2005), memory (Plailly et al. 2005), and expectation (Zelano, Mohanty, & Gottfried 2011). Therefore, more than a simple primary sensory area, the piriform cortex can be considered as an associative cortex which elaborates the olfactory stimuli in virtue of behavioral, contextual, and cognitive information (Freiherr 2017).

Another area directly connected with the olfactory bulbs is the amygdala, a key area for the elaboration of emotionally charged stimuli (Whalen & Phelps 2009). It has been shown that olfaction and gustation were the sensory modalities that activated the amygdala the most (Costafreda et al. 2008) and olfaction is the only sensory modality characterized by direct bidirectional connections between the primary sensory cortex and the amygdala (Gottfried 2006). This means that the amygdala continuously modulates the processing of odor salience (Winston et al. 2005).

The primary cortex projects to several areas (Carmichael, Clugnet, & Price 1994), among which a special role is played by those included in the so-called secondary olfactory cortex. This neural network contributes to processing olfactory stimuli and subsequently modulates behavior, affective and autonomic states, and memory.

An important role is played by the insular cortex which is crucial for the integration of inputs coming from viscera, sensory modalities, and cognitive processes, thus creating a unitary feeling which represents the "emotional now" of the organism (Craig 2009). Thus the insula appears to be a central hub in the modulation of interoceptive processing in light of olfactory stimuli.

The neocortical area mostly involved in olfactory processing is the orbitofrontal cortex. It is an associative area involved in learning and motivation which is bidirectionally connected

with several areas of the primary olfactory cortex (Gottfried, Small, & Zald 2006). As regards the processing of olfactory stimuli, it works as an associative region which contributes to the neural representation of odor identity, familiarity, valence and predicting reward value (Royet et al. 2001; Gottfried & Dolan 2004) in light of cognitive and contextual information (Gottfried & Dolan 2003). It has a crucial role in modulating olfactory processing thus giving rise to the final conscious percept. For these reasons, its thickness is a good predictor of olfactory discriminatory ability (Seubert et al. 2013).

This short presentation of the neural architecture of the olfactory system is useful to highlight certain characteristics that are important for my analysis. First of all, the olfactory object is not produced by pure bottom-up processing, rather it involves the orchestration of several neural areas. This complex activity renders the olfactory percepts a thick unit of information. It appears that olfactory objects are not a simple reflection of external odorants. Rather, they are structurally constituted by the cognitive and emotional expectations of the organism, influenced by it is internal state, and modulated on the basis of contextual clues. Therefore, an adequate investigation of smell has to take into account the structure of the organism which perceives the odor, its bodily state, its expectations and the context in which it is situated. Second, since odor processing bypasses the thalamic relay, smells can have a deep influence on our life without being processed consciously. Olfaction, therefore, can be a fertile ground to investigate the differences and similarities of conscious and unconscious perceptions. Third, olfactory processing is intrinsically emotional. Smells are entangled in affective processing in every step: from the initial elaboration performed by the bulbs to the top-down modulations carried out by the amygdala and the orbitofrontal cortex. As a consequence, they can be a powerful tool to examine the relationship between perception and emotion. I will delve into these issues in the subsequent chapters.

Before moving on, however, I want to highlight a problem that is affecting current studies on the relationship between emotion and olfaction. This field of research has been growing in recent years. However, as Delplanque, Coppin, & Sander (2017) underscores, most of the research carried so far was confined to the evaluation of the hedonic valence of the stimuli. In fact, the vast majority of the scientific research investigated the pleasantness of odors (Yeshurun & Sobel 2010), how pleasantness is affected by odor intensity (Mohanty & Gottfried 2013), and the state of arousal elicited at different intensities (Bensafi et al., 2002a). Nevertheless, equally pleasant or unpleasant odors can elicit affective states that are qualitatively

different. Both the sweet smell of blueberry muffin and the warm smell of sandalwood can be regarded as pleasant but one is linked to a dimension of edibility and the other to relaxation. In a similar way, the odors of burnt plastic and spoiled food are both unpleasant but the former is linked to an experience of fear or anxiety, the latter to an experience of disgust.

The complex affective experience linked to odors is well-known by perfumers since equally pleasant manufactured perfumes express different levels of sensuality (Porcherot et al. 2010). A study that investigated more thoroughly the complex affective states related to smell was carried out by Rétivau, Chambers, and Milliken (2005). In their study they asked a group of women to describe the alteration in mood induced by fragrances that received similar hedonic ratings. They found out that when participants were allowed to describe in more detail the way in which a fragrance affected their mood, they were able to provide more elaborated, albeit consistent, descriptions. So for instance, "floral chypres citrus" was linked to a decrease in anger and confusion whereas the "woody citrus coniferous" increase their hostility and tension. Hence, not only similar fragrances (in this case they were both citrus based) induce different moods, but also the moods are granted with different valence. Therefore, I believe that a philosophical examination of olfaction should take into account the various affective states related to odors. To do so, I intend employ a philosophical model that, in virtue of its dynamical approach to the different ways in which organisms engage with their environment, may be able to investigate the manifold ways in which smells influence our life. A crucial advantage of the research carried out so far on the pleasantness of the stimuli is the fact that they have been able to link the pleasantness of the odorants to their molecular structures. Thanks to this research it is possible to build electric noses able to categorize odorants on the basis of their pleasantness (Haddad et al. 2010a). However, molecular structure is not the only determinant of pleasantness. For instance, the same odor can be granted with a different hedonic value if it is presented as coming from two different sources: patchouli switches its hedonic rating if it is presented as "incense" or "musty basement" (Herz & von Clef 2001). Moreover, the same odor can become unpleasant if our psychophysical state changes: even the smell of chocolate can become nauseating if one eats too much chocolate (Small et al. 2001). To adequately understand these phenomena, I think it is useful to move beyond the idea of pleasantness as a mere causal effect of the structure of odorants and to scrutinize more

carefully the dynamic relationships between an organism and its environment.[11] In this way, I will able to address several open questions linked to the relationship between odors and emotion: given their structural affective dimension is it possible to conceive of smells as affective states as some authors suggest? Can odor be distinguished on the basis of the affective states they instantiate? If an odorant elicits two different affective states in two different persons are these people experiencing a different smell?

Conclusions

Smell has been overlooked by philosophers and cognitive scientists alike. So much that it is called the Cinderella of the senses. Smell is generally viewed as a vestigial sense with little importance for human beings: at best it grants us with fleeting sensations that are difficult to capture in language and to use as a reliable source of knowledge.

However, recent investigations on olfaction shed new light on this enigmatic sense. Biological research showed that a vast portion of the human genome is dedicated to olfaction. In its turn, psychophysical research testified that human olfactory abilities are vastly underestimated. On the one hand, we can detect an incredible amount of odors that outnumbers the number of sounds and colors we can identify. On the other hand, our olfactory sensitivity and discriminatory abilities are comparable to most species of mammals. Unsurprisingly, our olfactory abilities get better with usage: both odors experts in the West and native people of tribes settled in the rainforests show impressive olfactory abilities which are reflected in their olfactory lexicon. Smell appears particularly important for our affective and pragmatic relationship with the environment: for instance, it plays a crucial role in the appreciation of food and in social relationships.

The peculiar functioning of smell is mirrored by its neural architecture. The neural processing of olfactory stimuli is a collective enterprise that involves top-down projections from cognitive and affective brain areas. As a result, olfactory percepts do not merely reflect the properties of the external odorants. Rather, they are deeply influenced by the current internal states of the organism, and the context it is embedded in. Consequently, olfaction can be a perfect candidate to examine open questions on the nature of perception and affectivity. Before moving on with my investigation in the next chapter I will outline the theoretical model that will guide my endeavor.

[11] A new psychological line of research, heavily influence by Scherer's component theory to emotion (Scherer 1984), started to address this problem by developing a more fine-grained approach to empirically investigate the affective dimension of olfactory perceptions (Delplanque, Coppin, & Sander 2017).

Chapter 2 - An enactive understanding of the mind: between primordial affectivity and pragmatism

Introduction

The philosophy of mind and cognitive sciences have been dominated by a brain-centered understanding of the mind. According to this view, the mind is a computational entity that elaborates the inputs coming from sensory modalities to produce an accurate and objective representation of the external reality; this, in return, allows the organism to generate effective motor outputs. The mind is regarded as a computer software whose main function is the elaboration of amodal symbols on the basis of formal rules. The essential hardware for this software is the brain and, thus, mental activity coincides with brain activity, which is viewed as the necessary and sufficient element for the existence of the mind. The role of the body and the relationship between the agent and the external environment are regarded as inessential. So much so that many philosophers view the possibility of the "brain in a vat" as a legitimate metaphysical scenario, a scenario that could actually come into existence.

Despite the high popularity and the fruitful theoretical gains yielded by this paradigm, in the last decades several scholars have started to cast doubts on this understanding. Against the skull-bounded conception of the mind, they campaign for a more prominent role of the body and the environment. The mind should be conceived as rooted in a body with intimate and dynamical connections with its surroundings. The intimate coupling between the brain, body, and world leads to a rejection of the mind as a representational entity that processes amodal symbols. Rather, the mind is viewed as a cluster of processes grounded in sensorimotor contingencies and neurophysiological patterns of activity that orient the behavior of the agent.

I will begin this chapter by presenting the main tenets of enactivism and the main difference between this approach and classic cognitivism. I will then explore the theoretical principles of the enactive approach that will be crucial for my thesis: autopoiesis, the sense-making system, the notion of primordial affectivity, the sensorimotor principle, the concept of affordance, and the embodied predictions.

Enactivism in a nutshell

Enactivism was set in motion by the landmark book *The Embodied Mind* by Francisco Varela, Evan Thompson, and Eleanor Rosch (1991). This book was the result of several threads of thought coming from different traditions: cognitive science, pragmatism, phenomenology, evolutionary biology to name but a few. The enactive approach is thus a complex fabric whose fibers have been woven in different directions, which partially overlap in their theoretical assumptions, but are not fully consistent with each other.[12]

Varela, Thompson, and Rosch (1991) impinge on a pragmatic and phenomenological understanding of the mind, conceived as a dynamic system enacted, i.e. brought forth, by an embodied organism in interaction with the environment. This preliminary aspect points to three central elements for enactivism: mind, body, and the world. The mind has to be understood as a biological structure that evolved to coordinate how the organism relates to its surroundings through online interactions. Mental processes essentially depend on the organism's ability and disposition to act. Consequently, abstract cognitive processes based on symbol-manipulation are regarded as relatively recent innovations and, thus, should not be taken as paradigmatic examples to reflect on the nature of the mind.

Enactivism conceives of the mind as embodied, embedded and, sometimes, extended. The embodied mind thesis refers to the idea that mental processes are (partially) constituted by bodily processes. The embedded mind thesis refers to the idea that mental processes are (partially) dependent on extrabodily processes located in the environment. The extended mind thesis stresses that in certain occasions the coupling between mind and the world is so structural that the mind is conceived as extending beyond the boundaries of the body (Clark & Chalmers 1998). In these cases, environmental elements are part and parcel of our cognitive (Menary 2010) and affective processes (Colombetti & Roberts 2015). Therefore, mental processes can be adequately understood only by taking into account extracranial processes that can involve the body as well as the environmental surroundings.

[12] An extensive analysis of the difference between these strands is beyond the scope of this work. Since my presentation is aimed at developing a useful theoretical model to guide my analysis, it has no claim of completeness. I will limit my analysis to a review of the aspects that will be more relevant for my discussion. For an in-depth review of the enactive approach and its criticism, I refer to several papers which present an up-to-date state of the art (Wilson 2015; Goldinger et al. 2016; Ward, Silverman, & Villalobos 2017; Newen, Gallagher, & De Bruin 2018).

The emphasis on the embodied and embedded nature of the agent leads to dismissing the idea that sensory and motor systems are peripheral suppliers and executers of the cognitive processes. Conversely, they are the very root from which cognition stems. What is more, enactivism envisions the body as a self-regulatory unit structurally constituted by metabolical and homeostatic processes carried out by the endocrine, immune, and circulatory systems among others. All these systems interact with each other and affect mental processes and thus have to be taken into account when reflecting on how the mind works.

In order to gain a better understanding of the main tenets of the enactive approach, I will now present a review of its relationships with the philosophical and scientific framework that characterizes cognitivism.

Enactivism vs. cognitivism

Enactivism emerged as an alternative to the understanding of the mind heralded by classic cognitivism. In the cognitivist framework, the human mind is understood in analogy with computers and humans are viewed as entities that compute information (Miller 2003). Computers receive inputs from the environment and, through complex internal processes (enabled by optimized algorithms) are able to solve specific tasks with impressive efficacy, sometimes outperforming humans. Humans are also able puzzle-solvers which possess a wide array of interconnected mental states that can be understood on the basis of formal internal rules. Therefore, human minds and computers are thought to share two basic abilities: they process information on the basis of internal rules and they use symbols in their calculations.

This metaphor emerged in the 1940s when the first computers were built and Artifical Intelligence was created. In the wake of this technological advancement, a new paradigm was developed: the Human Information Processing (HIP) (Lindasy & Norman 1977). The main tenet of this approach is that the mind can be conceived as an information processing system: an incredibly powerful computing machine. The mind receives inputs of information and operates on them by encoding, decoding, retrieving, and storing them. This complex elaboration of information allows us to accurately represent the world, form beliefs and memories, and instruct our motor system on which actions it should perform.

The information processing metaphor quickly became the dominant narrative to understand the core of human nature (Newell & Simon 1972; Fodor 1981) and conquered both academia and popular culture. Cognitivist scientists started to focus their attention on highly abstract cognitive tasks like linguistic processes, chess games, and the Tower of Hanoi puzzle. Linguistic and symbolic problem-solving abilities became the epitomes of mental activity and the study of the mind focused on the analysis of mental manipulation of symbolic representations. This metaphor was crucial for the advancement of cognitive sciences and propelled the most important discoveries on the nature of the brain and the mind carried out in the last decades.

These astonishing achievements were marked by a reductionist approach. Classic cognitivism, in fact, is based on a skull-bound understanding of the mind. If the mind is a software, its hardware is identified in the brain. The brain is thus the sole activator of the mental software that runs our mental world: the whole leverage of mental action is ascribed to neural functioning. The body is viewed as nothing more than a vessel whose sole duties are keeping the brain alive and providing it with new sensory information to keep its computation going. Many philosophers even suggested that it might be possible to get rid of the body entirely and still maintain a perfectly functioning mind (e.g. Dennett 1981). This happens because cognitivism usually entails a functionalist view of the mind according to which, since the mind is a software, it could function equally well in any hardware able to realize a similar functional role as the one performed by the brain (Block 1995). This popular idea returns in sci-fi novels and movies that depict technologies able to download human minds in computers that generate a simulation indistinguishable from the real world. Along the same lines, the external environment is viewed as an amorphous source of data which acquires meaning only when processed by the brain.

Albeit this conception of the mind is still the main game in town, criticism and alternatives sprouted (Haugeland 1981). The idea that mental life is confined in the human skull was deemed insufficient to explain several cognitive processes. An adequate understanding of phenomena like spatial navigation, inattentional blindness, and emotion perception appears to require the inclusion of the body and of certain environmental features. Some of these examples are particularly striking. In fact, while cognitivist theories are able to give reason to mental abilities that involve complex manipulation of symbols, they struggle to explain how simple motor tasks are performed. A good example regards throwing tasks. Experiments show

that unskilled throwers are unable to determine the best balls for throwing tasks by estimating through observation and hefting. However, when they are allowed to practice throwing different balls, they become reasonably good at identifying the best balls for a given throwing task (Zhu & Bingham 2010). For classic representational theories, it is difficult to explain this kind of scenario. In fact, in the first scenario people had sufficient abstract information to create an accurate mental representation of the ball to perform the task. However, they could succeed only when given the chance to perform trials. Cases like this hint that our mental processes did not evolve to accurately depict physical properties of the objects but relational properties which allow us to interact effectively with the environment: we do not perceive size and weight of objects but their throwability. And to adequately perceive throwability we need to interact with the objects (Zhu & Bingham 2011).

As several breakthrough theories emerged, evidence on the embodiment of the mind started to accumulate and proved that the cognitive role of the body is manifold. First of all, cognitive processes are distributed on the body. It has been shown that bodily gestures help and improve problem-solving abilities (Alibali, Boncoddo, & Hostetter 2014). For instance, when we solve math problem motor areas linked to the movement of the hands are activated as gesturing facilitates mathematical reasoning (Andres, Seron, & Oliver 2007). Bodily activity grounds language processing as well. When one reads verbs linked to specific motor activities like licking, kicking or picking, motor brain areas related to the movement of the tongue, the foot, and the hand are, respectively, activated (Pulvermüller 2005). In the same way, object concepts are crucially dependent on the motor actions related to their use (Beauchamp & Martin 2007) and motor and premotor neural systems switch on when we mentally simulate possible actions (Jeannerod 2001). The body constrains cognitive capacities as well. In fact, our mental activities are deeply influenced by the kind of physical body we have. A clear example regards distance estimation. Research ascertained that people with longer arms perceive objects as being closer to them than people with shorter ones (Proffitt & Linkenauger 2013).

Importantly, new evidence suggests that our minds and our behavior are literally regulated by visceral processes. A major route of interconnection between the body and the brain is the gut-brain axis (Cryan & Dinan 2012). We are usually oblivious of the staggering number of bacteria which cohabit within us: the human intestinal microbiota contains at least 100 times the genes of our genome (Gill et al. 2006). Most of these microbes are harmless or even helpful: they take a slice of the food we ingest and, in turn, help digestion. They also

contribute to the production and regulation of neurotransmitters and hormones which are sent to the brain via the enteric nervous system, the so-called "second brain" (Bauer, Huus, & Finlay 2016). As a consequence, bacteria populations are correlated with different mental profiles. An interesting experiment was carried out with two different mice strains characterized by a distinctive temperament. One population was placid and less inclined to social behavior; the other was more gregarious and excitable. Researchers decided to colonize the guts of the two strains with bacteria coming from the other group. This induced a personality switch. The calm mice became more social and increased exploratory behavior while the excited ones quieted down and reduced their social interactions (Bercik et al 2011). This research is still in its infancy, and more studies are needed to confirm the relevance of these findings not to mention their possible extension to humans. Nevertheless, it suggests that the body has a greater influence on mental functioning than previously thought. Moreover, this investigation can have important practical implications. For example, people who suffer from depression and autism spectrum disorder show similar gut microbes. These studies might lead to the development of microbe-based therapies aimed at influencing the patients' personalities by altering their microbiota (Gilbert et al. 2013). Guts are not the only viscera able to influence mental activity. Variation in heartbeat influences the evaluation of fearful and neutral faces (Garfinkel et al. 2014). In a similar way, patterns of respiratory processes impact perceptual tracking (Rassler 2000) and emotion perception (Zelano et al. 2016).

Some of the evidence was so strong that even cognitivist scholars recognized the necessity to take into account, albeit partially, the role of the body in analyzing mental activity (Goldman 2014). However, they still deny that the body directly contributes to mental processes. They explain these phenomena by relying on body-formatted representations in the brain: neural representation of bodily states associated with various physiological states. Enactive scholars view these solutions as a clumsy move to patch cognitivism up while maintaining an internalist position (Gallagher 2018). They think that this evidence calls for a new way of understanding and investigating mental phenomena which places the body and the environment in the spotlight. As Gallagher explains,

> brains evolve to function the way they do because they evolve with the body they are part of, and in environments that are coupled in specific ways to those bodies […] changes or adjustment to neural processing will accompany any changes in these other wordly factors, not because the brain represents such changes and respond to them in central command mode, but because the brain is part of the larger embodied system that is coping with changing environment. Just as the hand adjusts to the shape of the object to be grasped, so the brain adjusts to the

> circumstance of organism-environment. And just as it is not clear that we gain anything by saying that the shape of the grasp represents the object to be grasped, it's not clear that we gain anything in saying that brain activation represents the world (Gallagher 2017a: 20-21).

As Gallagher's quote highlights, enactivism also entails that mental life is situated or embedded. In fact, online cognitive and emotional processes take place in a real context which inevitably influences them (Clark 1997; Griffiths & Scarantino 2009). For instance, cognitive processes rely on actions that manipulate the external environment to aid problem-solving tasks, so-called epistemic actions (Kirsh & Maglio 1994). A good example involves Tetris, a tile-matching videogame. In the videogame pieces of different geometric forms (composed of different square blocks) fall from the top of the screen one at a time. The player has to arrange the pieces horizontally. When she is able to create a full horizontal line the pieces disappear and the line of blocks above them descends to the bottom. The pieces fall indefinitely and the game ends when the blocks cover the whole screen. During their falling, the player can move the pieces laterally and rotate them until they reach the bottom of the screen. In this way, she can manipulate the pieces to adapt them to the configuration of blocks that lies on the ground. In a landmark study, it has been shown that players do not mentally manipulate the tiles and then use the controller solely to adjust the final position of the tiles. Rather, they keep moving the tiles to aid their reasoning. Most of the actions they perform are pragmatically useless because they are not finalized at placing the falling piece in the right position. However, they are epistemically valuable because they help the players' cognitive processes. It is in virtue of these "epistemic actions" that players are able to elaborate an effective strategy to improve their performance. In a Tetris game the offloading of mental reasoning is realized for a purpose that is inherent in the blocks themselves. The goal of the player is to intersect the blocks in the right way and the blocks do not have a symbolic relationship with something else. Still, we can also employ the environment to perform epistemic actions that are symbolic in nature. This happens when we write notes on a paper to solve a mathematical problem.

Similarly, emotions and moods are embedded in the environment (Colombetti 2017; Colombetti & Krueger 2015). For instance, we employ music as a tool to induce and regulate affective states (Krueger 2019). When feeling melancholic we can play a slow downbeat piece that attunes to our mood whereas when we are working out we might rely on a metal or hip-hop playlist to energize ourselves and grant us an additional energy kick that boosts our performance. Furthermore, humans seem able to skillfully manipulate the environment by

engineering "affective niches" in order to reliably promote, uphold, and sustain specific emotions and moods in a certain situation. To continue with the example of music, it has been shown music can also be used in religious ritual practices to funnel a sense of belonging and communion and create a solemn atmosphere that induces states of devotion and inner contemplation in the believers.

According to the enactive account, classic cognitivism replaced the dualism of body and soul with a body/brain dualism. To avoid this dualistic thinking we need to regard brains as parts of the dynamical attunement of living systems to their environment, not as the sole explanatory unit of mental life. We should conceive of mental activities as biological processes that evolved through natural selection. From this standpoint, mental activity was primarily a form of online interaction that helped organisms to engage with their external surroundings.

Dynamic autopoiesis

Enactivism conceives of every organism as a complex system characterized by internal processes that depend on each other. Their intimate interdependencies allow the system to be a unit, no matter the situation in which it finds itself. A living being is thus an autonomous entity, it «is self-individuating: it generates and maintains itself through constant structural and functional change» (Di Paolo & Thompson 2014: 68). The autonomy of living systems lies in a peculiar characteristic: autopoiesis (Varela 1979). A living system is literally self-productive as it constantly generates the conditions for its own survival. In other words, it is a self-organized system. Self-organization is «the spontaneous formation of patterns and pattern change in systems that are open to exchanges of information with the environment and whose elements adapt to the very patterns of behavior they create» (Engel et al. 2010: 268).

This does not mean that living systems are completely independent of and isolated from the external environment. On the contrary, since they need to continuously exchange matter and energy, they are thermodynamically open. However, they are operationally closed, that is, the systems that maintain and regulate their activity are internal to the organisms themselves. The organism's engagement with the environment is regulated by a domain of possible interactions that depend on the living system's structure.

Since organisms are dynamical complex systems that result from the interactions of various interconnected processes, enactivism explains them by relying on dynamical system theory. Dynamical system theory assesses that the activity of a system emerges from a network of interacting units.[13] Importantly, organisms are not stable, they are entities on the verge of collapse. If the internal dynamics of the system goes awry and the system is not able to establish an effective relationship with the environment to counterbalance it, it will cease to exist. Thus, living beings are precarious entities in the never-ending business of keeping themselves alive by monitoring and regulating their internal processes and interacting effectively with the external environment on the basis of their internal condition. As a result, even the more primordial forms of life exhibit a normative behavior as they seek conditions that maintain their homeostasis.

A famous example to elucidate this point is the analysis of a bacterium swimming in a sucrose gradient (Varela 1997; Di Paolo 2005). The bacterium is separated from its surroundings by a permeable membrane. This border, while distinguishing the bacterium from its surroundings, allows several processes to be brought forth which maintain the bacterium alive (absorption of nutrients, elimination of wastes, recollection of chemical information, etc.). The bacterium is regarded by Varela as an autopoietic entity: a system able to maintain its own life in virtue of the organization of its internal processes through a dynamical interaction with the environment. The behavior of living beings is thus context-sensitive and flexible.

In complex organisms, autopoiesis involves several interlaced systems. For instance, the human body is comprised of several systems which interact with each other such as the neural, the muscle-skeletal, the immune, and the endocrine system. The functioning of these systems is not rigidly hierarchical, wherein one system (i.e. the neural one) is regarded as the governor of the whole organism. Rather, the systems are intertangled and continuously influence each other and through this interaction the complex behavior of the organism emerges. The different parts «are coordinated without an executive agent or programme that produces the organized

[13] Dynamical System Theory is a mathematical theory which describes how systems change over time. Over time a system undergoes through different states following a trajectory. Its behavior can be fleshed out on the basis of differential equations which describe how the system changes through the state space, i.e. the locus of the possible states a system can undergo. The points that the system visits more frequently in the state space are called "attractors" whereas those that the system avoids are called "repellors". Taken together, they constitute the topology of the state space. A system is self-organized, that is, it is able to maintain structure and to behave in an ordinate way in virtue of the interaction of its constitutive elements. Thanks to this model, it is possible to describe the evolution of a system without referring to discrete states but rather by analyzing its dynamical activity. This theory has been successfully applied to explain a wide variety of cognitive processes thus giving birth to Dynamical cognitive science (Wheeler 2005) which has been applied to investigate emotional phenomena (Colombetti 2014, chap. 3).

pattern. Rather, coherence is generated solely in the relationships between the organic components and the constraints and opportunities of the environment. This self-organization means that no single element has causal priority» (Smith & Thelen 2003: 343–344).

A crucial tenet of enactivism is that autopoiesis generates, at the same time, a difference between the living system and the external environment, and a domain of possible interactions with the external world. Crucially, this domain of possible interactions is rooted in the organism's structure and needs. As a result, external physical events are not regarded as neutral. Conversely, they impact the organism's life in a particular way and they offer the organism different possibilities for acting. This production of a world granted with meaning is regarded by enactivism as the hallmark of cognition.

The sense-making system: the hallmark of cognition and emotion

According to the enactive approach, every living being experiences the environment in virtue of its embodiment and related needs, aims, skills, and constraints. Consequently, the organism possesses a perspective on the world which confers meaning to it. Enactivism phrases this by saying that every form of life is granted with a sense-making system. Therefore, even the simplest organism does not merely react to environmental stimuli. Rather, it brings forth a meaningful world.

A good example to show this relation is bacteria chemotaxis. Chemotaxis is a form of interaction showed by several small organisms that navigate in chemical substances. For instance, if you place a bacterium in a heterogeneous sucrose solution it will tumble through the gradient. It might be said that the bacterium are merely reacting to different stimuli. However, the bacterium exhibits specific responses that are appropriate given its internal conditions and the changes in the situation it is embedded in (Egbert, Barandiaran, & Di Paolo 2010). As Thompson highlights, «although sucrose is a real and present condition of the physicochemical environment, its status as food is not. That sucrose is a nutrient is not intrinsic to the status of the sucrose molecule; it is, rather a relational feature, linked to the bacterium's metabolism. Sucrose has significance or value as food, but only in the milieu that the organism itself brings into existence» (Thompson 2007: 158). Therefore, the relationship between the bacterium and the gradient confers a specific meaning to the gradient itself that, from the bacterium's standpoint, becomes a nutrient. The enactive view regards this form of interaction as the

hallmark of cognition. In fact, «even the simplest organisms regulate their interactions with the world in such a way that they transform the world into a place of salience, meaning and value» (Thompson & Stapleton 2009: 25). Cognition is thus a form of practice, a performance that allows the organism to bring forth structure by acting. It is a process aimed at directing and regulating behavior. The sense-making system grants the bacterium with the ability to establish a field of relevance which allows the system to navigate effectively within the world so as to maintain and propel its existence.

However, as Di Paolo (2005) highlights, bacteria do not simply strive for their survival. They also display preferences towards the various degrees of sucrose gradient they relate to. If surviving was the only drive of the organism, the sense-making system would simply divide the world by using the dichotomic features of good for survival and bad for life. In such a dichotomous system bacteria would tumble only when their survival is stake. Quite the contrary, studies on bacteria chemotaxis show that bacteria like *E. coli* move through different nutritional gradients to find those that suit best their current condition (Koshland 1980). Bacteria do not simply react in the same fashion towards external stimuli since their behavior is structurally dependent on their homeostatic status (Alexandre & Zhulin 2001). As the concentration of sugar varies, a bacterium evaluates it in relation to its current internal state and, thus, generates a degree of preference. External events are not evaluated as merely "good" or "bad" but they are placed on a graded scale based on how they improve or deteriorate the living system status. Bacteria seem to possess an internal normativity through which they evaluate their surroundings and guide their behavior. This dynamic negotiation is called by Di Paolo *adaptivity*. We should expect that the more complex the system, the more diverse its preferences will be.

To sum up, living systems do not merely react to environmental contingencies. They possess a perspective through which the world is evaluated and normative directives that govern their relationships with the environment. The external conditions are regarded as better or worse in relation to the maintenance of the system. The meaning of the world is thus generated by the organism to foster its survival and well-being. Since each living system produces meaning, each living system can be viewed as cognitive (Thompson 2007, chap. 6). Accurate higher-order representations can be a form of cognition but they are later developments that impinge on the basic sense-making system. As Di Paolo and Thompson assess, «basic cognition is more a matter of adaptive self-regulation in precarious condition than

abstract problem solving» (Di Paolo & Thompson 2014: 73). What primordial forms of life need is to effectively interact with the external events in an online fashion, to attune to the ever-going changes in the external circumstances and their internal demands. This interaction is regarded as a cognitive process because the organism is able to establish an adequate process to achieve goals. The crucial tenet is that the ability to make sense of the world depends on our active engagement with it. Living beings actively engage with the world not only because they are able to perform actions but also because they care for their existence and they are touched by external events. As Colombetti (2014) highlights, this ability to be sensitive to external contingencies entails a crucial theoretical consequence: the sense-making system is not solely the hallmark of cognitive process but also of affective ones.

Primordial affectivity

As explained above, a crucial feature of living beings is that they strive to survive. This entails that they are concerned with their own existence. In other words, they are affective beings. Affectivity can thus be conceived as the ability of each organism to be sensitive to something, as a basic lack of indifference. To reformulate Haugeland's saying (Haugeland 1998): affectivity is the ability to give a damn.

The most extensive theory on enactive affectivity is proposed by Giovanna Colombetti (2014). According to her, affectivity points to the general ability of living beings to be sensitive to and touched by what matters to them. Affectivity is a basic capacity shared by all living beings, it is an unavoidable characteristic of biological life. Moreover, since affectivity is present in primordial living beings that lack consciousness, it can (and often does) occur unconsciously.

This theory has a critical consequence in the conception of cognitive processes. In fact, Colombetti maintains that all mental faculties, cognitive ones included, impinge, in a way or the other, on this primordial capacity. As she explains, «affectivity permeates the mind – namely, affectivity is not a distinct "part" of the mind that merely "interacts" with other non-affective parts» (Colombetti 2018: 576). Therefore, the traditional account which conceives of emotion and cognition as neatly separate domains is rebutted. The interconnectedness between cognitive and affective processes characterizes also high-developed species like humans and is reflected in their neural organizations (Lewis 2005; Pessoa 2013).

Therefore, affectivity is not an occasional phenomenon that manifests itself in sudden emotional bursts or in longstanding moods. To say that the mind is inherently affective does not equal to say that the mind is inherently emotional. Emotions (like fear, anger, sadness or disgust) are short-lived and intense episodes that impinge on this primordial capacity of being affected by something: they are overt expressions of this primordial affectivity[14] which also involves a wide-ranging set of processes which spans from hunger to satiation, from fatigue to relaxation, and comprises all the instances of pain and pleasure. All these affective states are dynamic responses enacted by organisms to changes taking place either inside or outside of them. But how does this conception help us to clarify the nature of emotional experience?

According to the enactive account, emotions can be regarded as self-organizing patterns of activity enacted by the whole organism to adapt to the contingencies taking place in the environment. This adaptation requires living systems to confer meaning to the situations they are currently living, to appraise them. The appraisal is not regarded as a higher-order disembodied evaluation as in classic cognitive understanding (Solomon 1993). Conversely, it involves the activity of the whole situated and embodied organism and structurally comprises bodily processes (Colombetti 2014). To draw on William James' famous examples (James 1884), the cryes, strikes, and trembles we experience when we are sorry, angry or afraid, are bodily ways through which we make sense of the situation we are experiencing. As Colombetti (2018: 578) states, «bodily feelings in emotion experience are not just feelings of the body, but ways of feeling the world and of perceiving its affective qualities through how the body is experienced». This affective activity is not a mere reaction to certain stimuli, rather it is brought forth by an organism which is already action-oriented.

To gain a better grasp of this conception, it is useful to briefly examine Walter J. Freeman's conception of emotion. Freeman defines emotions as "intentions to act" (Freeman, 2000a). According to him, organisms are not led to action by a linear chain of events which begins with the stimulation of a sensory organ and ends with the execution of an action. The sensory stimulation is received and processed by an organism that is already action-oriented and

[14] This proposal resonates with Antonio Damasio's theory of emotion (Damasio 2003). Damasio explains that affectivity is a crucial characteristic of living beings in their everlasting struggle for survival (Damasio 1999). The processes which allow brainless organisms to self-regulate themselves «contain the essence of the process of emotion that we humans have» (Damasio 2003: 41). However, as Colombetti highlights, there is in an important difference between the enactive account and Damasio's view (Colombetti 2014: 23-24). Unlike enactivism, Damasio does not attribute cognition to brainless organisms. In his view, while they possess affective capacities they lack cognitive abilities, which are regarded as higher-order processes that require cortical structures (Damasio 1994).

modulates its activity in relation to the sensorial stimuli and their affective valence. Thus, affective states emerge from a process of circular causality taking place within the organism.

To conclude, from an enactive standpoint «emotional episodes correspond to specific self-organization forms […] that recruit or entrain various processes (neural, muscular, autonomic, etc.) into highly integrated configuration or patterns» (Colombetti 2014: 69). Since emotions are highly context-sensitive, their configuration will depend on how the different processes will influence and constrain one another. The specific way in which these factors interact will vary from individual to individual. This will grant each individual with a unique affective profile which will guide its engagement to the specific situation it is living. As a result, a coldblooded relationship with the world is unattainable and affectivity is an unavoidable constituent of both perception and action. The organism actively engages the external environment through a form of affective interaction: it does not relate to a neutral world but with an *Umwelt*.

Umwelt

Umwelt is a term coined by the Baltic German biologist Jacob von Uexküll (2010). According to him, the world can be conceived as an *Umgebung* (the physical and chemical world) and as an *Umwelt* (the world from the perspective of the organism). From the viewpoint of every organism, the world is not an aggregate of physical and chemical processes. Rather the world, as lived by the organism, is intrinsically granted with significance. The world is always experienced by the organism as a world relevant to its need. As Brentari explains, «the fundamental idea […] which Uexküll attempts to convey with simple and accessible language, is that animals do not limit themselves to receiving an already formed external world but are constantly engaged in an active process of sense-conferring» (Brentari 2015: 138). Different species will have different sense-making systems and this will ensure the existence of different *Umwelten*, both from a perceptual and an action standpoint. What characterizes all of them is their intrinsic affective nature. In fact, the events which structure the Umwelt are granted with a specific "tone" (*Ton*) that colors the perceived properties and confers valence to them. As Brentari explains, «a prey is not perceived as something neutral, but rather as an object "colored" by a particular feeding tone (*Freßton*)» (Brentari 2015: 139). The valence which is infused in the objects contributes to instantiate a specific mood (*Stimmung*) in the organism. To follow the above-mentioned example, a predator who is chasing a prey colored with a feeding

tone will be in an internal state of enticing frenzy expectations. Therefore, living beings are always attuned to the world via specific affective states that depend both on their internal state and on the contingencies of the situation they are experiencing. As Colombetti highlights, «the world takes on significance and value precisely in relation to what the organism is concerned about and striving for – there is no meaningful environment for the indifferent, non motivated being» (Colombetti 2014: 19).

Since different species will be granted with different embodiments and different sense-making systems, they will enact different *Umwelten*. Therefore, the same physical object can have diverse meanings for two species and can thus take part in two distinct *Umwelten*. Uexküll crafted a good example to explain the interaction of the different species within the same niche by analyzing how they differently relate to the same oak tree. «For the fox, who has built its den among the oak's roots, the oak has become a solid roof which protects it and its family from the perils of the weather». And thus it possesses a protective tone. Whereas «for the squirrel, the oak, with its many branches offering handy springboards, takes on a climbing tone, and for song-birds, which build their nests in the remote twigs, it offers the needed carrying tone» (von Uexküll 2010: 129-130). This example shows that the environment is not a set of pre-given meanings that the organisms detect (as in the case of naïve realist) or reconstruct (as in the case of representational accounts). Instead, each organism is coupled with the environment in a specific way which depends both on the contingent and structural properties of the environment, and on the contingent and structural features of the different living beings related to it. Organism and environment are co-dependent, i.e. they co-constitute each other through dynamical interactions. As Ward Silverman, & Villalobos (2017: 369) point out, enactivism entails a «rejection of a strictly realist or objectivist conception of the world to which we respond in perception, in favour of a conception of the world as both a product and reflection of our engaged activity».

Crucially, the *Umwelt* is not constituted only by physical elements but also by the relations with other living beings (Brentari 2015, ch. 4). If we carefully think about it, most of the relevant elements in an organism's *Umwelt* are indeed other living beings: preys, predators, potential mates, offspring, and so on. As Uexküll explains (cit. in Brentari 2015: 79), «it should be no surprise that the environment of an animal also includes other living beings. A relationship of mutual determination also establishes itself between the animals themselves, which gives way to the significant phenomenon that the hunter corresponds to the hunted as

much as the hunted corresponds to the hunter». From an enactive perspective, within the world we enact, all our relationships with other living beings – being predatory, social or parasitic, etc. – are enacted as well. That is, they are not given once and for all; rather, they are constantly brought forth in virtue of the respective sense-making systems of the living beings involved.

The enactive reading of Uexküll theory allows us to understand that the environment is never encountered as a neutral space that receives meaning only after the intervention of cognitive processes. The fact that an organism is always related to an environment endowed with meanings does not imply that is phenomenally aware of such meanings. The *Umwelt* is not necessarily present in the consciousness of the animal, it can exist only in the form of action opportunities (Merleau-Ponty 2003). Every organism enacts a world: the physical house which it inhabits becomes its home, its *Umwelt*. And the *Umwelt* inevitably mirrors the nature of its inhabitants and grants them the necessary properties to act within it. In fact, the affective and evaluative capacities displayed through the sense-making system would be useless, were they not linked to effective behavior. And a central feature of the enactive approach is precisely the underscoring of the intimate relationship between perception and action.

