

TRAVELLING ON SMELL-TIME

The human olfactory system is a collection of distinct anatomical subsystems that are unified by their function: detecting chemicals and converting them into neural signals (Trimmer & Mainland, 2017). Five to ten percent of the air we breathe is directed by the nasal conchae toward a patch of cells on the roof and adjacent sides of the nasal cavity (Keyhani *et al.*, 1995; Zhao *et al.*, 2004). This area, which contains more than 100 million receptor cells (Keller & Vosshall, 2016), is where the stimulus conversion—transduction—kicks off. An interesting fact: *olfactory transduction is much slower than in vision or audition due to the timing of the sniff cycle. This allows the system to use temporal encoding, in combination with spatial encoding, to increase the capacity of the system.*¹ Smells smelled by those who are able to smell are thus processed from the very beginning as potential time-traveling machines, because each odorific complexity we register in our memory reflects a world in and of itself.

Smells seem to offer a great opportunity to restructure the reality of the individual. Yet, the olfactory dimension is rarely part of design strategies in architecture, urban planning or landscape urbanism. As designers, we learn to compose mainly with shapes, shapes whose full scale and effects on our senses we will experience only when constructed. Designing ambiances and other intangible structures requires different dexterities and alternative approaches.

A number of questions arise when thinking about how to use an olfactory medium in design. For my part, as a designer, disinterested by the simple dissemination of synthesized odors, and as an interdisciplinary researcher, studying the influence of smells on human spatio-temporal perception, the questions that seem the most interesting to reflect upon are:

- How can smells be used to create structures that have the potential to interact with mental states? To be conducive to mental health?
- What materials used in construction could be arranged together in order to compose an olfactory signature specific to a space?
- How to conceptualize structures where olfactory ecosystems can live and expand at the beat of atmospheric turbulences?
- How to create a chemically dynamic space for the treatment of a given psychological problem?
- What can be conceptualized to reach individuals whose sensitivity to odors has diminished, or those who have lost their sense of smell?

The angle with which we approach these questions is also a significant parameter in the development of solutions and conceptual means. The ways in which we think human perception works can naturally lead to very different solutions.

¹ Trimmer C., Mainland J.D., 2017. The Olfactory System. In *Conn's Translational Neuroscience*, 375.

To live is to predict

According to the enactive approach to the mind, cognition arises through a dynamic interaction between an acting organism and its environment (Thompson, 2007; Varela *et al.*, 1991, Maturana & Varela, 1987, 1980). We are not passive receivers but active seekers, as would say Alva Noë (2004). In other words, we do not ‘receive’ sensory inputs from our surroundings and translate them into mental representations; rather, we enact the world through our interactions with it. Moreover, according to Andy Clark (2016), our brain does not suddenly light up in response to events in our surrounding; it is active all the time, dashing off thousands of predictions of what we might encounter and thus preparing our body to deal with it. Constantly attempting to predict the sensory inputs and reduce the error generated by these predictions, our brain are prediction machines (Clark, 2016; Hohwy, 2013). As a consequence of this constant storm of predictions, most of the time our brain is receiving more inputs from itself than from the outside world (Feldman Barrett, 2017; Seth, 2015; Hohwy, 2013).

Following this line of thought, we can surmise that the structure of our reality is mostly built from intrinsic brain activity that calls on prior knowledge that experience has laid down in our synaptic connections (Friston, 2005). When we are in an environment that is familiar to us, for example, a significant part of what we define of reality is built from the various predictions that correspond to what we find meaningful in the moment. These predictions are generated by probabilistic models and are experienced as memories (Buckner, 2010). Since our actions validate our predictions, our predictions will adjust according to our level of attention, which may be triggered by an emotionally poignant event that takes place, a desire to discover, sensory signals that are overwhelming, or simply because the environment we are in is unfamiliar and requires us to closely pay attention. Understanding the world therefore implies sketching out different scenarios in our mind. These scenarios may be incoherent, unreal or true to reality, but still, they are multi-level ‘narratives’ (although not necessarily or not fully linguistic).

Our reality lies, ultimately, in a fictional relationship between us and the environment. What we perceive is not the affirmation of a ‘truth’ but an heterogeneous reality; that is to say an intimate reality shaped by our understanding of the tangible and intangible structures that are within the reach of our senses. Impregnated by the memory entanglement in which our perception bathes (Eichenbaum *et al.*, 2016; Wood *et al.*, 1999; Eichenbaum *et al.*, 1996) and which shapes our personality, what we perceive is between the possible and the real. I agree here with Hans Vaihinger's (1852-1933) theory of fictional constructions, which defends the idea (2008, c1923) that we can only perceive phenomena, from which we construct fictional thought models to which we give a value of reality. We behave ‘as if’ the world were matching our patterns (Vaihinger, 2016 :115). Vaihingerian fictionalism claims that possible worlds, regardless of whether or not they exist, are essential to our understanding of the world. From this point of view, reality is neither true nor false, but possible, and from then on, inextricable connections between reality and imagination can only exist.

With this line of thought, we are moving away from Kant's transcendental idealism, which postulates that the imagination is the act of connection between a sensible datum and its intellectual representation. Instead of defining the imagination as a generator of

images corresponding to concepts allowing the judgment to seize an intuition, I rather agree with the interpretation of Heidegger who proposes an ontological synthesis where imagination itself is time (Heidegger, 1986: 302).

It should be noted at this point that the work of imagination does not start from nothing; it is interwoven in one way or the other with models received from cultural traditions. It requires us to call upon who we are, —that is, to appeal to the mosaic of experiences that makes the person we are. Also, if we agree that imagining is not the act of generating mental images, the term ‘mental image’ must then be understood as a perceptual construct based on predictive models. Like these models, ‘images’ are generated by neural patterns (Howard, 2018; Pearson *et al.*, 2008; Kosslyn *et al.*, 1995); the result is thus not an image that is derived from perceptions. To avoid suggesting that an ‘image’ is a mental replica of something absent, we thus shall use the expression ‘mental impression’ from now on.

A mental impression is in constant evolution, and that is simply because we are alive in the world. It is an element which contributes to the definition of a dynamic landscape in the sense that they do not remain frozen in our mind, like the specular reflection of an object which would persist in our consciousness, but instead participate in an act of structuring, in a mental elaboration of a scheme (Keogh & Pearson, 2017; Denis, 1979). For example, when we are watching a movie, we are continually guided by expectations about what will happen next, expectations that we correct as the story unfolds, until they coincide with the conclusion (Ricœur, 2008:259). The process of following the story does not end in the story but in us, the spectator. Because stories are examples of life possibilities, they project new universes distinct from the one in which we live. To watch a film (or read a book, or listen to a story) is thus to unfold the implicit horizon of a world that envelops the actions, the characters, the events of the story told. As a result, through imagination, the person watching the movie belongs at the same time to the horizon of experience of the movie and to that of its real action (Ricœur, 2008:266). We can see clearly here how much temporality plays its cards in our perception of reality.

Tempor(e)ality

Time is born of my relations with things,² says Maurice Merleau-Ponty in *Phénoménologie de la perception* (1945). He argues that we perceive the world through embodied action, that is to say, a bodily intentionality he calls *motor intentionality*. In this view, acting is experienced as a steady flow of skillful activity in response to one’s sense of the situation (Dreyfus, 2002:378). The best example for understanding what he means is one he gives in *La structure du comportement* (1942): *the field itself is not given to the football player, but present as the immanent term of his practical intentions; [...] Each maneuver undertaken by the players modifies the character of the field and establishes in it new lines of force in which the action in turn unfolds and is accomplished, again altering the phenomenal field.*³ If experience emerges from one’s

² Le temps naît de mon rapport avec les choses. — Merleau-Ponty M., 2002 (c1945). *Phénoménologie de la perception*, Paris : Gallimard, 471.

³ Le terrain de *football* n'est pas, pour le joueur en action, un « objet », c'est-à-dire le terme idéal qui peut donner lieu à une multiplicité indéfinie de vues perspectives et rester équivalent sous ses transformations apparentes. Il est parcouru par des lignes de force (les « lignes de touche », celles qui limitent la « surface de réparation »), — articulé en secteurs (par exemple les « trous » entre les adversaires) qui appellent un certain mode d'action, la