The intimate relationship between perception and action

In the enactive account, the activity of an organism is the constitutive feature of its mindedness. As Varela, Thompson, and Rosch (1991: 173) point out: «in a nutshell, the enactive approach consists of two points: (1) perception consists in perceptually guided action and (2) cognitive structures emerge from the recurrent sensorimotor patterns that allow action to be perceptually guided». The very term enactivism stems from the necessity of highlighting the intimate link between mental states and actions: «we propose as a name the term *enactive* to emphasize the growing conviction that cognition is not the representation of a given world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs» (Varela, Thompson, & Rosch 1991: 9).

In many contemporary accounts elaborated by cognitive scientists and philosophers of mind, the purpose of perception is thought to be the accurate representation of the external world. Percepts are created for perception's sake and possible courses of action are not directly related with the perceptual system, but rather are dependent on the operations carried out by cognitive processes. For instance, according to Marr (1982: 340) humans «very definitely do

compute explicit properties of the real visible surfaces out there, and one interesting aspect of the evolution of visual systems is the gradual movement toward the difficult task of representing progressively more objective aspects of the visual world». Palmer (1999: 6) stresses that «vision is useful precisely because it is so accurate. By and large, what you see is what you get. When this is true, we have what is called veridical perception». Along similar lines, Lehars explains that (2003: 376) «the perceptual modeling approach reveals the primary function of perception as that of generating a fully spatial virtual-reality replica of the external world in an internal representation». This view that is now dominant – albeit contested (Akins 1996) – regards mental life as constituted by layers connected in a linear fashion. Sensory receptors receive raw data from the environment. The information is then transferred to the cognitive areas which are in the business of interpreting and evaluating the stimuli to form beliefs, desires, and intentions. These cognitive operations eventually lead to instructions which are imparted to the motor systems whose duty is to set in motion the decisions planned by the cognitive system. Hurley defines such a linear model the "sandwich model" of the mind (Hurley 1998). In this account, perception and action are just the external slices which sandwich the cognitive meat. And as every sandwich is defined by the main ingredients contained within the slices, so our mental life is essentially identified with the cognitive processes which mediate between sensory inputs and motor outputs. Enactivism attempts to overturn this model. More precisely, it stresses that the intimate connection between perception and action lies in two factors: 1) the organism actively probes the environment; 2) the exploratory behavior is aimed at finding possibilities for action. The former is known as sensorimotor account, the second is linked to the notion of affordances.

As regards the former, in the enactive account, perception is conceived as an exploration of the environment. According to enactivist theorists, phenomena like amodal completion and inattentional blindness show beyond doubt that we are not able to construct an accurate model of the world as classic cognitivism entails (O'Regan & Noe 2001). However, in order to go beyond the classic cognitive model, we need to reconceive how perception works. Classic perception theory is based on the idea that the world does not provide sufficient information to navigate it. The information that impacts the retina at any given time can potentially come from an infinite number of objects. So how is it possible that we are able to constantly and effectively disambiguate the stimuli we perceive? The classic answer to this riddle is that we are able to reconstruct an accurate picture of the external world in virtue of cognitive processes that are thus conceived as post-perceptual mechanisms decoupled from the online interaction with the

environment. Enactive theories propose a radical departure from this understanding. They maintain that the ambiguity caused by a supposed impoverishment of the stimuli vanishes when we consider that we can disambiguate the stimuli by moving around. It is true that the single frame of light that stimulates the retina at a given instant can be generated by an infinite number of sources. However, the changes in the stimulation which result form an active exploration of the environment (by moving around to view the stimulus from different viewpoints or by moving the objects to observe them from different angles) can be caused by an extremely limited amount of objects. Therefore, our perceptions vary in relation to motor behavior and we are granted implicit expectations about how the environment will change in relation to our movement. As Dewey had already noted, «we begin not with a sensory stimulus but with a sensorimotor coordination, the optical-ocular, and that in a certain sense it is the movement which is primary, and the sensation which is secondary, the movement of body, head, and eye muscles determining the quality of what is experienced. In other words, the real beginning is with the act of seeing; it is looking, and not a sensation of light» (Dewey 1896: 358–359).

The crucial change entailed by this approach is that we should not regard sensory information as the starting point of mental processes. Every perception is always preceded by previous actions that forge the anticipations that guide the subsequent perceptual activity. Perception is not conceived as a collection of snapshots, rather it is a process which unfolds through time. And this process is modulated by the activity of the organism: the saccadic movement of the eyes, the turn of the neck, the manipulation of the objects contribute to disclose previously hidden features of the environment. The environment thus possesses a relatively stable structure with which we interact and our sensorimotor systems evolved to be sensitive to certain structures and to exploit these regularities. We are able to know the world because we can navigate it, and not vice-versa. That is why enactive theories entail that perceiving can be regarded as a kind of action. As Anderson explains, we cannot understand the action of perceiving as decoupled from the actual state of the organism and the situation it is part of: «any […] perception-action sequence was in fact preceded by an action that was itself preceded — and not just preceded but accompanied — by a different perception, and so on through the whole history of the organism, creating a framework of sensorimotor coordination apart from which the isolated sequence cannot be understood» (Anderson 2014: 167). Sensory information is thus continuously used to refine current performance and specify novel possibilities for interaction.

The intimate relation between action and perception does not end here. In fact, the relation between the organism and the environment brings forth situations *through* action. Consequently, the meaning of perceptual neural states is not related to accurate representations of the objects but rather to their role in guiding effective actions. For instance, recent research ascertained that motor neurons that are activated by motor actions related to tool using can be triggered by the visual perception of these tools even when actions are not performed (Grafton et al. 1997). Thus, when we perceive an object we directly perceive the possibilities of action that it affords. As Heidegger (1962) would have phrased it, our primary way of being-in-the-world is not a passive representation or a theoretical contemplation, but rather is the practical relation of the ready-to-hand (*Zuhanden*). Enactivism draws on this phenomenological account and regards perception as an ensemble of processes through which we engage the environment by bringing forth a domain of relevant action possibilities. Our engagement with the external world is an active and goal-directed process that enacts opportunities for interaction. These opportunities are called affordances.

Affordances

The theory of affordances was formulated by J. J. Gibson, who provides the following definition: «The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill […] It implies the *complementarity of the animal and the environment*» (Gibson 2015: 119). Therefore, affordances are opportunities to engage with the environment in specific ways tailored to our biological needs, goals, and abilities. A sidewalk can afford walking, a tree can afford climbing, a chair can afford sitting. When we perceive these objects we do not merely perceive qualities like color or shapes but we perceive the potential forms of interaction they offer.

Since affordances depend both on the environment and on the organism, they are relational properties. More precisely, they are «relations between particular aspects of animals and particular aspects of situations» (Chemero 2003: 184). While the environment presents specific physical features, every species developed a particular sensitivity to certain action-relevant properties. As Warren explains,

> the frog's visual system, for example, is tuned to particular patterns of motion that, in the restricted context of its niche, specify small edible prey and large looming threats. The fish's lateral line organ is tuned to pressure

> waves that specify obstacles, the movements of predators and prey, and the positions of neighbors in the school. Even the narwhal's tusk turns out to be a sense organ tuned to salinity differentials that specify the freezing of the water's surface overhead. The narwhal is thereby in perceptual contact with a property of its niche — the penetrability of the surface — that is critical to its survival (Warren 2005: 340-341).

Identification of affordances is not a hardwired mechanism dependent solely on the genetic makeup of a given species. The ability to detect different action-relevant properties, in fact, is tightly linked to the development of the individual. This development depends both on the natural unfolding (or disappearing) of certain embodied skills and, in certain species like humans, on the acquisition of certain socio-cultural practices. For instance, a 12 months-old child cannot perceive a tree as climbable as she is barely able to walk. In the same way, members of cultures who are not accustomed to ladders will be puzzled in front of one and they will need someone to show them how to use it in order to perceive that object as climbable.[15] In the same way, a domestic cat raised in the narrow borders of a city apartment will not perceive a plastic garden net as climbable.

Cultural practices and past experience can refine our expertise in certain activities and this will generate new affordances. In fact, «in acquiring a skill we learn in which places in the environment to find the affordances relevant to our concern and what aspects of environment to attend to» (Rietveld & Kiverstein 2014: 331). For instance, whereas a novice climber will be unresponsive to a small creek in a rock, a parkour athlete will be able to detect numerous grips in the seemingly flat surface of a city building: in virtue of its embodied skills acquired with practice, she is able to perceive the climbability of an otherwise unsurmountable structure. One can also lose certain acquired skills and this will change the affordances one is able to perceive. Thus, the same 85-year-old parkour athlete suffering from loose knees and hip arthritis will hardly perceive a steep wooden ladder as affording climbing.

To formalize how affordance perception varies among groups of individuals, Rietveld and Kiverstein (2014) propose to rely on Wittgenstein's notion of "form of life" (Wittgenstein 1953). As they interpret Wittgenstein's theory, a form of life is characterized by its ecological niche and set of practices. Therefore, the form of life of a given organism is manifested through relatively stable patterns of behavior which are usually coordinated among different individuals over different timescales. Moreover, since humans forms of life are inherently

[15] A similar case is reported by Uexkull during one of his trip to Africa: Brentari 2015: 120.

socio-cultural, and since people can belong to different socio-cultural groups, they express multiple and overlapping forms of life at the same time. Or to phrase it differently, each person expresses a unique form of life which is the resultant of the interaction between the genetic makeup and the socio-cultural upbringing. As Rietveld and Kiverstein highlight, a form of life encompasses three levels of analysis: the form of a life of a species (a cat and a human will perceive different affordances in a ball); the one informed by a specific socio-cultural practices (a soccer player and a bodybuilder will perceive different action possibilities offered by the ball); the one related to the specific person and its own unique style (a high-skilled professional soccer player like Cristiano Ronaldo or Messi will perceive different affordances in the ball if compared to an amateur player).

At any given time we are immersed in an affordance space which is «the (abstract) range of possibilities provided by any change in body or environment» (Gallagher 2017a: 174). The affordance space is not static but dynamic as «one's environment affords many possibilities for action. But each has its affective price tag, and they are not equally affordable» (Gallagher 2017a: 154). Therefore, it is possible to distinguish the affordances that stand out as relevant in a given situation form those that are lingering in the background. The dynamic variation between them depends on changes both in the agent and in the external environment. Uexküll gives us a good example to understand this variation: a domain of interactions between a hermit crab and a sea anemone. In the example, the sea anemone's meaning changes in relation to the hermit crab's disposition. When the crab is chased by a squid the shield of the sea anemone is infused with a protective tone and affords a specific action to the crab which will place it on top of its housing to camouflage itself. In a situation in which the crab lacks its shelter the sea anemone will afford crawling and the crab is likely to try to enter it. Finally, for a starving crab the sea anemone will be regarded as a tasty meal and it will afford eating (von Uexküll 2010: 93). As these example highlights, we encounter the objects in the environment in terms of what they can afford. Our response to affordances is context-dependent as the same percepts can invite different actions in different contexts. The same portion of the environment can offer multiple affordances granted with varying degrees of relevance: those that stand out are the ones that are tuned with the needs of the moment. These relevant affordances will prompt a state of action readiness that will cause to establish, enhance, modify or maintain a given relationship with certain portions of the environment (Frijda, Ridderinkhof, & Rietveld 2014). Importantly, as the hermit crab example shows, the environmental factors that shape

our affordance space (and certain affordances themselves) can be constituted by other animals and even members of our own species.

As the affordance theory highlights, our perceptions evaluate the salience of the different possible interactions offered by the environment and detect action-opportunities. The corresponding neural patterns do not represent states of the world or possible action courses, but rather they embody different control systems that allow the organism to select and manage the action possibilities offered by the environment. Thus, action selection can be viewed as a dynamic process that is tightly linked to the variations of the affordance space (Anderson 2014, chap. 6). In virtue of this mechanism, we are granted a flexible relationship with the environment and we can endow it with multiple meanings that impinge on our present affective states.

Affordances can also offer the possibility of achieving specific affective states: they can be affective affordances (Hufendiek 2016). In fact, objects, people, and events play an important role in eliciting, regulating, amplifying, and weakening our emotions and moods. And when we encounter them we perceive their "affective allure" (Rietveld 2008). We decorate our house, wear particular clothes, play certain music tunes, visit our friends or go to our favorite places (being them bars or parks) to funnel our affective experience into particular channels. As we saw, the perception of these affordances will vary according to forms of life and their particular psychophysical state. For instance, a smoker and a person who quit smoking for a long time will respectively perceive a pull and a push when they see a pack of cigarettes on the table. But it is also possible that the ex-smoker might be attracted by the cigarettes when she is in a condition that increases either the urge or the pleasure of smoking, for example after a long and lucullan dinner. In this case, the pack of cigarettes will come to the forefront of affordance space, and once our ex-smoker would have taken a cigarette out of the pack, the lighter will be gleaming in front of her as the object that will afford the possibility of taking the longed-for puff.

One might ask how this switch in the affordance space works. In fact, the same object can invite action or leave the agent cold. How does the agent attune to the environment? How is it motivationally engaged with its surroundings? How come does a specific affordance jump to the forefront of our attention? In order to modify its attunement, the agent needs a sort of normative principle: it needs to evaluate how it is faring in a given moment and to anticipate the probable results of the upcoming actions. Moreover, if we regard the life of the agent from

a diachronic standpoint, we realize that the agent needs to be able to reinforce the dynamics that brought about a relative improvement to its well-being and to modify her engagement with the world when things are not going well. Let's delve deeper into these issues.

Anticipatory affective processes

In the last few years, researchers have been gathering a huge amount of evidence which shows that perceptions are highly dependent on top-down processes: the incoming flow of sensory input is constantly refined and shaped by predictions and expectations. This new understanding turns upside down the common view on perceptions: they are conceived as active elaborations of data rather than passive registrations of stimuli. For instance, we expect light to come from above, objects to be convex, people not to yell. These expectations model our perceptual experience. This might appear a trivial observation. However, on the basis of this observation, it is possible to give reason to several problematic cases. One example regards the hollow-mask illusion (Hill & Johnston 2007). In this visual phenomenon, the back of the mask, despite being concave, is perceived as a convex face popping out of the mask. This phenomenon can be explained because the incoming sensory stimuli are processed on the basis of the "concave-object expectation". These cases show that our sensory processes do not start from the incoming flux of sensory data but from the top-down expectations which are used to shape and confer meaning to sensory stimulations.

Crucially, these anticipatory processes are intrinsically affective. When we perceive a visual object we do not merely register its surface properties like shape and color. The elaboration of this information is structurally implemented with affective responses related to our past experience with that object. In fact, researchers ascertained that V1 neurons are in the business of predicting stimuli reward on the basis of prior experience (Shuler & Bear 2006). Moreover, «even in regions of the brain such as primary visual cortex that are classified as "sensory", most synapses received by pyramidal neurons arrive from other cortical neurons and only a small percentage (5 percent to 20 percent) can be attributed to sensory input» (Sporns 2011: 150). This massive modulation of sensory inputs suggests that perceptions are more complex processes than previously thought.

One of the most prominent proposals to explain these novel findings is Barrett and Bar's affective prediction hypothesis which states that the «responses signaling an object's

salience, relevance or value do not occur as a separate step after the object is identified. Instead, affective responses support vision from the very moment that visual stimulation begins» (Barrett & Bar 2009: 1325). To support their hypothesis they underscore the perceptual role played by the orbitofrontal frontal cortex (OFC).[16] When a visual stimulus is perceived, this area activates a cascade of changes along different systems which cause interoceptive sensations linked to prior experience that contribute to constituting the visual experience. Our body prepares itself to interact with objects on the basis of prior association before the visual objects are fully recognized. As they explain,

> the OFC's ongoing integration of sensory information from the external world with that from the body indicates that conscious percepts are indeed intrinsically infused with affective value, so that the affective salience or significance of an object is not computed after the fact. As it turns out, the OFC plays a crucial role in forming the predictions that support object perception. This suggests the hypothesis that the predictions generated during object perception carry affective value as a necessary and normal part of visual experience (Barrett and Bar 2009: 1328).

Therefore, the bodily affective response is not a subsequent addition to previously neutral stimuli but it structures the stimuli before they are completely processed. In an enactive understanding, we can assess that the agent evaluates the visual stimuli with its whole body on the basis of its prior experience (Colombetti 2014: 105-106). [17]

Visual perception is thus affective since the very beginning and it motivates the organism to actively interact with its current situation. When we perceive an object we immediately predict its value through the activation of bodily affective responses orchestrated by the activity of the orbitofrontal cortex. The gist of the situation is not evaluated after we know which kind of objects we are perceiving. Rather, it is elaborated early on in the process. This information is then fed back into the system which is generating the visual images. The subsequent perceptual processes enrich the quality of the images, but the affective relevance of the elements is already there since the beginning (Stapleton 2013).

Organisms are also able to confer affective meaning to encounters that are not immediately dependent on the regulation of biological equilibrium. For instance, the smell of

[16] While Barrett and Bar focus on the role of the orbitofrontal cortex they suggest that the orchestration of affective values is more complicated and it likely involves diverse brain areas (Barrett & Bar 2009: 1331), a position shared by Allen and Friston (2016).

[17] Barrett, however, understands this mechanism on the basis of brain-bound perspective christened Embodied Predictive Interoceptive Coding, according to which affective predictive processing is performed by neural visceromotor regions (Barrett & Simmons 2015).

food can signify the presence of nutrients and trigger internal changes which prompt the organism for food intake even though organisms do not feed on odors. In the same way, the smell of predators' urine alerts the prey of a serious menace for its own life even though predators might be absent. Organism's evaluation and behavior can and do change not only in the presence of relevant biological objects but also in the presence of reliable bearers of those objects.

These observations allow us to understand how affordances present themselves with different degrees of relevance. Affordances are marked with affective value because our percepts are always granted with affective relevance. As Uexküll already noted, the perception of the opportunities for action is accompanied by specific "tones". We inhabit an affordance space that at any given time offers us several action possibilities that can be in conflict with each other. How do we select between them? On the basis of the affective predictions hypothesis we can state that changes in the environment lead to different neurophysiological activations that prime percepts with different affective values. Thus, there is constant competition between these patterns of neural activity that reflects the competition of different affordances to stand out as more relevant (Cisek 2007).

The affordances that stand out as relevant energize the agent behavior on the basis of its current needs and physiological state. The relevance of the affordances is linked to states of action readiness, which are «actual preparations for action» and include «the adoption of an attitude toward an object or event, from which an actual change of relationship with that object or event may emerge» (Frijda, Ridderinkhof, & Rietveld 2014: 518). These states lead the agent to begin, maintain, regulate or interrupt its relationships with the objects and event is facing (Frijda 2007). The appraisal of a given situation is thus intrinsically motivational, as it inclines the organism towards a course of action (or the lack thereof).[18] Therefore, the states of action readiness are motivational in nature, not because they furnish reasons for action or representation of desirable outcomes, rather because they attune us towards the world in specific ways which necessarily involve bodily evaluation and preparations to act (Dewey 1896).

As Frijda, Ridderinkhof, and Rietveld (2014) argue, states of action readiness can compete with each other as well. In fact, it is possible that events and objects are

[18] Action readiness is a spectrum and thus can include states where action readiness is very low. For instance, if I am very tired after a long day of work and I enter in my cozy living room I will be primed to lie on the couch.

simultaneously appraised in different ways and these embodied evaluations interact with each other thus furnishing a primary implicit way of regulating affective relations with the environment. For instance, if we start to have an argument with our partner at a friends' party our anger might be curbed by the embarrassment we feel to expose our quarrel to the public's eyes. As Frijda, Ridderinkhof, and Rietveld (2014: 518) stress, «this implies that processes that regulate action are at least to some extent impulsive. These processes may not have regulation as their goal, but make way for concurrent or competing action readiness. One state of action readiness may happen to weaken or modify another one». Anyhow, what is crucial is that the organism is able to anticipate how the possible interactions with the environment impact its survival and well-being.

However, as we stated before, we encounter the environment as beings motivated to act by endogenous processes. Sensory stimulations are received by an organism that is already ready and eager to act and, thus, the former cannot be understood as *causa prima*. Therefore, the states of action readiness linked to affordances do not trigger behavior, rather they modulate it and orient the action. On the one hand, affective states inform the salience of perceived stimuli. On the other hand, they prepare the organism to act and modulate its unfolding behavior. They are pervasive and constitutive elements of how an organism relates to the world.

For behavior is endogenously-driven, our metabolic equilibrium structures the way we perceive the world by altering the affordance space and making certain objects standing out as relevant thus prompting related states of action readiness. For instance, a decrease in blood sugar causes a cascade of biophysical events that lead the agent to look for food and the eating affordances stand out as relevant.

Crucially, this dynamic attunement is not ruled by a homuncular governor which estimates and computes the possible courses of action. Rather, «behavior is regular without being regulated» (Gibson 2015: 215). It is dependent on the dynamical coupling between the organism and the environment (Van Gelder 1995), e.g. actions adjustments shape our perceptions and the latter inform what we perceive in a neverending loop. As Anderson explains,

> any given circumstance will naturally contain or be partially defined by multiple organism-environment relationships and opportunities for action. […] the detection of these will activate regions of the brain according to

> their native dispositions, as modulated by their interactions with other regions. When this is combined with the neural expression of the organism's other relevant states — temperature, glucose levels, general arousal, and so on — the result is a particular pattern of neural activity jointly determined by the organismal and environmental circumstances […] this process is biased by the organism's ongoing evaluation of future reward and continuing interaction with its environment: sensory inputs and reward estimates will reinforce some patterns and disrupt others, changing their weights. Naturally, the process can be indirect as well if, for example, online experience triggers the recall of stored experience, which might itself tend to reinforce or disrupt some set of neural patterns and partnerships (Anderson 2014: 215–216).

From the vantage point of this theoretical approach, perception and action «are, in many cases, directed more by the homeostatic relevance of information than by the need for accuracy and completeness in representing the outside world» (Barrett & Simmons 2015: 7). We are embodied performative agents, not contemplative spirits. This view turns upside down our classic conception of the relation between action and perception: action guides perception. «The fundamental *cognitive* problem facing an organism – deciding what to do next – might best be understood not as choosing the right response of a given stimulus but as choosing the stimulus in light of a given goal» (Anderson 2014: 182-3). For the organism, the crucial problem is to regulate its relation with its world so as to maintain an adequate level of self-organization (Bruineberg & Rietveld 2019).

Conclusions

In this chapter, I offered a review of the 4E approaches to cognition and emotion, the theoretical model that will guide my subsequent analysis. This approach rejects the brain-centered view that has dominated cognitive science and philosophy of mind in the last decades. Conversely, it confers to the body and the environment an essential role in bringing forth mental states. According to this account, mental states are produced by the intimate coupling between brain, body, and environment and thus involve extracranial components. They are not in the business of producing accurate representations of the external world, rather in virtue of affective sensorimotor activities they help agents to navigate their surroundings.

4E approaches, however, are not fully consistent with each other and they are more a heterogeneous ensemble of different theoretical assumptions. In my investigation, I highlighted 4 of them: the enaction of the *Umwelt*; the embodied primordial affectivity; the pragmatic stance; the anticipatory process.

To begin with, organisms are conceived as autonomous entities. They continue to exchange energy and matter with the environment and regulate their internal processes to maintain a relatively stable structure. We experience the environment based on our embodiment and needs. As a result, the relationship established between the organism and the environment is dynamical and context-sensitive. Every organism is constantly engaged in an active process of sense-making. Such a sense-making system is constitutively affective since the value of the world structurally depends on the concerns, needs, and motivations of the organism. As a result, organisms bring forth a meaningful structure by actively interacting with the environment. We do not merely react to physical stimuli, rather we bring forth a meaningful world, an *Umwelt*. The environment is not neutral but rather is a place of meaning for the organism touched by external events. The *Umwelt* thus can be regarded as the ensemble of all the action opportunities offered to the organism.

This lack of indifference points to the second pillar of the enactive model I intend to use: primordial affectivity. Primordial affectivity is a basic biological capacity common to all living beings: the ability to be touched and moved, to experience something as significant. Since this ability is a basic requirement for living beings, all biological processes, mental ones included, are inherently affective. Moreover, the opportunities for interaction offered by the Umwelt are always granted with an affective value.

A third view brought forth by the enactive understanding of the mind regards the relationship between perception and action. This intimate connection is based on two accounts. On the one hand, perception is regarded as a form of action. When we perceive we actively explore the environment. Moreover, during the perceptual act, the motor actions we perform impact the contents of perception. On the other hand, whenever we perceive a given object or situation we do not merely perceive its phenomenal qualities. We also perceive possibilities for actions (affordances) granted with specific affective values that entice the possible ways in which we can relate to it. Hence, perceptually guided actions unfold possibilities for interaction with the world. The Umwelt takes the form of an affordance space that corresponds to the possibilities for action offered by the environment in a given situation. Each of these possibilities stands out differently, depending on the internal state of the organism and the overall situation.

This leads us to the fourth element: anticipatory affective processes. Organisms do not merely react to external stimuli, rather they actively seek conditions that match their current states or needs. We encounter the environment as beings motivated to act by endogenous processes and evaluate our current situation in light of our previous experience. Therefore, the states of action readiness linked to affordances do not trigger behavior, rather they modulate it and orient the action.

To sum up, the *Umwelt* solicits certain actions in the agent which, in virtue of her prior experience, develops a more sophisticated way of discriminating the situations and of interacting with them. The evolutionary trajectory of every species led to the production of agents that embody biological organizations that complement their respective niches. The survival of an organism is thus consistent with the kind of body it has and with its prior experiences. Every living system is thus granted with an internal normativity that crucially depends on its attunement to its ecological niche (Friston 2011). However, genetic inheritance is not our destiny. Minds evolve through the interaction of the organism within its environment and thus are characterized by a «continuous re-shaping, re-wiring, and re-modelling» (Malafouris 2010: 55). During the agent lifespan, certain sensorimotor connections are reinforced while others are diminished thus resulting in a continuous process of pattern competition which allows the organism to act in the world from its own individual standpoint, with its own biases and proclivities. Every living being develops a personal attunement to certain physical properties of the socio-material environment which is translated into a personal sensitivity. This interaction shapes the individual brain and body which adapts in specific ways to the environment and refine their modalities to epistemically and pragmatically engage with it. Habits and past experiences are embodied and manifested in the agent anticipatory dynamics and its embodied skills. Brains are not regarded as world-mirroring devices but as vehicle of world-making, «vehicles that support based on individual learning history, the construction of the experienced world and the guidance of action» (Engel, Friston, & Kragic 2015). After having shown how mental activity is grounded on the biodynamics of living beings, I will present how this model can help us understanding olfaction.

Chapter 3 - Olf-action: enacting the sense of smell

Introduction

Smells are often regarded as faint and fleeting perceptions, which vanish in the blink of an eye and elude the direct gaze of our attention. Think of the subtle pear aroma of a Bourdeaux Chardonnay, the mysterious and charming aura of a top-class perfume, or of the mystic fragrance of incense that brings the worshippers in contact with the immaterial realm of God. In all these examples, scents are hardly quantifiable and difficult to define through verbal labels. This elusiveness has been employed by novelists and poets to convey subtle personal sensations. It has also been one of the main obstacles for systematic philosophical research in olfaction: how are we to define an experience so mysterious and evasive as the one of smells?

This picture of olfaction can be puzzling when one regards smell from an evolutionary standpoint. Smells have played a crucial role in the arm race that guided the evolution of lifeforms on our planets: rancid whiffs emitted by rotten matter allow animals to move away from likely source of bacterial infection; the acrid smell of a predator alerts an anxious prey that a potentially fatal encounter is looming over the horizon; the scent of blood signals a frenzy predator that its next meal is approaching; pheromones are used by many species to communicate with their fellow companions their will to mate and make them go into heat; many species use the signature odor of their urine to mark their territory and place neatly defined boundaries in the form of an olfactory warning. A quick glimpse at these examples goes against the ephemeral view of scents and leads us to regard smells as tangible entities, strictly linked to emotional reaction and action tendencies.

In the present chapter, I intend to focus on this second point of view. More precisely, I aim to employ the enactive model detailed in the previous chapter to reason on olfaction from a pragmatic and affective point of view. The chapter is divided into three sections. In the first section, I discuss how olfactory perception is tightly linked to action. On the one hand, I show how the motor action of sniffing is a crucial component of smells; on the other hand, I show that we can correctly understand how olfaction works, only if we investigate it as employed by an agent that moves through space.

In the second section, I explain that odors are not objective representations of the chemical properties of the environment. Rather, they are enacted by an action-oriented organism on the basis of both its present situation and its prior experience.

In the last section, I examine the crucial role played by odors in attuning us to the surrounding environment by shaping our affordance space. In particular, I investigate how the environmental attunement performed by agents can be influenced also by odors we are not aware of, either because they are too feeble to be consciously perceived or because they are not attended to and are not consciously linked to our practical engagement with the environment.

Sniffing around

Many philosophers regard smell as a proximal sense (Lycan 2000; Batty 2010b; Keller 2016), a sense that lacks spatial structure and that is purely concerned with sensations located *in* the nose (Smith 2002: 139). This conception is tightly linked with the idea that odors are nothing more than personal feelings. As the Scottish philosopher Thomas Reid famously phrased, when we smell an odor we «cannot give it a place, any more than he can give a place to melancholy or joy: nor can he conceive of it to have any existence, but when it is smelled. So that it appears to be a simple and original affectation or feeling of the mind, altogether inexplicable and unaccountable» (Reid 1983: 13). This conception, however, does not fully square with our personal experience. When we enter a park on a sunny spring day we do not regard the symphony of flowery scents that embrace us as a modification of ourselves but rather as lingering around us. Even contemporary philosophers that do not share such a subjectivist conception of odors still regard scents as lacking any sort of significant spatial property. Clare Batty, for instance, states that «olfactory properties are presented "out there" or "around me" - but there is no more spatial differentiation than that» (Batty 2010b: 112). Olfaction, in this account, in conceived differently form vision and hearing; the latter allow us to perceive objects at a distance and detect (with different degrees of precision) where they are located.

I agree with Louise Richardson (2013) that this kind of conception is *prima facie* quite surprising since we usually perceive odors as coming from the outside and as regarding properties of the environment. The gentle breeze of May delights us with the flowery scents coming from the blooming fields nearby and when we roam around our city we notice the

scents and fragrances that mark particular neighborhoods or streets. Nonetheless, many authors express criticism of the idea that olfactory perception is granted with spatial resolution. Batty bases her theoretical stance on a phenomenological thought experiment. In her account, at any given moment, we are not able to determine the source of the smell we are experiencing. For instance, if you enter blindfolded in a room and the fragrance of rose captures your attention, in that very moment it is not possible for you to determine whether the smell arises from an odor dispenser located in the opposite side of the room or from a flower bouquet that another person has placed under your nose. If we reflect on smell from a synchronic perspective, it is impossible to determine the spatial boundaries of the scents we experience which, at best, are experienced as being in the hereabouts.

According to Andreas Keller (2016) the lack of spatial resolution is due to the physiological structure of our olfactory perception. The nostrils, in fact, do not allow us to perceive the location of the object at any given sniff. In this respect, a pioneer study was carried out by Georg von Békésy (1964). He presented different odors to participants at different times and different concentrations and asked them if they were able to detect the location of the source: they mostly succeded. However, most of the odors employed by Békésy were chemicals able to stimulate the olfactory and the trigeminal systems at the same time. In fact, most of the odors we perceive are accompanied by a peculiar chemosensory perception caused by the trigeminal nerve (Frasnelli & Manescu 2017). The trigeminal nerve innervates the face and is responsible for facial movements and sensations, some of which are intimately linked with smells as its branches extend to the nose (Brand 2006). For instance, the irritation caused by the smell of onion and garlic is caused by the activation of this nerve. The trigeminal nerve can contribute to the production of pleasant enticing sensations as well, like the freshness of menthol and the hotness of capsaicin. These sensations are so intimately entangled with the smell of mint and hot pepper that it is impossible to phenomenologically disentangle them. The general agreement is that on the basis of their neurophysiological effects, we can distinguish 3 types of odors: 1) pure odors, which stimulate only the olfactory nerve; 2) trigeminal odorants, which also stimulate primarily the trigeminal nerve; 3) bimodal odors, which stimulate both the olfactory and the trigeminal to the same extent (Martin 2013: 8). Therefore, in order to ascertain whether we have directional smelling, Békésy's experiment was verified by controlling for pure odors (Kobal, van Toller, & Hummel 1989). Participants were able to individuate from which nostril they were sniffing when they smelled carbon dioxide (trigeminal odorant) and menthol (bimodal odorant). However, they failed to locate the direction from which vanilla and

hydrogen sulfide (pure odorants) were coming. Therefore humans, differently from other species (Rajan, Clement, & Bhalla 2006), are not able to smell in stereo.[19] This fact leads Keller to dismiss the spatial nature of olfactory perception.[20]

These theories are based on a common assumption: the ideal vantage point to investigate perception is a synchronic analysis. The subject is regarded as a static entity and the olfactory experience is viewed as the experience of detecting a given odor in a specific concentration at a given moment. Conversely, as highlighted in the previous chapter, I think that perception is best conceived as a dynamic experience that unfolds through time. Our perceptual experience is not a collection of snapshots, but rather a never-ending activity that involves an agent's engagement with the world. If you are lying on a sofa and suddenly perceive the smell of burnt plastic, you tilt your head, jump up and, by paying close attention to the relative intensity of the scent trails, you start to chase it to ascertain whether it is coming from the kitchen or from the outside. While you approach the burner to see if you forgot the fire on, the burning smell starts to gradually faint away. So you move towards the window at the opposite side of the room and you can perceive the burnt smell more pungently and, thus, you rule that the unpleasant scent must come from the outside. As this example shows, we experience smells as extending through space in different intensities and we are able to experience this feature because we move through space (Aasen 2018).[21] In this case we are able to follow a given scent trail and to fully experience the spatial distribution of smells in virtue of the employment of skillful sampling behavior based on implicit expectations. As the sensorimotor theory of perception outlined in the previous chapter highlighted, every organism has an implicit knowledge of how perception varies in relation to its own movement (O'Regan & Noë 2001). For instance, when we move, our visual scene changes as the optical flow pattern received by the retina expands or retracts. Still, we perceive the visual scene as maintaining a high degree of constancy in virtue of our anticipatory expectations linked to the sensorimotor contingencies we learned. It is not that we gather information from our movements and then use it to reflect on how the smells change;[22] rather our olfactory experience changes in virtue of

[19] When certain equipment is applied to the human face, so as to force a wider separation of the nostrils, participants appear to be able to smell in stereo (Porter et al. 2005). However, as Gottfried (2005) stresses, it is not clear whether these instruments unveil an already present ability or allow us to acquire a new one.

[20] Both Keller and Batty offer several arguments to defend their thesis. However, I am not be able to review of all of them as this chapter is not only dedicated to the notion of spatial olfactory perception. For extensive review and criticism on the matter cf. Batty 2014; Aasen 2018; Young 2019.

[21] This implies the ability to recognize the same smell across different concentration.

[22] A position held by Batty (2010a).

our dynamical engagement with the environment. Therefore, olfactory perceptions are extended in space and they are not perceived as single bits.

This peculiar structure of olfaction lies at the ability of spatial navigation. As the example of the bacteria presented in chapter 2 shows, chemical senses would be useless if living systems would not be able to move. One obvious reason is that living systems need to move away from states that threaten their well-being and towards situations that will improve their flourishing. A second, perhaps less obvious reason, is that chemicals are not evenly distributed in the environment, rather they are present in the form of gradients and their quantity and density vary across space. Living systems, thus, need to be able to navigate the environment, locate themselves in different positions to be able to experience the characteristics of their environment. Humans as well are able to navigate the environment by using olfactory information, either by tracking scent trails (Welge-Lussen et al. 2014) or by relying on odor distributions (Jacobs et al. 2015). For instance, in an experiment, blindfolded subjects wearing earplugs were placed in a random location within a room where two odor dispensers (sponges imbued with essential oils) were gradually emitting different odorants. The participants were able to return to the location by smell alone after having been moved around (Jacobs et al. 2015).[23]

This idea is confirmed by Linda Jacobs's research. Her evolutionary proposal on the evolution of the olfactory system suggests that the olfactory bulb did not evolve to simply detect chemicals, but also to guide chemotaxis (Jacobs 2012). Olfaction can be viewed as a sophisticated evolution of this basic ability, navigation via chemicals, which can be regarded as the basic component of sensory mechanism. As Dusenbery (1992: 121) highlights, «chemicals are probably the original stimuli since they can participate directly in biochemical reactions without needing a sensory transduction step. This may be the reason that chemicals seem to be the most universal of stimuli. Indeed, it is possible that all organisms make use of chemical stimuli».

[23] Keller refuses this argument. In fact, according to him, «that a stimulus is used for navigation does not mean that the perception of the stimulus has spatial structure» (Keller 2016: 70). In my opinion, his refusal stems from a pure synchronic consideration of perceptual experience as a sequence of frames. It is true that, at any given instant, we do not synchronically perceive smells as granted with neat spatial boundaries and situated in a specific location. However, if we dismiss an investigation of olfactory perception that reasons on our perceptual experience on a moment-to-moment basis, and adopt a diachronic analysis, as a pragmatic and enactive approach invites us to, this synchronic consideration will lose its force.

But how do we navigate through smells? The experience quality of the odors varies with their concentrations. The same odorant at different concentrations appears as having different qualities. Generally, the higher the concentration the nastiest the smell. For instance, sulfur mercaptan at low concentration smells like coffee whereas at higher concentrations it is experienced as a fetid stench. However, some chemicals are an exception to this rule. A case in point regards macrocyclic ketones, which, at low concentrations, smell musky; at higher concentrations, instead, they smell like cedarwood (Wilson & Stevenson 2006: 72). Importantly, since odors change their quality according to their concentration, and these changes are gradual, it is possible that living beings exploit this variability to navigate the environment (Jacobs 2012). Odors, however, are deeply affected by turbulence as streams of water and airflows can disrupt odor distributions. To overcome this problem, animals developed sophisticated mechanosensory systems tightly linked to olfaction that enable them to navigate odor landscapes, despite turbulences in both water and air: insects have antennas, fish have lateral lines, and mammals have vibrissae (Atema 1996). As Anderson (2014: 168) highlights «because chemical cues tend to be sparse, evanescent, and subject to various kinds of disruption (e.g., from turbulence), reliable reception requires constant sampling, integration with navigational systems, and sensitivity to relevant potential disruptions». The evolution of our perceptual system, therefore, is not functional to passive observers of the world, but rather it is conditioned by the need of moving agents.

As Jacobs (2012) suggests, the primary function of olfaction is not discrimination and acuity, bur rather navigation in the environment. And this is confirmed by the fact that even species with impressive visual acuity, like diurnal birds, still employ olfaction for spatial navigation (DeBose & Nevitt 2008). Our sensing always takes place in a physical space and it requires a physical exploration of that space in order to be effective. These examples can help us to rebut Lycan's view according to which «considered only phenomenologically a smell seems a modification of our own consciousness» (Lycan 2000: 277). Quite the contrary, both humans and animals experience smell is not purely an internal state of consciousness, but as located in the environment. They regard their olfactory experience as extending over onto the environment.