body-environment coupling (Thompson, 2007:314, 326; Noë, 2004; Varela *et al.*, 1991; Merleau-Ponty, 1945; Husserl, 1913), temporality makes it a dynamic pattern (Husserl, 1928; Nielson *et al.*, 2015). For example, if you meet a tree along your path while walking, *the tree as remembered, the tree as perceived and the tree as anticipated are all intended as one and the same tree, [...] time-consciousness thus comprise both awareness of external things and their temporal characters, and awareness of experience itself as temporal and unified across time.*⁴ By developing this point in a Husserlian way, we can say that three levels of temporality outline human perception: 1- the temporal characters of external objects; 2- the experiences we have with those objects; and 3- intentional acts directed at them. A temporal thickness is thus at play in the present. This margin invites our body to perpetually evolve into a present where being and consciousness meet⁵—a living present. The hierarchical predictive perspective described earlier adds to this basic phenomenological account the fact that this temporal thickness is simultaneously active at many different timescales (Howard, 2018), from the microscale of neural processing to the mesoscale of action and cognition and the macroscale of lifespan narratives (memories and projects). Since time thickens the present with a double horizon of past and future (Merleau-Ponty, 2012:288), our present thus opens up to temporalities that we do not live in the moment (Nielson *et al.*, 2015; Nyberg *et al.*, 2010; Tulving, 1972). Moreover, it makes us discern a social horizon that is enlarged by collective histories (Olick, 1999; Heidegger, 1927). Time is thus a *network of intentionalities*.⁶

There is thus no timeline other than innumerable temporal ramifications that form and break. That may be an explanation of why the significant events that we perceive are archived in our memory without any particular temporal order (Tversky, 2000). In this way, a memory can be linked to one or more perspectives, or be rebuilt into a logical narrative when we remember it (Olick, 1999). This not only allows us to liberate ourselves from both the temporal and spatial constraints of the present to relive the past, but equally, to project us into the future.

The signals we grasp from the environment simultaneously stimulate multiple sensory modalities, which creates interconnections among various sensory areas of our brain (Hardcastle & Giocomo, 2019; Zhang *et al.*, 2016). Because of this active networking, our reality is continuously shaped by a memory system which follows a variety of temporal rhythms. If we take a closer look at the path of the olfactory signal in the brain, we see that this input is encoded initially by a sensory neuron of the nasal mucosa and then transposed into a neuronal pattern in the glomeruli of the olfactory bulb (Frasnelli

déclenchent et la portent comme à l'insu du joueur. Le terrain ne lui est pas donné, mais présent comme le terme immanent de ses intentions pratiques ; le joueur fait corps avec lui et sent par exemple la direction du « but » aussi immédiatement que la verticale et l'horizontale de son propre corps. Il ne suffirait pas de dire que la conscience habite ce milieu. Elle n'est rien d'autre à ce moment que la dialectique du milieu et de l'action. Chaque manœuvre entreprise par le joueur modifie l'aspect du terrain et y tend de nouvelles lignes de force où l'action à son tour s'écoule et se réalise en altérant à nouveau le champ phénoménal. —Merleau-Ponty M., 1967 (c1942). *La structure du comportement*, Paris : PUF, 183.

⁴ Thompson E., 2007. *Mind in Life. Biology, Phenomenology, and the Sciences of Mind*, London: HUP, 318.

⁵ [Le présent] *est la zone où l'être et la conscience coïncide.* — Merleau-Ponty, *Idem*, 2002:485 / Landes, 2012:448.

⁶ Le temps n'est pas une ligne, mais un réseau d'intentionnalités. —Merleau-Ponty, *Idem*, 2002:477 / Landes, 2012:440.

et al., 2008; Firestein, 2001; Buck & Axel, 1991). This ‘signature,’ equivalent to the one produced in visual association areas of the brain, is then passed to the olfactory cortex where memorization work is carried out. There, each memory is assembled in the moment from building blocks distributed in bits and pieces throughout our brain (Shepherd, 2010; Porter et al., 2005), an assembly process that is biased by our beliefs and feelings (Feldman Barrett, 2017).

In this multisensorial world that is ours, smells are perhaps the most powerful agents to set our memory into action and spin the wheel of our imagination. By maintaining close ties with imagination and memory, smells exert a significant influence on our perception of space, mainly because they tend to drag us along on a mental voyage through time. Forming an intangible topography in motion, the fragrant harmonies we perceive allow us to evolve, by conscious or distracted mental projection, between the virtual planes of countless places we have encoded in our memory. In other words, smells stage little universes in our reality, universes that I call *smellscapes*.

Smellscape you say?

Before taking this reflection further, an important distinction must be made between two terms: ‘*smellscape*’ and ‘*olfactory ambiance*.’ A distinction must be made, or at least, the meaning of each expression needs to be defined much more precisely than it is now in the literature, in order to avoid them misleading our thoughts, particularly with regards to olfactory perception. Presently, whether in the scientific or popular literature, each term conveys vague ideas by trying to say too many different things at the same time. So here is an attempt to delineate a distinctive meaning to each.