The linkage between olfaction and action runs even deeper. In fact, every smell we sense depends on a sniff we take. With every sniff clouds of molecules are inhaled by our nostrils. They travel through our nasal cavity to reach the olfactory receptors placed in the epithelium.

Sniffing allows us to actively sample the environment (Wachowiak 2011). Thanks to sniffing we are able to modify the turbulence level in the nostril and induce chemicals to travel towards the upper nasal cavity where the olfactory receptors are located (Kepecs, Uchida, & Mainen 2006). Since only a tiny fraction of the airflow (10%) reaches the sensory receptors (Zhao et al. 2006), sniffing is an essential part of smelling. However, as Mainland and Sobel highlight, sniffing is not «merely a stimulus carrier» (Mainland & Sobel 2006: 192) but it is part of the olfactory percept.

In a landmark experiment, Bocca, Antonelli, and Mosciaro (1965) proved that sniffing is necessary for olfactory perception. He delivered odorants directly to the nasal epithelium of participants via injection thus bypassing sniffing and airflow and allowing the odorants to reach the receptors via the bloodstream. In this case, subjects were able to perceive the odor only when they were asked to sniff. Sobel and colleagues proved (Sobel et al. 1998) that this mechanism depends on sniffing and not on airflow. In fact, subjects were able to perceive odors even when the experience of the air flowing through the nostrils was suppressed by a local anesthetic. Sniffing therefore constitutively contributes to the identity of the odor we perceive: «the sniff is as integral to olfactory perception as the eye movement is to visual perception» (Mainland & Sobel 2006: 181). This structural interrelation has been confirmed by subsequent research which ascertains a reciprocal influence between smells and sniffing. On the one hand, we adjust to the stimuli by altering our sniffing patterns (Johnson, Mainland, & Sobel 2003). On the other hand, alteration of the sniffing patterns modifies olfactory perception (Teghtsoonian & Teghtsoonian 1984). For instance, when we sniff vigorously we are able to detect feeble odors that would go unnoticed with feebler sniffing (Laing 1983). Furthermore, we modulate our sniff in relation to odor pleasantness. In particular, we sniff longer when experiencing pleasant fragrances and we take shorter sniffs in the presence of unpleasant smells (Bensafi et al. 2003). Sniffing behavior is so crucial to smell that it can be used to diagnose anosmia (Dulay & Gesteland 2003).

The importance of sniffing for olfaction is also supported by the olfactory loss suffered by Parkison's disease patients, whose olfaction is severely compromised (Hawkes & Doty 2017: 308-333). This sensory impairment is partially caused by the loss of motor ability that controls sniffing. In fact, when subjects are taught to sniff more vigorously, their olfactory experience improves (Sobel et al 2001).

Sniffing is so implicated with smelling that it modulates also olfactory imagery (Bensafi et al. 2003). When you are asked to imagine a smell you sniff. A motor sequence that is not instantiated when you try to conjure up sights or sounds in your mind. And if you wear nose clips that prevent you from sniffing, the vividness of the imaged smell will decrease (Arshamian et al. 2008). Moreover, the sniffs you perform while imaging odors resemble the ones taken during actual smelling. In particular, if you imagine a pleasant odor, you will take larger sniffs, whereas, when imagining an unpleasant odor, your sniffs will be feebler (Bensafi, Pouliot, & Sobel 2005).

The cerebellum, a crucial neural area for motor control, is likely implicated in sniffing since it is active during smelling (Savic et al. 2000). This is confirmed by studies that underscore how cerebellar lesions are linked to olfactory impairments (Connelly et al. 2003). The modulation of the olfactory percepts via sniffing is likely modulated also by cortical activity. For instance, a recent study showed that electrical stimulation of the insula and related limbic areas of anesthetized rats induced respiratory changes that resemble exploratory sniffs (Aleksandrov, Invanova, & Aleksandrov 2007). These findings are preliminary but they suggest that sniffing may be a route through which affective anticipation modulates olfactory perception.

However, to state that sniffing is crucial for smell perception is not to state that olfactory perception can be broken down into a collection of olfactory snapshots, each corresponding to a single unit of sniffing, as Smith seems to suggest (2019: 173). In fact, smell has a temporal thickness that can encompass several inhalation and exhalation cycles (Patterson, Lagier, & Carleton 2013). Just as a visual scene maintains a temporal constancy despite saccades and blinkings, scents persist between the gaps of the sniffs. Finally, sniffing is present also when we smell unconsciously, that is when we perceive subthreshold odors (Arzi et al. 2012); the same goes for odors perceived while we are asleep (Arzi et al. 2014). Indeed, sniffing can be reflexively elicited by chemicals and nonchemical stimuli (Mainland & Sobel 2006: 188). Therefore, our olfactory system is constantly sampling our surroundings even when we are not aware of it (Wachowiak 2011).

Smells as affective perceptions

«Smells are surer than sounds or sights to make your heart-strings crack» (Kipling 1903: 191). The opening verses of Rudyard Kipling's poem Lichtenberg beautifully describe the rich interplay between smell and emotion. Their intimate relationship can be intuitively recognized by everyone: we rejoice at the peacefulness induced by the floral breeze of May, whereas we are alarmed when we sense a burning smell coming from the kitchen. The interconnection between olfaction and emotion is so close that it is cross-culturally recognized (Ferdenzi et al. 2013a; 2013b). What is more, a wide array of neuroscientific evidence has confirmed the intuitive evaluation made by people worldwide: it is no coincidence that we tend to relate the sense of smell with emotional experiences as they share vast areas of brain networks, such as the amygdala, the insula, the hippocampus, the anterior cingulate cortex, and the orbitofrontal cortex (Soudry et al. 2011; Mohanty & Gottfried 2013). This interconnection runs so deep that it constitutes olfactory perception themselves. In what follows, to draw on the previous examples, I intend to show that the peacefulness induced by the spring breeze and the state of alarm caused by the burning smell are not emotional reactions causally triggered by the perceived odors, rather they are intrinsic features of the percepts themselves.

An interesting starting point to begin this investigation is wintergreen mint (methyl salicylate). Nowadays, its icy flavor is beloved in Western countries and it is fairly easy to find this flavor in candies, popsicles and other sweets that delight kids and adults alike. However, its popularity was not always so widespread. Albeit it was one of the most popular smells in the USA during the 1970s (Cain & Johnson 1978), it was one of the least liked in the UK during the 1960s (Moncrieff 1966). This may be related to the fact that, while in the USA wintergreen mint was solely used in candies, in the UK it was the fragrance of analgesic ointments used during World War II (Herz 2011). A similar case regards eugenol, an odor emitted by dental cement. It has been ascertained that people who had bad experiences with dentists find the scent of eugenol unpleasant, whereas people who did not have bad dentist experiences treat it as neutral (Robin et al 1998). Thus, it appears that personal experience might alter the hedonic valence of the odor we perceive and that the very same odor can be perceived as pleasant or unpleasant on the basis of prior association.

To investigate this phenomenon, Herz and von Clef (2001) carried out an interesting experiment. They presented participants with several labeled vials containing different

chemicals and they asked them to sniff the odors, rate their pleasantness and give a brief description of them. Unbeknownst to them, vials labeled differently contained the same chemical compounds. For instance, menthol was presented either as "breath mint" or "chest medicine", I-B acid was labeled as "parmesan" or "vomit" and so on. Participants tended to use different descriptors when talking about the same odors and their pleasantness evaluation was heavily influenced by the linguistic label. For instance, menthol in the "chest medicine" condition was considered as unpleasant while in the "breath mint" condition was regarded as pleasant. This experiment proves that contextual influence (in this case a verbal label) primes specific affective expectations that influence the hedonic evaluation of the odors.

A similar effect is generated by contextual sensory cues. In an ingenious study, Morrot, Brochet, and Dubourdieu (2001) asked participants (54 enology undergraduate students) to describe the odor of some wines. The wines were either white or red but, unbeknownst to the participants, part of the white wines was colored with an odorless artificial red dye. When participants had to describe the smell of the artificially colored white wines, they describe as if they were red wines, not white! But novice tasters are not the only ones to fall into this trap. Parr, White, and Heatherbell (2013) employed a similar deceitful mechanism to test wine connoisseurs (sommeliers, winemakers, and wine marketers). They served them red wines, white wines, and artificially colored white wines. The wines were poured either in clear or dark glasses. Parr, White, and Heatherbell verified the similar illusory effects highlighted by Morrot, Brochet, and Dubourdieu. However, when served wines in opaque glasses, the participants performed better than when using clear glasses. This means that seeing the color of the wine induced expectations on the aroma they were about to perceive that, in return, influenced their description. Does this mean that the olfactory experience was shaped by the color? To further investigate the matter, we need to turn to neuroscientific experiments.

In 2005 a team led by Ivan de Araujo and Edmund Rolls carried out an fMRI study (de Araujo et al. 2005). In this experiment, participants sniffed a particular odor: isovaleric acid with cheddar cheese flavor, a pungent odor and one of the main components of the sweaty food odor. The odor was presented to the participants as either "cheese odor" or "body odor". When it was smelled as "body odor" it was rated significantly more unpleasant. Interestingly, this rating was correlated with a different brain activation: the anterior cingulate cortex and the medial orbitofrontal cortex showed increased activation when participants believed they were smelling "cheese odor". As we saw in the previous chapter, the medial orbitofrontal cortex is

linked to the endocrine and autonomic systems and leads them to induce specific bodily changes that contribute to the evaluation of the stimuli and activate specific action tendencies on the basis of prior experience (Barrett & Bar 2009). Therefore, the evaluation of pleasantness is not a mere cognitive judgment. In the case under scrutiny, there are two different perceptual experiences carried out on the basis of prior experience and affective anticipations that impinge on bodily states.

The medial orbitofrontal cortex is not the only cortical area that mediates the affective properties of olfactory stimuli. Research carried out by Jay Gottfried's lab ascertains the existence of olfactory predictive templates in several areas involved in odor perception which include, besides the orbitofrontal cortex, the anterior and the posterior piriform cortex. According to their research this network of anticipatory processes «represents a plausible unifying mechanism to explain the widespread modulatory effects of imagery and context on how an odor is perceived» (Zelano, Mohanty, & Gottfried 2011: 185).[24]

But how should we understand the interlacement between cognitive and perceptual processes? These phenomena are usually explained as the deployment of internal knowledge via an implicit inferential mechanism. This interpretation conceives of smells as theory-laden perceptions that acquire meaning after, or in virtue of, the employment of some held belief. By following Orlandi's suggestion (2014, chap. 4), I think that it is more useful to explain these phenomena as the resultant of context-sensitivity rather than cognitive penetration. Context sensitivity is the resultant of the co-variation of neural, bodily, and environmental processes. If we regard these elements as being interlaced factors of the dynamic of an enacting system, we do not have the need to postulate the existence of inferential processes that confer meaning to the elements of the processes. Conversely, we can conceive of living beings as sensitive to certain environmental features in virtue of their genetic endowment and past experiences. And it is precisely in virtue of such sensitivity that the chemical properties of the environment are shaped in a peculiar way. As a result, the significance of the smells we perceive does not derive solely from their chemical properties but it is also influenced by the affective patterns, perceptual skills, bodily states, and other co-occurring environmental stimuli: this complex orchestra of elements concurs in shaping and conferring meaning to the current olfactory experience.

[24] A similar mechanism in present also in the visual system. For instance, V1 neurons anticipate learned rewards. As a consequence, the affective component of visual stimuli cannot be regarded as a subsequent addition to the perceptual experience but it is rather part and parcel of the visual experience itself (Shuler & Bear 2006).

Prior experiences do not shape only higher-order processes of the brain; they can influence and impact basic perceptual processes as well. This is shown by the fact that cortical processes are not the only ones involved in affective olfactory expectations. A growing amount of evidence is pointing to the role played by the olfactory bulb in the affective elaboration of olfactory percepts. As said previously, the olfactory bulb is the first stage of olfactory processing and endows the olfactory percepts with an initial affective imprint.

First of all, it is well-known that the olfactory bulbs receive inputs from cortical areas that modulate the processing of the stimuli in a top-down fashion (Záborszky et al. 1986). Secondly, the olfactory receptors seem to be organized on the basis of emotions strictly linked to specific action tendencies (Haddad et al., 2010b; Mori & Sakano, 2011). For instance, Kobayakawa and colleagues (2007) produced a mutant line of mice that lacked the receptors usually activated by spoiled food: such mice failed to show the innate response for those odors even though they were able to detect them. Hence, a mechanism to encode emotional valence and action tendencies appears to be deeply engrained in the olfactory system from an early stage of processing. Moreover, this shows that the olfactory receptors do not merely decode the chemical features of the molecules but respond to them on the basis of their biological salience. The nauseating odor produced by spoiled food is due to the decarboxylation of free amino acids caused by bacteria enzymes and by the fatty acids produced by lipid oxidation (Dielenberg & McGregor 2001). In mice's olfactory bulb there is only one area of receptors processing this kind of odors, whether produced by fatty acids or by amines, whose molecular structure is quite different. This shows that the receptors are not solely sensitive to molecular structures but also they play a crucial role in encoding the emotional valence and the relative action tendency.

The bulb is also constitutively shaped by the olfactory experience one has over the course of one's own lifetime (Freeman & Schneider 1982; Mandairon & Linster 2009). In point of fact, several experiments show that simple variations in olfactory experience modify the neural patterns of the bulbar neurons. For example, simple exposure to odors influences the way in which neural cells respond to future stimuli (Fletcher & Wilson 2003). These modifications are crucial in fine-tuning the perception and in guiding associative learning and developing odor specific responses. Our brain plastically changes to influence the way we will perceive the next stimuli based on prior experience. It is important to highlight that this kind of association is crucially related to emotional responses. When rats are conditioned to associate a neutral odor with an electric shock the neurons of the olfactory bulb plastically change to

endow the odor with a fearful aura since the earliest processing (Kass et al. 2013). This shows that the learned emotional processing of odors happens before cortical processing. Hence, the emotional association of the odor is not an additional feature that is added to a percept already produced, as if it was an hedonic layer superimposed to an already structured perception. Quite the contrary, it is reflected in the very first stage of neural processing which shapes the kernel of the percept itself. In other words, our previous experiences allow us to detect relevant relational contingencies that might help us to engage with a novel situation. By following Gallagher, we can state that «perceptual processes at the subpersonal level are already shaped, via mechanisms of plasticity, by bodily and environmental (including social and cultural) factors and prior experience. […] social and cultural factors have a physical, plastic effect on brain processes that shape basin perceptual experience and emotional responses» (Gallagher 2007a: 122-123). Therefore, odors are not perceived differently because we entertain different beliefs and, via our reasoning, we modulate their features. Rather, they are processed differently because past experiences have shaped our brains and bodies in unique ways leading us to develop different sensitivities.

From these examples, one might think that this kind of anticipatory mechanisms can bear negative consequences to living systems since they distort their perceptions and do not allow them to perceive the world "correctly". This worry, however, holds only if one believes that the focus of perception is an accurate depiction of the external reality. According to such a view, molecules are the perceptual objects of olfaction, i.e. what we "smell is external matter". Thus, the molecular compounds which trigger our perception are the objects of smells, namely the olfactory percepts. Benjamin Young formulated the most recent version of such an account. He proposes that smells are «three-dimensional molecular structure of chemical compounds diffused in odor plumes» (Young 2016: 8). In this model, each olfactory quality can be explained on the basis of the molecular structure of the chemical compounds which bind to the organismic receptors. However, from an ecological perspective, the perception of the molecular structure of the chemicals does not appear to be useful. What would be the ecological advantage to know the chemical structure of an odor? We have developed expensive and quite complicated technological instruments that allow us to ascertain the chemical structure precisely because our olfactory system cannot do that job. What our olfaction allows us to do is to perceive relevant properties of our surroundings: whether a prey or a predator is close to us, whether we are moving towards a dangerous sulfur area, whether the food we are about to eat might be ripe or rotten, whether we are approaching a potential mate or likely rival,

and so on. Moreover, the system needs to be sensitive to both our past encounters and our present state, in order to optimize our engagement in relation to the environmental features that are particularly relevant right now because of our present situation and that proved to be particularly important in our past. Therefore, if we conceive of perception as enslaved by action, the worry of perceiving illusory smells disappears.

To conclude, our olfactory perceptions should not be understood as mere passive representations of chemical information. Conversely, they have to be grasped on the basis of the continuous engagement an organism has with the world. This vision resonates well with Walter J. Freeman's (2000b) theory. According to him, our experience is modeled on the basis of our previous interactions with the environment. In his model, the brain is regarded as a nonlinear dynamic system influenced by myriads of factors. Therefore, it is impossible for a stimulus to steadily induce the same effect. Stimuli are always encountered by an organism that is already active and, thus, their effect will depend on the current state of the organism as it encounters them. This happens because our brain plastically changes every time we perceive new odors. These changes are a function of both the chemicals we encounter and the situation within which we encounter them. This does not mean that the odorants are to be completely disregarded in our analysis. Much research proved that the chemical features of the molecules do play an important role in our olfactory experience (e.g. Keller et al. 2017). However, the final percept is structurally influenced by contextual features, the past history of the agent, and its internal state. Hence, the same chemical molecule, perceived in the same moment, by two different agents, can give rise to two different olfactory experiences. Or that the same agent can have two different olfactory experiences if she encounters the same molecules in two slightly different conditions. As Freeman notes,

> a sensation from an odorant does not create a pattern in the brain that is fixed and stored away in a memory bank. Instead, I have observed that brain activity patterns are constantly dissolving, reforming, and changing, particularly in relation to one another […] a sensory stimulus from an object does indeed induce the formation of a pattern in the brain, but when it is given repeatedly it does not induce precisely the same pattern in the same brain, let alone in any other brain. This is to be expected, because not only does the same object mean different things to different people, its meaning for the same person is continually shifting (Freeman 2000b: 22).

What is more, the agent is part of the situation itself, and, changes in its olfactory surroundings induce a change in its affordance space. In fact, odors seem to influence the

relevance of certain affordances, either directly or indirectly, by changing our moods and our response to the action opportunities offered to us.

Smells in the affordance space

In the last section, I aim to explain how odors shape our relationship with the affordance space we inhabit. As I explained in the previous chapter, the environment offers us several opportunities for action called affordances; thus our surroundings can be conceived as an affordance space. Within the affordance space, each affordance can be more or less relevant, depending on our internal state and the situation we are embedded in. The relevant affordances stand in the foreground of the affordance space and solicit our action while the less relevant ones lie on the background and we will oblivious to them. I intend to show that odors can shape our engagement with the affordance space by altering our moods. Moods are slippery entities which proved recalcitrant to a one-size-fits-all definition (Stephan 2017). They can range from transient states – e.g. a grumpy state caused by gloomy weather – to deep long-lasting feelings – e.g. a state of personal despair provoked by a failed marriage. In what follows I will be concerned only with "shallow moods", that is «moods that are elicited by organismic and/or environmental conditions» (Stephan 2017: 1492). These elicitors exert a transient influence on us that may be sufficient to cause a shift in our affordance space.[25]

An important feature of moods is their "pre-intentionality". As Matthew Ratcliffe (2008) highlights, moods are pre-intentional, they are not directed towards a specific element of the world, rather they influence the way in which we relate to it. This is a crucial difference between emotions and moods. For instance, when I am angry I usually direct my anger towards given objects or events (e.g. the player of the team that misses a penalty kick). On the contrary, when gloomy weather makes me grumpy I am not grumpy towards something in particular. Still, the grumpiness affects the way through which I relate to the world: I might be easily irritated by feedbacks received from a colleague which I would have found helpful on a sunny day. Moods are crucially related to our situatedness within the world, they shape the topology of our affective space and influence the likelihood of enacting certain kinds of emotional episodes or perform certain actions (e.g. when I am depressed I am more likely to face a challenge with

[25] However, if the organismic or environmental condition endures across time the mood can last longer. For instance while a brief episode of allergy may cause a transient discomfort and numbness, a long-lasting hay fever can induce a prolonged state of irritability.

hopelessness than grit). Therefore, a mood can be described as a «specific mode of experiencing various events» (Colombetti 2014: 80). The mood, from this standpoint, frames the way I experience events or objects. If I am depressed I will regard the world as a flat space that affords no possibilities for meaningful interactions, whereas if I am cheerful I will encounter the world with a cheery disposition and my lightheartedness will transform what could have been a nasty remark into a slight hitch.

Odors are among the environmental factors that elicit shallow moods. For instance, floral odors seem particularly effective in improving one's own mood as they reduce anxiety (Chioca et al. 2013) and depression (Komori et al., 1995). Moreover, people who wear floral fragrances report more positive moods than control groups (Schiffman, Suggs, & Sattely-Miller 1995) and the sole presence of floral odors enhances pro-social behavior (Haviland-Jones et al. 2013). Indeed, over the ages, humans have consistently relied on flowers to induce positive moods (Classen, Howes, & Synnott 1994).

Before moving on, an important caveat is in order: albeit shallow moods can be transient and short-lived (like the irritable state one experiences when feeling the pangs of hunger), they do not arise out of the blue. It is not that odors lingering in the air move us away from an unaffective state by instantiating a given mood. Rather, we are always in a specific mood through which we experience our surroundings. The odors elicit a shift in our mood that can still be influenced by the background mood that we have on a given day or in a given period of our life. As Stephan explains, «manifest moods are always the amalgam of all effective moods […] Hardly ever one single factor dominates so strongly that the mood it elicits is experienced in an unmixed way» (Stephan 2017: 1492). Therefore, odors appear to impact our moods and, as a result, they modify our relationship with the surrounding: they allow or enhance certain experience of directedness towards the world.

To investigate this matter further, let's start with some experiments carried out in a shopping mall. In these cases, the researchers attempted to bring about prosocial behavior by inducing a positive mood through pleasant food odors. In a shopping mall, confederates tested the willingness to help of unaware passers-by by approaching them near cookies shop, coffeeshops or non-scented shops located in an almost odorless part of the mall. The experiments tested the participants in two different conditions. In the first condition, confederates directly approached passers-by asking them to change 1$ in coins. In the second

condition, confederates "accidentally" dropped a glove and it was recorded how many passers-by picked it up. In both cases, participants were much more likely to help the confederate when s/he was close to shops emitting pleasant odors, such as bakeries and coffee-shops (Baron 1997; Guéguen 2012). In the cases under examination, the pleasant smells of freshly baked pastries, induced in the passers-by a positive inclination towards the various events that were happening. Thus, they were more inclined to view the glove laying on the ground as an occasion to help a fellow human being than as an indifferent object lying on the ground. Surrounded by the pleasant aroma of fresh bakery, the passers-by experienced the fallen glove as affording the possibilities to help a fellow human being. A possibility of engagement that is hidden when no pleasant odor is lingering in the air, is revealed when the fragrant aroma of roasted coffee is lingering in the air.

It might also be interesting to investigate this kind of effect by employing different odors. As I explained in Chapter 1, odors can elicit specific moods, that are not solely related to general pleasant or unpleasant states (Delplanque, Coppin, & Sander 2017). In the case under scrutiny, food odors can have an appetizing effect[26] and thus can lead subjects to rush towards food shops or away from confederates, thus rendering them oblivious of opportunities for social interaction. Albeit the researches do not address this issue, in my opinion, the two studies were able to indirectly control for the appetizing effect in two different ways. In Baron's study the experiment was carried out during late morning (11-12 AM) and early afternoon (2-4 PM) mainly to investigate the matter in situation of moderate shoppers traffic. This can have averaged out the appetizing effect. In fact, while in the morning condition lunch hour is approaching and it is likely that shoppers might be more driven by food odors to grab a snack, in the early afternoon case passers-by's stomachs are likely to be full and as a consequence the appetizing effect of food odors might be diminished. Furthermore, in Guéguen's study confederates were explicitly instructed not to approach passers-by that were standing in front of any shops, thus ruling out interactions with shoppers motivated to enter a food shop to grab something to eat.

However, these considerations are speculative and it might be better to scrutinize other research that investigated the relationships between ambient odors and prosocial behavior. An interesting case regards a study carried out in different clubs to test the impact of different fragrances on the dancers. In fact, one of the problems experienced by several clubs after the

[26] I will delve into this issue in Chapter 4.

banishment of smoking in public spaces was the lack of a fragrance that could hide the malodor produced by the sweaty bodies of the dancers. Therefore, the researchers wanted to verify whether pleasant ambient odors could improve the dancers' experience. In this study, on some nights of the week, different fragrances (orange, seawater, and peppermint) were pumped in the dancefloor at a concentration that would make them noticeable but not too evident. When the ambient odors were sprayed over the dancefloor, the club-goers reported a better mood and an overall more positive experience. Moreover, they said they enjoyed the music more and showed and enhanced dancing activity (Schifferstein, Talke, & Oudshoorn 2011). Therefore, it seems that the presence of pleasant odors impacts people's moods in a significant way thus altering their engagement with the surroundings.

This effect does not occur only for prosocial behaviors but for consumers' experience too. Marketing research shows how mood shifts induced by certain scents can have an important impact on how people relate to their surroundings. In one study a pleasant odor was funneled through the air conditioning system of a clothing store to verify the effects it had on consumers who, when leaving the shop, were asked to fill out a questionnaire. When the odor was sprayed the customers reported a more pleasurable experience, they stayed for longer in the shop and spent more money than controls (Morrison et al. 2011). A similar effect has been registered in casinos: when ambient scents were sprayed people tend to stay longer and increase their gambling activity (Hirsch 1995).

However, since moods contribute to shaping our attunement with the surroundings, we should expect that ambient odors' effect will be higher for people who are "out of tune" with respect to their situation. For instance, if an odor is sprayed in a shop to improve customer's experience and induce them to spend more money, its effect will be stronger on the customers who have less shopping motivation. This is precisely what was found in a study on scents' effects on consumer experience (Doucé & Janssens 2013). As in the research described above, an ambient scent was diffused in a fashion store to verify its influence on shoppers' behavior. The researchers ascertained that «the presence of a pleasant ambient scent had no influence on customers with high hedonic shopping motivation. However, the presence of an ambient scent had an unexpected positive influence on pleasure, evaluation of the store environment, and evaluation of the products of customers with low shopping motivation» (Doucé & Janssens 2013: 230). The induction of a mood aimed at increasing shopping behavior will have little effect on a person that is already shopping-oriented. Conversely, curious passers-by might be

more affected by the same odor as it can shift the way they engage with their surroundings by influencing their openness towards the display items which will solicit a "buy-me" experience.

As these studies show, odors influence our relationships with the surroundings whether we are conscious of their presence of not, whether we link them to our current affective state or not. In fact, while in the examples described above the passers-by could have aware of the presence of food odors, it is extremely unlikely that they were able to link them to their helping behavior.

A theoretical proposal that might be useful to ponder on this issue is the search-engine hypotheses, formulated by Jeannette Haviland-Jones and colleagues (Haviland-Jones & Wilson 2008; Haviland-Jones, Wilson, & Freyberg 2016a). According to them, the olfactory system might be viewed as a search-engine that monitors the salient changes taking place around us by modulating our affective responses. As a result, we are granted an unconscious match-mismatch system that continuously correlates information coming from different sensory modalities. This system is always attempting to associate stimuli by both confirming learned association or making new ones. Therefore, we should expect that the effect of odors are stronger when the person experiences congruent stimuli. This is precisely what has been verified by marketing research. In a bookshop, the employment of chocolate ambient scents increased the amount of money spent by visitors for only books related to the odors, e.g. cooking or baking books (Doucé et al. 2013).

This hypothesis can also help us to explain how undetected odors influence our behavior if they have been experienced before. In fact, scents trails lingering in the background can be undetected either because we are unaware of them or because their intensity is too feeble to be consciously processed. In both cases, they can prompt in us specific bodily states that can lead us to perform specific actions or experience certain feelings. However, since we do not normally associate odors to the solicitors of our behavior or of our emotions, we fail to attribute any causal role to them. To make an example, imagine to walk into a shopping mall, a fragrant sandalwood scent crosses your way without catching your attention. However, its brief presence was strong enough to induce you in a positive mood that leads you to think of the pleasant chamber music concert you attended yesterday. If you now bump into a friend of yours that asks you why you have a smile on your face, you will likely to tell her about the concert. You will hardly link the fond memory of the concert with the sandalwood scent

emitted by the dispenser of the clothing shop you have just walked by even if it was the same odor that embellished the theatre hall where you went last night.

It might appear an *ad hoc* example, but there are several documented cases of the subconscious effect the odors have on us. When a particularly negative experience is associated with an odor, the subsequent experience of that odor can elicit an unpleasant emotional state. These states can have several intensities depending on the situation's criticality. In a mild situation, where odors are paired with a frustrating task, they can be associated with that thwarting condition, and, thus influence subsequent cognitive tests. This was attested by a study that involved 5-year-old children. They were asked to solve an impossible maze-task that highly frustrated them while the room was sprayed with an unfamiliar scent. After failing the task they were brought in another room where they had to find 20 puppies missing their tales on a sheet containing 120 drawings of animals (Epple & Herz 1999). When the room was scented with the same smell present during the frustrating task, the children got worse results on the test. The odor associated with the previous frustrating task evoked a discouraged mood and led to decreased motivation. The same effect occurred with college students (Herz, Schankler, & Beland 2004).

This kind of association can induce more serious consequences as well. In an experiment, participants were made inhale carbon dioxide, which causes hyperventilation, mixed with eucalyptus oil. Subsequently, when exposed to the eucalyptus odor they started to hyperventilate even several days after the first exposure (van den Bergh et al. 2006). What is more, such associative learning is at the basis of breakdowns linked to Post Traumatic Stress Disorders. Olfaction, in fact, can be a traumatic reminder of a distressing experience lived in the past. For instance, a Vietnam veteran associated the smell of diesel and burning rubber with the devastating war memories. These odors were able to elicit intrusive thoughts and memories that made him «feel uncomfortable, nauseated, and sometimes guilty» (Vermetten & Bremner 2003: 203). He was aware of this effect and he intentionally avoided places where he could encounter these odors.

The intimate relationship between smell and emotionally-laden memory was brilliantly captured by Proust in his *Swann's way* (Proust 1992). The main character is having tea with madeleine, little shell-like cakes. The savor induces in him a profound emotional experience:

> No sooner had the warm liquid mixed with the crumbs touched my palate than a shiver ran through me and I stopped, intent upon the extraordinary thing that was happening to me. An exquisite pleasure had invaded my senses, something isolated, detached, with no suggestion of its origin. And at once the vicissitudes of life had become indifferent to me, its disasters innocuous, its brevity illusory—this new sensation having had the effect, which love has, of filling me with a precious essence; or rather this essence was not in me, it was me. I had ceased now to feel mediocre, contingent, mortal. Whence could it have come to me, this all-powerful joy? I sensed that it was connected with the taste of the tea and the cake, but that it infinitely transcended those savours, could not, indeed, be of the same nature. Where did it come from? What did it mean? How could I seize and apprehend it? (Proust 1992: 60-61)

This short description has been heralded by folk wisdom as a testimony of the capacity for olfaction to open a gate to the past as if odors were granted with a sort of time-travel capacity. However, if we carefully read the Proust's words we can see that they do not entail that odors can recreate a vivid autobiographical memory. In point of fact, the character is struck by an emotional experience coming from the past that he struggles to comprehend. He tries several times to investigate the nature of this sensation: he tries to focus attentively to his inner feelings and he sips the tea more than ten times to evoke a more vivid image of the past but he is not able to recognize the exact source of that feeling. He is at the point of giving up when «suddenly the memory revealed itself. The taste was that of the little piece of madeleine which on Sunday mornings at Combray (because on those mornings I did not go out before mass), when I went to say good morning to her in her bedroom, my aunt Léonie used to give me, dipping it first in her own cup of tea or tisane» (Proust 1992: 63).

As Jaquet (2010: 131-142) highlights in her reading of Proust, albeit olfactory sensations are able to bring to life meaningful emotional experience from the past, «l'odeur et la saveur sont comme des esprits dormants qui s'éveillent involontairement, elles ne ressuscitent pas pour autant le monde ancien tel qu'il a été vécu; elles ne permettent ni de revivre le passé ni de rattraper le temps perdu» (Jaquet 2010: 182).

This is made clear by another passage of *Swann's Way*

> suddenly a roof, a gleam of sunlight on a stone, the smell of a path would make me stop still, to enjoy the special pleasure that each of them gave me, and also because they appeared to be concealing, beyond what my eyes could see, something which they invited me to come and take but which despite all my efforts I never managed to discover. Since I felt that this something was to be found in them, I would stand there motionless, looking, breathing, endeavouring to penetrate with my mind beyond the thing seen or smelt (Proust 1992: 252).

All sensory impressions for Proust are able to revoke meaningful memories from the past. However, «l'odeur et la saveur occupent une piace privilégiée et éclipsent la vue qui reste trop associée à la mémoire volontaire» (Jaquet 2010: 184). Therefore, albeit odors do seem to be more intimately connected with one's own autobiographical memories than other sensory modalities, they do not appear to provide a sensorial time travel, as folk wisdom sometimes has it. Rather, they appear to induce more easily strong emotional sensations connected with events of one's own past that need careful reflection to be fully relived. Interestingly, this understanding has been recently confirmed by several studies that show how odors allow participants to produce more emotional autobiographical memories than other senses (Chu & Downes 2002; Herz 2016).

The search-engine hypothesis suggests that these kinds of associations are more common than we usually think of. The scents trails lingering around us are crucial components in instantiating affective states, chains of thought or overt behaviors, at least more than we usually credit them for. According to this theory, olfaction is at least as much about identifying odors as it is about influencing our affective responses and attuning us to the external environment. For instance, participants unknowingly exposed[27] to citrus-scented cleaner identified cleaning-related words faster in a linguistic identification task. Moreover, they reported more related cleaning activity when asked to describe their daily activity. Finally, when asked to eat a crunchy biscuit they kept their table cleaner and removed more crumbs than the control group (Holland, Hendriks, & Aarts 2005).

So far, we have dealt with cases of minimal awareness: situations in which the stimuli are strong enough to be consciously processed, but are usually not consciously registered or no attention is paid to them. Olfactory minimal awareness is fairly common, as Keller underscores, «with almost every breath we inhale air containing odors at relatively high concentration; yet olfactory experiences are very rare» (Keller 2011: 9). For instance, most of the time, we are not conscious of how the area in our surroundings smells, even though there are enough odor molecules to activate a conscious olfactory experience. Most of the time, the olfactory stimuli are processed unconsciously, and we become aware of them only when we pay close attention to them (Köster 2002). For instance, albeit our house has a peculiar scent (and even each room smells differently), we are usually unaware of it. But when we go to our friends' houses we immediately notice their signature scent (Keller 2011). In fact, reliable continuous encounters

[27] After the experiments they were asked to complete an awareness test and they failed to identify the odor.

with an odor decrease the likelihood of having a conscious experience of that odor. This is a form of sensory adaptation, that in olfaction is particularly prominent. In fact, olfaction leads to complete habituation. Even strong odors fade away from our consciousness after a few minutes of conscious experience (Dalton & Wysocki 1996). This phenomenon is confirmed by neuroimaging studies that show different brain activity after 9 or 60 seconds to the exposure to odors. The study showed that the initial exposure produces an increase in brain activity and that 20 secs after there is a return to baseline (Poellinger et al. 2001). Habituation is crucial for the usefulness of olfaction: once we habituate to the environment's odor, we are able to detect novel odors and thus able to react promptly. Why does this happen?

A good answer is provided by the Misfit Theory of Spontaneous Conscious Odor Perception (Köster, Møller, & Mojet 2014). According to this theory, the odors that we consciously perceive are those «that do not fit our memory-based expectations, either because they deviate from the normal odor in that situation or by being particularly "good" or "bad" are spontaneously and consciously remarked in normal everyday life» (Köster, Møller, & Mojet 2014: 1-2). We consciously perceive odors in two cases: 1) if there is a misfit with our expectations of the situation we are embedded in; 2) when an odor acquire a new affective value in relation with the internal state of the agent (because it is hungry, fatigued, and so on). Conscious olfactory processes happen when we encounter novel or particularly relevant odorants: a rancid stench coming from the corner of a street that signals us a potentially nasty encounter or the fragrant aroma of a freshly baked pizza that invites to buy a slice. This might have an economic and evolutionary reason: to save overt attention resources to perform other functions and perceive novel odors. Olfactory conscious experience can thus be conceived as «a form of "perception by exception" guided by olfactory memories via the expectations about the odors in the situation» (Köster, Møller, & Mojet 2014: 2). This means that the effects of the odor are not completely odor-dependent, but that they are tightly linked to the situations. As Köster and colleagues highlight, «odors are probably not meant to be identified. They are the silent emotional reminders of the surroundings and situations with which they are linked by unconscious association and they are powerful evokers of the feelings that belonged to these events» (Köster, Møller, & Mojet: 7). This does not mean, however, that our olfactory system is often shut down. Conversely, it is constantly sampling the environment: it reacts to the different scent trails around us by altering our affective state and the affordance space around us. This should not come as a surprise since olfaction is an evolution of the chemical senses

that allowed primordial forms of life to enact a meaningful environment without being phenomenally aware of it.

This observation leads to an important question: is it possible that smells can be perceived unconsciously? That is, is it possible that smells too feeble to produce an experience granted with a phenomenal character, an experience that feels like something, are still able to influence our behavior and modify our relationship with the surrounding environment? They would be instances of unconscious perception, a kind of process that is present in all of the sensory modalities (Prinz 2015). Several studies have investigated this matter by focusing on so-called perithreshold odors, namely odors that cannot be discriminated from unscented air (Castellanos et al. 2010). The fact that odors can exert an influence on us even if they cannot be consciously processed is proved by neuroscience research: undetected odorants activate the olfactory epithelium (Hummel, Mojet, & Kobal 2006) and several cortical areas (Sobel et al. 1999). A similar effect is present in the autonomic system. In fact, perithreshold concentrations of jasmine tea and lavender scents decrease heart rate and increase parasympathetic system activity. As a result, undetected odors can induce bodily relaxation that, in the case of jasmine tea, is so strong to lead people to self-report a reduction of anxiety (Kuroda et al. 2005). This effect can have cognitive and behavioral consequences. For instance, when people are asked to write about personal events with a perithreshold floral odor (rose or gardenia) lingering in the background, they are more likely to use positive connoted words like "happy" "enjoy" "fun". Along the same lines, undetected floral odors improve the likelihood of approaching a stranger, getting closer to him or touching him (Haviland-Jones et al. 2013).

What is more, it appears that undetected odors orchestrate different affective reactions than conscious ones. The fact that odors can have a specific emotional effect when not consciously perceived is well-known by the perfumers. Indeed, they keep the concentration of certain odorants at a perithreshold level because their effectiveness is impaired when they are detectable: for example, musk loses its sensualizing effect when consciously detected in fragrance (Köster & Degel 2000). This effect can influence social behavior as well. In an experiment, participants were asked to rate the likability of neutral faces after sniffing a bottle. The bottle could contain different chemical compositions at different intensities (subthreshold or suprathreshold): neutral air, pleasant odors, unpleasant odors. Subconscious perception of odorants influenced the rating of the faces, with pleasant odors improving their likability and unpleasant odors reducing it. Interestingly, the conscious detection of odors did not have this

effect (Li et al. 2007). In a similar way, when people are placed in a room with perithreshold cleaning odor lingering in the air, they are more likely to recognize trust behavior in a monetary game by sharing a larger amount of money with other participants. Furthermore, they are also more likely to donate money to a charity or to offer as volunteers (Liljenquist, Zhong, & Galinsky 2010).

To conclude, the olfactory experience is underpinned by several processes (chemical features of the molecules, agent's expectations, and present internal states, other sensory cues, etc.) and each of them has different precedence depending on the situation. As Barwich (2018: 338) stresses smells «are not so much about objects and stable object perception as about changes in the chemical composition of the environment and flexibility in terms of its contextual evaluation. In the course of percept formation, sensory input is filtered and structured by different anticipatory processes. What we perceive is highly dependent on a signal's combination with other sensory cues, previous experiences, and expectations of what options a signal affords». Smells are not a matter of passively encoding action-invariant chemical properties. Conversely, they constantly support the organism's capacity of structuring action-relevant context (cf. Engel, Friston, & Kragic 2015). From sniff to sniff, the nose, the brain, and the body constantly reshape our engagement with the smellscape that surrounds us. As a result, olfactory experiences are unique to the history of each individual. They are structurally endowed with a personal meaning that «depends on the entire history of an animal […] The meaning is shaped by the present context, which is provided by the senses of the body and the world under limbic control» (Freeman 2000b: 114). Therefore, olfactory perception highlights how an agent relates to the world on the basis of its own present state and its prior experience. It discloses the constitutive features that allow the subject to engage with its environment. It shows how perception, cognition, memory, imagination, and affective states are deeply intertwined in the enaction of the *Umwelt*.

Conclusions

In this chapter I discussed the intimate connection between smell, emotion and action. By borrowing the sensorimotor account on perception, and in light of several empirical research, I highlighted how olfaction is crucially dependent on the act of sniffing to deliver phenomenal experiences. Sniffing thus can be viewed as a sophisticated motor skill that allow us to sample the world. Moreover, thanks to the sensorimotor account we can investigate perception from a

diachronic perspective: perceptual experience dynamically unfold as the agent interact with the environment. From this point of view, by navigating within the world we are able to perceive the smell as extending through space in different intensities and to follow scent trails by employing a skillfull sampling behavior. Odors can affect us unconsciously as well. Most of the time, we are not conscious of being surrounded by odorants, still much empirical research showed that they can evoke feelings and affect our cognitive and behavioral responses. Thus, our olfactory system is constantly sampling the environment and the scent trails surrounding us alter our affective states and the affordance space we perceive. Smells do not merely provoke an emotional reaction in the organism, rather they are modulated by its current affective state and expectations. The olfactory experience is underpinned by several processes (chemical features of the molecules, agent's expectations, and present internal states, other sensory cues, etc.) and each of them has different precedence depending on the situation. As Barwich (2018: 338) stresses smells «are not so much about objects and stable object perception as about changes in the chemical composition of the environment and flexibility in terms of its contextual evaluation. In the course of percept formation, sensory input is filtered and structured by different anticipatory processes. What we perceive is highly dependent on a signal's combination with other sensory cues, previous experiences, and expectations of what options a signal affords». Smells are not a matter of passively encoding action-invariant chemical properties. Conversely, they constantly support the organism's capacity of structuring action-relevant context (cf. Engel, Friston, & Kragic 2015). From sniff to sniff, the nose, the brain, and the body constantly reshape our engagement with the smellscape that surrounds us. As a result, olfactory experiences are unique to the history of each individual. They are structurally endowed with a personal meaning that «depends on the entire history of an animal […] The meaning is shaped by the present context, which is provided by the senses of the body and the world under limbic control» (Freeman 2000b: 114). Therefore, olfactory perception highlights how an agent relates to the world on the basis of its own present state and its prior experience. It discloses the constitutive features that allow the subject to engage with its environment. It shows how perception, cognition, memory, imagination, and affective states are deeply intertwined in the enaction of the *Umwelt*.

Chapter 4 - The role of smells in food experience: disgust, hunger, and aesthetics

Introduction

In a prominent review, Richard J. Stevenson (2010) singles out three functions played by human olfaction: individuation and ingestion of food; avoidance of environmental hazards; social communication. In this chapter, I deal with the first two functions in relation to food behavior.

First, I examine how smell helps us to detect bad odors in the environment. In so doing, smell allows us to avoid potential sources of contamination and to discern potentially dangerous food. I focus most prominently on olfactory disgust and I highlight both the bottom-up and top-down processes involved in this affective state. In particular, the enactive approach allows me to explain how disgust is brought about by the complex intertangling of several brain and bodily processes that impinge on the individual's past experience.

Second, I investigate how olfaction influences feeding behavior. Our relationship with food is modulated by the dual nature of olfaction. On the one hand, orthonasal olfaction is a critical modulator of food-related motivational states like hunger and satiety. On the other hand, retronasal olfaction plays a critical role in flavor experience.

Third, I discuss how olfaction does not simply allow coarse affective states merely related to the survival of the individual (e.g. refusal of spoiled food; intake of nutritious one) but it can be considered an aesthetic sensory modality. To make this case, I draw on contemporary aesthetics theory which highlights the crucial role played by attention in aesthetic experience.

Olfactory disgust

You walk towards the fridge to look for something to snack on and, as soon as you open the door, you are faced with an acid whiff emitted by the sour milk carton forgotten there a week ago. In the moment in which you perceive the nasty odor you recoil: your nose wrinkles, your

upper body shudders and retracts in a quick spasm and you feel a retching sensation in your throat and mouth. In other words, you are disgusted. This brief description allows us to pinpoint several aspects of disgust.

To begin with, disgust can be viewed as a survival mechanism that allows us to avoid potential sources of contamination (Curtis & Biran 2001; Curtis 2013), thus fostering our survival and well-being. As Nina Strohminger explains «organisms must balance the need for nutrition against the peril of toxic comestibles […] More generally, organisms must negotiate the value of exploration against the potential danger lurking beneath each unturned stone» (Strohminger 2014: 478). Disgust achieves these functions by rejecting its source (Korsmeyer & Smith 2004). The elicitors are perceived as offensive and the mere fact of being in their proximity is disturbing.

Its aversive nature is clearly shown by the behavioral response it elicits: disgust prompts a withdrawal mechanism that leads the organism to distance itself from the object (Rozin, Haidt, & McCauley 2016). The subject is motivated to move away from the elicitor or to get rid of it. The response prompted by disgust is avoidance: when we are disgusted we want to avoid any contact with the disgusting object, whether this involves seeing it, smelling it, touching it, hearing it, or tasting it.

In particular, as regards olfaction, the perception of a foul odor signals that an unpleasant violation of the border of your body has taken place. Whenever we smell an odor we incorporate small particles emanated by an alien body. This is of crucial importance as one of the functions of disgust is to protect the boundaries of the self from the external environment (Rozin, Lowery, & Ebert 1994; Miller, 2004). If a nasty smell is perceived, it means that it has crossed the body threshold. This point was already stressed by Kant who, in the *Anthropology from a pragmatic point of view*, explains that «filth seems to arouse nausea not so much through what is repugnant to the eyes and tongue as through the stench that we presume it has. For taking something in through smell (in the lungs) is even more intimate than taking something in through the absorptive vessels of the mouth or throat» (Kant 2007a: 269). This idea was further elaborated by Simmel in his *Sociology of the senses*. In his reading, smell entails an incorporation of the odor and gives rise to a feeling of closeness which is unrivaled by all the other senses but taste: «when we smell something, we draw this impression or this radiating object so deeply into ourselves, into our center, we assimilate it, so to speak, through the vital

process of respiration as close to us as is possible through no other sense in relation to an object, it would be then that we eat it» (Simmel 2009: 578). Consequently, the repulsion generated by reek odors is characterized by a «radical and unappealing» quality and they are almost impossible to overcome by other sensory or cognitive instances (Simmel 2009: 579). All of this renders smell «dissociating sense» (Simmel 2009: 579) *par excellence*.

In point of fact, olfactory disgust tends to be quicker and more pervasive than visually triggered disgust. A good example to validate this assumption regards Damien Hirst's famous work *A Thousand Years* (1990). The work consists of two glass and steel containers connected with a pierced glass wall. In one container we find a large white box with several round openings form which flies fly out. In the other one, an insect electrocuting light hangs above a decaying cow's head. The flies fly about, feed on the severed head, lay maggots in it and, eventually, end their life with a zap as they get too close to the electrocuting death machine. This contemporary *memento mori* was a stunt that completely captured the attention of the visitors which could stare at it for hours in utter dismay. Until the putrefaction process went too far and the stench of decay became unbearable (Gallagher 2012). Hirst was then forced to replace the real head with a fake one made of dog food, lard, blood, mayo, and ketchup. As we can see, while the visual disgust elicited by the decomposing head did not stop the visitors to admire Hirst's uncanny genius, the stench of putrefaction was enough to keep them all out of the room. The aversive reaction generated by foul odors has also been confirmed by neuropsychological research which ascertained that foul odors are among the most powerful aversive stimuli (Levine & McBurney 1986). This reaction is specifically related to nasty smells since it appears that people react quicker and have more accurate perceptions of unpleasant odors than pleasant ones (Bensafi et al., 2003; Boesveldt et al. 2010). Similar considerations were outlined by the German phenomenologist Aurel Kolnai. In his seminal treaty *On Disgust*, he states that smell functions as a watchtower, allowing us to keep noxious substances at bay (Kolnai 2004).

However, this hypothesis is debatable. Much research believes that disgusts is primarily linked to taste. Already Darwin (2009: 265) stressed that «disgust is a sensation rather more distinct in its nature, and refers to something revolting, primarily in relation to the sense of taste, as actually perceived or vividly imagined; and secondarily to anything which causes a similar feeling, through the sense of smell, touch, and even of eyesight». Paul Rozin drew on this idea and showed that 1 to 5 years old children do not appear to be bothered by the odor of

feces or decaying substances (Rozin et al. 1986). However, neonates react immediately when they taste sour or bitter substances with frowning and tongue protrusion to expel the product (Chapman et al. 2009). It makes sense to have an innate reaction to food rejection and a heightened sensibility for sour and bitter foods. On the one hand, many toxic plants taste bitter, on the other hand, sour taste might indicate the presence of bacteria in the food we are about to eat (Lindemann 2011).

One of the main reasons that led several scholars to consider taste the primary disgusting sense is linked to human development. While taste aversion is innate, humans develop an aversion towards foul odors only at the end of infancy. According to Rozin, this peculiar development can be explained by the omnivore's dilemma (Rozin 1976). We are a generalist species capable of finding nourishment from a vast array of food items. At the same time, the ability to absorb nutrients from different sources can lead to potential perils as a seemingly juicy berry can easily be a poisonous death trap. Therefore, we need to balance a varied feeding strategy with carefulness for unfamiliar foods. All things considered, it makes evolutionary sense to possess a sensitive period to acquire a specific feeding repertoire. Such a period usually ends at the end of the weaning, when disgust appears to be fully developed (Cashdan 1994). The late development of disgust might allow children to fully acquire the diet of their own group. It is for this reason that children do not have problems in savoring varieties of food compared to adults, besides the ones that are sharply bitter or sour (Stevenson et al. 2010).[28] This can help us to explain why preference for bitter taste (e.g. coffee and vegetables) develops during adolescence. Teenagers have a fully developed immune system and thus have a lower risk of contracting disease by ingesting poisonous foods (Martin 2013: 4). Finally, since olfaction is critical in learning the food repertoire, it also plays a crucial role in "learned taste aversion". In point of fact, we tend to avoid the aroma of food which made us feel sick, as we link that aroma with the unhealthy consequences we suffered. Crucially, the learned aversion is related to the aroma of the food we ingested and it can be induced by a contingent state of nausea. In a famous experiment, children with neoplastic disease were given an ice cream to eat before the treatment of chemotherapy. The ice cream was a novel Mapletoff flavor produced with maple and black walnuts. Four months later, the children were given both the Mapletoff

[28] Our refusal for certain food is not only based on sensorial impressions but also on an ideational component. For instance, many Westerners recoil at the idea of eating certain animals (e.g. insects) or certain parts of animals (offal or giblets). This might be linked to a cognitive repulsion to the ingestion and incorporation of potential contaminating substances (Rozin & Fallon 1987). For an in-depth reflection on the links between disgust and the problem of contamination cf. Rozin et al. 1989; Rozin & Nemeroff 1990.

ice cream and another novel ice cream called Hawaiian Delight and were asked to rate their preferences. Only 25% of them preferred the Mapletoff and generally the Mapletoff ice cream was regarded as significantly unpleasant. This experiment proves that when we link a state of nausea with a given aroma we are likely to develop a refusal for that odor. This learning mechanism has a clear evolutionary value since we are led to avoid food that sickened us in the past.

By reflecting on the studies discussed so far we can flesh out the primacy of disgust along two lines. Taste appears to possess a developmental primacy as it is developed since we are born. Smell possesses a spatial primacy as it immediately triggers a negative reaction when in the presence of foul odors. As Martin (2013: 3) states «smell is the first chemosensory custodian of survival» as it prevents ingestion or contact whereas taste is the «final custodian».

A common idea among scholars is that olfactory stimuli trigger a disgust reaction, that is that the stimuli are perceived as initially neutral. Disgust is regarded as a psychophysical reaction to the stimuli instantiated by a cognitive evaluation of the latter as if the odor was a neutral precursor of the affective experience. Quite the contrary, as highlighted in the previous chapter, in the enactive framework disgusting olfactory stimuli are considered affectively-charged since the very beginning. As stated above, the affective dimension of disgust is not a subsequent addition but rather a structural component of the olfactory percepts. When we smell an unpleasant odor we enter in a state of offensiveness which is perceived as a visceral sense of nausea and retching. Thus, olfactory disgust is perceived not only with the nose but with the whole body. According to the enactive approach, the nauseating feeling arising from your stomach and the involuntary withdrawal executed by your body are not consequential aspects of an evaluative cognitive process. Indeed, they are structural and necessary components of the emotion which is driving you away from the source of the loathsome stench.

This affective process already starts during the first stages of olfactory processing, in the olfactory bulb (Takahashi, Nagayama, & Mori 2004), whose sensory receptors seem to be organized on the basis of emotions strictly linked to specific action tendencies (Mainen 2007). Among these action tendencies, we find the aversive reaction towards spoiled food (Kobayakawa et al. 2007). Moreover, neuropsychological research shows that, when we smell foul odors, the areas which prepare the body to retract from the negative stimuli are also

activated. In an fMRI experiment, when participants smelled the rancid odor of rotten yeast, the anterior insula, and the precentral gyrus were among the areas activated (Reske et al. 2010). The insula integrates information coming from viscera, sensory modalities, and cognitive processes, thus creating a unitary feeling which represents the "emotional now" of the organism (Craig 2009). Moreover, it is the cerebral area mostly involved in olfactory disgust (Krolak-Salmon et al. 2003; Royet et al. 2003) and it might work as an internal alarm center that alerts the organism of the potential intrusion of noxious stimuli (Reiman, 1997).[29] In addition, direct electrical stimulation of the insula generates a distinct feeling of nausea and an impulse to retch (Penfield & Faulk 1955). The precentral gyrus, on its part, is the site of the primary motor cortex which, on this occasion, is recruited to activate a withdrawal response. Thus, we can interpret these findings as a defensive reaction enacted by the body as a whole to avoid potential contamination caused by rotten matter.

Furthermore, since disgust is a mechanism evolved to minimize the risk of contracting diseases (Curtis & Biran 2001), olfactory disgust seems to be able to trigger a sort of sanitary protocol within the body (Oaten, Stevenson, & Case 2009). On the one hand, whenever we smell foul odors**,** we automatically activate a facial response aimed at minimizing potential contamination: for instance, we squeeze the nostrils and clench the lips (Susskind & Anderson 2008). On the other hand, aversive odors stimulate immune responses (Mei et al. 2000; Rubio-Godoy, Aunger, & Curtis 2007; Riether et al. 2008). Indeed, we have a tendency to associate loathsome smells with diseases (Bulsing, Smeets, & van den Hout 2009). This sort of behavioral immune protocol might be at the root of a psychological mechanism that leads us to view bad odors as unhealthy. For instance, odors labeled as "harmful" are perceived as irritating (Dalton, 1999) and exposure to bad odors is associated with decreased quality of life, higher stress levels, insomnia, nausea, headaches, eye irritation, and increase in mental disorder (Nicell 2009; Sucker, Both, & Winneke 2009). This connection is so strong that bad odors in the past were held accountable for diseases. In ancient times – both in Greece and in China – it was believed that diseases such as cholera and the plague were caused by a noxious form of bad air, a miasma. A belief that held true until the beginning of the 20th century (Nash 2007). This connection is reflected also in language; for example, malaria literally means "bad air". It should not come as a surprise that in the past several measures against the plague were aimed at controlling bad air: people burnt aromatic herbs and spices in their houses to purify the

[29] The insula is not only involved in disgust. It is a crucial hub which integrates bottom-up sensory signals with interoceptive and attentional expectations thus regulating a wide range of affective states (Barrett & Simmons 2015).

atmosphere and public authorities burned aromatic logs in the streets for the same reason (Classen, Howes, & Synnott: chap. 2).

Even the mere suggestion that an unpleasant odor is present in the room increases reports of health symptoms and a slight feeling of revulsion (Knasko, Gilbert, & Sabini 1990). It is probably on these grounds that Lessing criticized the depiction of people pinching their nose to avoid coming into contact with a foul odor, as it will be sufficient to arise a reaction of disgust in the audience:

> In a painting of the burial of Christ, Pordenone pictures one of the bystanders holding his nose. Richardson objects to this on the ground that Christ has not been dead long enough for his body to have begun to putrefy. But in the case of the resurrection of Lazarus, he believes that the painter might be allowed to depict some of the bystanders in such an attitude, as the story expressly states that his body had already begun to smell. To my mind, such a representation would also be unthinkable, since it is not only actual stench that awakens a feeling of disgust but even its very idea. We avoid places that stink, even when we have a cold (Lessing, *Laocoön* in Menninghaus 2003: 47).[30]

Besides this bottom-up affective mechanism, olfactory disgust is also characterized by a top-down influence. As we saw in the previous chapter, the mere suggestion that the odor we are smelling comes from a foul source is sufficient to render the odor unpleasant. This contextual olfactory effect was famously portrayed by Mark Twain's novel *The Invalid's Story* (Twain 1992). In this short story, the narrator tells the misadventures which struck him when he decided to bring the corpse of a deceased friend of him to his parents to fulfill his friend's last wish. Once at the train station, he found a white-pine box that matched the description of his friend's coffin. However, the box was loaded with guns. Just before the departure, a man entered the car to place a package containing ripe cheese over the box before leaving. Both the narrator and the expressman (whose duty was to guard the goods wagon) were unaware of the true content of the two containers and believed that the stench emitted by the ripe cheese was actually the odor of the corpse. As discussed in the previous chapter, this prior expectations shape perceptual processes thus morphing the experience of certain odors.

To sum up, the fact that the olfactory stimuli are already endowed with a quite specific emotional connotation fits easily in the idea that the appraisal cannot be conceived as a mere

[30] I quote the translation offered by Menninghaus in his work because it was modified to emphasize the specific effect of olfactory disgust.

higher-order cognitive response. On the other hand, past experience grants us specific expectations that shape the quality of our perception and the way we react to them.

In conclusion, olfactory disgust can be regarded as a multilevel sensory process that recruits bodily affective processing from the beginning. Stench can be viewed as an affective response which recruits bodily processes and action tendencies to appraise an object's valence and foster the organism's survival and well-being. Therefore, disgust is not a consequence of sniffing some nauseating smell but rather it is part and parcel of the olfactory experience.

Savoring disgust

So far, I have presented disgust as an extremely negative emotion whose main goal is to protect the organism from encounters with potential sources of contamination. In this reading, disgust appears as one of the simplest reflexive-like physical response. Because of these properties, disgust was not conceived as an emotion but rather as a physical reaction by Ancient Greek philosophers. (Lateiner & Spatharas 2017). Even though this conception is true for several instances of disgust, I think that it does not tell the whole story. Nowadays, the study of disgust has presented a more comprehensive conception of this emotion (Strohminger 2014; Rozin, Haidt & McCauley 2018). Yet, many researchers consider that «it would be difficult to generate approach tendencies toward an object that elicits disgust» (Davidson 1994: 239).

Recently, however, several scholars raised the attention on more subtle properties of disgust (Menninghaus 2003; Korsmeyer 2011). More specifically, disgust appears to exert a sort of morbid attraction: people are willing to spend money to view gory scenes in horror movie and the yucky videos of Dr. Pimple Popper (which, as the name indicates, are close-ups on pimple oozing out their yellowy discharge) are among the most viewed on Youtube. As Kolnai (2004) had already pointed out, the "macabre attraction" elicited by disgust is linked to a specific phenomenological property of this emotion. While other emotions are concerned with the essential properties of the perceived object (their *Dasein*), disgust is usually directed to its perceptual features, to its *Sosein*, its so-being. An object is not disgusting in itself, rather some of its features appear disgusting. For instance, a corpse, the quintessential disgusting object, does not elicit disgust until the onset of putrefaction, only when specific perceptual features start to appear. For this reason, Kolnai considers disgust an "aesthetic emotion". In his reading, the peculiar intentional structure of disgust allows us to dwell on the sensorial impressions of the

object and might make room for an aesthetic appreciation of the latter. Disgusts, in fact, can compel interest and disgusting objects can spur a magnetic fascination.

One might think that, when a loathsome object becomes alluring, he loses all of its disgusting properties. However sickened our fascination might be, since we are attracted by the object, we do not feel disgusted anymore. Nevertheless, I follow Korsmeyer (2011) in saying that such a conception is linked to a narrow view of this emotion. When we usually consider emotions like fear or anger we make room for different nuances. For instance, one can feel mildly annoyed by an inappropriate joke and furious about an outrageous moral violation. In the same way, we can be stricken by sheer terror when we see a snake crossing in his path in the wood, but we can feel thrilled while riding a rollercoaster. Importantly, in the latter case fear can morph into an exciting feeling without losing some of its aversive features. Disgust can present similar nuances as well: our stomach turns upside down when we are faced with a rancid whiff of vomit and we can relish the somatic spasm induced by a macabre artwork. As Korsmeyer stresses, in certain conditions, we can genuinely savor disgust. An interesting study carried out at the University of Birmingham can be useful to examine how disgust can be experienced when engaging harmless objects like artworks. In the experiment, participants watched the Texas Chainsaw Massacre, a horror movie well-known for its gore scenes (Mian et al. 2003). It is sufficient to mention that the main villain disembowels his victims with a chainsaw and wears their faces as masks. At the end of the movie, the number of leukocytes in the participants' saliva skyrocketed: the body treated the fictional disgusting stimuli as if they were signals of potential contamination.[31] Yet, this bodily reaction does not prevent many of us to enjoy horror movies. As Korsmeyer puts it «aesthetic disgust is a response that, no matter how unpleasant, can rivet attention to the point where one actually may be said to *savor* the feeling. In virtue of this savoring, this dwelling on the encounter, the emotion constitutes a singular comprehension of the value and significance of its objects» (Korsmeyer 2011: 3).

Albeit it is easier to elicit a pleasurable instance of disgust with visual stimuli, we can be positively aroused by disgusting food as well. Here I am not concerned with eating exotic foods that usually arise disgust because they are taboo in one's own culture, like eating insects. Nor am I concerned with dishes served in a morbid fashion, a trend that is spreading to the fanciest restaurants in the world whose menus are in no way inferior to the one offered to Indiana

[31] The experiment is affected by a severe flaw since they did not ask the participants to report their emotional state. However, the leukocytes activity is consistent with the emotion of disgust.

Jones in the Pankot Palace. For example, The Noma offers a gothic menu that includes a mousse of duck brain served inside a duck head to be eaten with a spoon made with the duck beak. Rather, here I want to focus on foods whose flavor is enriched by slightly nauseating olfactory aroma shades. Several foods present a sophisticated mixture of savouriness and revulsion. The most well-known case regards certain kinds of ripe cheeses that are delicately balanced at the edge of revulsion. Yet, when one compares different cuisines, one does not have a hard time to find dishes that present odors so strong to put off many table companions. Nevertheless, the very same pungent aromas can enliven the palate of others. For instance, Ancient Romans were very fond of *garum*, a sauce produced with fermented fish which had a distinct pungent smell. A typical Chinese delicacy is century eggs, i.e. eggs marinated in a mixture of salt, ash, clay, and rice for several months. Thanks to this process the eggs become darker, creamier and acquire a pungent aroma due to the sulfur compounds released within it. Another famous case is *hákarl*, Icelandic ferment shark meat which offers a strong ammonia fishy flavor. A final case regards kidneys. Alexandre Dumas in his *Grand Dictionnaire de Cuisine*, while describing recipes for kidneys stresses that «they are characterized by a flavor of urine, which is what the connoisseurs of this sort of dish are seeking» (Dumas 2011: 41). The main character of Joyce's *Ulysses,* Leopold Bloom, confirms this peculiar preference. As Joyce tells us «Mr. Leopold Bloom ate with relish the inner organs of beasts and fowls. He liked thick giblet soup, nutty gizzards, a stuffed roast heart, liver slices fried with crustcrumbs, fried hencod's roes. Most of all he liked grilled mutton kidneys which gave to his palate a fine tang of faintly scented urine» (Joyce 1992: 65).

It appears that the tension between disgust and elation elevates the savor of these plates. In the past, there were several cookbooks who taught how to heighten the savor of several dishes by granting them a slight touch of disgust. A good example regards pheasant. As the father of gastronomy, Jean-Anthelm Brillat-Savarin (1994) explains: «When the pheasant is eaten only three days after its death, it has no peculiarity; it has not the flavor of a pullet, nor the perfume of a quail […] It is especially good when the pheasant begins to be decomposed — an aroma and exciting oil is then produced, like coffee, only produced by torrefaction. This becomes evident by a slight smell and change of color». In a similar fashion we deliberately lead food to the point of putrefaction to intensify its flavor. As Kolnai phrases it, «incipient putrescence is path to throw the aroma of a substance (for a while) into higher relief: we actually speak of venison that is 'high' of *haut goût* […] a slight putrefaction still does not suppress the specific smell and taste of the material in question, but indeed accentuates them to

an extent which makes them even more characteristic, the phenomenon of *haut goût*» (Kolnai 2004).

Thanks to these subtle nauseating notes, the food achieves a more complex flavor which enhances our appreciation. Disgust, therefore, due to its strong presence, can enrich and deepen the flavor of the food: «Despite the power of this aversion, within a certain range what are presented to the nose and tongue as disgusting sensory qualities may be cultivated and converted into sensations that are the same or very similar, except for the important fact that they have become pleasurable» (Korsmeyer 2011: 68). In such cases, disgust migrates from the realm of the nauseating to the territory of the edible. What is more, it is deliberately sought for as a way to enrich the experience of eaters.

Olfaction, therefore, appears to play a crucial role not only in avoiding poisonous food but also in guiding our palate. I will now delve deeper into this issue as I examine how smell modulates the state of hunger and satiety, which can be conceived as affective and motivational states.

Hunger and satiety

Imagine being invited to a barbecue. As soon as you arrive, a piquant smell reaches your nostrils: you feel your stomach rumbling and your mouth watering. An urge to savor a juicy burger guides you towards the grill. After having eaten for a while, you start to feel full and when you are offered the umpteenth burger the appetizing aroma has completely lost its appeal. Quite paradoxically, it can even become nauseating if you are bloated and stuffed. What happened? How come the very same odor switched its valence?

Aristotle already noted that food odors are not pleasant when sated. In *Sense and Sensibilia* he states: «For owing to the fact that savors are qualities of nutrient matter, the odors connected with these are agreeable as long as animals have an appetite for the food, but they are not agreeable to them when sated and no longer in want of it; nor are they agreeable, either, to those animals that do not like the food itself which yields the odours» (443b20-443b24, Aristotle 1957).

The sense of smell is able to deeply influence food behavior by affecting both preparatory food intake and satiety-related motivation. In fact, the perception of food odors

prompts the organism for food intake by stimulating salivation (Epstein et al. 2003), insulin release (Johnson & Wildman 1983), and gastric acid secretion (Feldman & Richardson 1986). This effect is particularly strong when we have not eaten for a while. While hungry, the sense of smell has an "appetizing effect" as even brief exposure to food odors increases the subsequent food intake (Yeomans 2000). For instance, it has been proven that the aroma of bacon, even at perithreshold level, activates salivation (Yeomans 2006). We should point out that the appetizing effect of food odor is likely influenced by culture. For instance, two Japanese delicacies like *katsuobushi* (flakes of dried fermented and smoked tuna) and *hoshi-natto* (fermented soybeans), does not smell edible to Germans. In the same way, *Pernod* (anise-flavored alcoholic beverage) does not appear drinkable to Japanese (Ayabe-Kanamura et al. 1998).

Even in the same culture, not all foods have the same appetizing effect. Scientific research ascertained that the affective valence of food is both general and specific. The orbitofrontal cortex, an area involved in conferring affective value to perceptual stimuli, responds differently to pleasant smells depending on the identity of the odor. Hence, pizza and chocolate will elicit different patterns of neural activity (Howard et al 2015). It appears that savory and sweet food odors are encoded differently in the brain. These neuroscientific findings can explain the process underneath the specific craving instantiated by food odor depending on our personal preferences.

However, the pleasantness of food odors decreases during eating. This effect was firstly attested by Michel Cabanac and it is known as the "Cabanac effect". The scholar showed with an experiment that the pleasantness of orange odor declines after sugar intake (Cabanac 1971). According to him, it is a case of allisthesia as the evaluation of a sensation elicited by external stimuli depends on the internal state (*milieu interior*) of the organism experiencing it (Cabanac, Minaire, & Adair 1968). Subsequent studies confirmed this effect and showed that it was independent of the perceived intensity of the odor (Rolls, Rolls, & Roew 1983). Moreover, they suggested that allisthesia might be innate (Soussignan et al. 1997) and correlated it with deactivation in the activity of the orbitofrontal cortex activity, a brain area that represents food reward value (O' Doherty et al. 2000).

At first sight, the role of olfaction might seem a mere consequence of the gastrointestinal activity. However, it has been proved that the simple fact of smelling food (without even seeing it) for the length of a regular meal decreases both the appetite and the

pleasantness of food odor (Rolls & Rolls 1997). This case of sensory-specific satiety testifies the role played by olfaction in food intake as well as its partial independence from gastrointestinal activity and calorie intake (Rolls 1984).

Satiety can also alter the food flavor to the point of reaching disgust. We are all aware that excessive indulgence in eating renders them nauseating (Miller 1997: chap. 6). Kolnai examined how a usually pleasurable activity, when constantly repeated, can become disgusting. In his interpretation, in such cases «it is then not only the object but also our enjoyment of it that becomes disgusting» (Kolnai 2004: 63). In other words, the activity did not simply cease to be pleasurable, rather «the pleasure involved becomes merely shallow, barren, reduced to a state where its perceptible contrast with the will of life of the person […] it is the fact that it persistently endures which gives rise to a defense reaction» (Kolnai 2004: 63).[32] When pleasure reaches surfeit it becomes nauseating.

This hypothesis was ascertained with a study in which a group of chocolate lovers ate chocolate while undergoing a PET four and a half-hour after breakfast. The goal was to measure how the subjects reacted to chocolate after they had eaten to satiety. To investigate this matter, researchers asked subjects to eat one square of chocolate every 5 minutes and to rate the chocolate on a scale that went from "Delicious: I really want another piece" to "Awful: eating more would make me sick". Unsurprisingly, both the pleasantness of the taste and participants' motivation to keep eating gradually decreased square after square. During the experiment, the activity of the gustatory cortex and secondary olfactory cortex was modulated by the orbitofrontal cortex, an area that regulates the affective and motivational value of food odor.[33] The changes in the physical state of the participants changed the flavor percepts, this interpretation may be confirmed by the fact that «the differential engagement of the cortical gustatory areas suggests that in humans taste cells have access to information regarding the internal state and reward value of the stimulus» (Small et al. 2001 1727).

In light of the enactive approach, we might interpret feeding behavior as a complex pattern of self-organization guided by several components within the organisms. The

[32] This investigation can also explain a necessary feature of pleasurable activities as «the object is then pleasurable to the extent that everything else that is experienced is of itself and other things being equal also enjoyable, as having an accent that stands positive to life» (Kolnai 2004: 63).

[33] The experiment did not highlight any modulation in the activity of the primary olfactory cortex. This «may reflect the insensitivity of PET to temporal events as opposed to insensitivity of the region to changes in reward value or perceptual experience» (Small et al. 2001: 1727).

components are closely interconnected but their interrelation does not follow a simple linear causal reaction, as the enactive approach predicts. In point of fact, food olfactory valence does not depend solely on an alleisthetic change. It is not a mere consequence of the gastrointestinal activity. On the contrary, it is guided by internal principles and contributes to modifying the motivational state of the organism and its action tendencies towards food. And these neurophysiological changes are mirrored in the phenomenological experience lived by us. The perceptual system is chemically affected by hunger and satiety which influence its activity. Hunger and satiety shape and constrain our perception and action tendencies. After having discussed how odors modulate the basic affective state of hunger and satiety, it is time to investigate how odors qualitatively influence the flavor of foods.

Foods and flavors

In our ordinary language, we speak quite loosely of tastes and flavors. For instance, we say that coffee has a bitter flavor and that a burrito tastes spicy. However, in scientific language, the distinction between flavors and taste is much more precise (Martin 2013). Taste is the sensation activated by the taste buds distributed over our tongue. Taste buds are aggregates of chemosensory receptors located in several areas of the mouth: e.g. tongue, soft palate, throat, inside of the cheeks (Northcutt 2004). The debate on the number and kind of taste buds is still open. For a long time, researchers believed in the existence of four basic taste qualities: sweet, sour, bitter, and salty. Japanese researchers, however, proposed the existence of a fifth taste quality, *umami* (savory). *Umami* is a particular sensation linked to food like meat or cheese. In recent years, researchers discovered the existence of taste buds that process glutamate, a stimulus that is believed to signal protein intake. These receptors are regarded as the biological pillar of *umami* sensations (Chaudhari, Landin, & Roper 2000). When a chemical molecule binds to a taste receptor a neural impulse travels through the cranial nerve to the brain stem. Subsequently, neural patterns spread to different directions like the thalamus, the neocortex, and the limbic regions. These neural patterns play an essential role in the conscious taste perception which is always underpinned with affective value.

The effect of taste is not only determined by the activation of singular taste receptors. Their quality is crucially dependent on their intensity. For instance, when sodium chloride (salty) is slightly above the threshold level it appears sweet, whereas when its concentration is slightly lower than the level in saliva, it appears bitter (Breslin 2000). Moreover, tastes influence

each other. For instance, umami increases saltiness (Onuma, Maruyama, & Sakai 2018). The intensity of tastes is also influenced by smell as participants wearing nose clips will perceive different intensities of basic tastes (Mojet, Köster, & Prinz 2005).

However, although taste sensations are the basic pillars of food experience, they give only broad strokes to the quality of the food we eat. Taste alone makes us unable to detect the difference between an apple and a potato, or between coffee and wine. Eating gives rise to multifaceted experiences like crisp salty rosemary chips or a tender garlicky savory filet mignon. This experience that we usually call "tastes" is labeled "flavors" by scientists. Flavor, thus, is a multisensory perception produced by several sensory modalities. Scientists and philosophers are still debating on which senses actually contribute to the experience of flavor and whether flavor can be regarded as a unitary sense or as a combination of several senses. Nonetheless, most scientists agree that several modalities contribute to the flavor of the food we ingest. Beside taste we can count touch (e.g. chips can be crisp or soggy), chemesthesis (the burning sensation of chili), and, most importantly for us, olfaction. As Smith (2015) highlights, the intrinsic multisensory nature of flavor challenges the classic idea that senses work in isolation. Philosophers and cognitive scientists have begun to unveil the nature of multisensory perceptual organization (Bayne & Spence 2015; Spence 2015). Someone has even proposed that flavor should be considered as a single sense (Auvray & Spence 2008) since different sensory impressions are fused into a single percept. More specifically, this experience is regarded as a fusion rather than an intermingling as the unitary experiences which contribute to its production cannot be singled out through a phenomenological examination.

The multifaceted richness of flavors is mostly due to olfaction. Between chugs and gulps, food and beverages give off odorants that float behind the palate, travel through the nasopharynx and reach the olfactory epithelium. In point of fact, we have two olfactory routes through which we channel odorants towards our olfactory epithelium. The external odorants are channeled through the orthonasal route while the odorants perceived from within go through the retronasal route.

Retronasal olfaction grants us with the plenteous variety of flavors sensation (Bojanowski & Hummel 2012). When it does not function properly (for instance when we have a cold and our nasal passages are congested) we are unable to fully appreciate the flavors of food. To experiment played by olfaction in savoring foods, it is sufficient to sip a glass of red

wine while firmly pinching the nose. In the beginning, you will feel a mere bitter sensation coming from your tongue. As soon as you release the nostrils from your grip, you will be able to perceive the spiraling dance of aromatic notes which spur from plums to dark chocolate.

According to Shepherd (2012), human smell is geared towards retronasal olfaction. His theory is backed up by anatomical research which ascertained the peculiar structure of our skull (Lieberman 2011: chap. 10). First of all, our oral cavity is shorter than other primates' and there is void between the epiglottis and the soft palate. Secondly, humans (along with chimpanzees, gorillas, and orangutans) have an open posterior nasal cavity. As a result, odorants find an open and relatively short vertical route to float toward the olfactory receptors. Furthermore, we are granted with a turbulent nasal cavity in which high rates of internal airflow allow more odorants to reach the epithelium. A final feature might involve cortical processes. As we saw in the previous chapter, our olfactory system seems highly influenced by cognitive processes and particularly geared to the recognition of subtle variations in odorants. In fact, the finer discrimination of odors does not depend solely on the olfactory bulb, but also on top-down processes that are heavily influenced by the individual's past experience (Kay et al. 2009).

This peculiar sensitivity might be linked to a specific human characteristic: we are the only species who invented cuisine. Cooking is so important that it is an activity present in every known culture (Wrangham & Conklin-Brittain 2003). Cooking has several evolutionary advantages: it makes foods more nutritious, easier to ingest and faster to digest. Also, it kills parasites and pathogens. Not only does cooked food provides such evolutionary advantages but it also tastes better as heat enhances the number of odorants released from the food and their variety. Thanks to cooking, we vastly increase the offering of food aroma: roasted meat, grilled fish, fragrant bread, baked cookies, fermented dairy products, alcoholic products like beer and wine, and the prominent use of spice.

Taken together these findings seem to suggest that «evolution favored some aspects of human gustatory hedonism» (Lieberman 2011: 408). More specifically,

> it is tempting to speculate that mechanical processing and cooking, the latter of which releases particularly intense and complex aromas, helped drive some of our chemosensory capabilities. Alternatively, if cooking is a more recent invention, then it is possible that an enhanced retronasal pathway combined with a bigger neocortex predisposed humans toward a greater appreciation of cooked food when it was invented. Either way, evolution has helped some of us to enjoy fine cuisine (Lieberman 2011: 413).