The term *smellscape* was originally coined in 1984 by the geographer Daniel Gade, who was then wondering about olfactory ambiances.⁷ However, due to the language barrier and the fact that the world of research has long been westernized, I would not be surprised to learn that the term existed in another language before Gade, particularly on the side of the Arab and Persian world.

After Gade, John Douglas Porteous, also a geographer, would say in *Landscapes of the Mind* (1990) that: *any conceptualization of smellscape will be non-continuous, fragmentary in space and episodic in time, and limited by the height of our noses from the ground, where smells tend to linger*.⁸ In this way, Porteous suggests that the *smellscape* is not only reduced to the dynamic fluxes of smells that structure our environment, but it primarily englobes the perception and appreciation of the one that is aware of these fluxes. Soon after, Japanese researchers Ohno & Kobayashi, wishing to define the concept of *smellscape*, conducted a survey (1997) in two parts: the first with urban planners, the second with ordinary citizens. The general interview with Japanese town planners revealed that they were sensitive to the olfactory dimension but that it

⁷ *Odour, or the 'smellscape,' is an intriguing dimension of place ignored by geographers. A small island in the Indian Ocean provides an empirical example of a smell-defined space. The central odour there is a mixture of redolent ingredients dominated by the fragrant blossoms of ylang-ylang. Horticultural specialization on this plant provides an essential oil made from the flowers and exported for use in perfume. Olfaction, the most subtle yet enduring of human senses, can transmit geographical information in plate characterization, landscape reconstruction and atmospheric quality.*— Gade D., 1984. Redolence and Land Use on Nosy Be, Madagascar, *Journal of Cultural Geography*, (4)2, 29.

⁸ Porteous J.D., 1990. *Landscapes of the mind: Worlds of sense and metaphor*, University of Toronto Press, 25.

was rare that such a factor was considered at any phase of a project development. For the second part, the researchers asked the residents of the port city of Hakodate, Hokkaido, in which situations they would recognize a ‘smellscape.’ It emerged from this investigation that there were two types of olfactory ‘sources’: 1-smells of everyday life, and 2- smells that evoked mental images of lived situations. Again here, although highlighted by the survey results, the dissociation between the source of odors and the mental impressions that result from our experiences with odors was not made, thus letting both meanings aggregate into one word. In tune with Porteous, Victoria Henshaw would later define (2013) a smellscape as *the overall smell environment, but with the acknowledgement that as human beings, we are only capable of detecting this partially at any one point of time, although we may carry a mental image or memory of the smellscape in its totality.*⁹

The term shifted to a more structured definition since Gade but, with the desire to encompass everything to which it is bound, became more ramified instead of being more rigorously refined. Because of this, the expression is often used to mean either the smells that are present in the environment as a whole (Frasnelli & Proulx, 2019; O’Meara & Majid, 2016; Niedenthal, 2012; Diaconu, 2011), the mental expression of an intimate recognition triggered by smells (Bouchard, 2013, 2017) or both (Belkayali & Ayan, 2017; Young, 2017).

Let us look first at the term ‘smellscape’ (in French: *paysage olfactif*). The term is understood to be the union of ‘smell’ and ‘landscape.’ In English, smell can either mean an odour, or the act of smelling; landscape, on the other hand, is first and foremost defined as a composition of images, representations and sensations that are created in our mind following an experience of a place (Rogers, 1997; Besse, 2000). The landscape is not the morphology of the environment but a relational and dynamic entity, where nature and society, gaze and environment, are in constant interaction (Berque, 1994:5-6). The landscape is a space of feeling (Besse, 2000:123) infused with the perceiver’s subjectivity. If the environment is always there within the scope of our senses, the landscape appears only under certain conditions, as it comes from a place of memory. Following this line of thought while remaining faithful to the enactive approach we introduced to develop on the subject, a smellscape is therefore a mental allegory composed of multiple mnemonic impressions shaped by smells and tinged by our moods in the moment as well as by other sensory signals. These mental impressions are in constant mutation as, consciously or not, we keep reacting to what we smell. A smellscape testifies to the olfactory harmonies encountered in the environment: the ones we experience in the moment, the ones that lasted in our mind from previous experiences, and the ones that arise from expectations.