The crucial role played by olfaction is testified by the development of food preferences. We start to develop olfactory preference while we are in the womb, through the food eaten by our mother. In fact, diet influences the amniotic fluid odors (Mennella, Johnson, & Beauchamp 1995). This was proven with an experiment in which pregnant women who had to undergo a routine amniocentesis procedure were asked to ingest either a garlic pill or a placebo pill 45 minutes before the operation. The smell of their amniotic fluid was evaluated by a panel of adults and the amniotic fluid of the women who had ingested the garlic pill had a distinct garlicky smell. Subsequent research proved that the smellscape of the amniotic fluid crucially impacts odor preference in infants. For instance, children whose mothers ate carrots during pregnancy or while breastfeeding showed a preference for carrot cereal over plain cereal when compared to controls (Mennella, Jagnow, Beachuamp, 2001). The development of these food preferences can be regarded as the first form of olfactory cultural adaptation.

Another case that illustrates the importance of smell in flavors regards spices. In the past, people went to great lengths to acquire spices whose olfactory qualities play a crucial role in enhancing the overall flavors of the food we eat. «As in the classical period, herbs and spices were widely used to flavor food in medieval and Renaissance Europe. While the former were readily available to all, however, the latter were luxury goods from the fabled East. Spices had been introduced to medieval Europe by the crusaders, who acquired a taste for them during their sojourns in the Holy Land» (Classen, Howes, & Synnott 1994: 66). Despite spices play a crucial role in disguising decaying meat and in curbing potential bacterial infection (Sherman & Billing 1999; Liu et al. 2017), they are crucial for conferring flavor to foods. Up to the point that even alcoholic beverages, who would not be at perils of bacterial contamination, can be heavily spice-scented.

Despite the paramount importance of olfaction for food appreciation, people confuse easily taste and olfaction: in a study with 750 participants who complained of chemosensory dysfunctions, the 66% of them reported having taste dysfunction while actually only 4% had taste dysfunction as for others the taste impairment was to be related to anosmia (Deems et al. 1991). But if olfaction is so important for our eating behavior why do we disregard its role? This likely happens because while we eat we have a cutaneous stimulation of the mouth and we tend to regard the mouth as the source of the quality experience brought forth by foods. The common attribution of this complex experience to taste only has been called "location illusion" (Rozin 1982) as the fruity quality conveyed by the volatile compounds of the food we are

chewing are perceived as occurring in the mouth. This is a phenomenon of displaced referral similar to the phantom limb, in which a sensation that occurs in a part of the body is perceived as located somewhere else (Ramchandran & Hirstein 1998).

However, not all cultures are so oblivious to the crucial role played by smell in food appreciation. In Ancient Rome, fragrances were even added to the food and sometimes guests had a hard time distinguishing the smell of food from those of fragrances. In fact, their banquet was a quintessential olfactory celebration as «the different scents enjoyed at a banquet—perfume, flowers, incense, food, and wine—therefore, would all be variations on an olfactory theme» (Classen, Howes, & Synnott 1994: 24). As Classen, Howes, and Synnott report, «Romans were aware of the crucial role played by smell in food. In fact they used to add fragrance to their food to confer them a more sophisticated aroma even risking to increase their bitterness. Pliny attests that "some people actually put scent in their drinks and it is worth the bitter flavour for their body to enjoy the lavish scent both inside and outside"» (Classen, Howes, & Synnott 1994: 67). As they explain, «in the modern West we think of perfume and food as constituting two very different categories, distinct both in odour and in edibility. In the ancient world, however, there was no such division: foods could be perfumed and perfumes could be, and were at times, eaten» (Classen, Howes, & Synnott 1994: 24). This complex interplay was made possible by the fact that some perfumes were made with edible elements (such as honey, cinnamon, mint, roses) which could be appreciated both as food and as fragrances.

As a consequence, orthonasal and retronasal olfaction appear to play different functions as the former is more related to elements outside the body while the latter is strictly related to odors that come from within the body (Rozin 1982). However, we are sometimes able to feel retronasal smell as olfactory perception. This happens only in laboratory settings wherein, thanks to sophisticated technological apparatus, odors can be delivered to the olfactory epithelium through the retronasal route (Small et al. 2005). Interestingly, in these experiments non-food odors (lavender) are perceived as smells (e.g. coming from the nose) whereas food odors (chocolate) are perceived as tastes (e.g. coming from the mouth). Therefore, it appears that past experience not only shapes the quality of the odor we perceive, as shown in chapter 3 but also the location of the odor. This hypothesis is backed up by subsequent experiments that delivered different combinations of tastants and odorants to the tongue and the nose. The combination could be congruent as vanilla with sucrose, or incongruent, as vanilla with sodium chloride. When the combination was congruent most participants reported a sensation

occurring in the mouth whereas when it was incongruent they tended to localized the sensation in the nose. The same effect did not happen when subjects combined vanilla with water, thus showing that the localization was linked to taste rather than touch sensation (Lim & Johnson 2012). This, again, proves how past experiences modify the spatial localization of the stimuli. In order to have a proper localization we need an ecologically appropriate combination of taste and smell.

If odors play a dual role can we regard olfaction as a having a dual nature? An interesting starting point to ponder on this matter is that orthonasal and retronasal smell appear to deliver slightly different qualitative experiences. For example, the aroma of coffee we perceive as coming from the cup is slightly different to the one we perceive when sipping the freshly brewed beverage. Therefore, smell can be viewed as consisting of a dual-modality (Smith 2015) similarly to the dual pathways for vision (Milner & Goodale 1992). This difference is testified by different engagements with the two smells. As we saw above, food odors, when smelled orthonasally, induce eating action tendencies reflected in changes in physical parameters. If we smell a dish for long enough salivation reduces as our appetite decreases. However, when the same food odor is presented retronasally salivary response and appetite increase as if a novel food odor was presented. This effect proves the qualitative difference between the odor perceived with the two routes (Bender et al. 2009). Likely, the qualitative difference is to be attributed to the inverted route of absorption in the epithelium (Mainland & Sobel 2006). Moreover, orthonasal and retronasal smell activate slightly different neural areas (Small et a. 2005) and olfactory disorder can affect the two routes differently (Cowart et al. 2003; Landis et al. 2003).

The dual nature of olfaction allows us to investigate a little further the interaction between smell and taste. To begin with, some odors are commonly described in terms of taste: a strawberry can smell "sweet" and several herbs smell "bitter" (Spence, Auvray & Smith 2014). What is more, odors can acquire taste qualities. If an odor is paired with sucrose for several trials, it will be perceived as having a "sweet" smell. In the same way, if we pair a feeble sugary solution with an odor that is regarded as sweet due to previous experience (e.g. strawberry aroma), the solution will be perceived as sweeter. The same holds true for other taste/odor combinations (Small & Prescott 2005). In a similar way, tasteless water appears sweet when presented with the "sweet" smell of banana (isoamyl acetate) (Hort & Hollowood 2004). Also, smell and odors interact more intimately as certain odors will increase the sensation of

sweetness (Bartoshuk & Klee 2013). Furthermore, sugar, an odorless tastant, is perceived more similar to a congruent tasteless odorant such as vanillin than to another odorless tastant, salt (Rankin & Marks 2000). This convergence is reflected by neural activation since sweet odors and sweet tastes activate overlapping brain regions (Veldhuizen et al. 2010). Moreover, the piriform cortex appears to be influenced by tastes and appears to be an area of chemosensory convergence (Maier, Wachowiak, & Katz 2012).

This chemosensory convergence seems to play a role in the acquisition of food preference. For example, if artificial fruit flavors are paired with sucrose they subsequently become more liked even in the absence of sucrose. On the contrary, when the same fruit flavors are paired with a bitter substance they became more disliked (Baeyens et al. 1990). A similar effect was ascertained with ordinary food items. In a study, children learned to like vegetables if they started to eat them with a dressing they like (ranch dressing or even ketchup). And they subsequently kept this preference even when they ate the vegetables without dressing (Anzman-Frasca et al. 2012). Finally, similarly to smells, flavors are shaped by our expectations. In an experiment, Yeomans and colleagues (2008) served two groups smoked salmon ice cream. A group believed they were eating ice cream, the other a frozen mousse. The former find it less pleasant, more salty and savory.

In the previous chapter, I underscored how smell can be best conceived as an active sense. Does the same hold true for the multimodal experience of flavor? In this regard, a reflection that strikes as particularly relevant is Shepherd's analysis of the muscular actions performed during food ingestion (Shepherd 2012: chap. 17). While we eat lips, tongue and jaws are constantly moving and their movements are coordinated with each other and with breathing patterns. To eat the food we open our mouth, clench the delicacy with our teeth, tear it apart and shape it into morsels that are shoveled in our mouth. Once the morsels are within the palate we begin to chew them. Morsels then are continuously displaced by the tongue between the teeth which slowly decomposed them into a unitary ball-like mush called bolus. Albeit chewing is essential to help digestion, it is also crucial for flavor. In fact, the highest level of flavors is obtained when the bolus has become a unitary mass. During this process, chemical compounds are released from the morsels. These movements enrich the sensory impressions by causing the food to travel to several taste buds and by enhancing the quantity and quality of the volatile compounds that float retronasally towards the olfactory epithelium. When mastication is over the bolus is then moved by the tongue towards the end of the palate and the

act of swallowing increases the final savor of the food (Smith 2015). More specifically, during swallowing our breath is held to block food from falling into the trachea; but in the very moment we finished to swallow the food we automatically exhale and a great volume of food odorants are released toward the epithelium letting us experience the aftertaste of the food we have just ingested.

In this paragraph, I have presented eating as an affective experience that is not only linked to survival but to a complex appreciation of food that involves several sensory modalities. We are not merely concerned with getting enough nutrients to survive, rather we are constantly engaged in enhancing the appeal of the food we eat and we deploy complex cultural techniques to refine our plates. However one might ask: can this hedonism give rise to genuine aesthetic experience? The final paragraph will be concerned with this issue.

Before proceeding a caveat is in order. I am not interested in examining whether foods or beverages can be considered artworks. Fine cuisine is able to create sophisticated works that require adequate expertise to be fully appreciated. From this vantage point discerning the quality of good wine can be as complex as discerning the quality of a painting (Smith 2007). Albeit the creation of food artworks has been advocated by several philosophers (Quinet 1981; Winterbourne 1981), in what follows, I will focus on the notion of whether savoring food can be conceived as an aesthetic experience.

Aesthetic of food

The delight given by food and drinks has been usually conceived as a purely sensory enjoyment and not as an aesthetic experience. Usually, aesthetics concerns the realm confined to sight and hearing (Korsmeyer 1999, chap. 1). There are several reasons for this neglect (Sibley 2001). Gustatory sensations have been considered too intimately linked with the survival need of eating for them to to be looked at as an aesthetic experience; their nature is too feeble and momentary for aesthetic appreciation; they are too visceral for a reflected contemplation.

The most prominent rejection of savoring food as a form of aesthetic experience is formulated by Kant (Sweeney 2012). Kant in his *Critique of Judgment* (Kant 2007b) offers two orders of reason for the refusal of food as an object of aesthetic experience. First, food is too much linked to the actual existence of the object to allow someone to engage it with a

disinterested stance. In fact, for Kant aesthetic experience must be disinterested, namely not linked with the actual existence of objects but only related to their presentation, to the way in which things appear (Hilgers 2019). In the case of food, we relate to the object to satiate our hunger. Therefore, our relationship with food is profoundly linked to our desire to consume it. As a result, the appreciation of food stems from our appetite and it is concerned with the actual existence of food and thus cannot be disinterested.

Second, for Kant savoring food is too much rooted in a subjective appreciation and personal preferences to make room for a disinterested universal judgment, they can lead only to "agreeable pleasures", that is judgments based only on a private feeling. As he explains,

> thus he does not take it amiss if, when he says that Canary-wine is agreeable, another corrects the expression and reminds him that he ought to say: It is agreeable to me. This applies not only to the taste of the tongue, the palate, and the throat, but to what may with anyone be agreeable to eye or ear. A violet colour is to one soft and lovely, but to another dull and faded. One person likes the tone of wind instruments, another prefers that of string instruments. To quarrel over such points with the idea of condemning another's judgement as incorrect when it differs from our own, as if the opposition between the two judgements were logical, would be folly. With the agreeable, therefore, the principle holds good: Everyone has his own taste (that of the senses) (Kant 2007b: 43-44).

For Kant, the sensorial pleasures offered by foods, colors, and musical instruments are merely a matter of personal preferences and are not amenable to a universal judgment that solely can assess what is beautiful. Therefore, the pleasure we gain from food is merely a form of enjoyment.

In my opinion, this conception of aesthetic is too much focused on the cognitive assessment to fully capture the nature of aesthetic experience. As Böhme highlights, in Kant's understanding the aesthetics «became a question of judgment, that is, the question of the justification for a positive or negative response to something» (Böhme 2017). Thus, to adequately capture aesthetic experience we need a «turn from meaning to experience in the perception of works of art» (Böhme 2017). In my opinion, in order to reason on aesthetic experience and not on aesthetic judgments, and consequently to make room for the aesthetic appreciation of food, we need a new understanding of the perceptual mechanisms involved in aesthetic experience. A philosophical theory that strikes me as particularly relevant in this matter has been recently elaborated by Bence Nanay (2015).

According to Nanay (2015), a prominent form of aesthetic experience is linked to a peculiar attention modality. As explained in chapter 2 and 3, we are usually oriented towards the world with a pragmatic stance.[34] Usually, we direct our attention towards certain objects and we focus only on certain properties: those that are salient in the situation we are embedded in. For instance, if we want to eat an apple we scrutinize the fruits in the fruit bowl, we examine their shape, surface, and color and then pick the one that appears the juiciest. When we have to enter a room we direct our attention to the handlebar to see the kinds of actions it affords to access the room. On the contrary, when we have an aesthetic experience, our attention functions in a different way: it is distributed and focused at the same time. The attention is focused on a single object but distributed over its properties. We distribute our attentional focus among several features of the object and their mutual formal relationships. As a consequence, we do not engage the object with a direct practical goal. We do not seek salient proprieties to guide our action, rather we distribute our attention. At first glance, this modality might appear as a form of aesthetic disinterestedness. However, as Nanay underscores,

> practical interest in an object, which is supposed to exclude aesthetic experience, could be described as attention focused on a limited number of its features—the ones we are interested in from a practical point of view. It is only when we are free from practical interests that we have a chance to experience the object in an aesthetic manner. This does not mean that we experience it with no interest […] Aesthetic attention does not equal the lack of attention. It equals distributed attention among a variety of properties, which is nonetheless focused on the same object. Thus, we can say that aesthetic interest is not really disinterest but rather distributed interest (Nanay 2015: 26).

As Robert Hopkins had it, aesthetic experience is not a matter of judging beauty (that is, forming a belief that something is beautiful), rather it involves savoring beauty, that is «responding to is in a more full-blooded way» such that «the sensibilities are engaged by that beauty» (Hopkins 1997: 181).

Nanay backs his interpretation with empirical research which shows how art experts engage artworks differently from laymen. A study compared how laymen and art experts (people who studied art for 5 to 11 years) direct their gaze at paintings and artistic photos. While laymen focus their attention on the salient features of the object (e.g. faces), art experts distribute their gaze towards the whole surface of the image they are experiencing (Vogt & Magnussen 2007). As this reflection highlights, aesthetic experience is crucially dependent on a

[34] Actually, Bence Nanay is skeptic of the enactive reading of the mind as he endorses a representational view (Nanay 2013). However, both enactivism and Nanay's perspective share a common pragmatic understanding of perception.

specific form of attentional distribution, which is «focused with regard to the object and distributed with regards to the properties» (Nanay 2015: 29).[35] This theory is helpful to solve an important problem of aesthetics: the fact that when we are not always able to live an aesthetic experience when facing the same artwork. If we have the luxury to visit the museum several times in a year you might have experienced this peculiar situation. Let's say that you live in Madrid and you are particularly fond of Picasso. It is very unlikely that you were able to fully savor his Guernica every time you went to El Reina. Sometimes you are stuck in awe in front of this monumental work. Other days you might not have an adequate psychophysical state to fully savor the aesthetic experience, or you might be struck by "museum fatigue". In that case, the painting still stands in front of you in all its magnificence but it is mute. You can admire Picasso's strokes, the way he captures the tragedy of war, but you are not moved by it. By following Nanay's proposal, we may say that these two different engagements are due to different attentional modalities. Indeed, while aesthetic attention can be cultivated, as the experiment cited above shows, nothing guarantees that we can activate it at will. Moreover, since aesthetic experience is defined by this peculiar attentional modality, it is not strictly dependent on specific objects like artworks. Conversely, aesthetic experience can be related to everyday situations (Nanay 2018). For instance, they can be elicited by natural landscapes (Carroll 1993), ordinary objects (Irvin 2008) and, I argue, food.

In our regular eating practice, we ingest food quickly either because we wolf down our plate or because we engage in other activities: we chat with our table companions, mind-wander or watch tv. As a result, the flavor goes mostly unnoticed and we fail to appreciate the complex intermingling of aromas offered by food. In this way we fail to cultivate an adequate attentional disposition to elicit aesthetic experience.

The crucial role played by attention was already noted by Brillat-Savarin who remarks that «there are individuals to whom nature has refused *a fineness of organs and a degree of attention*, without which the most succulent food passes unperceived» (Brillat-Savarin 1994, my italics). In this regard, Brillat-Savarin distinguishes the pleasure of eating from the pleasures of the table.[36] While the former «is a peculiar sensation directed to the satisfaction of a necessity» the latter is «a reflected sensation».

[35] This form of cultivated attention is not the only element that contributes to aesthetic experiences. The aesthetic objects and the setting in which they are experienced play a crucial role as well (cf. Böhme 2017).
[36] For Brillat-Savarin the pleasures of the table are also linked with the relational aspect of eating together. I am not concerned with this analysis. For a similar consideration cf. Simmel 1997a.

The reflection unfolded in the previous chapter may help us to explain why olfactory attention can grant us with refined aesthetic experience. As showed in the previous chapter, our smell sensitivity is geared towards the detection of faint changes and this might allow grasping the subtle olfactory variances delivered by foods and wines. Moreover, when attended properly, food and wines unravel their peculiar temporal thickness. In point of fact, «flavour perception is not a single event but a dynamic process with a series of events» (Piggot 1994: 167). Consequently, our aesthetic appreciation of food and beverages is strictly linked to the temporal unfolding of these interwoven sensations. To examine this matter I will focus on wine tasting.

As Smith highlights, sommeliers «pay attention to the temporal sequence, noting what happens in the attack as the wine enters the mouth, what happens in the mid-palate and in the finish as the flavors persist: the travel of the wine across the palate and its texture as silky or lush and velvety matter when assessing the qualities of the wine» (Smith 2019: 178). Therefore, «tasting has a dynamic time course and slowing it down makes a difference to what we notice and what we can pick out. In this way, *how* we taste affects *what* we taste; and attending to each aspect of the dynamic time course changes the temporal scale of the tasting experiences we have» (Smith 2015: 323). What is more, a refined examination of wines does not happen in a single sip, rather, «a wine of any interest will not give up all of its secrets at once. Each mouthful we take allows us to contemplate it a little further, to assess its character» (Smith 2019: 178-179). When the initial impression given by the first sip dissolves a new experience develops as more odorants make their way through our retronasal route. Later on, after the wine is ingested (or spat out) the aftertaste ensues and lingers in our palate. Thus, wine appreciation is not an immediate event that is disclosed in the moment of the first sip, rather it is an extended process that unfolds across time.

This careful examination requires highlighting a component of aesthetic experience that Nanay does not place under the microscope of this research: the active engagement with the object of aesthetic attention. As Bergson had already noted, attention is an embodied phenomenon, that it is structurally «accompanied with movements» (Bergson 2001: 27). When we attend to visual stimuli we scrunch up or open our eyes, we turn our neck in different directions, we move the muscles of our face by clenching the lips or drop our jaws. As Bergson explains, these expressions are not carried out to solely express our feelings, rather «these

movements are neither the cause nor the result of the phenomenon; they are part of it» (Bergson 2001: 27). As a consequence, wine tasters do not passively perceive the wine they are experiencing, rather they attend to it, they direct their attention in a multifaceted way (Todd 2010). And to direct their attention they carefully move the wine within their mouth (Peynaud 1987). As Shepherd (2012: 152) highlights «the expertise of a wine connoisseur is highly dependent on the particular tongue movements that have been learned». The aesthetic experience offered by wines thus requires a similar optimal relation as paintings do. As Merleau-Ponty (2002, chap. 3) noted, aesthetical experience requires to have an optimal relation with the object. To fully experience pictures in an art gallery we need to know how to move our living body in relation to them. If we are too close we risk losing the overall dimension of the picture and its atmosphere. If we are too far away we are not able to appreciate the minute details which compound the picture nor the brushstroke technique employed by the artist. In a similar manner, aesthetic appreciation of wines is a form of skillful engagement that requires to attend the wine in an optimal manner for sensory evaluation. In fact, when we want to savor a wine we do not gulp it, rather the tongue swishes it through the palate to assure the wine will be passed to as many taste buds as possible while it releases its volatile compounds towards the olfactory bulbs.

The appreciation of the wine is also dependent on sophisticated cognitive processes that shape perception. Wine connoisseurs carefully scrutinize the wine and discriminate its features on the basis of previous knowledge and past experience. Their perception is refined and cultivated by their past practices. The experienced wine taster scrutinizes the different features of the wine and their intimate relationships (Smith 2007). First, he pays attention to aroma offered by the glass when still and then after gently stirring the glass he appreciates the subtle dance of aroma that arises towards her nose. Maybe the wine is dominated by a firm earth note. Maybe there is a smooth passing from floral to citrus notes. The wine is then gently sipped, swish through the mouth while sapiently breathing its aroma. One may notice astringent pricking of tannins concealed beneath a rich body. Or the wine can give rise to silky mouthfeel that gently embraces the palate. The different sensory modalities collaborate and influence each other in a waving dance that we can fully appreciate only when our attention is distributed towards the interlacement of the wine properties that untangles in our mouth.

Personal knowledge can shape aesthetic experience too. As Smith states «knowing what we are tasting – the grape variety, the region, the vintage, even the wine maker – can make a

difference to our prior expectations. We taste to confirm or adjust those priors, to fond out how the wine is showing, and an experienced or expert taster knows that each perception is just a snapshot of a larger, unfolding flavor profile which charts he age and development of the wine, in the bottle, in the glass, over time» (Smith 2019: 179). These anticipatory mechanisms are not negative, conversely, they direct our attention and allow us to have a more complex perceptual experience. As Smith shows, wine critics are able to make refine discrimination that are not possible to a novice, as he states, these discriminations are not based on a cognitive interpretation but rather they «improve one another's perceptual awareness of the tasted wine, leading to finer discrimination» (Smith 2007: 45).

This kind of guided appreciation is present in several forms of aesthetic appreciation. A good and recent example regards cinema. In the last year, new technology has given directors a more sophisticated way of filming.[37] A few years ago ARRI – one of the leader suppliers of filmmaking equipment – released the new 65 large-format cameras. This technology has been regarded by several filmmakers as a game-changer since they are able to realize more detail images. In particular, these cameras allow filming wider scenes without going wider. As a result, directors are able to create a meaningful juxtaposition between the character and the surroundings. This new technology was exploited by Alfonso Cuáron in his new masterpiece *Roma*. Thanks to this technology he was able to picture the complex intermingling between the emotional development of the characters and the dramatic evolution of '70s Mexico in a way that was inconceivable before. In particular, the natural and social surroundings were brought closer to the viewers while the story was unfolding in front of their eyes. This type of shot allowed Cuáron to picture more fully the affective impact of the situation without losing intimacy in his narration. While this effect might have been unconsciously grasped by viewers oblivious to new technology, a film critic, knowing the advent of this technology, could have grasped Cuáron's movie more fully.

Therefore, aesthetic experience is not a mere ephemeral feeling. As I understand it, aesthetic experience is not mesmerized attention and it is not merely concerned only with the fleeting hedonic states elicited by the agreeableness or disagreeableness of the wine. First of all, the quality of the wine is not present all the once in a glimpsing hedonic state. Wine tasting is an extended act that unravels through time. It does not merely provoke an immediate reaction

[37]https://www.indiewire.com/feature/large-format-cameras-arri-alexa-65-film-language-joker-roma-midsommar-1202179944/.

of pleasure or displeasure. Rather, the wine is characterized by a specific structure that requires several sips and a careful appreciation of the interlacement of different sensory modalities to be fully appreciated (Smith 2007).

Secondly, it is an active engagement that involves the employment of sophisticated sensorimotor knowledge. The eyes of the art experts dart in different directions to capture the complex ramification of formal properties of painting. In the same way, the sommeliers swish the wine within the mouth, gently moving it across the palate to appreciate its body and allow all the taste buds to ascertain its properties. This movement allows the odorants encapsulated in the liquid to move freely from their source and float towards the olfactory bulb so as to generate a cascade of neural events that contribute to the overall flavor.

Thirdly, aesthetic appreciation impinges on the expectations of the connoisseur. The sensorial presentation is integrated with the personal experience and the refined knowledge of the wine taster who is able to appreciate its core value.

In this experience, we attend to food differently from the usual, by distributing our attention towards the overall experience. The olfactory aesthetic experience is thus related to a refinement of our perception grounded on active engagement with the features of the object we are experiencing (Barwich 2017).

It should not come as a surprise that, as a consequence of this daily engagement with smells, perfumes and wine tasters show remarkably better ability in distinguishing, categorizing, imaging, and memorizing odors (Zucco et al. 2011; Crojimans & Majid 2016) which are reflected in structural and functional modification of related neural processing (Royet et al 2013). If "art teaches people how to see", as Ad Reinhardt famously said, so wine tasting teaches people how to savor.

To conclude, aesthetic experiences are not merely determined by the objects we focus on. Rather, they are crucially dependent on our active engagement with them. And such an engagement is strongly influenced by our past experiences and sensorimotor knowledge. As a result, aesthetic experience is not offered equally to everyone but needs to be cultivated. However, as Shusterman explains, one does not necessarily need expensive wine or prestigious artworks to enrich his own perceptual experience and come to nourish aesthetic engagement.

In a paper in which he analyses the manifold changes that Zen training had on his life, he explains how certain forms of meditative practice allowed him to develop a sophisticated form of distributed attention. In virtue of this new attentional modality he was able to transfigure everyday experiences and access a form of refined and appreciative awareness. When he discusses the impact of this form of "embodied aesthetic" in his eating habits he states that he realized how his «habitual manners of eating were rather careless, casual, and sometimes sloppy» (Shusterman 2013: 30). But after learning eating meditative practice his «awakened attention enriched the satisfaction of eating. With skillfully focused purpose, my consciousness would carefully but smoothly shift its attention from the pickled plum, seaweed, or clump of sticky rice and fermented soy beans on the tips of my chopsticks to the opening of my mouth and then to the diverse feelings of tasting and chewing the food before I would swallow it with similarly heightened awareness» (Shusterman 2013: 31). This form of sharp and contemplative attention opens the door for a rich experience that can enlighten our perception granting us a «heightened discriminating consciousness» that «elevates tasting from crude sensuality to spiritual refinement» (Shusterman 2013: 23).ù

Conclusions

In this chapter, I analyzed how smell influences our relationships with food. First of all, I examined the empirical review on olfactory disgust from the lens of the enactive approach. When we smell a revolting odor, the nauseating feeling arising from the stomach and the involuntary withdrawal are regarded as structural and necessary components of the emotion which is pushing us away from the source of the loathsome stench. The experience of stench can thus be regarded as an affective response which recruits bodily processes and action tendencies to appraise an object's valence.

However, our affective experiences are modulated both by the context and previous experience. In the light of this consideration, I examined cases in which olfactory disgust partially looses its negative hedonic state and can even grant us with pleasant experiences, for instance when we savor a piquant cheese. When we savor foods tinged with pungent fragrances their slightly nauseating aroma enriches our experience. The peculiar intentional structure of disgust, particularly concerned with the presentational qualities of the object, invites us to attend to the sensorial impressions offered by the object and can even lead to an aesthetic experience.

Subsequently, I showed how olfaction mediates our relationship with food. On the one hand, it modulates the homeostatic states of hunger and satiety. When we are hungry, smell has an appetizing effect and it boots the pleasantness of food odors. When we are satiated the same food odors lose their pleasantness and can even be perceived as nauseating. Therefore, the olfactory stimuli are always evaluated based on the internal state of the organism and are structurally linked to its action tendencies. The enactive approach allows me to interpret the feeding behavior as a pattern of self-organization wherein hunger and satiety shape our affective perception and motivational state. On the other hand, smell plays a crucial role in the multisensory experience of flavor. In virtue of the retronasal olfactory system, the chemicals liberated while chewing food reach the olfactory epithelium thus granting us a complex evaluation of the qualities of the food we are about to ingest. Moreover, the experience of flavor can be viewed as active since it crucially depends on the motor movement we perform while chewing food or sipping liquids.

Finally, I discussed the possibility of aesthetic experience brought forth by smell. I focused in particular on cases of wine tasting. To argue for the existence of an actual aesthetic experience I relied on Bence Nanay's theory. According to Nanay, aesthetic experience crucially depends on a particular attentional state in which we focus our attention on a specific object (e.g. the wine) and we distribute it over its properties. In this way, we can appreciate the mutual formal relationships between the properties of the wine (e.g. the aroma, body, mouthfeel). In my analysis, I integrate Nanay's account with an embodied understanding of attention that regards attention as based on the movement performed by the organism. In the case of wine tasting, the appreciation of the sommeliers depends both on their knowledge-based expectations and on their ability to perform specific muscular movements. Wine tasting is thus an extended process based on a skillful engagement with the wine whose perception is refined and cultivated by past practices.

Chapter 5 - The social role of smells

Introduction

«There is no doubt that the surrounding layer of air scents every person in a characteristic way, and in fact it is essential to the olfactory impression existing that way so that, of the two developments of the sensory experience – toward the subject, as liking or disliking it, and towards the object, as recognizing it – one allows the first to prevail by far» (Simmel 2009: 577). Simmel's words capture a phenomenon that is not usually pondered on in philosophy: the fact that each of us constantly gives off odors that contribute to the impressions we offer to the other.

In point of fact, each of us has a specific body odor that is influenced by a wide array of factors: genetic makeup, diet, hormonal variations, diseases, personality traits, emotions all contribute in sculpting our personal bouquet (Havlíček, Fialová, & Roberts 2017). But what is the role played by the smell we constantly exude? In the present chapter, I intend to investigate this problem. I begin by briefly reviewing the age-old question on the existence of human pheromones and, more broadly, on chemical communication among humans. Then I devote the remaining of the chapter to scrutinize two issues.

The first regards the possibility of communicating emotions via odors. Recent research ascertains that when we experience different affective states we give off specific odorants that appear to influence other fellow human beings in a peculiar way. I delve into this issue to verify the extent of this research and to see whether these findings may help us to reflect more generally on the workings of human communication.

The second issue is linked to the social role of odors (Largey & Watson 1972; Low 2009). In particular, I investigate how the smell of others has been used to create social barriers, maintain social distinctions and ostracize target outgroups.

Body odors beyond pheromones

The social world of animals is filled with odors. Ants employ odorants to recognize each other, maintain social hierarchies, and regulate reproduction (Pask et al. 2017). Simply spraying putative sexual pig pheromones in swine farms improve mating and reproduction rates (McGlone, Garcia, & Rakhshandeh 2019). When reflecting on these phenomena one of the first concepts that floats in our mind is pheromone. Pheromones are «substances which are secreted to the outside by an individual and received by a second individual of the same species, in which they release a specific reaction, for example, a definite behavior or a developmental process» (Karlson & Luscher, 1959: 55). Pheromones are usually larger and less volatile than odorants and usually do not smell. Their perception is mediated by a specific perceptual system: the vomeronasal system. The vomeronasal system is designed to specifically detect pheromones and synapses in the olfactory bulb (Halpern 1987).

Whether humans use pheromones to communicate is highly debatable (Wysocki & Preti 2004). Albeit the notion of human pheromones is present in folk psychology and the perfume industry does employ it to sell products, there is little scientific evidence to support it. First of all, the vomeronasal system appears to be vestigial since it is present only during the fetal development. Some adults possess a vomeronasal system, but it is not functional (Meredith 2001). Moreover, even though we do secrete hormones (e.g. androstadienone) in sweat or saliva, their effect is highly context-dependent (Doty 2010). For instance, androstadienone causes neurophysiological changes (Savic et al. 2001) and modulates attention (Hummer & McClintock 2009). However, its effects are highly variable and they are influenced by sex, sexual orientation, and contextual elements. Therefore, it appears that chemosignals do not trigger behavior or emotions as they do in other species; rather they modulate our engagement with the situation we are living in (Jacob, Hayren, & McClintock 2001). Since the notion of pheromones might be inadequate to capture the role and effect played by these chemicals, scholars employ broad and general terms like semiochemicals or chemosignals (Haviland-Jones, Wilson, & Freyberg 2016b; Mohanty & Gottfried 2013).

Notwithstanding the debate on the more apt terminology to capture this kind of chemicals, recent research ascertained that the odorants we give off do play a role in our mutual relationships. First of all, they are a particular class of odors and are processed differently than environmental odors by the brain as they do not activate the olfactory cortex. Unlike

environmental odors, human body odors activate brain areas that process social information, regulates emotions (anterior and posterior cingulate cortex) and are part of the mirror neuron system (the inferior frontal gyrus). Therefore, body odor can be regarded as socially relevant information (Parma et al. 2017). In an experiment participants were asked to smell body odor (collected by asking participants to wear pads under their armpit for several nights) and fake body odor, a compound of odorants (mostly cumin and anise oil) qualitatively similar to body odor (Lundström et al. 2008). They found out that real and fake body odor activate different brain regions. In particular, body odor does not activate the olfactory cortex but the posterior cingulate cortex, the angular gyrus, and the dorsomedial prefrontal cortex. These areas are involved in processing emotional stimuli and creating the sense of self. Thus it seems that we attribute meaning to other's body odor on the basis of our own. Therefore, body odors might be helpful to sense whether someone is akin to us. This hypothesis is confirmed by other research that shows that people are able to recognize "family odors". For instance, strangers are able to match the t-shirt of mother and her child simply by smelling them. However, they are not able to perform the same matching task with husband and wife t-shirts (Porter, Cernoch, & Balogh 1985). What is more, grandparents are able to recognize via olfaction the garments wore by their new-born grandchildren before they get to meet them for the first time (Porter et al. 1986). Infants and mothers are able to recognize each other's odor as well (Porter 1999). On the one hand, infants prefer to orient towards a breast pad used by their mother that another one used by a random woman (Macfarlane 1975). On the other hand, mothers can pick the t-shirt wore by their newborn children from an array of t-shirts wore by other babies of the same age by simply sniffing them (Kaitz et al. 1987). Even if we are usually not aware of it, we maintain this olfactory recognition ability throughout our life: we are able to identify our own body odor with 90% of accuracy (Lundström et al. 2008) and our relatives' one with 85% of accuracy (Lundström et al. 2009). Familiar body odors play an emotional regulatory function as well. For instance, infants sleep better when they wear a t-shirt impregnated by their mother's odor (Goodlin-Jones, Eiben, & Anders 1997). Such a regulatory function is present also in adults as it was shown that smelling the clothes of partners during their absence reduces nostalgia and longing (McBurney, Streeter, & Euler 2012).

These studies suggest that body odor might play a role in group identification and in sorting out family and friends from strangers and (hence) potential foes. However, we do not go about smelling others to sniff out their partisanship. Recent research carried out by Noam Sobel's laboratory showed that we use a more subtle and unconscious way of smelling each

other out. Their research showed that the handshake might be a key component of human chemocommunication (Frumin et al. 2015). More specifically, after people have greeted each other with a handshake, they tend to put their hands towards their faces and spend a lot of time with their hands close to their nose. But are they smelling their hands or are they scratching and gently massaging themselves? To verify this Nobel and colleagues wired up more than 100 participants to several machines in charge of measuring variations of different psychophysical variables. In this way they could measure the subjects' nasal airflow without letting them guess the final aim of the experiment. During the experiment, participants were greeted by researchers who either shook their hand or not. They were filmed to verify how they behaved in the minutes before and after the encounter. In the minute before the greeting, they kept their hands close to the nose for 22 % of the time. Moreover when their hands were close to the nose their airflow doubled, suggesting that they were actively smelling themselves. Interestingly, after the handshake they kept their hands near their nose twice as much, and they increase the airflow in a similar way. These results point to two sets of behaviors that we apparently perform every day without being aware of them. First, we constantly smell ourselves. Second, when we have the chance, we unconsciously smell other people in subtle and undetected ways. Since these studies are in their infancy it is very early to establish the functions of these behaviors. However, in light of the research mentioned above, one might think that the smell of ourselves might be linked to a form of emotion regulation. In its turn, unconsciously smelling others might be a form of pre-reflective evaluation of their scent print.

So far we have scratched the surface of human chemosignals. The research examined above shows that humans are granted with a specific scent-print and that body odors subtly impact our social relationships. To delve deeper into this issue I will now direct my attention to a new research program which has investigated if humans communicate emotions via odors.

Smelling feelings

In Salman Rushdie's novel Midnight's Children, the Indian children born between midnight and 1 a.m. on August 15th, 1947 – the day India became independent – acquire superpowers. The main character, Saleem Sinai, obtains sophisticated telepathic abilities which allow him to penetrate other people's hearts and scrutinize their souls. This peculiar capacity is mostly manifested through his sense of smell. In fact, Saleem is able to sniff someone else's emotions, to smell their temperament and identify their mood through the specific odors they emit. For

instance, he tells us that he is able to detect «the acrid stench of his mother's embarrassment» (Rushdie 1991: 14), and «the heady but quick-fading perfume of new love, and also the deeper, longer-lasting pungency of hate» (Rushdie 1991: 352). In what follows, I intend to examine, if and how, we communicate emotions via olfaction. In so doing, I will try to understand to what extent our emotional abilities match Saleem's.

We know that olfactory communication among members of the same species is present in various animals. For instance, several experiments showed that rats, in stressful conditions, release chemicals that work as warning signals for their conspecifics (Kiyokawa et al. 2013). In the presence of these odorants, rats exhibit avoidance of the odor source and display behaviors that reflect an enhanced vigilance – such as concealing and heading out. Similar effects have been investigated also in farm animals (Vieuille-Thomas & Signoret 1992; Boissy, Terlouw, & Neindre 1998). Both heifers and piglets are reluctant to approach areas sprayed with urine of conspecifics which have been tethered for long periods of time (tethering induces high levels of stress in animals, a condition reflected in behavioral and hormonal changes). These animals show heightened vigilance and are less prone to eat food located in the areas where the "anxiety urine" was sprayed. Conversely, they do not express a vigilant behavior towards areas sprayed with urine produced by conspecifics that did not suffer stressful conditions. What about humans? Are we also able to communicate our feelings with the odors we give off? To ascertain this question, a specific experimental design was planned (Freyberg, Wilson, & Haviland-Jones 2016).

In a nutshell, the usual experiment is divided into two phases. In the first phase, participants, with cotton pads placed under their armpit, undergo a situation designed to elicit a given emotion or mood. In the second phase, other participants are exposed to the collected body odors and their responses are examined. Since this investigation has barely started, the affective states tested, so far, have been just a few: mostly anxiety/fear and, to a lesser extent, disgust and happiness (de Groot, Semin, & Smeets 2017). Unfortunately, there is no standard methodological framework and so the studies are quite different from each other. For instance, only in some experiments the donors and the smellers are asked to describe or rate their own affective state. Moreover, the odors are collected by using a vast array of stimuli: in some experiments the "anxiety" odor was collected from participants who were watching a horror movie-clip; in other experiments participants were students waiting for an academic examination. Nevertheless, similar effects are present when odorants are collected in brief

affective-eliciting situation artificially created in a laboratory (e.g. showing a horror movie) and when they are collected in more naturalistic situations that extend across time (e.g. during academic exams). Notwithstanding these methodological issues,[38] the studies have highlighted several consistent results (Fialová & Havlíček 2012; Lübke & Pause 2015; Haviland-Jones, Wilson, & Freyberg 2016; de Groot, Semin, & Smeets 2017).