Since it is essentially a mental expression left by sensory impressions, the smellscape can still be in the mind of the one who can no longer smell. Though they may be forgotten at some point, glamorized and/or transformed because of links to new sensory impressions that arise from another moment, smellscales remain alive and well in the mind of those whose sense of smell has disappeared or has become dysfunctional. I

⁹ Henshaw V., 2013. *Urban Smellscales. Understanding and Designing City Smell Environments*, London: Routledge, 5.

would go even further by claiming that it is possible for someone with congenital anosmia to form smellscape. That is to say, someone who is born with an inability to smell has forged a conception of what a smell can be by gathering what others who can smell have expressed (Bouchard—ongoing field survey, 2018; forthcoming results: 2021), and also from what she/he infers from her/his functional sensory modalities. It may sound like a synesthetic turbulence (when a stimulus is applied to another modality), but it is not, since the congenital anosmic is unable to process any information about smells. For the person with congenital anosmia, the ‘olfactory signal,’ if I may refer to it that way, comes directly from imagination and intellectual processing; and this mental process is influenced by all sensory cues received from the environment at the same moment, like it is for persons who are able to smell. The smellscape of one who has never smelled is different and yet the same than that of one who can smell.

Unlike the smellscape, a person with anosmia does not have access to olfactory ambiances (in French: *ambiances olfactives*). What do I mean by olfactory ambiances? In the Merriam-Webster dictionary, an ambiance is said to be *a feeling or mood associated with a particular place, person, or thing; an atmosphere*. But what is an atmosphere? If we agree that the atmosphere means, in general, the whole mass of air surrounding the earth, then it can be reduced to a gaseous envelope which surrounds something. In this way, the atmosphere, or the ambiance, is the environment that surrounds us. It is outside of us, mostly independent of us. The ambiance lingers when we leave. It may transform over time, but we will never know if we do not come back to the same place, because an ambiance is not in our mind. Ambiances are spatial phenomena (Pérez-Gómez, 2016:18) related to our emotions and moods (Pérez-Gómez, 2016:23). We feel and make sense of ambiances the same way we feel and make sense of smells, sounds or colors because in fact, an ambiance is the sum of all type of sensory cues that are present in the moment. The ambiance is tied to its physical context. Thus, being the aesthetical fruit of a purely intellectual recognition (Rogers, 1997), the landscape stands out from the dynamic fabric of the ambiance.

Members of the Centre for Research on Sound Space and Urban Environment¹⁰ in France, however, go further and argue that, if an ambiance is essentially a composition of physical signals, it is also defined by spatiotemporal forms, percepts, representations, elements of a code or a norm, and social interactions (Augoyard, 1995), although the description has been refined over the years, and refers now mainly to *a situation of sensitive interaction*¹¹ (Tixier, 2007; Augoyard, 2007). This brings us back to a hazy definition; again here, by wanting to say too much with only one term, the meaning loses direction.

The German philosopher Hermann Schmitz has another definition of an atmosphere. Schmitz proposes a phenomenology where the flesh is the vector of our relationship to the world, and in that view, the weight of emotions is there in our surroundings to be grasped, as feelings tinge the ambiance the same way a sensory signal—a smell for example—would do. Even though feelings take up space, they are not things but rather

¹⁰ Centre de Recherche sur l’Espace Sonore et l’environnement urbain (CRESSON)

¹¹ Loose translation of: « *L’ambiance désigne une situation d’interaction sensible.* »

half-things (*Halbdinge*). What does Schmitz mean by half-things? If *things last without interruption and act directly as causes that produce an effect by their action, inversely, the duration of the half-things can be interrupted, and their effect is indirect insofar as the cause and its effect coincide*.¹² In a Schmitzean perspective, the atmosphere is a felt space (Schmitz, 2018:51) that is energized not only by our feelings, but also by the emotions felt in the moment by the people that are there with us. In short, we are seized by the feelings we perceive in the environment, and these feelings compose an enshrouding atmosphere; consequently, atmospheres are as much forcefulness grasping the flesh (Schmitz, 2018:61), since there is a carnal character to feel.

Gernot Böhme, another German philosopher, does not conceive of atmospheres as intangible sensitive streams affecting our body as proposed by Schmitz. He rather defines the atmosphere as belonging to things, things that articulate their presence through qualities which he calls ‘ecstasies’: *ecstasies are those qualities which articulate the presence of the thing*.¹³ According to Böhme, every thing radiates, and in doing so, disturbs the homogeneity of its surrounding space by filling it with tensions. So, instead of being humans’ feelings that fill the space, composing in that way a particular ambiance (Schmitz, 2018), objects are the ones giving a space its particular ambiance. Nonetheless, since they are felt by human beings, atmospheres belong to subjects (Böhme, 2018 :36). Böhme's views on atmospheres clings to a theory of perception where one is physically present for what is to come, but is also a corporeal state related to an environment. Inasmuch as what are perceived first are not the sensations, the forms, or the objects, but the atmospheres (Böhme, 2018 :47).

While they do not agree on the substance of the atmosphere—the ambiance—nor on the way it is perceived, both Schmitz and Böhme, however, define the ambiance as being at reach. They both argue that we unearth the ambiance. It thus comes from outside of us. Like any sensory cues we are able to gather from our surroundings, an ambiance is there, structuring a particular dimension. An ambiance simply puts cues in place, and it is up to us to make sense of it, to build a significance that is our own. Consequently, since the person standing next to us does not have the same experiences, the same set of references, nor the same memories, and perhaps does not have the same cultural background and certainly not the same exact sensory systems abilities that we do, nor the same feelings as us in the moment, that person can only mentally structure the space we are in together differently. Whether defined by a harmony of emotions or a range of objects, the ambiance is not in our mind but part of the place it occupies. Only from there can we make sense of what this particular ambiance tells us about that space.

Countless fragrant fields energized by climate, movement, human activities and built structures are awaiting us in every bit of space. These fragrant fields are olfactory ambiances. Olfactory ambiances do not belong to us—they are part of the environment. Nonetheless, they allow us to progress, via focused or inattentive mental projection,

¹² Loose translation of: « Les choses durent sans interruption et agissent directement comme cause qui produisent un effet par leur action. À l'inverse, la durée des demi-choses peut être interrompue et leur effet est indirect dans la mesure où la cause et son effet coïncident. » Schmitz H., 2018. Les sentiments comme atmosphères, *Communications*, 1(102):57.

¹³ Böhme, G., 2001. *Asthetik. Vorlesungen über Ästhetik als allgemeine Wahrnehmungslehre*, München: Fink, 134. As translated by Andreas Rauh in *The Atmospheric Whereby: Reflections on Subject and Object*, *Open Philosophy*, 2019, 2(1):152.

through the virtual planes of countless places (Eichenbaum, 2017; 2014) because the sensory signals they carry tickle our olfactory memory (Plailly, 2005; Saive *et al*, 2014). In a nutshell, a smellscape is not an olfactory ambiance. One is a mental expression of a lived sensation following an experience in the environment, while the other is the olfactory flux that occupies the space. One is within us; we are submerged in the other.

Why do we design spaces? We shouldn't design spaces; we don't live in space, we live in time. We should design in the language of time¹⁴

We live at the effervescent rhythm of our consciousness. Whether we are attentive or not, asleep or awake, our brain never stops processing sensory inputs. It is precisely because of this incessant cadence that our life is of temporal nature. Nonetheless, the space in which we find ourselves is there, permeated by numerous dynamic tempi that are molded by ambiances, ambiances that are defined by a variety of extensions and boundaries that depend on formal articulations. So, we are, we go, we leave, we come back perhaps, but never is the space in which we were or we are now exactly the same, because the range of signals coming from the environment—which are as many possibilities for us to make sense of the space that surrounds us—proposes to us new realities to translate moment after moment. The ambiances are of a dynamic nature. All places are criss-crossed by particular tensions that define their character. This is what Christian Norberg-Schulz calls (1989) its *genius loci*. The term takes its origins in the era of the Roman Empire; it was seen then as the existential hold of a guardian spirit. We can translate it today as the identity of a place; a signature tone that is formed by various environmental factors and human interventions. Understanding the environment this way means that designers must first track the forces of a site before conceptualizing anything in this space, otherwise, all they will achieve will be meaningless (Norberg-Schulz, 1989:23).