First of all, the evidence regarding the ability to correctly identify other's body odor is sparse. In the vast majority of experiments, when asked to sniff the odorants and identify the corresponding feelings, participants were not able to match the body odor with the right emotion or mood. Furthermore, in many cases, people were not able to distinguish the emotionally-charged odor from controls and in some cases from the room air. Therefore, at present, it seems that people are unable to accurately discriminate between different emotionally-charged odors as Saleem does.

Nevertheless, emotional body odors do seem able to activate in the perceiver an affective state which resembles the emotion experienced by the odor donors. For instance, the exposure to happy body odor triggered a Duchenne smile in the perceivers and induced in them a more global perceptual focus than controls (a perceptual state that is usually correlated with a positive mood) (de Groot et al. 2015).

Similarly, the exposure to disgust body odor induced a facial expression of disgust: the *levator labii* was activated and the nose wrinkled. Moreover, eye fixation was reduced during the visual tasks (a behavior which shows a sensory rejection, a response which characterizes disgust) (de Groot et al. 2012).

The emotion which has been studied more extensively is fear/anxiety (Chen, Katdare, & Lucas 2006; de Groot et al. 2012; Adolph, Meister, & Pause 2013; de Groot, Semin, & Smeets 2014). The terminology varies among research groups as they indifferently use the terms "fear", "anxiety" and "stress", even in the same paper. The difference in terminology is also due to the fact that it has been impossible to pinpoint the organic compounds secerned in different

[38] This methodology of course present several issues (for discussion see Freyberg, Wilson, & Haviland-Jones 2016). For instance, since in most cases participants are not asked to describe their affective state, their feelings are surreptitiously inferred by the researchers. Moreover, the same situation can elicit different emotions or moods in different participants. The horror movie science can be scary for some and mildly entertaining for others. In the same way, the exam can generate anxiety or annoyance depending on the person. To enhance the precision of these investigations we should pay more attention to the phenomenological experience of the participants (see Colombetti 2014, Chap. 6).

emotional states. Nevertheless, it has been showed that anxiety odors activate a vast array of affective patterns in the receiver. First of fall, if asked to compile a self-report, participants exposed to anxiety odors reported a higher level of anxiety than controls. From an expressive point of view, this feeling was accompanied by an identifiable "fear facial expression". This reaction is mirrored by corresponding patterns of neurophysiological activity. In fact, smelling anxiety body odors was correlated with higher activity in brain areas involved in social stimuli processing (the fusiform gyrus), negative stimuli evaluation (amygdala), emphatic feelings regulation (precuneus, cingulate cortex), threat evaluation and risk assessment (inferior frontal gyrus). This activity may suggest that the anxiety odor informs us that someone else is feeling threatened, partially allow us to share this feeling and prepares us to react to an imminent potential danger. This anxiety tendency is consistent with how cognitive and behavioral responses are modulated. With respect to the latter, when participants are exposed to stimuli that induced a startle, their startle reflex is enhanced if compared to controls. Also, when participants were shown a horror movie-clip their fear facial expression was more marked if they were exposed to a fear body odor compared with controls. So it seems that anxiety odor induces an additive effect to overt reactions to possible threatening stimuli. As regards cognitive modulations, it was shown that anxiety odors modulate the evaluation of ambiguous faces as neutral faces appear more fearful. A second interesting finding in cognitive modulation involves reaction times. Usually, when people are exposed to fearful stimuli, their reaction time in identifying threating stimuli (for instance words or faces) is reduced. On the contrary, when participants were exposed to anxiety odors, their reaction time was slower and their accuracy in association tasks or visual search tasks was higher. This behavior might represent a state of high alertness and vigilance. This might be linked to the specificity of the olfactory system. Whereas vision is useful to optimally locate objects in space, olfaction works more as a search engine: it is useful to probe the environment in search for congruent information which has to be gleaned through other sensory modalities. This would explain the slow reaction in evaluating ambiguous stimuli. Therefore, we can speculate that the smell of fear might lead to freezing behavior instead of a flight response. This response is similar to the one displayed by the rats which exhibited concealing and heading out behaviors. This makes sense because a smelled threat is usually not clearly identified, the safe direction for the flight is unknown and a more careful evaluation of the surroundings is required. Finally, people who suffer from social anxiety disorder and panic disorder were more sensitive to anxiety body odor as they showed a stronger startle response and an enhanced brain activity in the amygdala and the inferior frontal gyrus.

Overall, these studies show that human chemosignals produce small but consistent responses which are reflected in motor behaviors, cognitive functions, and neurophysiological activity. Interestingly, these responses are congruent with the affective states experienced by the donors and thus we can interpret this situation as a case of emotional resonance. This attunement, enacted by the whole body, is fast, automatic and it happens without awareness; that is, most of the time people are not conscious of smelling human sweat and thus they are unaware of being in the presence of human chemosignals. Emotion and mood odors influence us when they are not identified and alter and modulate our affective states, overt behavior, and cognitive responses.

To sum up, olfactory affective communication can be viewed as a communicative system that induces a state of action readiness congruent to the perceived emotional chemosignals. This, in turn, activates a search for congruent stimuli that, if detected, are likely to activate a full-fledged emotional response. In the case of anxiety, body odor indicates the presence of a potentially dangerous situation. The action readiness of the organism is altered toward an anxious state and its attention is tuned to detect signals related to danger. If ambiguous stimuli are detected, they will be evaluated through these anxious lenses. Conversely, if there are no adequate stimuli which confirm our threat-searching behavior, it is likely that this "anxiety action readiness" will be short-circuited (Haviland-Jones & Wilson 2008).

This interpretation is admittedly speculative, but I think it is useful to highlight the strict interconnectedness between agents and their surrounding environment. A property that in my opinion characterizes also the emotional communication conveyed via other sensory modalities. Indeed, unconscious emotional mimicry happens when we view concealed emotional expression. From this vantage point, chemosignals are similar to involuntary facial movements when we undergo an emotional experience: even if they are so small and brief not to be consciously detected they can still affect other people. For instance, when we see happy or sad faces we activated facial muscles linked with positive or negative affect (Dimberg, Thunberg, & Elmehed 2000). A mechanism that appears to be mediated by mirror neurons (Carr et al. 2003). This mechanism can be linked to the fact that facial perception is neutrally mediated by the visual dorsal pathway that is connected with our pre-motor system (Debruille, Brouder, & Porras 2012). As a consequence

> we don't simply perceive the snapshot of a face in an instant, with the task of recognizing it, we respond dynamically over time to affordances offered by the others' emotions as well as by their actions. Face perception presents not just objective features or patterns that we might recognize conceptually as emotions – it involves complex interactive behavioral and response patterns arising out of active engagement with the other's face – yielding an experience of significance or valence that shapes response (Gallagher & Allen 2016: 2641).

The dynamics I have just outlined might have a crucial consequence for our understanding of emotion perception. When we perceive someone else's emotional expression we do not simply compute a given facial pattern as if the final goal was to identify the internal experience of the person standing in front of us. We actively respond to the others' affective states by activating specific neurophysiological patterns that are consistent with their experience. These findings can offer an interpretation of emotional communication which is consistent with the enactive approach (Colombetti 2014, chap. 7; Gallagher 2017, chap. 8) and that go beyond certain pitfalls of the predominant individualistic point of view of emotional communication. The latter conceives of emotional communication as mainly aimed to disclose the inner world of the sender. The receiver gleans the emotional cues sent by the emoter and, through a cognitive mechanism such as inference or simulation, is able to evaluate its mental states. However, in my opinion such a model is ill-equipped to explain the kind of emotional communication described so far.

In this regard, I would like to suggest that emotional communication is not solely concerned with understanding what someone else is experiencing. Another important aspect involves the possibility of attuning ourselves with the feeling experienced by the person near us. This is particularly evident in olfactory emotional communication it is unravelled without crossing the threshold of awareness. Nonetheless, such mood signals involve the arising of integrated expressive, physiological, cognitive and behavioral patterns of activity. This dynamic can be viewed as a perceptually induced resonance of the same affective state: I directly perceive the others' emotion within me, I am engaged with their affective states as they resonate in me. When I smell your fear, my body prepares to react to an imminent threat. This is presumably useful because we are similar individuals embedded in the same situation, and it is likely that what is threatening to you it might also pose a danger to me. In this regard, emotional expressions convey information about both the fellow companions and the external environment, allowing individuals to coordinate their responses to their surroundings. Hence,

when we are synchronized we are more likely to view the surroundings from a similar standpoint, to confer similar value to the world around us, to establish a shared reality and to act accordingly. As Kiverstein highlights, «the bodily affect I thereby undergo serves the function of orienting my attention to the world in ways that allow me to grasp something of the meaning the world has from your point of view. Shared affect thus plays a crucial role in allowing me to pick up on the ways in which the other person is responsive to affordances. It thus plays a crucial role in allowing me to share the other person's perspective on the world» (Kiverstein 2015: 538).

From this vantage point, emotion perception allows us to attune to someone else's orientation directedness towards the world: we become attuned in a similar fashion to the affordance space. We begin to share their perspectives on the world. We never perceive another body as an isolated monad, rather we always perceive them as situated in a particular context, as engaged with the world in particular ways. Moreover, in many cases we are embedded in the same situation and the very same events that are affective the other body affecting us as well. It is all the more natural that I experience the other as moved to act by possibilities and events that pertain also to my experience. This shows that I experience the other primarily in a pragmatic context. This context, in turn, illuminates the intentions, the motivations, and the affective states of the other. In this way, the emotional perception is not to be conceived as a passive detection of information, but rather as an active engagement with the other and with the world. This highlights an aspect of emotional communication which is usually neglected: that is, emotional communication modifies the pragmatic perspective I have towards the external world (Gallagher 2017b). The perception of another emotional state serves the interaction we can have with the others and with the context we are living in. This interaction is mediated by mirror neurons, specific neural populations which activate both when we act and when we perceive someone else acting (Rizzolatti & Sinigaglia 2006). Our brain-body system has been attuned by genetic predisposition and personal experience to mirror other people's state (Heyes 2010). We affectively react to specific patterns of emotional expression by directly and unconsciously shaping our bodily state and we attune towards the environment accordingly. Social interaction is not based on a representation or simulation of someone else's mental state mediated by mirror neurons. Rather, mirror neurons enable us to effectively interact with the other by preparing an affective response that shapes our attunement to that person and our surroundings (Gallagher 2007).

These dynamics are guided by affective sensorimotor couplings that result in specific embodied interactions that attune us to the socio-material situation we are living. If the attunement is prolonged there is an onset of the emotional state and we might instantiate an emotional sharing, that is we might share the same emotion towards the same event (Goldie 2000, chap. 7). This is all the more clear in cases of emotional contagion which «neither involve understanding nor result in it» (Goldie 2000: 191). In fact «what is typical of contagion is that the agent is not aware of the contagion: the agent takes his experience as original and not as caught from another […]even if we are aware of the emotion as having been caught from another, contagion will not be sufficient to gain a grasp of what the other's emotion is about, for the emotion can be 'caught' without 'catching' the object of the other's emotion» (Goldie 2000: 191). Emotional contagion, therefore, leads us to experience emotional congruency with the individuals which surround us and, as a result, modulate our engagement with the situation we are embedded in.

However, I do not want to claim that this form of pre-reflective mimicry necessarily leads to experience the other people's feelings nor that we can empathize with someone else's state only by sharing a common affective experience. To delve deeper into this matter, imagine you are in the hallway of your own department. While you are walking down the aisle you are thinking about the movie you saw last night. Suddenly you find yourself crammed in the corridor full of students. You realized that testing season has officially begun. You are surrounded by first-year students anxiously waiting to enter the room where they are about to take their first exam. The smell lingering in the air is far from pleasant due to the adrenaline-fueled sweat running down the armpits of the undergraduates around you. As we discussed above, the odorants given off by the students will likely affect you: the amygdala will be triggered, your *frontalis* muscle will twitch and you might experience a slight feeling of unease. However, since you have not much to do besides completing the review of a book, no threats or anxious tasks are looming over your horizon. As a consequence, the anxiety-driven state instantiated by the mood signals lingering in the air will be short-circuited and you won't join the quivering mood of the students. You might still be able to sympathize with them, but this won't require you to share their affective state.

Conversely, imagine being one of them. As usual, you caught up late with the study and you managed to read the last chapter of the book last night at 4 a.m., just in time for a quick nap before the dreaded alarm bell woke you up from a tense dream. The chemosignals emitted

by the students around you propel your anxiety. Thanks to anxiety-driven adrenaline rush you are able to stay focused throughout the whole test and manage to get a good mark out of it.

As these examples show, I do not want to maintain that chemosignals necessarily lead to sharing someone else's affective experience. Nor that to understand someone else's emotional state it is necessary to share their affective experience. What I maintain is that we can be pre-reflectively influenced by someone else's mood or emotion. Such an affective mirroring can facilitate our empathic response and can even give rise to a feeling of closeness (as share experiences usually do). However, this is not always the case.

Nonetheless, such an attunement can induce us to engage with the environment as our fellow human beings do. In this case we will become responsive to the same affordances: our affordance spaces will overlap. The shared affect attunes us to the affordances that are relevant to the other person. The affective state of our fellow human beings mediate our perceived array of affordances and consequently the way we engage with the external environment. Via olfactory mood signals, someone else's emotional state might unconsciously influence our engagement with the world and the action possibilities that are relevant for us. Therefore, smell can help us to make ourselves emotionally synchronized so as to engage in similar way with a given situation. Consequently, it might be possible that odors contribute to feeling and picking up the vibes of a particular situation through a sort of ripple effect (Barsade 2002). Even if we are not granted with Saleem's telepathic superpowers, we still possess a primordial form of communication that reflects our structural interconnectedness and our embedded status within the world.

Odor communication is not always affiliative. Historically smell was denoted as a quintessential antisocial sense. Kant in his *Anthropology from a Pragmatic Point of View*, stresses that «*smell* is taste at a distance, so to speak, and others are forced to share the pleasure of it, whether they want to or not. And thus smell is contrary to freedom and less sociable than taste» (Kant 2007a: 269). We can withdraw our gaze from a filthy person to part away from his undesirable presence; we can pretend not to listen to the words he utters with his foul mouth, but the only way to distance ourselves from his stench is to move away from him. This antisociality was historically linked to the intimate perception guided by the incorporation of the stimuli highlighted in chapter 4. As Simmel underscores: «that we smell the atmosphere of somebody is a most intimate perception of that person; that person penetrates, so to speak, in

the form of air, into our most inner senses» (Simmel 2009: 578). When we perceive the other person we are inevitably affected by its presence, we find ourselves imbued in its olfactory emanations. If such an olfactory effusion is unpleasant, it is felt as a gross violation of ourselves. This sensorial mechanism lies at the basis of practices of social ostracism and can give rise to harsh conflicts and violent clashes between groups.

The stench of the other

Body odor appears to be an object of attention in several human cultures, frequently endowed with negative connotations. In his *Historical Roots of the Fairytale*, Vladimir Propp (1997) reports that in numerous folk tales coming from different cultures there is a widespread notion that living human beings give off a peculiar odor. And when humans interact with spirits of the dead, the latter are immediately able to recognize the former because of their odor which is felt as unpleasant. The fact that the spirits of the dead are annoyed by the stench of the livings is a recurring theme in myths from places as diverse as Russia, North America, and Africa. As Propp writes, «The odor of the living is as repugnant and awful for the dead as the odor of the dead is repugnant and awful for the living» (Propp 1997). This myth highlights how several cultures are aware of the fact that humans emit odor, that such an odor is a distinct mark of their beings and that other beings might find it unpleasant. Such an unpleasantness, however, is not only a metaphysical feature used in fairy tales, but has characterized intergroup relations at every latitude and in every age. What is more, it is growing as a dominant feature of the present-day political propaganda.

The recent waves of immigration experienced by European countries have unleashed a racist storm continuously fuelled by xenophobic rhetoric. Just to give you a few examples, one of the most successful and controversial slogan used by the Greek Neonazi party Golden Dawn was "Get the stench out of Greece". More recently, both Steven Bannon – the former executive chairman of the far-right news network Breitbart News and former White House Chief Strategist in Donald J. Trump's administration – and Marine Le Pen – the president of the far-right French political party National Rally – praised Jean Raspail's dystopian novel *The Camp of the Saints*, which narrates the fall of Western civilization caused by "stinking mobs" of dark-skinned migrants (Raspail 1994). In what follows, I aim to scrutinize the role played by such an odor-based slur in the process of ostracization of "the other". In my analysis, I will

draw on historical and ethnographical studies on the one hand, and on neuroscientific literature on the other.

To begin with, it is worth investigating how widespread this phenomenon is. If we examine historical records and ethnographic fieldwork, we discover that contemporary right-wing politicians are not the only ones who regard "the other" as foul. In fact, smell has been used to stigmatize, marginalize and oppress several groups throughout human history (Classen 1992). For instance, the concern for the "foreign stench" was one of the marks of the anxiety looming over Rome when the Empire was on the wane. Even the intellectuals most open towards the Barbarians, like Salvian or Sidonius, complained bitterly about the nauseating stink of their bodies and their coarse hygienic habits (Classen, Howes, & Synnott 1994, chap. 2). The stigmatization of foreign people on the basis of their smell encompasses not only time but also space. For instance, *The Tale of Kamar al-Zaman and the Princess Budur, Moon of Moons* in *One thousand and One Nights* offers such a filthy and miserable description of the Europeans:

> they eat evil smelling, putrescent things, such as rotten cheese and game which they hang up; they never wash, for, at their birth, ugly men in black garments pour water on their heads, and this ablution, accompanied by strange gestures, frees them from all obligation of washing for the rest of their lives. That they might not be tempted by water, they at once destroyed the hammams and public fountains, building in their place shops where harlots sell a yellow liquid with foam on top, which they call drink, but which is either fermented urine or something worse. And their women, my son, are the abominations of calamity. Like the men they do not wash; but they whiten their faces with slaked lime and powdered eggshells. They do not wear linen or drawers to protect them from the dust of the road, so that their presence is pestilential and the fire of hell will never clean them (Mathers, 2005: 41).

If we move farther to the East, the stinky reputation of Europeans does not fade away; quite the opposite. The Japanese anthropologist Buntaro Adachi (1903) dedicated to the odor Europeans a small paper which appeared in the journal Globus in 1903. In the paper, Adachi, after having assessed that the «yellow race does not smell at all», defines the odor Europeans as strong and pungent and states that its foul quality is noticeable even immediately after they have bathed. A final example that testifies how such phenomenon is pervasive and evenly distributed is a dialogue between the cultural anthropologist Edmund Carpenter and an Inuit woman. «One day when Kowanerk [the Inuit woman] and I were alone, she looked up from the boot

she was mending to ask, without preamble, "Do we smell?" "Yes." "Does the odor offend you?" "Yes." She sewed in silence for a while, then said, "You smell and it's offensive. We wondered if we smelled and if it offended you» (Carpenter 1973: 64)
From these accounts, it seems that humans have the widespread tendency to consider the smell of other people worse than their own and to consider themselves pretty much odorless. And this happens even in the absence of prejudices or planned rhetoric of hatred.

This tendency has been ascertained by neurological findings which show that our brain activity is significantly different if we smell the body odor of a friend or that of a stranger. A study carried out in 2009 showed that the body odor of strangers is evaluated as more pungent and less pleasant when compared to those of friends (Lundström et al. 2009). Interestingly, smelling the body odor of a stranger activates both the amygdala and the insula, two brain areas that are related to fear and disgust. More specifically, the amygdala plays a crucial role in the evaluation of external negative stimuli while the insula works as an internal alarm center. Moreover, the body odor of a stranger activates the motor supplementary areas and the premotor area. Such a brain activity indicates that the body is ringing an alarm bell. Therefore, smelling the body odor of a stranger triggers a defensive reaction that alerts the body and prepares it to react to the presence of an unknown and potentially dangerous person in the surroundings (Parma et al. 2017).

Neuroscientific research has shown the presence of a similar mechanism for visual stimuli. When participants were shown pictures of masked faces, they displayed a strikingly similar neural configuration. Moreover, other experiments ascertained that the same neural configuration is present when participants are shown masked people (Whalen et al. 1998) or faces of people who belong to different ethnic groups (Ito & Bartholow 2009). Therefore, it seems that we are granted neural mechanisms which enable us to be alert in the presence of unknown individuals or strangers and to regard their proximity as a potential threat.

In the case of smell, one might question what causes a body odor to be perceived as unfamiliar and potentially dangerous. What we identify as our body odor is the massive cloud of volatile compounds that is produced by different areas of our body. As we saw above, a part of this compound is genetically determined, whereas another part is strongly influenced by environmental factors. Among the latter factors, one the most prominent is our diet (Havlíček, Fialová, & Roberts 2017). It should not come as a surprise that xenophobic propaganda has

addressed both sources in its vicious attacks. On the one hand, the stench is believed to manifest the wicked essence of the targeted group. On the other hand, it can be viewed as the product of the coarse habits adopted by its members. More frequently, these two elements are strictly interrelated and reinforce each other.

A clear example regards the stigmatization of African-Americans in the U.S (Smith 2006). During the end of the 19th century and the beginning of the 20th century, white slaveholders and citizens held firmly the belief that "Negroes stink damnably" and that their "rank smell, distinguish them from every other race of men". However, when they had to describe the odor, they frequently relied on food categories: African-Americans smelled of "stale perspiration and whisky", "overfired catfish" and "barbequed pork chops". As Mark Smith, in his powerful book, *How Race is Made*, assesses «too easily, such cultural associations – that blackness could be smelled through food preferences – slid into pre-existing categories touting an intrinsic, identifiable "black" smell» (Smith 2006: 80). African-Americans willing to integrate into white communities attributed the stench to dirty hygienic habits and made massive use of perfumes. However, such practices eventually only reinforced the stigma attached to the blacks: their use of perfume was regarded as a shady behavior that inevitably testified their intrinsic stench. The difficulty of getting rid of one's own smell seems to hint that a strong cognitive element is involved in this form of stigmatization. The attributed stench does not seem to be merely the result of the odorants emitted by the outcast's body. On the contrary, the beliefs held by the perceiver seem to play an important role in this phenomenon.

To investigate this issue it is useful to analyze how our cognitive system influences our olfactory perceptions. In this respect, the mere suggestion that an unpleasant odor is present in an unscented room affects mood reaction as if the odor was actually present: when people believed that unpleasant smell was present they reported unpleasant physical sensations (Knasko, Gilbert, & Sabini 1990). Therefore, if I believe that X stinks, I can report unpleasant physical sensations if X is in my surroundings, independently of the actual odor emitted by X.

Furthermore, as shown in Chapter 3 the quality of our olfactory perception is influenced by our expectation on what are about to smell. This bias influences the way we perceive someone else's body odor. A good example to illustrate this phenomenon is provided by the diary written by Felix Fabri, a friar who embarked on a pilgrimage to the Holy Land during the

15th century. In his diary, the friar wonders why the Saracens admitted the Christians in their baths. His answer is the following:

> it is said to be that the Saracens emit a certain horrible stench, on account of which they use continual ablution of diverse sorts, and since we haye no stench, they do not mind our bathing with them. This indulgence they do not extend to Jews, who stink even worse; but they are glad to see us in their baths, for even as a leper rejoices when a sound man associates with him, because he is not despised, and because he hopes that because of the sound man he himself may gain better health, so also a stinking Saracen is pleased to be in the company of one who does not stink (Miller 1997: 245).

These words provide a clear example of the so-called *foetur judaicus*, that is, a malignant stench attributed to the Jews during the Roman Empire and the Middle Ages. This smell was regarded as an intrinsic property possessed by the Jews in virtue of their malignant nature. Moreover, it was believed that the removal of their evilness by means of conversion would have carried away the foul odor. In fact, as several Medieval sources attest, «"the water of baptism carried off the Jews' odor," leaving them with a fragrance "sweeter than that of ambrosia floating upon the heads touched by the sanctified oil"» (Trachtenberg 2001: 48). In this case, the stench emitted by a group is a sign of their social dangerousness. The more a group is perceived as threatening, the more repulsive its odor. In Felix Fabri's account the Jews are more dangerous than the Saracens and thus their smell is more revolting. Christians, conversely, are pure and thus they do not stink. This strong belief is independent of the actual odor emitted by those persons. In his diary Felix Fabri recounts how his fellow-travelers used to throw the content of their chamber pots at those ship-companions who disturbed their sleep. The Saracens were unlikely to offer a more repulsive odor. However, Felix Fabri's belief about the odorlessness of Christians was so strong as to generate a paradox of the senses. In fact, according to him, the Saracens' habit of washing themselves was caused by their stench. On the contrary, Christians, since they did not stink, did not need to wash. As William Ian Miller states in his *The anatomy of disgust*: «Jews, blacks […] smelled as a matter of principle. Whether they really smelled or not, a stench would be imputed to them and presumably suggestion and wishful thinking made it so. These low engendered undeniable disgust and revulsion, so smell they must». (Miller 1997: 247). Therefore, the stench is a property acquired in virtue of one's own group membership. And, as we have seen, in certain situations this belief is internalized and shared also by the victims themselves who try to cover their odor.

Olfactory rejection can also affect social relations within the same ethnic group. In fact, the stench was crucial to enforce social barriers in the past (Reinarz 2013, Chap. 5). As Georg Simmel brilliantly expresses in his *Sociology of the senses*: «the social question is not only an ethical one, but also a nasal question» (Simmel 2009: 577). In his conception, when we interact the «developments of sense impression construct our relationship to the other (Simmel 2009: 571) and such sensory impressions (and the olfactory among them) color social relationships and structurally contribute to the way we relate to each other.

In this regard, a revealing study is Miller's analysis (1997, chap. 10) of George Orwell's *The Road to Wigan Pier* (Orwell 1989). Orwell was commissioned a book on the living condition of Midlands blue-collar workers in the midst of the economic crisis that brought havoc to Europe in the '30s. To put himself in the workers' shoes, Orwell went to live undercovered in sleeping quarters that «stank like a ferret's cage» (4) where workers ate a black trip, a «grey flocculent stuff» (5) crawling with roaches. The bread slices handed by Mr. Brooker, the owner of the lodging house where Orwell stayed, were marked with his black filthy thumb. In fact, Mr. Brooker, «like all people with permanently dirty hands he had a peculiarly intimate, lingering manner of handling things» (6) and it was common seeing him «carrying a full chamber-pot which he gripped with his thumb well over the rim» (10). Chamber-pots that could be placed under the dining table for hours.

Orwell's book is comprised of two parts. In the first one, he offers a detailed description of the workers' living conditions. In the second one, he presents an essay on social hierarchy where he focuses on the role played by disgust in placing social barriers. Orwell, in fact, designates disgust as the key stumbling block for socialism. Orwell, himself a socialist, grew up in upper-middle-class family and had serious troubled adapting to Wigan living standards. That experience enlightened him. He understood that the advent of socialism, first of all, had to face a sensorial problem: the assault on the senses caused by those groups of smelling drinkers. It comes as no surprise that middle and upper classes feel superior to them. And this smug attitude is even stronger in the less rich middle class, whose difference with the poor is a matter of manners more than means. Bourgeois, to avoid sinking among the «coarse faces, hideous accents and gross manners» (117) of the proletariat, distinguish themselves on the basis of sensorial appearances. As Orwell writes, the «real secret of class distinctions in the West-the real reason why a European of bourgeois upbringing, even when he calls himself a Communist,

cannot without a hard effort think of a working man as his equal. It is summed up in four frightful words which people nowadays are chary of uttering, but which were bandied about quite freely in my childhood. These words were: *The lower classes smell*» (119). The smell is thus an "an impassable barrier"

> for no feeling of like or dislike is quite so fundamental as a *physical* feeling. Race-hatred, religious hatred, differences of education, of temperament, of intellect, even differences of moral code can be got over; but a physical repulsion cannot. You can have an affection for a murderer or a sodomite, but you cannot have an affection for a man whose breath stinks-habitually stinks, I mean. It does not matter that one is brought up to believe the working classes ignorant, lazy, drunken, boorish and dishonest; it is when he is brought up to believe they are dirty that the harm is done (119).

What is more, in the struggle for social recognition, filthiness mirrors the moral corruption of the working class. And even Orwell struggles with this understanding. For, on the one hand Orwell was aware that the dirtiness was not to be ascribed to a lack of will, but rather to the inevitable conditions they were suffering. In fact, «actually, people who have access to a bath will generally use it» (122). On the other hand, he sometimes regards the filthiness as a consequence of their personality: «the squalor of these people's houses is sometimes their own fault. Even if you live in a back to back house and have four children and a total income of thirty-two and sixpence a week from the PAC, there is no *need* to have unemptied chamber-pots standing about in your living room» (55).

According to Orwell, his analysis is confirmed by the socialists' attitude towards the proletariat. On the one hand, they praise the virtue of the working class and they despise and condemn the bourgeois attitude towards the poor. On the other hand, it would be inconceivable for the socialist bourgeois to take over the disgusting manner of the proletariat: «I have known numbers of bourgeois socialists, I have listened by the hour to their tirades against their own class, and yet never, not even once, have I met one who had picked up proletarian tablemanners. Yet, after all, why not? Why should a man who thinks all virtue resides in the proletariat still take such pains to drink his soup silently? It can only be because in his heart he feels that proletarian manners are disgusting» (127). Orwell's satiric remark clearly shows the sensorial barrier between the classes. As Norbert Elias (2000) showed, the bourgeois class was defined by a civilizing process. The identity of the bourgeois of raise against disgust.

Paradoxically, in virtue of this opposition, disgust became a value to be nourished. The necessary virtue to be good members of the society, to display one's own sensibility, was to be squeamish, to be able to feel disgusted.[39]

Good manners became an essential feature of the bourgeoisie. Therefore, the only way to overcome the barrier of class distinction was for the proletariat to interiorize the middle-class habits: they had to stop stinking. As Miller shows, Orwell was deeply aware of this:

> it is easy for me to say that I want to get rid of class-distinctions, but nearly everything I think and do is a result of class-distinctions. All my notions-notions of good and evil, of pleasant and unpleasant, of funny and serious, of ugly and beautiful are essentially middle-class notions; my taste in books and food and clothes, my sense of honour, my table manners, my turns of speech, my accent, even the characteristic movements of my body, are the products of a special kind of upbringing and a special niche about half way up the social hierarchy. When I grasp this I grasp that it is no use clapping a proletarian on the back and telling him that he is as good a man as I am; if I want real contact with him, I have got to make an effort for which very likely I am unprepared. For to get outside of the class-racket I have got to suppress not merely my private snobbishness, but most of my other tastes and prejudices as well. I have got to alter myself so completely that at the end I should hardly be recognizable as the same person (161).

As we all know, the civilizing process eventually extended to the working class, after the great sanitization brought forth in Europe during the XX century (e.g Corbin 1986; Barnes 2006). The necessity of deodorization became a social imperative in contemporary Western countries. This gave rise to several commercial opportunities and a new industry of hygienic products started to rise. A famous case regards Listerine, currently one of the most famous mouth-washers. Listerine was originally sold by its business company as a general antiseptic and was mostly employed to clean dirty floors. In 1920 they started to rebrand Listerine as a mouthwash and one year later they capitalize on a then-obscure medical term – halitosis – to sell their product. They depicted bad breath as a major cause of reciprocal unattraction and especially a major cause of romantic turns off. This marketing strategy proved to be a blast and Lambert Pharmaceutical Company's profit skyrocketed: +4000% in just 7 years (Marchand 1985).

[39] This inextricable link is showed by the past usage of the German word for disgust, *Eckel*. As Menninghaus highlights, «since the eighteenth century, the German *eckel sein* not only signifies what is disgusting in the sense of being extremely offensive to the taste; it can likewise be ascribed to persons who are exceedingly delicate, oversensitive, hypertrophically addicted to making refined distinctions» (Menninghaus 2003: 5).

Stench as a social barrier is far from being a Western bourgeois creation. An interesting case that hints at the universal function performed by disgust in providing an affective and sensorial basis for social hierarchy involves an Ethiopian tribe: the Dassanecht (Almagor 1997). Their community is divided into two groups: cattle-herders and fishermen. The former has a higher social ranking than the latter as the cattle are viewed as the perfect animals and play a practical as well as symbolic role in their culture. Interestingly, a crucial property that distinguished the two groups is smell. Fishermen are wrapped up in the reeking stench of fish whereas the cattle-herders wear the fragrant aroma of their livestock. They anoint themselves with butter, urine, and manure as the scent of the cattle is regarded as a pleasant aroma. As Classen summarizes, «the odor of cattle is held to be superior to that of fish by the Dassanetch because cattle are considered superior to fish. The odor of pastoralists, who are identified with cattle and form the elite within Dassanetch society, is therefore considered good, while that of fishermen, who are identified with the inferior fish, is considered bad» (Classen 1993: 139). The odor becomes the bearer of group identity. Therefore, as Reinarz highlights, the Dassanetch case is important because «The "odor of the other" […] becomes not simply the odor attributed to others but also the way odor is understood and employed by others» (Reinarz 2013: 110).

The Dassanetch case suggests that even seemingly stinky odors might be regarded as fragrant when associated with a high social rank. Indeed, there is an abundance of cases in the history of smell. For instance, the Tyrian purple dye wore by the Ancient Roman aristocracy was made with the secretion of a sea snail and thus gave off an acrid odor that became associated with their prestigious rank (Classen, Howes, & Synnott 1994: 20). An even more extreme case involves Louis XIV court. During his reign the association between royalty and perfume was cemented and fragrances were abundantly used even to adorn the dozens of fountains in Versailles. However, the court remained a filthy place. The halls and galleries stank of urine and excrement and even livestock were allowed to defecate there. The stench became such a distinct mark of the court that a member of the upper class ordered «his servants to urinate around his manor so that his home would acquire the same aristocratic aroma as that famed court» (Reinarz 2014: 154). The sensorial paradox highlighted with Felix Fabri appears to invest ethnic as well as class distinctions.

To sum up, in the aversion we feel towards a stranger's body odor two factors seem to be at stake. On the one hand, we are granted with a system that evaluates the body odor of strangers as offensive and potentially dangerous. On the other hand, we construct social narratives that, through the degradation of the other, prompt us to regard the targeted group as revolting *per se*. So, we can feel aversion for a group because of how they smell and, on the basis of this aversion, we characterize them as stinky. It is very likely that most of the time these two processes reinforce each other thus creating a visceral repulsion toward the other.

Olfactory disgust, in virtue of this continuous oscillation between the physical and the metaphorical, seems a particularly effective mechanism to ground the visceral repulsion toward the other. First of all, as highlighted in the previous chapter, only a few sensations are as primordial and urgent as the physical refusal induced by olfactory disgust. In fact, foul odors are amongst the most powerful aversive stimuli. This ability has an evolutionary significance as it reduces the risk of coming into contact with potential sources of contamination. By employing an olfactory-based slur, society demands its members to view other groups just as contaminating as a decaying body or a putrid toilet can be. This repulsiveness makes the body odor a perfect instrument to mark social boundaries and to ground an aversive emotional reaction towards the target groups. Their offensive odor is thought to mirror their corrupted nature.

Secondly, smell can be perceived at distance. It travels through space and it imposes its presence on the perceiver. As Carnevali highlights, «condensed in intolerance towards the others is a rejection of what is most individualizing, singular, and unremovable about them, their material body» (Carnevali, forthcoming). The sensorial turmoil provoked by the outgroup's smell comes to symbolize the social disruption identified with the outgroups. From this standpoint, smell symbolizes the anxiety felt towards the invasive forces which are perceived as a threat to the stability of the existing social boundaries. And the call for the regulation of this offensive odor necessarily goes through the regulation of the others' bodies in space. In fact, while bodies can be physically contained, smells cannot. Or better, smell can only be contained by containing the physical bodies. Stench, thus, is transformed into an impassable barrier and disgust becomes the power that demarcates the boundaries between one's own group and the others.

Furthermore, at the basis of interpersonal disgust there lies an essentialist conception: a tendency to attribute to members of other cultural and social groups a unifying essence. In this way, their individual differences are wiped out: all the members are essentially alike in virtue of their common nature (Haslam 2006). Albeit the essentialist framing of the other curbs a multifaceted cultural understanding, it is not malevolent in itself as not all outgroups are necessarily perceived as disgusting. For instance, a racist southerner who despises people of color and Jews will hardly feel the same visceral refusal for Korean or Japanese people. However, when the essential features attributed to the other group elicit disgust, they are not merely perceived as being the same, they are regarded as threatening and repugnant. They are dehumanized (Maoz & McCauley 2008). This means that they are despised to the point of being regarded as less than human.

The intricate psychological process underpinning dehumanization has recently fallen under the microscope of neuroscientific research. In particular, to investigate the paradigmatic emotional reaction felt towards outsider Susan Fiske developed the Stereotype Content Model (Fiske 2018). According to Fiske, our relationship with the other is heavily influenced by two categorical attributes: warmth and competence. Warmth indicates how trustworthy, friendly, honest or likable the members of a group are perceived. Competence points to perceived competence, intelligence, assertiveness and confidence. The intersection of competence and warmth gives rise to an affective space in which different groups are placed. Importantly, people who are regarded as having low warmth and competence elicit disgust. Not any group is dehumanized of course, and dehumanization is a gradual category rather than an either/or one. In Fiske's analysis, dehumanization was not a matter of ethnic belonging but rather of social classes as the dehumanized persons were either homeless or opioid addicts. Given the result one might ask if dehumanization is a matter of holding derogatory belief towards other or if it goes so far so at to shape our perception.

According to Gallagher and Varga (2014), this emotional reaction is not merely a matter of propositional beliefs held towards outgroups since it influences directly the way we perceive the other. First of all, it has been ascertained that when we see pictures of outgroup members, the amygdala and insula show enhanced activation. This means that we activate a bodily response that leads to viewing the person as a possible threat as a state of internal alarm is triggered within the body. Moreover, empirical evidence shows that our empathic responses are influenced by the attitude we have developed towards a specific cultural or social group

(Gutsell & Inzlicht 2010). In particular, if we dislike a particular group we do not display activity in the motor cortex while observing action performed by members of that group. Therefore, our mirroring of their activity is diminished. Consequently, a discriminating attitude towards a given group renders its emotions and intention less clear for us. When we perceive ostracized outgroup members, the automatic mimicry of expressions and gestures is diminished (Likowski et al. 2008) and this weakened behavioral response is reflected in decrease motor cortex activity (Molnar-Szakacs et al. 2007). Moreover, we are less likely to feel empathy towards outgroups. For example, when we see video of people being inserted needle on the face, our anterior cingulate cortex activity, an area crucial for empathic responses, is diminished if the tortured person belongs to another cultural group (Xu et al. 2009). Therefore, social interactions and empathic responses are deeply influenced by group membership. In other words, the perception we have of the other is deeply influenced by our cultural situatedness.

What is more, when prejudiced participants see pictures of people that elicit disgust in them (e.g. homeless or drug addicts) their medial prefrontal cortex activity is diminished (Harris & Fiske 2006). This area is crucially involved in social cognition and in processing someone else's mental state. Diminished activation of this area might suggest that the perceived person is dehumanized since it is not regarded as a self-determining being. Importantly, such deactivation is coupled with the activation of the insula and the amygdala: the overall neural activity dangerously resembles the one present when viewing images of putrid toilets or roaches. Disgust leads us to see other groups as revolting: the psychological and neural basis of empathy weakens and the others cease to be one of my kind; they become pseudo-human. According to several scholars, this psychological mechanism lies at the basis of genocides (Chirot & McCauley 2006). Historically, genocides are anticipated by a denigratory campaign towards the target group that is depicted as contaminating and dehumanized. When dehumanization succeeds, we cease to feel empathy towards the group and to regard them as self-determining agents: rather, they are perceived as contaminating and threatening entities that endanger society.

To sum up, discriminatory social-cultural practices do not only grant us with a set of derogatory beliefs. Rather, they directly shape our perception by reinforcing certain neurophysiological patterns. There is no need to postulate the addition of a cognitive belief that confers meaning to our social perceptions. The same mechanism of plastic changes that we highlighted in Chapter 3 influences the perception of other human beings and the

intersubjective relationship we have with them. Discriminatory social practices are embodied in neurophysiological patterns that, in turn, reinforce those practices, thus creating a self-confirmatory vicious cycle that informs our perception and intersubjective habits. As Gallagher and Varga highlight, «in the case of dehumanization one is not trained to make bad inference; one is conditioned to directly perceive others as non-persons» (Gallagher & Varga 2014: 196).

This investigation can lead to a revision of the concept of social recognition. From Axel Honneth's reflection onwards, philosophical studies on recognition have been carried out from a cognitive and ethical standpoint (Honneth 1995). On the one hand, recognition is regarded as a form of respect we feel towards the other. On the other hand, it is a form of identification as I recognize the other as one of my kind. Recognition is, therefore, a mechanism that structures conscience and requires an interaction with the other. More specifically, recognition allows humans to recognize themselves as depending on someone else's opinion, someone else's esteem, as needing reciprocal responses, consideration, attention, and several kinds of related symbolic attribution. However, as Barbara Carnevali (forthcoming) underscores, such a rational formulation is at odds with the barriers risen by the senses. As Carnevali and Pinotti (forthcoming) stress while reflecting on Simmel's thought, «our relationship to others is thus a *taste* for others, a subliminal inclination to like or dislike them – what Simmel also calls *sympathy* and *antipathy*. This is an original 'aesthetic way' to tackle the question of *Anerkennung* (recognition), the typically Hegelian term that Simmel himself had recourse to. Social status is not guaranteed by an abstract, moral acknowledgment, but is rather the product of an aesthetic appreciation – 'I like / I dislike' – in accordance with individual taste». By following this proposal one can ask how it is possible to achieve a mutual symbolic recognition based on mutual respect and esteem with someone that has been rejected as revolting, with someone who has been dehumanized (Carnevali, forthcoming).

Consequently, the studies analyzed above calls for a radical rethinking of the mechanism of recognition and to root it on a sensorial dimension. This is all the more necessary if we reflect on Honneth's paradigmatic example of lack of recognition: invisibility (Honneth 2001). In fact Honneth does not completely refuse a sensorial dimension of recognition since he regards visibility as an essential dynamic for recognition. To recognize the other I need to hold him as the receivers of expressive gestures. The denial of expressive gestures is taken as a form of invisibility which prevents recognition to be effectively realized. However, recent psychological research shows that a paradigmatic example of the invisible others, the homeless

opioid addicts are not taken as invisible, but rather as disgusting. This is shown by their ability in recognizing facial emotional expressions (Martin et al. 2006). On the one hand, drug addicts are usually less keen and fast than normal populations in processing facial expression and this reflects their lack of social interactions. On the other hand, they show an enhanced ability to recognizing the facial expression of disgust. According to the researchers, this enhanced ability might reflect the fact of being the constant target of someone else's disgust. Rather than invisible, they are perceived as revolting.

This sensorial rejection suggests that the primordial form of recognition is based on sensorial impressions. As Carnevali highlights, recognition is driven by a fundamental «aesthetic *qualitative dimension*» (Carnevali 2017: 10). As she shows in her reflection on Simmel's thought, the affective perception of the other gives rise to sensible inclinations which shape the social relations we instantiate. Indeed, in Simmel's social relations are morphed by the workings of the senses. To understand how social relationships work, therefore, we first need to understand how our sensorial modalities work. «acting on the subject, the sense impression of a person brings about feelings in us of desire and aversion, of one's own enhancement and diminishment, of excitement or calm by the other's appearance or the tone of that person's voice, by the mere physical presence in the same space». (Simmel 2009: 570). This affective element is so crucial that it is almost impossible to reach an objective knowledge of the other persons: the voice of the others, their smell, the features of their faces inevitably leave traces on the most objective conception we can have of them: «our sense impressions of a person allows the emotional value, on the one hand, the usefulness for an instinctive or sought-after knowledge of that person, on the other, to become jointly effective and for all practical purposes actually inextricable in the foundation of our relationship to the person» (Simmel 2009: 571).

Since these affective components are structural in our perception of the other, «the knowledge of people is necessarily an *affective knowledge*. In this subjective reaction of feeling, which coincides with a sensible, non-reflective and instinctive inclination relating us to others in a movement of original sympathy or antipathy, lies the key to the intelligibility of the role that sensibility plays in the phenomenon of recognition and of social esteem» (Carnevali 2017: 16). The sensory impression we have of the other affectively charges the relationship we have of them and the beliefs we form. Hence, the starting point of our social interaction is not solely of cognitive or ethical nature but also it involves the sensorial impression conveyed by the others'

somatic styles (Shusterman 2011): their bodily appearance, voice, gestures, the way they talk, smell and dress contribute to the way I interact with them. As Carnevali (2017: 26) highlights, whenever we perceive a person «a form of experience occurs within the subject in which it is impossible to distinguish clearly between the cognitive dimension (what we know of them thanks to the perception), aesthetics (the sensations and affects stimulated by perception, especially the essential forms of sympathy and antipathy) and the practical dimension (the different relationships that can be established with this person)». Therefore, every form of intersubjective relation is necessarily guided by an affective inclination we have towards the other that impinges on perceptual elements. However, as the examples of cultural shaping of perception highlighted before, the inclinations we have towards a person in their turn can shape our perception and thereof the kind of intersubjective relations we engage in.

Albeit Honneth conceives that we can have an affective relationship with the other that constitutes an elementary form of recognition; this form is conceived as empathy towards the generic humanity of the other (Honneth 1995; 2008). In my opinion, this conception is too abstract to give reason to the more troubling dimension olfactory disgust points to. In fact, in our social interaction we do not engage with a general other, rather we are directly touched by the individual sensorial features of the person we are interacting with. By following Carnevali (2017: 27-28) we can say that the encounter with the other is always «determined by the uniqueness of the circumstances of sensory perception as well as by the affective singularity of the individualities concerned (the singularity of its sensory appearance, the singularity of my sensory reaction)».[40] Recognition, thus, depends on being influenced by the concrete encounter with the other's attitude, expression, and sensorial presence.

Of the senses, olfaction is the one most linked with the subjective impressions of the others. Smells grant us an evaluative and practical disposition towards the other that immediately shape and color the interaction in a specific way. In fact, «such a dimension is associated with uncontrollable reactions of taste and disgust, which in turn are reflected in the

[40] As Carnevali (2017: 28) stresses, this position inevitably open a pandora box of moral problems on how ought we to behave towards given the possibility of an immediate ostracizing inclination we might have towards them. In fact how are we suppose to achieve an respectful interaction with another person that has been already rejected on the basis of the unpleasant sensory impressions it generated on us? In my work I am not interested in analyzing the ethical ramification of this theory but in reflecting on the empirical dimension of social interactions. Inevitably, this position dismisses the idea of a pure abstract and cognitive ethics and entails that ethical problems can be fully understood only in relation with their structural affective and sensorial underpinnings.

process of distancing that is at the root of social spatialization and hierarchy» (Carnevali 2017: 19).

Conclusions

In this chapter, I investigated the numerous ways in which body odors influence social relationships. The body odors we emit are influenced by our current emotional state. More specifically, during certain emotional experiences, we emit odors that function as chemosignals. Albeit undetected, they are unconsciously processed by other people and can give rise to instances of emotional contagion. In these scenarios, the body odors appear to activate in the perceivers an affective state similar to the one experienced by the emitter. Interestingly, these cases of emotional resonance mostly happen without awareness. Therefore, I argued that this reflection on olfactory communication allows us to regard emotional communication as an active response to someone else's affective states. By attuning ourselves with the feeling experienced by those around us we can evaluate the surrounding in a congruent manner thus giving rise to a shared affordance space. Emotional perception is not passive decoding of information, but rather an active engagement with the other and our surroundings.

Odor communication can have antisocial consequences as well. I investigated several empirical studies that highlight how the body odors of outgroups are usually regarded as stinky and threatening. Research carried out in cultural history and anthropology shows how the olfactory repugnance of others qualifies both interethnic and intraethnic relationships. This olfactory aversion appears to be based on two factors. On the one hand, we are prone to automatically evaluate the body odor of strangers as offensive and potentially dangerous. On the other hand, we bring forth social narratives that present the outgroup as revolting. Thanks to the enactive framework I argued that such beliefs can be viewed as a form of cultural situatedness that shapes how we perceive and affectively relate to those groups. Therefore, discriminatory socio-cultural practices become embodied in neurophysiological patterns that shape our perception and relational habits.

Finally, in virtue of this novel comprehension, and based on Carnevali's reflection, I proposed an alternative understanding of the problem of recognition. Recognition is a social mechanism rooted in sensorial impressions. We do not engage with a general other, rather our social interactions are infused with affectivity and start with the concrete encounter of the

sensorial presence of the other. The sensible inclinations we have towards the other shape the social relations we instantiate.

Chapter 6 - Olfactory affective scaffolding

Introduction

So far we have dealt with how humans actively relate to odors lingering around them. Humans are aware of the profound influence odors have on their lives and they have implemented numerous practices to harness their affective power. In the last chapter, I investigate how humans actively shape their olfactory surroundings to channel their emotional states and give rise to specific atmospheres. To begin with, I present the environmental scaffolding approach. According to this philosophical approach, our cognitive and affective modalities are embedded in specific environmental situations that impact the way in which we think and feel. What is more, we actively manipulate our environment to facilitate, sustain, and regulate our cognitive and affective capacities. Afterwards, I argue that in virtue of this manipulation we are able to generate specific atmosphere. Atmospheres are affective situations generated by several socio-material elements such as people, work of arts, rooms, natural and urban landscape. By modifying the mode of presentation of these elements we are able to convey specific atmospheres. In particular, I intend to focus on the way the implementation of specific fragrance can elicit such phenomena. To examine this issue I focus on four case studies. First, I discuss how people use perfumes to shape their olfactory aura. Second, I analyze how food and traditional cuisine can create an olfactory atmosphere and how this atmosphere is particularly important for immigrants to create an emotional link with their homeland. Third, I examine the use of fragrance in churches and temples to convey specific religious feelings that nudge the worshippers towards a collective experience. Fourth, I consider how we are able to scaffold the experience of olfactory absences and, in particular, I focus on antiseptic procedures in hospital.

Affective scaffolding

In Chapter 2 we saw that the enactive understanding of the mind relies on a situated perspective. We are not minds that float about in a vacuum, rather we are embedded beings always situated in a specific environment. This rather trivial consideration can be exploited to investigate the nature of the mind. Usually the environment is regarded as offering a series of inputs that organisms process and respond to in order to assure their survival and well-being.

According to a situated perspective, however, this causal approach barely scratches the surface when it comes to understanding the complex relationship between organisms and the environment. Conversely, a situated perspective highlights how organisms are structurally coupled with their surroundings: the world that surrounds us continuously supports our mental state by offering us material scaffoldings.

The concept of scaffolding was initially employed by Vygotsky (1978) to explain how children acquire new cognitive skills when they are adequately supported by teachers and caregivers. During their development, children enter several zones of proximal development. When they undergo these phases, their motor and cognitive abilities are not fully developed yet and they need the assistance of adults to fully show their cognitive potential. For example, adults hold the children's arm while they attempt to make the first steps or they cue them on the right track while they are trying to solve a mathematical exercise. In this way, children can learn how to successfully operate in the world. Recently, Andy Clark (1997) employed and extended this idea to explain how humans engineer the world to support specific instances of problem-solving. For example, during a busy night bartenders might have problem to remember all the orders they have to serve. To dispense the drink without any error they offload some cognitive tasks on the environment by placing glasses of different shapes (each corresponding to a specific drink) at the time of the ordering. In this way, the line of glasses helps them to remember which drinks they have to mix (Clark 2001: 141). This brief example shows how we actively shape the world to set up an adequate material framework that facilitates our actions: we create environmental scaffoldings.

This fruitful theoretical branch was further elaborated by Sterelny (2010). Sterelny's reflection is highly influenced by the concept of niche construction developed most prominently by the evolutionary biologist Kevin Laland. According to Laland (2000), living systems actively modify their own niche, namely the «sum of all the natural selection pressures to which the population is exposed» (Odling-Smee, Laland, & Feldman 2003: 40). More specifically, niche construction is regarded as «the process whereby organisms modify their own and/or each others' niche, through their metabolism, their activities, and their choices» (Laland et al. 2009: 196). This perspective emphasizes «the active role that organisms play in driving evolutionary and co-evolutionary events» (Laland et al. 2009: 196). Therefore, the adaptation between animals and the environment is bidirectional: animals in part adapt to the external environment and in part shape it to supports adaptive behavior and increase their fitness.

Niches are thus different from habitats as the latter are more independent of the activity of a specific biological group.

Niche construction regards a wide array of biological organisms whose vital efforts is reflected in the dexterous shaping of their physical surroundings. This engineering activity is clearly manifested by activities aimed at guaranteeing protection from predators and improving the amount of nutritional resources. For instance, birds build nests, rabbits dig burrows, and spiders spin webs (Laland, Odling-Smee, & Feldman 2000). Niches can also be chemical in nature as in the case of ants who leave trails of pheromones to guide their companions from the nest to the food sources. Moreover, niches can be intergenerational: the dam built by a group of beavers offers protection and nourishment to their offspring and influences their bodily and mental development. As we can see, niches are a reflection of the specific life forms that inhabit a specific environment. By crafting them, animals make sure that the environment presents viable characteristics to meet their demands.

Humans build niches as well (Laland 2007). By crafting our surrounding we make the world our home and the environment comes to reflect our nature. According to Sterelny (2010), since environmental resources support and shape our cognitive processes, the niches we build can be regarded as epistemic. In his analysis, Sterelny carves out several dimensions that characterize the functioning of these epistemic niches: trust, individualization, and collectiveness.

Trust «involves the agent's assessment of the reliability of their access to a resource and the reliability of the resource itself» (Sterelny 2010: 473). For instance, when we are in a new city and we take the subway for the first time we place trust on the subway map we find at the station. Importantly, reliability of the same resource change in relation to the situation, and thus agents usually learn rules of thumb to know when and how they can access a specific resource. Trust is, therefore, a matter of degree: certain environmental resources are seen as absolutely reliable and are used automatically while others are known to provide their effect only if certain conditions are met.

The second dimension is individualization or entrenchment. To perform our actions we can use several tools and during our daily practice, we get accustomed to a specific set of tools. This case is particularly evident in certain professions. For instance, while amateur soccer

players use mass-produced shoes, professionals have their own bespoke shoes specifically tailored to their needs. These shoes adhere perfectly to the shape of their feet. Moreover, craftsmen take into account players' specific request: for instance, certain players want the upper part of the shoes to tightly embrace their feet while others prefer more loose shoes. Players can also ask to insert a carbon plaque to make the shoes more rigid. In this way each pair of shoes is modeled to the specific style of play of the player. Albeit professional athletes could play with a random pair shoes, their performance is so dependent on their own personalized pair that when they break their shoes the day before an official game the factory of the brand stops its daily processes just to craft a new pair of shoes on time. Therefore, professional player's personalized shoes are highly individualized while mass-produced shoes have a lower level of entrenchment. Of course, there is a virtuous cycle between trust and individualization. The more a resource is trusted the more it will be used and thus the more individualized and transparent it will be. On the other hand, the more a resource is individualized and transparent the more reliable it will be considered.

Finally, environmental scaffolding is not employed by single individuals but it can also be shared by a whole group. A good example of collective environmental scaffolding is offered by Tribble's study (2005) on Elizabethan theatre (Sutton 2010). An aspect that stroke many scholars of Shakespearean theatre was the ability of actors to perform an impressive amount of plays. In her study, Tribble explains that actors used different material and interpersonal cues to stage a play. To carry out their performance, the actors had no proper script. Instead, they relied on the material configuration of the stage to support their actions. For instance, they employed an on-stage two-dimensional map of the play to cue their acting. In this way, they did not have to memorize all the lines of the play but could rely on their surrounding to carry out an effective performance. In these cases, the environment is not scaffolded for the benefits of a single individual but for a whole group.

Environmental scaffolding is carried out in relation to affective states as well. In their seminal paper, Griffiths and Scarantino (Griffiths & Scarantino 2009) offer a new account of emotional processes. Usually emotions have been conceived as internal states that allow the organisms to evaluate the significance of a given situation and lead them to react effectively. The role of environment is confined to providing inputs and receiving outputs. With their situated approach, Griffiths and Scarantino focus their investigation on the intimate relationship between the organism and the environment. On the one hand, by drawing on

several studies that showed how emotional expressions are crucially dependent on active interpersonal interactions, they propose to conceive of emotions as social signals aimed at influencing other organisms. On the other hand, they show how the material culture of a group can scaffold the affective states of its members. Instances of scaffolding take place along two different timescales. First, the cultural environment can scaffold our emotional synchronically, by offering us material surroundings that support and elicit the unfolding of our emotional experience on a present-based timescale. For instance, by going on a walk in a park that surrounds the city I can ease out my stress for an imminent deadline. Second, the cultural environment can scaffold our emotional state diachronically, by letting us acquire a specific emotional repertoire. For instance, immersing regularly in nature can lead to development of the *shinrin-yoku* (forest bathing), a body and mind renewal (Park et al. 2010). This form of scaffolding can be social as well. Society can engineer the structure of certain places to drive and regulate specific moods. For instance, a municipality can undergo an ambitious project of urban planning: they can enlarge the sidewalk, build new bike lanes, and improve public transportation services to render the city less crowded and ease the stress felt by its inhabitants.

This affective perspective was further elaborated in recent years (Stephan, Walter, & Wilutzky 2014; Colombetti & Krueger, 2015; Colombetti, 2017; Colombetti 2017). According to Colombetti and Krueger, humans seem able to skillfully manipulate the environment by engineering "affective niches", «instances of organism-environment couplings (mutual influences) that enable the realization of specific affective states» (Colombetti & Krueger 2015: 1160). Affective niches reliably promote, uphold, and sustain specific emotions and moods. We give rise to a specific niche and stylize the environment on the basis of our needs and preferences. As a consequence, affectivity essentially involves «actively modifying one's environment for the sake of one's affective life itself (to sustain, amplify, or dampen it)» (Colombetti & Krueger 2015: 1160). Colombetti (2017: 1444) emphasizes that «we can regard the act of scaffolding our moods as involving both active and passive elements: we actively manipulate the environment so that we can be passively influenced by it». We exploit specific material qualities of the world to elicit specific affective states. In this way, we shape the affordance space we perceive and we channel ourselves towards specific affective states. For instance, we decorate our houses with pictures and paintings to create a personalized environment that reflects our taste. We place knick-knacks over our furniture to remind us of fond memories or special people in our life. We play music in our car to match our morning mood while we commute to work. The interaction with these environmental elements likely

induce us specific affective states: they make us happy, help us to regulate our mood and induce emotionally-laden memories. This kind of affective feedback can also have pragmatic functions: we might wear a comfortable hoodie to ease the stress while studying or we might play a hard rock song to grant us an extra kick-boost when we run (Krueger 2014). Most of these affective resources are highly individualized. While we study we hardly choose to listen to random music but we play our personalized playlist or we select a new album based on the suggestion of a webzine that we trust and that we know it will likely conform to our taste.[41] Affective niche construction can have a deeper social component as well. For instance, we may decide to move into an apartment with our friends to enjoy their company more closely and rely on them in case of need. Given the fact that affective niches reliably regulate our affective states, we have trust in them. We trust that they will be able to drive and shape our affective experience in the way we designed them for.

An important feature of all this form of scaffolding is stylization. This form of plastic modification can regard our persona as well. We do not buy random clothes but we create a unique style that makes us at ease and offers to others a specific impression. In point of fact, the affective niches that are created, even in our most intimate spaces, are often shaped to be experienced by others. People before going out to a romantic date might arrange the room to convey a specific image of themselves, for instance they might place a guitar at the bed and unfold a Whitman's book over the cabinet to show their artistic taste. Therefore, by crafting our niche we do not only regulate our mood but we try to influence others' affective states as well.

Finally, affective scaffolding can be incorporated (Colombetti 2016). Incorporation indicates the possibility to insert an object into one's own lived body in such a way that the object is integrated within the body schema, namely, the set of mode of engagement that structures the way we experience the world. This notion was elaborated by Merleau-Ponty (2012) when he investigated the way certain objects pre-reflectively shape our engagement with the world. To explain this form of integration Merleau-Ponty offers the example of a lady wearing a hat with a long feather: «a woman may, without any calculation, keep a safe distance between the feather in her hat and things which might break it off. She feels where the feather is just as we feel where our hand is. If I am in the habit of driving a car, I enter a narrow

[41] People can also choose to listen to the radio or play playlist on Spotify. However, these music selections are perceived as trustworthy. We do not select a random channel radio but we have our favorite programs. In a similar way, the Spotify playlists are not generated randomly but are based on algorithms that arrange the songs based on our previous listening experiences.

opening and see that I can 'get through' without comparing the width of the opening with that of the wings, just as I go through a doorway without checking the width of the doorway against that of my body» (Merleau-Ponty 2002: 165). As we can see in this case the clothes she dresses are incorporated in the way her body moves in the surrounding space: in the moment in which she passes through a door, she does not experience the hat as an external object but rather as an extension of her body. Colombetti (2017) suggests that incorporation can also shape the way we affectively relate to the surroundings. To point this out, she presents the example of a fashion-conscious person who carefully selects how to dress. The way one dresses does not affect only the image one offers to others but it is also pre-reflectively ingrained in the way one relates with world. When a person likes her outfit and the relative body image she offers to others she cheers up and feels confident and attractive. Conversely, when she does not wear as she would have liked to, she might be more irritable or insecure. In this case, the clothes are pre-reflectively incorporated into her own affective body. When she interacts with others, she will not likely to pay attention to the clothes she is wearing. However, if she does not feel at ease with her outfit, the background uneasiness will shape her mood and the way she engages in her social interaction.

The way we dress or the way we shape a room is not only helpful to scaffold specific affective states but also gives rise to a specific atmosphere. In the next paragraph, I discuss this phenomone.

Atmospheres

It's your first day at an international conference. The coffee break takes place in a wide room with giant windows that offer a nice view of the woods surrounding the campus. The circle of trees that strays to the horizon holds you in a protective embrace. The sunlight spreads in the whole room and the tables are spaced out well enough to welcome all the guests. You feel welcomed by the spatial arrangement of the place. While looking around you spot a friendly group of people chatting in front a table where trails of baking delights are laid out in a spherical shape. You pick the positive vibes of that circle and decide to join their conservation hoping to find a new group of friends. At the end of the break, you plan to meet at the entrance of the department to go for a night out. None of you has ever been to this city so you decide to explore a couple of pubs. While strolling around the little alleys your attention is grabbed by a cozy place with wooden tables and soft blankets placed over the chairs. Your eyes

catch gorgeous dishes of pasta accompanied by fancy glasses of wine. The mood of the place matches the warm climate of your group so you propose them to sit there to have a couple of drinks. After grabbing a few pints the conversation starts to become more engaging and animated. Moreover, the place is about to close so you decide to carry on your night to another place. Just around the corner you hear rock music coming out from an English pub with a little crowd in front of it. The attention of the group is grabbed by the energetic vibes exuding from the bar and you decide that it might be the perfect place to end up your night.

This brief vignette can be a good starting point to analyze the concept of atmosphere. The places we visit and the people we met are always characterized by an affective tonality, they are imbued by a mood or *Stimmung* that exponents of the *New Phenomenology* movement define atmosphere (Riedel 2019). Atmospheres are a constant presence in our life as they are an essential aspect of how we relate to our surroundings. The room that hosts the coffee break emanates a quiet ambiance, the group we decided to join is surrounded by a friendly aura and the pub where we finished our night had a vibrant atmosphere. In fact, atmospheres can be emanated by natural and urban landscapes, buildings, rooms and groups of people. Atmospheres can emerge from natural elements like landscapes that are permeated by a characteristic mood, a specific mood of presentation. Even each individual person radiates a specific atmosphere. One of the people in your group might be a tall well-fashioned woman with a square face and a firm voice who is enveloped by a charming aura. Another one can be a meditative relaxed man whose friendly voice makes you instantly feel at ease in his presence. The atmosphere of each of us is based on a pre-reflective and preverbal assessment that affects the dynamic of the subsequent social interactions. Moreover, the specific dynamic of interpersonal relations within a group gives rise, in their turn, to a common atmosphere that tinges that collective unity.

Atmospheres are not static but rather dynamic phenomena that change across time. On our part, we can tune in or tune out these atmospheres. As the night goes on and more drinks are served the atmosphere of the group becomes more energetic and vibrant. Nevertheless, some of the attendees might start to feel a little bit tired and they can experience a slight detachment from the group as time goes by.

Atmospheres can be a valuable tool to reflect on the affective relationships between organisms. As Thibaud (2017) explains, they show us that «the elements of the environment are

not only causal factors which affect human beings as organisms but they produce an impression on their feeling (*Befindlichkeit*). And what mediates objective factors of the environment with aesthetic feelings of a human being is what we call *atmosphere*. The atmosphere of a certain environment is responsible for the way we feel about ourselves in that environment» (Thibaud 2017). These words capture the dual nature of atmospheres. In fact, when reflecting on atmospheres one is puzzled by their seemingly indeterminate ontological status. Do they belong to the subject that perceives them or to the object that emanates them?

Initially, one might be tempted to regard these feelings as mental projections. One perceives a bar as cozy because of the good company one is surrounded with. Another pub can appear vibrant due to the few pints one drank during the night. However, this subjective understanding fails short to give reason to the palpable presence of these moods. Atmospheres do not appear as the product of a cognitive process, rather they appear to extend through space. More specifically, when we are confronted with an atmosphere, it seems that a specific affective meaning of the environment reverberates in our body. The atmospheres, in fact, involve the material presence of the objects, space, and persons that take part in the situation. These elements conjointly contribute to the feeling we experience. Moreover, we can agree on what kind of atmosphere is present, we can conceptually define it. Importantly, this assessment does not need to correspond to the feeling that characterizes that particular atmosphere. Even those who are not moved by the atmosphere can still be able to perceive how the affective situation is channeled towards a unitary feeling. For instance, one member of the group might be too tired to pick the energetic vibe of the rock band but she can still agree on their vibrant aura. Another feature that points to the seemingly objective nature of atmosphere is the fact that one enters in them. When we enter an atmosphere we are affectively involved by it as we experience it with our whole body. We can be seized or rapt by an atmosphere. In fact, atmospheres have a peculiar emanation, they can capture us and they can change our mood after we have entered them. Finally, an atmosphere can be carefully created (Edensor & Sumartojo 2015). For instance, architectures and interior designers are in the business of crafting atmospheres which must elicit the intended mood in the audience by evoking a specific climate. They know how to precisely arrange the different elements of a room to make sure that this local setup generates a specific ambiance. For example, architects are profoundly aware that space is not only experienced physically but also sensually and mindfully (Van der Laan 1997). As an illustration, the sensorial quality of different elements affect the experience of space, so a wood cabin appears more intimate than a white classroom of the same dimension.

The careful set up of atmosphere is particularly evident in stage designing (Böhme 2017: chap. 3) where lights, sounds, and material elements are attentively manipulated to convey the right kind of emotion to the audience. For instance, if the light is a little bit too bright we might not experience the oppressing atmosphere that a Nekrosious' play requires.

By taking into account the apparent objective nature of atmospheres, one might be tempted to grant them an autonomous existence. As if they were literally exiting out there. However, this interpretation cannot fully explain the way we engage with them. In fact, not only is it possible for us to fail to pick up the vibe of an atmosphere, but we can also transfigure its affective character. For instance, one of our friends might be too focused on the imminent talk he has to give to appreciate the tranquility of the woods that surrounds the campus. He might even feel the threatening presence of the dark trees in front of him if he is too anxious. In a similar way, a charming person might appear to us as aggressive or insolent if we get nervous after a couple of drinks. In these cases, the people are out of tune from the atmospheres and are not able to participate in their affective resonance (Seyfert 2012). As Thibaud explains, atmospheres «are nothing without a subject feeling them» (Thibaud 2017). Therefore, to adequately characterize an atmosphere we need to feel it.

Atmospheres thus appear ontologically ambivalent, neither objective nor subjective, they can be better conceived as quasi-things (Griffero 2017). So, how can we understand these elusive phenomena? In my opinion, a good solution to this puzzle is offered by Böhme (2017). In his reflection, he characterizes atmospheres as relational phenomena that possess an intermediary status between subject and object. Much like the Umwelt or the affordances, atmospheres cut through the objective/subjective divide. They are mediating factors that impinge on several elements and that render them according to a given mood. As Böhme explains, «atmosphere is the common reality of the perceiver and the perceived. It is the reality of the perceived as the sphere of its presence and the reality of the perceiver, insofar as in sensing the atmosphere s/he is bodily present in a certain way» (Böhme 2017: chap. 1). This proposal can account for several features we have highlighted.

First off, to account for both their emotional and spatial character, Böhme conceives of atmosphere as spatial carriers of moods since they are spaces granted with a diffused feeling. They are tuned spaces experienced through immersion. Nevertheless, the same environment can affect the same person in different ways depending on its internal state and expectations.

However, since we are similar beings with almost identical physiological needs and an analogous cultural upbringing, we are likely to experience a given atmosphere in a similar way (Hauskeller 1995). This concordance helps to give reason to the perceived objectivity of atmospheres and to their status of quasi-thing.

Atmospheres are not mere objects of perception but they modulate perception: «atmosphere is what relates objective factors and constellations of the environment with my bodily feeling in that environment. This means: atmosphere is what is *in between*, what mediates the two sides» (Thibaud 2017). Atmospheres are also affected by the presence of things, persons and their interrelation, they are generated by this interaction (Böhme 2017: chap. 1). This means that the perceivers are not passive but contribute to the dynamic unfolding of an atmosphere. They are entangled and conjoined within it. Hence, atmospheres are sensed by the subject and this sensing becomes part of his bodily embedded state and influences the way in which s/he engages in the situation. In turn, this engagement can alter the quality of an atmosphere. This reflection sheds new light on the nature of our sensorial perception. As Carnevali (forthcoming) highlights,

> the senses are not limited to connecting individuals. Their medial function must be understood in the double sense of the word *medium*, which can indicate both a means of transmission and a *milieu*, an environment, or better, an *ambience* in which things are immersed and with which they are permeated. The environment in which human sensoriality and sensibility are exercised has a clear atmospheric association: it designates not only a physical or cultural "place," but also a kind of ethereal substance that can be perceived and sensed in its turn.

The bidirectional relation between the atmosphere and the perceivers affect also inanimate objects. Each of them is influenced by the overarching nature of the atmosphere and, in their turn, they contribute to the generation of the atmosphere. Objects are bathed in a general atmosphere which encompasses all the elements located in a given space. To characterize this phenomenon Morton (2007) employs the concept of rendering, which indicates the all-encompassing rhythm, hue, or tone that embraces the elements that partake to a given atmosphere. As a result, the atmosphere creates a unitary feeling that stretches through a situation imbuing it with an overall affective meaning. This feature is brilliantly described by Simmel in his reflection on the atmosphere radiated by a natural landscape: «the mood (*Stimmung*) of a landscape permeates all its separate components, frequently without it being attributable to any one of them. In a way that is difficult to specify, each component partakes in

it, but a mood prevails which is neither external to these constituents, nor is it composed of them» (Simmel 2007: 26). However, this effect does not necessarily spread in the same way to all the entities involved. In fact, each thing radiates into the environment its specific aura: it shapes the surroundings by infusing in it a particular feeling. In this way, every object contributes to the generation of the overall unitary mood. As a result, within the emotional tone of the atmosphere it is possible to single out specific affective rhythms. Still, the overarching breath of the atmosphere extends to all the elements and even the objects that might appear as unfit are affectively shaped by it.

Given the all-encompassing nature of atmospheres, all the senses are involved in them. In fact, atmospheres are synesthetic as the different senses coalesce together into a unified impression. Nonetheless, it is possible to single out the contribution made but each sensory modalities. Of all the senses, smell played a crucial role in the analysis of atmospheres (Griffero 2014: chap. 2). This profound importance stems from several reasons. First of all, etymologically the word atmosphere derives from the Ancient Greek *Atmósfaira* which literally means sphere of vapor (Riedel 2019). The power that smell has in evoking atmosphere was well-known by ancient writers who relied heavily on olfactory jargon to vividly evoke in the reader's mind the mood of a particular scene. A good example is offered by Martial's epigram that evokes the atmosphere of a kiss:

> perfume of faded balsam in yesterday's vases; last aroma that falls from a curving jet of saffron; scent of apples ripening in their winter box, or of a field luxuriant with spring foliage, or of silks from our Lady's Palatine presses, or of amber warmed in a girl's hand, or of a jar of black Falernian broken, but a long way off, or of a garden keeping Sicanian bees; odor of Cosmus' alabaster boxes and the hearths of the gods, or of a garland just fallen from richly pomaded locks-why speak of this or that? They are not enough. Mix them all together: such is the fragrance of my boy's morning kisses (Martial 1993: 118).

It should not come as a surprise that philosophers applied this concept to the way in which smell contributed to the creation of such atmospheres. When the concept migrated to modern European languages, it broadened its semantic space and started to refer to the radiation of feelings and humors. However, it also maintained its olfactory root since «these "atmospheres" were primarily related to the sense of smell and were composed of various transpirations specific to a body. In the case of human atmospheres, *feelings as humors* could thus literally be smelled and prompted attraction or repulsion» (Riedel 2019: 86). In the previous chapter, we have dealt with these forms of emanation and explained how they play a role in

emotional contagion and social relations. For Tellenbach (1981), one of the most prominent figure in modern reasoning on atmospheres, the atmosphere is primarily a matter of the olfactory aura that radiates from people. According to Tellenbach, bodies emanate these effluvia that become a «preflective and preverbal element of contact» (Tellenbach 1981: 229) and influence relationships among family members and broader social groups. However, he also notes that the atmosphere of several places is highly dependent on their smell: «churches, hospitals, schools and barracks have their typical smell and with it their specific atmosphere which reveals their characteristic qualities more comprehensively than does their physical equipment perceived by the higher sense-organs» (Tellebanch 1981: 228). Along the same lines, Böhme notes how «odors are an essential element of the atmosphere of a city, perhaps even the most essential, for odors are, like almost no other sensible phenomenon, atmospheric: "Expelled indeterminately into the distance," they envelop, cannot be avoided; they are that quality of a surroundings which most intensely allows us to sense through our disposition (*Befinden)* where we are. Odors enable us to identify places and to identify ourselves with places» (Böhme 2017).

Olfaction might be particularly important for atmospheres because the odorants are breathed in. One the one hand, this incorporation provides a sense of phenomenological closeness and fusion. On the other hand, it naturally breaks the subjective/objective divide questioned by atmospheres. The interest for smell by atmospheric thinkers might also be related to the fact that smells do not have neatly define edges, rather their limits are mutable. Nonetheless, despite this ephemeral spatiality, smells are emotionally intense: they can give rise to strong sensations and can acquire interpersonal and social significance.

Given odors' emotional strength, humans have carefully engineered their olfactory surroundings to reliably induce certain kind of affective states. Through the ages, they have worn fragrances and adorned places to create attractive personal and social atmospheres. As Classen, Howes, & Synnott (1994: 12) note, «people of antiquity used scent not only for purposes of personal attraction, but also as an important ingredient for everything from dinner parties through sporting events and parades to funerals». Nowadays, olfactory scaffolding is yet again a pervasive element of society (Henshaw et al. 2018). Scents and fragrances are carefully managed in every level of our lives: from the single person to private and public spaces. We use deodorants to suppress, confine, and shade unpleasant body odors. Perfumes and colognes are employed as olfactory adornments to create a pleasant olfactory aura and attract others'

attention. Little trees inhabit many driver's cabs. These fragrances are used to irradiate a distinct atmosphere that allures others and comforts oneself. Moreover, there is increasing attention to ambient odors in architecture and urban planning (Sternberg 2009). Odors are employed to craft specific smellscapes aimed at improving the productivity of the workers, stimulate consumers to buy more products, or reduce anxiety and depression in patients. Many places such as hotels, casinos and spa spry certain fragrances in order to make a good first impression on their clients. Brands create personal odor to influence the memory for specific products in the hope of gaining faithful clients (Morrin & Ratneshwar 2003). In what follows, I intend to investigate several instances of olfactory scaffoldings aimed at eliciting specific atmospheres.

Perfumes

In contemporary Western societies people have a strong tendency to use perfumes and deodorants: we go to great length to hide our odor and offer more appealing smells to others. Given the widespread usage of perfume, it might an ideal testing ground to reflect on affective olfactory scaffolding. A good starting point to begin our investigation is Simmel's reasoning on this matter. According to him, each of us naturally emits a specific olfactory aura. Crucially, this aura can be manipulated by employing fragrances. As he explains, «perfume covers the personal atmosphere; it replaces it with an objective one and yet makes it stand out at the same time» (Simmel 2009: 579). Simmel underscores an ambivalent feature of perfume: on the one hand, perfume appears to cover our body odor, on the other it enhances it.

In recent years, neurophysiological investigations have scrutinized the intertangling between body odor and perfume. First of all, our own body odor appears to be linked to the human leukocyte antigen (HLA), the human expression of the major histocompatibility complex (MHC). This group of genes regulates the immune system and are involved in the reception of new organs. For this reason, identical twins do not have any problems with organ compatibility since their MHC genes are identical. Interestingly, dogs are able to identify the unique body odor of each person, besides twins (Harvey et al. 2006). This observation led Lewis Thomas (1978) to hypothesize a connection between body odor and the immune system. This hypothesis has been confirmed by several studies. In particular, these investigations proved that we have a tendency to prefer partners with an odor that reflects a different type of MHC genes than our own (Ober et al. 1997). In a seminal experiment men were asked to wear for three consecutive nights the same t-shirt. A group of women was then asked to rate the

sexual attraction for the different odors. They consistently found more attractive the t-shirts wore by men with MHC genes markedly different from their son (Wedekind et al. 1995). This research was massively replicated and it was found that MHC genes dissimilarity is a good predictor of sexual satisfaction and intimacy among couples (Havlíček & Roberts 2009; Kromer et al. 2016). This sexual preference towards body odor emanated by person with different MHC genes has a strong evolutionary significance. Each one of us has a specific combination of MHC genes. The more varied the MHC genes, the stronger our immune system. Therefore, if one is born from parents with markedly different MHC genes one will have a more effective immune system.