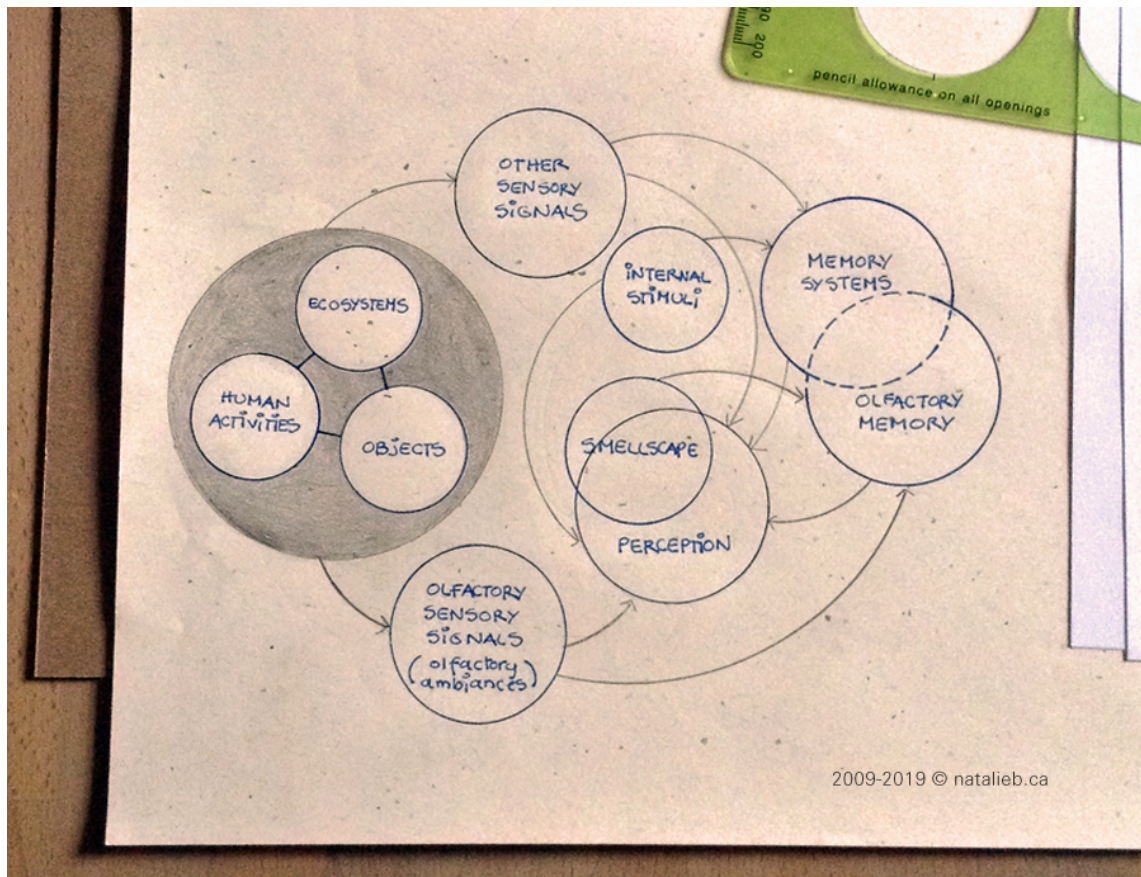
Yet, despite the compendium of efforts produced by researchers studying the intangible dynamic of space, still, the olfactory dimension is rarely—and the word is weak—taken into account when it comes to conceptualizing spaces. It is surprising considering the importance that perfume and incense have had since the beginning of civilization (Baldi, 2014; Morita, 1992; Corbin, 1982; Lucas, 1930), going as far as being the privileged bond between mortals and divinities. But as Tadao Andō-sensei points out: *Nowadays, a large part of so-called postmodernist architecture gives the impression of being in the final stages of a disease: the transcendence from the visual to the occidental. However, there is no reason that only historical forms, in other words only visible things, should hold the status of context in architecture. If we admit that context is but another name for the organic entirety of culture, we must without doubt introduce invisible things into our visual field.*¹⁵

¹⁴ Nick Tyler, Chadwick Professor of Civil Engineering, UCL (UK). October 31, 2018. Online: [<https://twitter.com/TheCentricLab/status/1057709149801324544>]

¹⁵ Loose translation of: « *De nos jours, une bonne partie de l'architecture dite postmoderniste donne l'impression d'en être au stade terminal de cette maladie qu'est la transcendence du visuel, à l'occidentale. Pourtant, il n'y a pas de raison que seules les formes historiques, autrement dit seules les choses visibles, aient le statut de contexte pour l'architecture. Si l'on admet que le contexte n'est qu'un autre nom du tout organique de la culture, sans doute faut-il introduire dans notre champ visuel des choses invisibles.* » Tadao Andō (1987). In Nussaume Y., 1999. *Tadao Andō et la question du milieu – réflexions sur l'architecture et le paysage*, Paris : Éditions Le Moniteur, 10.

From that point of view, we can argue that a division within environmental design is lacking: one that endeavors to conceptualize olfactory environments; that lingers to develop structures where olfactory ecosystems can live and expand at the beat of atmospheric turbulences. If we agree that the reality of the environment is molded in part by the shifting sands of our olfactory memory, an informational processing system that carries us on a diversity of temporal rhythms that radiate the instant into a myriad of moments, any designer interested in working with the olfactory dimension has many avenues to explore conceptually. Nevertheless, s/he must keep in mind that any creative solution s/he puts in place will mainly address the user's olfactory memory, that is to say: a variable that can be highly variable from person to person.

As it encodes our experiences, our meetings and other associations lived at different times, our olfactory memory not only allows us to retain in its nets as many smellscapes as there are memorable moments, it also brings back any one of them in the present moment to either add new olfactory shades following a similar experience, or simply to insert the amplitude of its imprint on the place where we find ourselves (Bouchard, 2013). Below is a model that represents what I believe to be olfactory perception dynamics according to an enactive approach.



Calling upon our experiences to understand the world, it would seem that all that makes up spatial perception are those prior beliefs that we apply to reality through prediction; but still, when we perceive, our emotional state is crucial to the flow of experience, and acts as a global order parameter for neural processing (Varela 1999; Varela & Depraz, 2005). Contrary to vision, whose pathways go through the neo-cortex before reaching the amygdala—which irrigates memory systems when an emotion intervenes (Canli *et al*, 2000)—, the human olfactory system connects directly to the amygdala. When we smell, olfactory neurons in the nose send signals to the olfactory bulb which processes those sensory inputs and sends the translated information to the limbic system (Shepherd, 2010; Firestein, 2001; Buck & Axel, 1991) which is involved in our behavioural and emotional responses. Therefore, olfactory signals (ambiances), cause immediate pre-conceptual affects, whereas visual signals first give rise to cognitive analysis.

Another point to emphasize, sniffing (Schaefer & Margrie, 2007; Mainland & Sobel, 2006) and odor coding take some time to process (Bathellier, Gschwend & Carleton, 2010; Laurent, Wehr & Davidowitz, 1996); this brings another layer of temporal dynamic into play. Indeed, *different coding schemes in olfactory circuits deal with temporal fluctuations of the neural activity*. Olfactory molecules, which are in constant fluctuations in the environment, *enter into contact with the olfactory receptor neurons depending on these fluctuations. Due to this constraint, the question is whether network activity is regulated by internal mechanisms, such as oscillations, or by these fluctuations. In this case, the olfactory system might have to encode this temporal feature in addition to odor identity and intensity information. [...] In the case of encoding fluctuations of the odor plume, the timing component is now carried by the stimulus itself and is therefore external to the system.*¹⁶ So, to summarize, smells tinge the environment with their chemical presence and create a singular and invisible topography in space. Carried by air or water, odorant molecules rarely remain in place. They come more often than not, finding their way to our nostrils, to inform us of what awaits us or of situations occurring in the moment; they may even try to charm us to follow them to some other place. Creating a scented orchestra that sets in motion, through both space and time, various odoriferous harmonies in the environment, olfactory ambiances stir our mind to travel within the temporal thickness of the present. Thereby, in the end, by voluntary or distracted mental projections, our *theatrum memoriae* stages in the structure of the present a timeless reality that is specific to us but which all the same reflects temporally patterned neural responses.

Considering the extent to which smells can affect the behavior of an individual, designers should be primarily concerned with creating spaces that not only open the imagination of the individual but also allow positive moods to thrive. In this scheme, all the senses should be called, not just our vision, as is too often the case. The fields of architecture and environmental design must evolve and train professionals capable of conceptualizing both tangible and intangible forms. Moreover, as Alberto Pérez-Gómez underlines, designers must be capable of infusing spaces with particular tones resonant with focal actions (2016:26). In this logic, architectural structures offer a way to call

¹⁶ Bathellier B., Gschwend O., Carleton A., 2010. Temporal Coding in Olfaction, in A. Menini (ed.), *The Neurobiology of Olfaction*, Boca Raton: CRC Press, 332.

upon our own mindscapes; and within the discipline of design a new field of specialization exists: smellscaping.

Montréal, spring 2019.

Note de l'auteure aux francophones : ce texte apparaît ici dans sa version anglaise pour qu'il soit accessible au plus grand nombre possible. Mes excuses à celles et ceux qui auraient aimé le lire en français.

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