Crucially, this genetic makeup can also influence people's preferences for fragrances as genetic markers are correlated with fragrances choices (Hämmerli, Schweisgut, & Kaegi 2012). As a result, the fact that a person wears floral rather than woody fragrances might not merely be the effect of certain effective marketing campaigns or the acquisition of preferences developed in previous years. In a study, more than 100 men and women were asked to rate several fragrances and to indicate the ones which they would like to wear. The preferences were highly correlated with their MHC genes (Milinski & Wedekind 2001). Moreover, 2 years later they maintained the same preferences, thus showing that they are quite consistent across time. This might indicate that we select perfume to amplify our body odor, as Simmel suggested. Rather than masking our body odor, we are subconsciously wearing odorants that complement and enhance it. This effect is testified by another research that showed that body odor and fragrances influence each other. In the study participants were asked to rate the body odor of other people in two conditions: with or without fragrance. The donors were either assigned a fragrance or they could wear their son. While perfume increased the likeability of all body odors, its effect was markedly different if the donors could choose the fragrance by themselves. In fact, the body odor of participants who could not pick the fragrances were rated more unpleasant than those who could choose which fragrance to wear. Therefore, we seem able to select a fragrance that complements effectively our body odor. (Lenochová et al. 2012). Moreover, fragrances do not appear to be neutral, rather their effects are modulated by the body odor of their wearers. Just like a dress does not suit everyone, the same fragrance can have different effect depending on the person wearing it. Consequently, the scent of a given fragrances acquires a specific quality in relation to the body odor of its wearer. Perfumes are thus mixed with body odor, the two interact with one another and it seems possible that a person uses perfume to unconsciously extend her personal olfactory aura.

The effect of perfumes might run even deeper as they seem to become pre-reflectively engrained in our own body style (Shusterman 2011). To depict the extent to which perfume can intimately embrace one's own personality Shushertman reports Angela Houston's testimony of her favorite fragrance, Jean Patou's Mille:

> from the moment I smelled it, it was mine in a way that no other perfume had been since Blue Grass, which my mother first gave me when I was a child. It's round and floral and warm, with just a hint of spice without being too hippie, and just floral enough without being too sweet. It smells like midnight in the Bois de Boulogne—sexy and mysterious. I think it creates a mood. It's alluring. It says, I'm interested in life, in olfactory senses as well as visual ones. It says, I'm in the mood for something. It also says I'm feminine, I'm complete. It stands to exist with my mother's perfume, Shalimar, which haunts me to this day. I even wear it to go to bed: I spray it behind my ears, old style. (Unless I'm wearing pearls.) People really like it. Even when I was a smoker, they told me I smelled good—which is saying something! When you find yourself in an embrace and someone tells you that you smell good, it's wonderful and unexpected. Mille is rare, hard to find, which I like about it. It means I don't bump into many people who smell like me» (Shusterman 2011: 153-154).

As we can see, Houston regards this perfume as an essential element to her life to the point that she wears it even when she goes to bed.

This case can help us understand how style and self become intimately interconnected. According to Shusterman this interconnection runs deep because «style is an integral part of one's own being, so that changing one's style means in some way changing one's self» (Shusterman 2011: 156). In particular, Houston's testimony highlights how, once a specific fragrance has been picked, it is usually elected as one's own second skin. Given that perfume can play a crucial in defining one's own style it might also influence the development of one's own self. More specifically, perfumes might shape our bodily affective style: the habitual way we experience, express and regulate our affective states (Maiese 2016). In this regard, several studies showed how perfume helps us regulating our mood. In has been ascertained that the daily use of cologne for several weeks improved the mood of men and women: they were less anxious, irritated and depressed than controls (Schiffman, Suggs, & Sattely-Miller 1995). Moreover, exposure to unfamiliar fragrances increases heart rate and might indicate a slight enhancement in stress. (Haviland-Jones, Wilson, & Freyberg 2016). Finally, when teenagers are asked to use a different fragrance than the one they usually wear, they show lower level of social enjoyment and a heightened sense of alienation (Freyberg & Ahren 2011). Perfume can thus become so engrained in one's own somatic style to become incorporated. A personal

fragrance becomes a habitual envelope that surrounds the wearer. Thanks to olfaction's quick habituation the perfumes quickly becomes transparent: we might not consciously perceive it (albeit it can be attended at will) but still it helps us in regulating our affective style. On the one hand, perfumes appear to be implicit tools of mood regulation. On the other hand, they create an affective frame through which we experience the world and ourselves. Our mood thus can be partly shaped by the tacit awareness that we are wearing our personal fragrance.

Perfumes are not only used to please ourselves and to regulate our moods. They are also crucial for offering other people a positive and attractive body image. The use of perfume is thus tightly linked with the desire to please the others. In its turn, this desire to please is intrinsically ambivalent insofar as it involves the eagerness of being recognized as the source of someone else's pleasure: we want to attract, to be valued and esteemed. In fact, as Carnevali highlights, we are driven by an anthropological desire of seeking recognition. Interestingly, the value we strive to reach in social relations is always imbued in a sensory connotations: «One wants to please and, ahead of that, to be perceived: to receive attention, admiration, attract the eye, which contributes to an increase in the social value of the individual» (Carnevali 2017: 31). Therefore, attracting other's attention is by itself a mean to gain social value.

Here we are faced with a puzzle: the seemingly altruistic desire to please others is rooted in the egoistic desire of being noted, of emerging as an individual excellence (at the inevitable expenses of other fellow human beings). This reflection on the dual nature of aesthetic recognition stems from Simmel who explains that «interwoven with the desire of the person to please associates are the opposite tendencies in the interplay of which the relationship between individuals generally takes place: a goodness is in it, a desire to be a joy to the other, but also the other desire: that this joy and "favor" would flow back as recognition and esteem, our personality be reckoned as an asset. And this need increases so far that it entirely contradicts that initial selflessness of the desire to please» (Simmel 2009: 30). Therefore the altruistic desire to please others and the egoistic desire to emerge in a positive light are two sides of the same coin.

To gain a better understanding of this subtle form of human relations we should go back to the concept of atmosphere. As we said above, each one of us radiates a specific atmosphere that might seize others' attention or might repulse them. Simmel captures this phenomenon by saying that «one can speak of a radioactivity of the person; there is around

everyone, as it were, a larger or smaller sphere of radiating signifi cance from each, in which everybody else who has anything to do with that person immerses—a sphere where the physical and psychological elements inextricably blend» (Simmel 2009: 333). In the everlasting battle for social recognition humans can employ all sorts of armaments: we can shape our physical body, become more knowledgable on trendy or obscure topics, learn to play music or acquire artistic skills. Anything that might confer us a charming, magnificent atmosphere will be adequate. As the reflection on style shows, we can engineer our atmosphere by strategically modifying our body image with several forms of adornments. Since the sensorial recognition is crucially influenced by the aura we radiate, among the most effective instruments we find those that involve a sensorial aspect of irradiation: jewelry and perfume (Carnevali and Pinotti forthcoming). Jewelry, in virtue of their brilliance, puts their wearers in the spotlight and produces a halo that surrounds the person. Perfumes create an olfactory aura around its wearer that extends and magnifies its being. They are both forms of adornment and, as such, they are effective only insofar as they guarantee a sensory pleasure to those who perceive them. They are bundled with the ambivalence that affected the desire to please. As Simmel explains, «adornment is something absolutely egoistic insofar as it makes its bearer stand out, sustains and increases one's self-esteem at the cost of others […], and at the same time something altruistic because its enjoyment is simply meant for these others – whereas even the possessor can enjoy it only in the moment before the mirror – and only with the reflection of this presentation attains value for the adornment» (Simmel 2009: 332). Thus, perfume brings forth an olfactory *mise-en-scène* of oneself that is offered to the public nose. As Simmel writes, «the perfume enhances the person's sphere as the sparkle of gold and diamond; one situated near it basks in it and is thus, to some extent, caught in the sphere of the personality. Like clothing, it covers the personality with something that should still work at the same time as its own radiance». (Simmel 2009: 579). As a result, the people who perceive the perfume are seized by the atmosphere which radiates from that person. By shaping their sensory appearances, perfume wearers, influence the people in their proximity. They modify the way they relate to and engage with them. They induce them to confer a specific meaning and value to that social encounter.

Perfumes, of course, do not exert the same influence on everyone. Although they might be pleasant, a person might regard someone else's fragrance as too sweet or too invasive. In fact, if the choice of perfume and the preference for body odor are both linked to MHC genes, then also the preference for the fragrance might be influenced by this genetic component. For

instance, it is said that Demetrius Poliorcetes, king of Macedonia in the III century B. C., tried all the fragrances in his possession to win the heart of a flutist (Classen, Howes, & Synnott, 1994: 28). The poor king might had to battle against a deeply engrained preference! Cultural factors play an important role as well. During the Rennaisance animal fragrances like civet or musk, were extremely popular and now they have fallen out of favor as we tend to prefer perfumes with more delicate notes. Finally, contextual factors are also to be taken into account. In a study, women were asked to wear a strong fragrance. When they were dressed informally they were perceived as warmer and more romantic. However, when they dressed formally they were regarded more negatively (Baron 1981).

Despite the variability discussed above, the alluring effect of the olfactory atmosphere irradiated through a fragrance can be staggering. This is particularly clear in the seductive dance of love. In this regard, one of the most important depictions of olfactory seduction is offered by Balzac's *The Lily of the Valley* (Balzac 1997). The book tells the story of the platonic love between Félix and a married woman, Madame de Mortsauf. As Jacquet (2010) underscores in her reading of Balzac's novel, perfume opens the dances of the novel and signals the encounter between the two lovers. Félix is bored at a party and he is sitting on a bench when a woman seats beside him. It is the perfume the first sensory impression offered to the young man who is immediately trapped in the heavenly atmosphere emanated by the woman: «instantly I breathed the woman-atmosphere, which irradiated my soul as, in after days, oriental poesy has shone there» (Balzac 1997: 18). The perfume becomes one with the woman who is identified by Félix as the lily of the valley which gives the book its title. As Jaquet highlights, «Le roman de Balzac est une illustration magnifique de la puissance expressive de la dimension olfactive; il fait du parfum la clé de voûte de l'amour et s'en sert de paradigme et de fil conducteur pour comprendre la relation à l'autre, la perception de sa personnalité et la constitution de son identité» (Jaquet 2010: 150).

Food and homeland

The effect of olfactory affective scaffolding and the creation of olfactory atmospheres invest several forms of social relationships. Tellebanch (1981) was one the first scholars to investigate the intimate relation between smell and atmosphere. In his reading, smell is always atmospheric since its impression is able to endow one's surrounding with a specific value. Smell has an element of togetherness that links us intimately with the surroundings and this for Tellebanch is

the atmosphere. Given this nature, smell (along with taste) is the foundation of our trust in the world since the first smells we breathe in are the ones of our caregiver and are thus indexes of the protective atmosphere emanated by the family. «From the start the child is steeped in the aura of family atmosphere, which becomes his own like the smell of the nest clings to the baby-bird. What happens to the animal in its oral-sensory atmosphere, happens to man in the meta-sensory province of atmosphere. It is preeminently confidence which is developed in the protective atmosphere of the family, a trusting confidence in a direct protectedness and intactness, and therefore confidence in the environment» (Tellenbach 1981: 229). In his reading of Tellenbach's theory, Böhme (2017) explains that for Tellenbach «atmosphere refers to something bordering on the olfactory – such as the climate of the homeland or the smell of the nest, that is, a sphere of familiarity which is perceptible in a bodily sensuous way». Therefore, the olfactory atmosphere of our family makes us feel at home and protected.

In my opinion, this reflection can be extended to the different smell we perceive in the nest were we have grown. Not only to the body odors of our caregivers but also to the smell of furniture and, importantly, food. As Griffero points out, «instead of allegorically referring to a social group, a region or a city, odour melts with them, allowing (more than taste) for a tuning or a fusion (positive or negative, it does not matter) of man with his environment to the point that 'there is no here and there» (Griffero 2014: 67). In the case of the family home, the different smells that coalesce in an over-arching olfactory ambiance are the sensory embodiment of the feelings of comfort and security we experience while growing up in a protective environment. These feelings harbor in us while we grow up and stays intimately linked with the olfactory aura that generated them. Up to the point that relying on these smells can be a powerful way to reconnect with the comforting atmosphere of our family during difficult times, like when we move to places far from home. This is particularly evident in the case of immigrants who are forced to move to another country. This situation can cause a culture shock, an experience that induces a state of alienation and high distress (Wexler, 2006: chap. 4).

Immigrants use the olfactory atmosphere of their native cuisine to emotionally reconnect with the homely feelings of their household to overcome the fragmentation of their present life. They are able to reconnect with their homeland through an immediate sensuous experience in virtue of the mnemonic and affective dimension imbued in their native food (Sutton, 2001; Law 2004). Immigrants, in fact, are more prone to adopt the language of their

host country and certain habits of thoughts, before changing the cuisine of their homeland. This attachment is not solely linked to nostalgia or to the preservation of their cultural identity. It is also crucially linked to the emotional bond of their family nest. Immigrants are so attached to their native food that they keep cooking it despite the negative consequence it might have in the process of integration. As we saw in the previous chapter social and cultural groups are ostracized because of their smell. Food has a strong influence in how a person smells and many communities are identified by the typical smell of their cuisine The aroma of their food impregnate their clothes, bodies, and the walls of their home and can be are a strong sign of their "immigrant" nature that can curb integration. Up the point that certain communities are even instructed by authorities to avoid producing unpleasant cooking smells (Ong 2000). This fact leave many immigrants to develop an ambivalent relationship with their food. In his research on Asian-American families living in New York, Manalansan IV (2006) notes how the food smells of their culture were not only a source of nostalgic comfort and group identity but also a source of anxiety. Despite these possible negative outcomes, many immigrants still persist in cooking their own native food and in receiving food provisions from their families that are living in their homeland.

To investigate this phenomenon, Sutton (2001) carried out an interesting study on the relation between food and memory on the island of Kalymnos in Greece. In his work, he showed how food helps migrants in creating a familiar atmosphere to counteract "experiences of displacement fragmentation" in the reconstruction of "wholeness". By drawing on Fernandez's (1982; 1986) theory, Sutton understands this process as a way of recapturing the totality of the old way of life (Sutton 2001: 75). More specifically, this phenomenon manifests itself through the conviviality between in-group members which impinges on shared sensory experience. Affective-laden perceptual experiences are thus crucial to bring forth a sense of relatedness and groups tend to recreate affective niches that make possible to achieve these states of belonging. According to Sutton, experiences related to food are fundamental elements in maintaining this sense of group membership. In our approach, we can view cultural food practices performed by immigrant as a potent tool to engineer a specific affective niche that is able to satisfy their longing for homeland and, at the same time, to create a feeling of unification.

In particular, Sutton focuses on *pestellomata*, packages of food sent to family members that moved out of the island, whether in Greece or abroad. These parcels contain several food

items: pickled fish, local cheese, tangerines, home-baked sweets, honey, figs, oil and spices like basil, oregano, thyme, and basil. These packages are not merely related to the practical support but are a type of affective scaffolding that helps migrants «reconnecting and remembering experiences and places one has left behind for short or long-term migration» (Sutton 2010: 74). This emotional bond is achieved through the sensorial and affective materiality of the food: «*pestellomata* are a piece of homeland, carrying inside them its sun, its sea, its wonderful smells» (Kepella 1985 in Sutton 2001: 78). The reception of *pestellomata* has a bittersweet component: while they help to maintain the affective bond with the homeland, they are also a concrete reminder of the distance. For this reason, they are received with «laughing and crying» (Sutton 2001: 82). Nonetheless, they grant immigrants a sense of «soothing fullness» (Sutton 2001: 82) that help them overcome the difficulties brought by *xenitia*, living in foreign land.

Immigrants are not the only groups who crave an emotional attachment with the food of their infancy. Nowadays, the consumption of food in many Western countries has stripped away the component of cooking food. The predominance of instantly prepared food and snacks has broken the intimate link between the preparation of food and its consumption. As a consequence, the aroma of cooking lingering in the air of one's own home is vanishing and with it is disappearing the atmosphere of intimacy it helps to create. As a result, a new marketing trend is emerging with the selling of room sprays with edible scents (Drobnick 2016). The Apple Jack & Peel manufactured by Clair Burke which offers the "welcoming aroma of baked apples warmed with cinnamon, spice, and a twist of citrus". Triple Swirl Sensation created the Grandma's Kitchen Candle whose label recites that "Nothing will stop you quicker in your steps than the aroma of Grandma's freshly baked goodies. Pulling them hot from the oven… you've now designated yourself the 'official' family taste taster". As Drobnick (2016: 352) notes, these artificial scents «perform a *compensatory* function»: they recreate the domestic feeling people are longing for in an era of mass-produced processed microwavable food. It is not a case that these fragrances focus on home-baking treats, which are typical of festivities and occasions where family reunites. These ambient edible scents lull their buyers in a soft embrace by evoking moods and memories linked to the pleasant time of childhood.

The warm embrace of incense

In religious and ritual contexts, material and interpersonal scaffolding interlace with each other. Religious spaces are engineered to induce and regulate a wide array of feelings like guilt, awe,

hope, anxiety, and grief (Colombetti & Krueger 2015). Churches can be designed in an austere way to accommodate the need for intimate contact with God and to emphasize certain aspects of bodily constraints and punishment (like uncomfortable wooden bench where worshippers knee on). Conversely, their design can be targeted to more joyful religious experience and more active interactions like the gospel churches in Harlem. The atmosphere breathed in during religious ceremonies homogenize the believers by creating a unitary feeling that imposes its presence on the mass of the worshippers. Several research highlighted the crucial role of music in generating this kind of atmospheres (Krueger 2019). Music has a deep impact on listeners' body: it vibrates within them and pulls certain emotional states out of them. As a result, the believers are collectively captured by the unfolding of a musical piece. Their neurophysiological responses gradually synchronize with the music and between each other thus giving rise to a perceived unitary feeling that enhances social bonding. This collective experience can be propelled even further by coordinated activities, like chanting, that help the single individual to participate in a form of religious unity (Riedel 2015).

Likewise, fragrances can be employed to scaffold certain emotional states and facilitate the creation of a collective religious atmosphere. Smells have always played a crucial role in religion. In many religions gods are portrayed as sweet-scented beings, exuding the most perfect fragrances from their bodies (Classen, Howes, & Synnott 1994; McHugh 2012; Price 2018). As a consequence, gods were believed to be delighted by sweet smells. So, worshippers used to adorn themselves with flowers and perfumes before entering the temples. The temples themselves and the statues wherein were heavenly scented with several fragrant scents that embodied the presence of the divine. The importance of smell in ritual practices is testified by the existence of ritual figurines with large nostrils that have been discovered in cultures as diverse as the Mayan (Meskell & Joyce 2003) and the Punic (López-Bertran 2011). It should not come as a surprise that one of the most common offerings to the gods was sending them fragrant smell by burning aromatic woods like incense and sandalwood (Howes 1987).

Christian religion makes no exception. The father of Church Athenagoras of Athens states God, «He is Himself perfect fragrance» (Carroll 2018) and St. John of the Cross wrote a dialogue on an olfactory dialogue between the soul and Christ, who is pictured as a flower exuding «divine odors, fragrance, grace, and beauty» (Classen 2006: 386). Nowadays, Catholic and Orthodox ceremonies are drenched in clouds of incense, which is by far the most common

fragrance of Christianity.[42] The importance of frankincense in Christan religion is testified by the fact that it was one of the gifts offered to Christ by the three wise men. However, the relationship between Christians and incense is quite ambivalent. Certain Christian thinkers despised the use of incense as it was seen as an idolatrous practice. Origen used to call it the "food for demons" (Classen, Howes, & Synnott, 1994: 51). Other fathers of the Church did not have such a negative view of incense but still they spoke against its usage: offering fragrances to God was regarded as a useless practice since God himself was a perfect fragrance. It is likely that for Christian believers during the 4th and 5th century the practice of burning incense was still linked with the martyrdom of many Christians that refused to offer fragrances to honor pagan gods and the Roman emperor (Carroll 2018). Incense, in fact, came back in favor during the 6th century when the memories of martyrdoms became less vivid in the eyes of the Christians. With its legal acceptance and subsequent reach of power, Christianity became more and more involved in lavish material culture (Harvey 2006). In particular, the use of incense started to spread when the ceremonies became public and gathered an increasing number of worshippers, especially in the cities. Up to the point that incense became «the most consistent accompaniment of religious experience» (Harvey 2006: 82). Usually, incense is placed into a round metal censer that either hangs from the wall or is handed by priests or altar servers. In many cathedrals as the bishop and priests walk down the aisle holding censer, a cloud of incense float above them and dispersed over the crowd of worshippers enveloping them in a warm woody embrace. One of the most stunning employment of incense takes place in the Santiago de Compostela Cathedral during the Feast Day. A 2 meters high silver censer, called *Botafumeria*, is held and swung by 8 monks and before the mass begins the incense smoke engulfs the whole cathedral (Alford 1957).

Most of the reflection on the use of incense is religions ceremonies have been heavily influenced by semiotic and cognitive understanding which focused mostly on its symbolic values (Howes 1987). Incense floats towards the sky and allows direct sensorial contact between humans and gods and thus it is regarded as the embodiment of the prayers raising to God. Moreover, its vertical travel is the symbolic representation of the metaphysical transcendence humans strive for. Also, thanks to their invisibility, fragrances are akin to the gods whose mysterious presence is undetectable with the eyes. Finally, the ephemeral nature of scents can evoke transitional phases, such as in the moment of transubstantiation in Roman

[42] Incense has been used in ritual and religious ceremonies across time and space. Despite sometime it fell out of favor or it was even banished, its presence is almost ubiquitous in the history of religion, both in the West and in the East.

Catholic Mass during which balsam or incense are burnt. However, in these accounts the sensorial and material elements which comprise rituals are gone missed or are taken fully into account (Bell 2009). Nevertheless, already Montaigne in his Essays, noted how smells «cause changes in me, and act on my spirits according to their qualities; which make me agree with the theory that the introduction of incense and perfume into churches, so ancient and widespread a practice among all nations and religions, was for the purpose of raising our spirits, and of exciting and purifying our senses, the better to fit us for contemplation» (de Montaigne 1993: 135). Therefore, we might question what are the peculiar features of incense that facilitate so much religious experience.[43]

Incense has a warm woody aroma. It has been showed that one of its chemical element, incesole acetate, activates a sensation of warmth in rats and it is possible that this effect «augments the euphoric feeling produced during religious functions, due to both positive, presumably mild, emotional effects and the sensation of warmth» (Moussaieff et al. 2008: 3033). This feeling of warmness is tight to the common perception of being imbued in the same divine atmosphere evoked by the clouds of incense descending over the worshippers. In this way, incense allows the worshipper to be immersed in a common olfactory atmosphere in a holistic manner. This common olfactory experience might crucially contribute to creating a communal emotional state among the believers. By breathing the same ubiquitous clouds of fragrant smoke, the mass of believers melt together into a unitary feeling of sacred transcendence which presides over the ceremony. In this way, the burning of incense contributes to the creation of a we-feeling among the worshippers (Largey & Watson, 1972). Therefore it is the rich sensorial materiality of the plants that make room for their sacred usage. This interpretation is also reflected in the writings of several prominent Christian figures. For instance, according to Ephrem the Syrian (406-373 CE), the incense is a material instrument the envelops the bodies of the believers with the sacred spirit of gods. In Ephrem's view, by breathing the believers could incorporate the fragrance of Christ within themselves: «the fragrance of Christ inhaled by the believer indicated by its smell the action of human-divine encounter through sensory experience» (Harvey 2006: 64). Incense allows the believers to transform themselves into a spiritual unity that becomes one with god. As Carroll (2018) highlights, «as the materials are joined to and absorbed within the physical being of the human

[43] The use of incense is not limited to religious rites. It has been used as a medicine (Mohagheghzadeh et al. 2006), – and its anti-inflammatory properties have been recently ascertained (Ammon 2006) –, as an aesthetic tool in the Japanese art of Kôdô (Jaquet 2018) and as a mean to measure time in Chinna (Bedini 1963).

person, the possibility of 'Emmanuel' [literally 'God with us'] is felt in the skin and smelt in the air» (Carroll 2018).

Smelling absences

So far we have discussed the sensorial presence of smells. However, as Roberts (2015) highlights, the absence of smell can be equally important for our phenomenological experience. By drawing on recent literature on perceptual absences (e.g. Sorensen 2008; Richardson 2010), he argues that it is possible to smell absences. Perception of absences involves several phenomenological experiences like empty rooms that are perceived as vacant spaces where objects can be located (Richardson 2010) or the silence of an attentive classroom (Sorensen 2008). Similar experiences are offered by olfaction. For instance, we can smell our refrigerator as free of odor or we can smell an odorless room that just been aerated (Roberts 2015). These olfactory experiences are usually emotionally-laden as they are usually tinged by affective states of delight or relief. Roberts highlights that the possibility of smelling absences is tightly linked to the active nature of smell. As he phrases it, «an act of inhalation that draws in no discernible odour can nonetheless be identified as an episode of (objectless) olfaction in which the region around the perceiver is experienced as empty, for the duration of the sniff. Moreover, sniffing marks the distinction between the olfactory experience of absence and the mere absence of olfactory experience» (Roberts 2015: 408). In fact, when we have a cold or we hold our breath we do not perceive odors but this happens because we do not have any olfactory experience at all, whereas when we find ourselves sniffing an odorless environment we smell the absence of odor. While many philosophical reflections tend to analyze absence in terms of immateriality, that is in relation to the non-presence of material aspects, Roberts' research allows us to investigate the presence of absence in spite of existence of material objects. Odorants are so ubiquitous that their material presence is unavoidable, however their presence can appear as an absence in specific conditions.

This philosophical reflection can be conjoined with studies in material culture that recently begun to analyze how absences can influence our lived experience (Bille, Hastrup, & Sørensen 2010). In particular, Fowles (2010: 25) highlights how «we have over-privileged a crude notion of presence linked to physicality and tangibility as if the only meaningful relations were those between entities that can be seen, smelt or felt». In such cases, the presence of absence can be materially constructed (Meyer 2012). A good example that involves the material

creation of absences linked to olfactory scaffolding regards the practices of cleaning hospitals. The creation of an odorless environment in hospitals is particularly important because, as Classen points out, «lack of odours is generally associated with cleanliness» (Classen 1993: 93).

The importance of cleanliness was not so paramount in the past. Hospitals were usually filthy places: infections of patients were not cleaned and blood and puss oozed out in the bedsheets that were also covered in urine and excrement. The rooms were usually airless and the wards were incredibly crowded. Moreover, since the patients, their clothes and linens were not changed, lice were spreading everywhere. They were rightly regarded as death traps. Nowadays, given the fact that we know how bacteria thrive in filthiness, such a situation would be regarded as absurd and intolerable. However, even before the advent of germ theories and the subsequent revolution in the antiseptic procedures in hospitals (Sternberg 2009: chap. 10), the need to purify hospitals acquired significant importance. The hospital, in fact, became the paradigmatic model of the deodorization and sanitation reform which took place in France during the 18th century (Corbin 1986). Gradually, cellars, vaults, and towers gave way to hatchets, airholes, and fanlights. Beds were spaced apart and placed closed to the windows that were frequently opened to air the rooms. Patients did not have to bring their own clothes or linens to prevent the entrance of malodorant sources of contamination. Patients, clothes, linens, and room were routinely cleaned and the elimination of bodily waste was strategically managed. In this way, «the hospital became the site for an apprenticeship in individual hygiene» (Corbin 1986: 108). After the Crimea War, these measures spread to England, and the rest of the world thanks to the incessant work of Florence Nightingale (Gill & Gill 2005). During the 20th century, hospital design improved even better thus leading to a significant decrease in infection rates.

Despite the widespread antiseptic procedures, many hospitals are musty places where «everywhere hung that special hospital smell, a cloud of disinfectant and visitors' bouquets, and urine and mattresses» Murakami (2001: 132). As Howes and Classen point out (2014: 58), this design «indicates that the sensory and aesthetic experiences of patients are not held to be crucial to their treatment for or recovery from illness. If nothing else, this creates an alienating divide between bodily well-being and sensory well-being. The place where you go to get well is the places that (aesthetically if not actually) sickens you». Of course, not all hospitals fit this rather uncharitable picture. Several are built on the basis of ecological health (Sternberg 2009): they are embellished artworks, balconies that grant patients garden views, comfort zones, ambient

music, soothing colors. Importantly, it has been ascertained that this design dramatically increases patients' recovery (Devlin & Arneill 2003).

Smells (or the lack thereof) play a crucial role in hospital design as well. To ascertain their role, Stenslund (2015) conducted a 3 months ethnographic fieldwork in the anesthesiology department of a Danish hospital. The study was aimed at investigating the phenomenological experience of doctors and patients in relation to the aesthetic olfactory atmosphere of the hospital. In her paper, Stenslund highlights how the hospital "smelled of nothing". In fact, even pregnant women, who are particularly sensitive to smell (Cameron 2014), did not notice any smell. This is particularly evident in operating theatres which are kept aseptically clean with only perfume-free soap. Before entering there, surgeons, nurses, and patients have to undergo strict cleaning routine which involves both the cleaning (and shaving in case of patients) of the body and the wearing of aseptic vests. As Stenslund (2015: 353) underscores, «such careful cleansing practice is carried out in order to minimize the risk of infection caused by germs, but this practice also hinders the emission of most human odor, which again marks the atmosphere». The vent is turned on to vacuum out foul odors, body parts are immediately removed. In this way, «the absence of smell shows its presence, in this case, as a safeguarding atmospheric quality of utmost importance to both patients and health care personnel» (Stenslund 2015: 353).

The emotional importance of such an engineered olfactory absence is testified by an observation made by Stenslund during her stay. The operating theatre was routinely closed to remove smells. This decision, of course, has an economic impact on the hospital, where surgical procedures are carefully and efficiently planned one after the other. When she went in the operating theatre to sniff out the smell they were about to get rid of, she could only felt the smell of chlorine (a disinfectant used to kill bacteria and virus) lingering in the air. Nurses explained to her that, although the presence of chlorine can be a sign of cleanliness and indicate the absence of germs and virus, it still signals their past presence and it can have a negative impact on patients' psychological welfare during the delicate experience of undergoing a surgical procedure. For this reason, the hospital decides to wait for the smell to fade away before passing on with the next surgical operation, as the absence of any smell would have a more positive effect on patients' state of mind. A different cleaning strategy is carried out in the hall of the hospitals. When cleaning they add just a little drop of perfume in the antiseptic solution. In this way, the rooms emit a barely noticeable "cleaning" smell. This strategy is aimed at exploiting the cognitive associations and spontaneous behavior linked with smell of

disinfectant discussed in Chapter 3. Therefore, «this smell of cleanliness, thus, was absent even if present; it was the physical molecular presence of smell showing a presence of absence experientially in as much as it gave the impression of cleanliness while still holding its message at a pre-conscious level» (Stenslund 2015: 355).

Conclusions

In the last chapter, I investigated how we shape our olfactory surroundings to channel emotional states and give rise to specific affective atmospheres. To carry out my analysis I relied, on the one hand, on the notion of affective scaffolding and, on the other hand, on the concept of atmosphere. This theoretical framework allows regarding affective modalities as embedded in specific environmental situations. As a result, we can actively manipulate our environment to facilitate, sustain, and regulate our affective experience, by bringing forth specific atmospheres. We actively shape the world to set up an adequate material framework that promotes, upholds and sustains specific emotions and moods.

I discussed four ways people employ to engineer their olfactory surroundings. First I examined the use of use perfumes. Perfumes help us to forge a unique style that makes us at ease and offers to others a specific impression. Perfumes can perform these functions via incorporation: they intermingle with our body odor and modify our natural olfactory aura. In this way, they become integrated within one's body schema and pre-reflectively shape the bodily affective style: the habitual way we experience, express, and regulate our affective states. Moreover, perfumes function as adornment by creating a sensorial impression on others: their atmosphere radiates from the wearer to the people around thus influencing their attitude.

Secondly, I analyzed the olfactory atmosphere brought forth by food, focusing in particular on how food is used by immigrant communities to establish an emotional bond with their homeland. The smell of food embodies the feelings of comfort and security we experience while growing up in the protective environment of our home. Despite the negative outcomes alien food odors might have on the integration process, immigrants rely on these smells to generate the homely feelings of their household and overcome the fragmentation of their present life.

Thirdly, I examined the use of incense in churches and temples to enhance the collective experience among the worshippers. This feeling of warmness produced by the cloud of incense that surrounds the devotees and plunges them in a common olfactory atmosphere. Therefore, the atmosphere breathed in during religious ceremonies imposes a unitary feeling among the mass of the worshippers that foster the creation of an affective we-space.

Finally, I considered the creation of the experience of olfactory absences by investigating antiseptic procedures carried out in hospitals. To investigate this phenomenon I relied on Robert's reasoning on the phenomenological experience of absences. These olfactory experiences are usually linked with specific affective states like delight or relief. Olfactory absences can be engineered to give rise to specific atmospheres. A major case in point is the creation of an odorless environment in hospitals. In hospitals, the absence of smell is a safeguarding measure that fosters a sense of cleanliness and care among patients and workers alike.

The case studies taken into account highlight how we stylize the environment based on our needs and preferences. In this way, we confer a specific mood of presentation to ourselves or the environment that stretches through a situation imbuing it with an overall affective meaning. This, in turn, shapes our affordance space and promote certain affective states like self-esteem, longing for and connection with the homeland, collective spirituality, and hygiene. These affective modalities are granted with a peculiar intensity thanks to olfaction. When we breathe in the atmosphere of a given situation, we feel a sense of closeness and fusion that breaks the subjective/objective divide. Smells, with their ephemeral boundaries and their intense emotionality, give rise to strong sensations and can acquire interpersonal and social significance.

Conclusions

In the last decades, the olfactory system fell under the microscope of scientific and philosophical analysis. In virtue of this research, we gained a better knowledge of the functioning of the olfactory system. However, a detailed analysis of the affective dimensions regulated by the sense of smell, able to weave together the threads spun by different disciplines is still missing. Indeed, my thesis aims at providing a comprehensive framework of the affective power of scents. To carry out my philosophical analysis I employed an empirically informed methodology. I interconnected a rigorous examination of research carried out in cognitive science and neuroscience with phenomenological analysis gathered from first-person experiences, literary analyses, and several case studies gathered from cultural history and ethnography.

To guide my research, I decided to rely on an affective-enactive approach. In virtue of this dynamical model, I was able to emphasize the role played by embodied interactions with the world in the unfolding of our perceptual experience. This vantage point allowed me to regard olfactory experience as inseparable from the organism experiencing it. The physiological state of the organism, its motor actions, its dispositions and expectations, the actions performed, the affective states, the contextual cues, are all elements that crucially contribute to the emergence of the olfactory experience.

I argued that smells are not ephemeral fragments of the phenomenological world experienced by the organism. Nor are they in the business of detecting chemical properties floating around the subject. Rather, smells are constrained and shaped both by the situation in which the subject is immersed and by its previous experience. As a result, they are endowed with a personal meaning based on the history of the organism experiencing them. They help us to attune to changes happening in the chemical environment that surrounds us by disclosing specific modalities of interaction, highlighting the affective relevance of certain affordances, and prompting specific states of action readiness: they support the organism in structuring a context relevant to its needs and preferences. Smells, therefore, come out as particular perspectives the organism adopts towards the world: as affective self-organizing patterns that dynamically unfold as the agent interact with its surroundings.

By adopting this stance, I was able to address several problems regarding the nature of perception and emotion. For instance, I discussed the possibility of investigating unconscious perception based on its affective and motivational correlates. We are rarely aware of all the scent trails that surround us since they are mostly processed under the threshold of awareness. Still, the scent trails floating around us have a crucial impact in directing our intentionality and shaping our affective states. Thus, it is possible to investigate perceptual processes by focusing on the way they alter our moods and the affordance space we perceive.

The analysis of the unconscious processing of odors is useful to investigate their social dimensions. In particular, they play a role in the processes of emotional contagion. This analysis allows me to understand emotional communication as a process of reciprocal attunement among subjects. Emotional perception is not a passive decoding of information aimed at disclosing the internal state of a subject. Conversely, it is better understood as an active engagement with the others and the surroundings. We attune ourselves with the feelings experienced by those around us and in this way we can appraise the surroundings in a congruent manner thus enacting a shared affordance space.

Albeit their encompassing unconscious dimension, odors influence our affective life even (and perhaps mostly) when they are consciously experienced. Regarding social processes, they can have antisocial effects. In particular, olfactory disgust has proven to be a powerful tool in practices of dehumanization and ostracization. This olfactory repulsion towards outgroups is based on the intersection of biological and social factors: discriminatory socio-cultural practices become embodied in neurophysiological patterns that frame our perception and morph the social interactions. Such a form of cultural situatedness shapes the way we perceive and affectively relate to those groups thus impacting on the processes of social recognition. From this vantage point, the recognition of the other is not a purely ethical and cognitive process but rather it is driven by a sensorial evaluation of the other.

Olfactory disgust, however, can have positive connotations as well since it drives us away from potential sources of biological contamination. More specifically, I propose to conceive of the experience of stench as an affective response that recruits bodily processes and action tendencies to negatively appraise an object thus avoiding a possible toxic encounter. Since odors are experienced in virtue of contextual factors and anticipatory processes, we can make room for cases of olfactory disgust in which a positive hedonic experience ensues. Such

cases are present in local cuisines all over the world as when people delight themselves with dishes that orchestrate a delicate balance between the savoring and the revolting. Olfaction does not allow us only to withdraw from rotten foods, but it is of paramount importance to guide our feeding behavior. On the one hand, it mediates the homeostatic patterns of hunger and satiety. On the other hand, it is a crucial component of the multisensoriality of flavor and it gives rise to authentic aesthetic experiences. I regarded the latter as the resultant of a particular modality of embodied attention: in virtue of a skillful and reflective engagement with the food we are savoring, we can appreciate the mutual formal relationships instantiated among its sensorial properties.

Finally, we design our olfactory environment to give rise to specific affective states and sensorial atmospheres. This active implementation of odors takes various forms: for instance, I analyzed the use of personal perfumes to extend and reinforce one's olfactory aura and the creation of olfactory absences in the hospitals through antiseptic procedures. In such cases, we actively engineer our surroundings to be passively affected by them. When we inhale the olfactory atmosphere that envelopes a particular situation we feel imbued in its overarching affective meaning. In such a way, it is possible to establish social values, like the feeling of oneness experienced by the worshippers in a church drenched in incense-laden air or the nostalgia or the link to the homeland felt by the immigrants when they savor they smell the aroma of their native food in their kitchen.

At the end of my work, I hope to have contributed to the appreciation of the manifold ways in which perception and emotions are intertangled. The affective-enactive approach I implemented helps to address many unexpected consequences of this interrelation thus allowing to address problems that go beyond the philosophy of mind narrowly conceived. In light of this research, it might be possible to raise new questions and embark on new theoretical journeys. For instance, it will be interesting to investigate the new production of digital odors form an embodied and enactive perspective. Or, as the reflection on the multisensory experience of flavor showed, it might be possible to deepen our understanding of how multimodal sensory experiences might impact our affective life.

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